

# Godot (game engine)

**Godot**<sup>[a]</sup> is a cross-platform, free and open-source game engine released under the MIT license. It was initially developed by Argentinians Juan Linietsky and Ariel Manzur<sup>[5]</sup> for several companies in Latin America prior to its public release.<sup>[6]</sup> The development environment runs on multiple operating systems including Linux, BSDs, macOS, and Microsoft Windows. It is designed to create both 2D and 3D games targeting PC, mobile, and web platforms.

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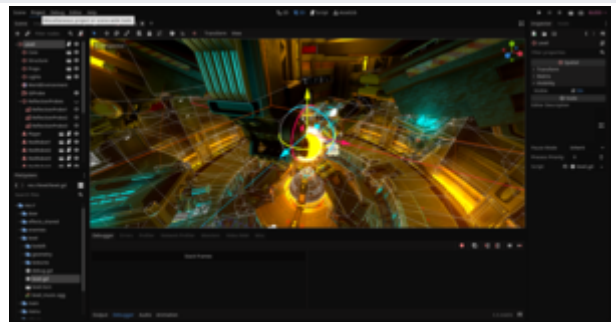
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## Features

Godot aims to offer a fully integrated game development environment. It allows developers to create a game, needing no other tools beyond those used for content creation (visual assets, music, etc.). The engine's architecture is built around the concept of a tree of "nodes". Nodes are organized inside of "scenes", which are reusable, instanceable, inheritable, and nestable groups of nodes. All game resources, including scripts and graphical assets, are saved as part of the computer's file system (rather than in a database). This storage solution is intended to facilitate collaboration between game development teams using software version control systems.<sup>[7]</sup>


### Godot Engine



A screenshot of the editor in Godot 3.3

<b><u>Original author(s)</u></b>	Juan Linietsky, Ariel Manzur
<b><u>Initial release</u></b>	14 January 2014 <sup>[1]</sup>
<b><u>Stable release</u></b>	3.3.2 <sup>[2]</sup> <span></span> / 24 May 2021
<b><u>Repository</u></b>	<u>github.com/godotengine/godot</u> ( <u>https://github.com/godotengine/godot</u> ) <span></span>
<b><u>Written in</u></b>	<u>C++</u> <sup>[3]</sup>
<b><u>Operating system</u></b>	<u>Microsoft Windows</u> , <u>macOS</u> , <u>Linux</u> , <u>FreeBSD</u> , <u>NetBSD</u> , <u>OpenBSD</u> , <sup>[4]</sup>
<b><u>Platform</u></b>	See <u>§ Supported platforms</u>
<b><u>Available in</u></b>	Multilingual
<b><u>Type</u></b>	<u>Game engine</u>
<b><u>License</u></b>	<u>MIT License</u>
<b><u>Website</u></b>	<u>godotengine.org</u> ( <u>https://godotengine.org/</u> ) <span></span>

## Supported platforms

The engine supports deployment to multiple platforms and allows specification of texture compression and resolution settings for each platform. Even though Godot Website provides binaries only for [Linux](#), [macOS](#) and [Microsoft Windows](#), its open-source nature allows us to use the editor on multiple OSs like [BSD's](#) by tweaking it. The Engine supports multiple platforms including desktop and mobile. Currently supported platforms as of Godot 3.3.2<sup>[2]</sup>  are

- Mobile platforms [Android](#), [iOS](#)
- Desktop platforms [Linux](#), [macOS](#), [Microsoft Windows](#) ([Universal Windows Platform](#)), [BSD](#)
- Web platform [HTML5](#), [WebAssembly](#).<sup>[8]</sup>
- Virtual/Extended reality platforms [HTC Vive](#), [Valve Index](#), [Oculus Rift](#), [Oculus Go](#), [Oculus Quest](#), all Microsoft MR headsets, Apple's ARKit and many more.<sup>[4]</sup>

There is also a [web-based](#)<sup>[9]</sup> editor hosted by the Godot community available for testing purposes. Even though the Godot engine can be run on [consoles](#), Godot does not support it officially as it is an [open-source](#) project rather than a licensed company and they cannot publish [platform-specific](#) code under [open-source](#) [license](#). However, it is still possible to port your games to consoles thanks to services provided by third-party companies.<sup>[10]</sup>

## Scripting

Godot supports a variety of programming languages for making games, including the integrated language GDScript, [C++](#), and [C#](#). Additionally, the engine includes GDNative, a facility for creating bindings with other languages, such as [Rust](#), [Nim](#), and [D](#). [Visual coding](#) is also supported, via the built-in language VisualScript, designed to be a visual equivalent to GDScript.<sup>[11]</sup>

The Godot editor includes a text editor with [auto indentation](#), [syntax highlighting](#) and [code completion](#). It also features a [debugger](#) with the ability to set [breakpoints](#) and [program stepping](#).<sup>[12]</sup>

## GDScript

Godot has its own built-in [scripting language](#), GDScript,<sup>[12]</sup> a [high-level](#), [dynamically typed](#) [programming language](#) which is syntactically similar to [Python](#). Unlike Python, GDScript is optimized for Godot's scene-based architecture and can specify strict typing of variables. Godot's developers have stated that many alternative third-party scripting languages such as [Lua](#), [Python](#), and [Squirrel](#) were tested before deciding that using a custom language allowed for superior optimization and editor integration.<sup>[12]</sup>

A simple "[Hello world](#)" program can be written like so:

```
func _ready():  
    print("Hello World")
```

More complex programs, such as this one generating a [Fibonacci sequence](#), are also possible:

### GDScript

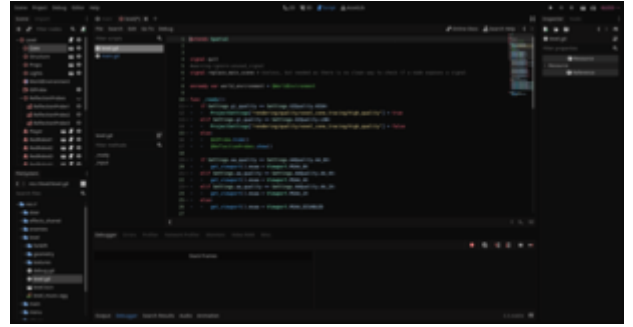
<b>Paradigm</b>	<a href="#">Object-oriented</a>
<b>Developer</b>	<a href="#">Godot Community</a>
<b>Typing discipline</b>	<a href="#">Dynamic</a> , <a href="#">Duck</a>
<b>OS</b>	<a href="#">Cross-platform</a> ( <a href="#">multi-platform</a> )
<b>Filename extensions</b>	<a href="#">.gd</a>
<b>Website</b>	<a href="#">docs.godotengine.org</a> ( <a href="https://docs.godotengine.org/en/stable/getting_started/scripting/gdscript/index.html">https://docs.godotengine.org/en/stable/getting_started/scripting/gdscript/index.html</a> )
<b>Influenced by</b>	

```

func _ready():
    var nterms = 5
    print("Fibonacci sequence:")
    for i in range(nterms):
        print(FibRecursion(i))

func FibRecursion(n):
    if n <= 1:
        return n
    else:
        return(FibRecursion(n-1) +
FibRecursion(n-2))

```



Screenshot of editing a GDScript file using the built-in script editor of Godot 3.3

## Rendering

Godot's [graphics engine](#) uses [OpenGL ES 3.0](#) for all supported platforms; otherwise, [OpenGL ES 2.0](#) is used. Future support for [Vulkan](#) is being developed, that also includes the possibility of support for [Metal](#) using [MoltenVK](#).<sup>[13]</sup> The engine supports [normal mapping](#), [specularity](#), [dynamic shadows](#) using [shadow maps](#), [baked](#) and [dynamic Global Illumination](#), and full-screen post-processing effects like [bloom](#), [DOF](#), [HDR](#), and [gamma correction](#). A simplified [shader language](#), similar to [GLSL](#), is also incorporated. Shaders can be used for [materials](#) and [post-processing](#). Alternatively, they can be created by manipulating nodes in a visual editor.

Godot also includes a separate [2D](#) graphics engine that can operate independently of the 3D engine. The 2D engine supports features such as [lights](#), [shadows](#), [shaders](#), [tile sets](#), [parallax scrolling](#), [polygons](#), [animations](#), [physics](#), and [particles](#). It is also possible to mix 2D and 3D using a 'viewport node'.

## Other features

Godot contains an [animation](#) system with a [GUI](#) for [skeletal animation](#), [blending](#), [animation trees](#), [morphing](#), and [real-time cutscenes](#). Almost any variable defined or created on a game entity can be animated.<sup>[14]</sup> The engine uses [Bullet](#) for 3D physics simulation.<sup>[15]</sup>

Additional features include:

- [Performance analysis graphs](#)
- [Light baking](#)
- [Multithreading](#)
- [Plugins system](#)
- [Render targets](#)
- [Video playback](#) using the [Theora](#) codec
- [Audio playback](#) of [Ogg Vorbis](#), [MP3](#) and [WAV](#) codecs
- [Particle system](#)
- [Texture import/export/compress pipeline](#)
- [Navmesh support](#)
- [Graphical user interface](#)
- [Keyboard](#), [mouse](#), [gamepad](#) and [touchscreen](#) support

## History

Godot's development was started by Juan 'reduz' Linietsky and Ariel 'punto' Manzur in 2007.<sup>[16][17]</sup> Linietsky stated in a presentation that the name "Godot" was chosen due to its relation to Samuel Beckett's play *Waiting for Godot*, as it represents the never-ending wish of adding new features in the engine, which would get it closer to an exhaustive product, but never will.<sup>[18]</sup> In February 2014, the source code for Godot was released to the public on GitHub under the MIT License.<sup>[19]</sup>

On 15 December 2014, Godot reached version 1.0, marking the first stable release and the addition of lightmapping, navmesh support, and more shaders.<sup>[20]</sup> Version 1.1 was released on 21 May 2015, adding improved auto-completion in the code editor, a visual shader editor, a new API to the operating system for managing screens and windows, a rewritten 2D engine, new 2D navigation polygon support, a much improved Blender Collada exporter, and a new dark theme.<sup>[21]</sup> The then-new 2D engine included shaders, materials, independent Z ordering per node, lights, shadows with polygonal occluders, normal mapping, and distance-field font support. Godot joined the Software Freedom Conservancy on 4 November 2015.<sup>[22]</sup>

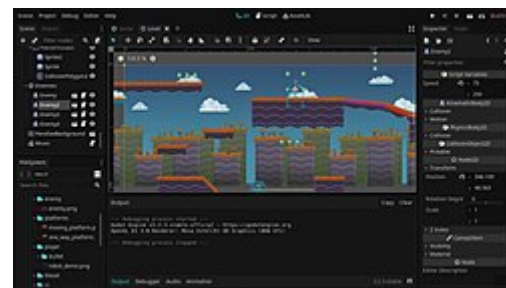
Godot 2.0 was released on 23 February 2016. New features included better scene instancing and inheritance, a new file system browser, multiple scene editing, and an enhanced debugger.<sup>[23][6]</sup> This was followed by version 2.1 in August 2016, which introduced an asset database, profiler, and plugin API.<sup>[24]</sup>

Version 3.0 was released on 29 January 2018, adding a brand new PBR renderer implemented in OpenGL ES 3.0, virtual reality compatibility, and C# support (via Mono).<sup>[15]</sup> Version 3.0 also added the Bullet physics engine in addition to the engine's built-in 3D physics back end and was the first version of Godot to be included in Debian. Godot 3.1 was released on 13 March 2019, with the most notable features being the addition of statically typed GDScript, a script class system for GDScript and an OpenGL ES 2.0 renderer for older devices and mobile devices.<sup>[25]</sup> Godot 3.2 was released on 29 January 2020, with the most notable features being massive documentation improvements, greatly improved C# support, and support for glTF 2.0 files.<sup>[26]</sup> The lead developer, Juan Linietsky, spent most of his time working on a separate Vulkan branch that would later be merged into master for 4.0,<sup>[27]</sup> so work on 3.2 was mostly done by other contributors. Work on 3.2 continues as a long-term support release,<sup>[26]</sup> including Godot 3.2.2 on 26 June 2020, a large patch release that added features such as OpenGL ES 2.0 batching and C# support for iOS.<sup>[28]</sup>

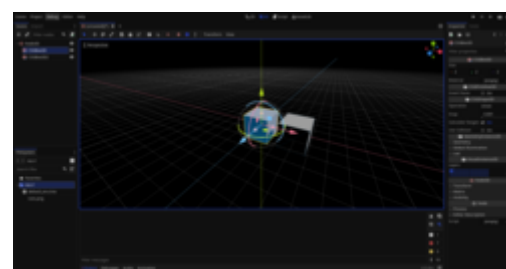
On 22 June 2016, Godot received a \$20,000 Mozilla Open Source Support (MOSS) "Mission Partners" award to be used to add WebSockets, WebAssembly and WebGL 2.0 support.<sup>[8]</sup> Later, with Miguel de Icaza's support, Godot received a \$24,000 donation from Microsoft to implement C# as a scripting language in Godot.<sup>[29]</sup>

On 3 February 2020, Godot received a \$250,000 Epic Games award to improve graphics rendering and the engine's built-in game development language, GDScript.<sup>[30]</sup> On July 8, 2020, Juan Linietsky mentioned that the Epic Games award will be used to permanently hire himself and George (Marques) for 2 years in order to free donation funds for new purposes.<sup>[31]</sup>

On 10 February 2021, Godot received a \$120,000 grant from Kefir.<sup>[32]</sup>



2D Panel in Godot 3.2



Screenshot of development build of Godot 4.0 running using Vulkan(dev build, May 10, 2021)

## Release history

Godot Engine release history

Version	Release date <sup>[33]</sup>	Notes	Latest minor version
1.0	December 2014	First stable release	
1.1	May 2015	Added improved auto-completion in the code editor, a visual shader editor, a rewritten 2D engine, and new 2D navigation polygon support.	
2.0	February 2016	Updated UI and added an enhanced debugger.	2.0.4.1
2.1	July 2016	Introduced an asset database, profiler, and plugin API.	2.1.6
3.0	January 2018	Added a brand new PBR renderer and <u>Mono</u> (C#) support. Replaced the physics engine with <u>Bullet</u> .	3.0.6
3.1	March 2019	Improved C# support, and added support for glTF 2.0	3.1.2
3.2	January 2020	A major patch release. Added OpenGL ES 2.0 batching	3.2.3
<b>3.3</b>	April 2021	A major patch release, adding new features such as MP3 loading and playback support.	3.3.2
3.4	Q2 or Q3 2021	Next minor release	
4.0	~2021	Adds support for the Vulkan graphics API and the latest build of Mono. Introduces SDF-based global illumination, along with several editor changes and performance optimizations.	

	Old version
	Older version, still maintained
	<b>Current stable version</b>
	Latest preview version
	Future release

## Usage

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Many games by OKAM Studio have been made using Godot, including *Dog Mendonça & Pizza Boy*, which uses the Escoria adventure game extension.<sup>[34]</sup> Additionally, it has been used in West Virginia's high school curriculum, due to its ease-of-use for non-programmers and what is described as a "wealth of learning materials that already exist for the software".<sup>[35]</sup>

## Community

Godot as an international project has an active community around the world. Some community members are an admin of local Godot groups." Godot Francophone", "Godot Engine Russia" and "Godot Iran" are the biggest Godot local communities.<sup>[36][37][38]</sup>

## Notable games made with Godot

- *The Interactive Adventures of Dog Mendonça & Pizzaboy*
- *Commander Keen in Keen Dreams* (Nintendo Switch port only)
- *Hardcoded*
- *Kingdoms of the Dump*
- *Rogue State Revolution*<sup>[39]</sup>
- *Deponia* (iOS and PlayStation 4 ports)
- *Carol Reed Mysteries*<sup>[40]</sup> (since 2021)
- *City Game Studio*<sup>[41]</sup>

## See also

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- [List of game engines](#)
- [Video game development](#)

## Notes

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- The engine's name is derived from the play *Waiting for Godot*. For native English speakers, the engine maintainers recommend *GOD-oh*, with the "t" being silent like in the French original, but they also acknowledge that a variety of pronunciations exist.<sup>[42]</sup>

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## External links

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- [Official website \(<https://godotengine.org/>\)](https://godotengine.org/) 
  - [godot \(<https://github.com/godotengine/godot>\)](https://github.com/godotengine/godot) on [GitHub](#)
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