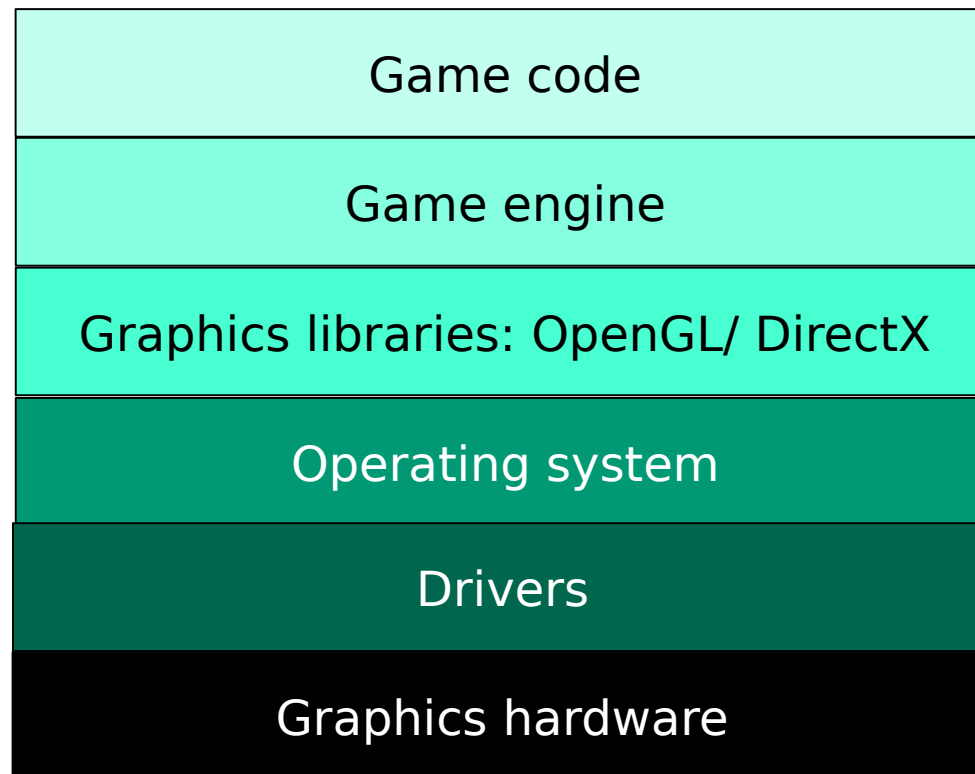


# Game engines

Dani Tost

# Software structure

A **simplified** view of the architecture of a game: the game is programmed on top of a **game engine** that provides a set of tools built on top of a graphical libraries that communicates with graphics hardware through drivers



# Game engines

- Software suites for game creation
- They usually provide:

- The game loop
- Tools to process interactions
- Tools to process sound
- Tools for rendering

- Tools for creating, modifying and importing assets
- Collisions & Physics
- AI
- Effects

# Game engines

- Software suites for game creation
- They differ in:
  - License
  - Price: free or not, options of price depending on the type of users
  - Support to 2D or 3D graphics, raster o vectorial
  - Target platforms supported (where the game will be played)
  - Game development platforms (where it will be developed)
  - Focus on programmer/non programmers users
  - Learning curve
  - Scripting language
  - Scope of game effects provided
  - Scope of the tools provided

Many benchmarks in the net. Choose depending on your goals and circumstances

# Game engines

- Unity
- Unreal
- CryEngine
- Ogre
- Blender (upbge)
- Corona
- SpriteKit
- Amazon  
lumberyard
- Marmalade
- Bulbox
- Construct 2
- Fusion
- GameMaker
- Cocos
- Felgo (V-Play)
- Godot

Comparison of Game Engines 2020

Game Dev / By SoloGameStudios / February 11, 2020



And many others, take a look at:

[https://en.wikipedia.org/wiki/List\\_of\\_game\\_engines](https://en.wikipedia.org/wiki/List_of_game_engines)

Next you'll find some details about some of them

# Game engines

A comparison from <https://www.incredibuild.com/blog/top-7-gaming-engines-you-should-consider-for-2020>

	Installation & Ownership	2D/3D	Ease of Use	Integration & Compatibility	VR Support	Customer Support
Unreal Engine	***	Both	***	*****	Yes	***
Amazon Lumberyard	***	3D Only	*****	***	Yes	***
CryENGINE	***	Both	***	*****	Yes	***
Unity	***	Both	***	*****	Yes	***
GameMaker: Studio	*****	2D Only	*****	***	No	***
Godot	*****	BothBoth	*****	***	No	*****
Cocos2d	*****	2D Only	*****	***	No	***

# Game engines

Choosing the best game engine is a difficult decision. Unity and Unreal are good options for complex cross platform 3D games, but there are others popular ones like CryEngine. There is a wide choice for 2D games, for instance GameMaker or Coco2d

# Unity



<https://unity.com/>

- Cross platform, proprietary
- 2D and 3D
- Multiplatform: Windows, MacOS, Linux, Android, IOS and web (25)
- Scripting in C# and JS
- License for use up to 115\$ month
- Often ranked as the best game engine
- AAA+ games



About [game classification](#):

- AA
- AAA
- AAA+
- AAAA
- III

<https://unity.com/es/case-study>

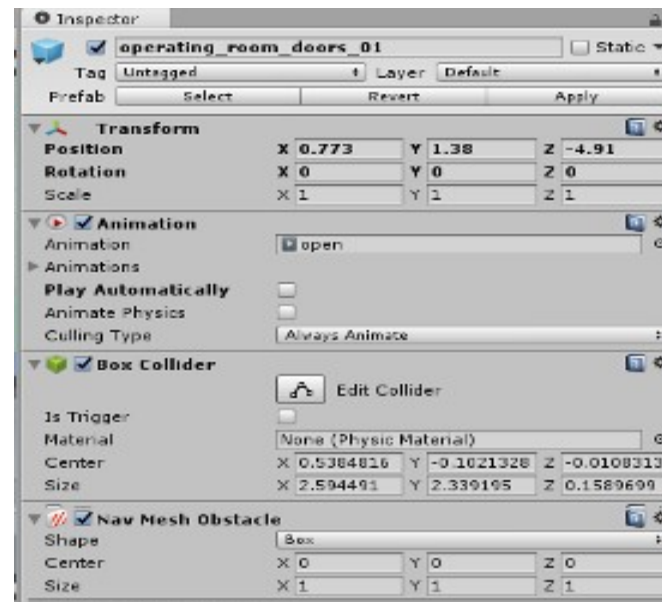


# Unity



<https://unity.com/>

- Programmers define the collision behavior of their objects, determine if they are an obstacle for navigation, and set animations (continuously or started as can create scripts (in C#) defining the behavior of the objects. These scripts (components) are run at every frame or if specific events occur
- Any number of scripts can be assigned to any object. These scripts are run each frame or when specific events occur.



# Unreal Engine 5

<https://www.unrealengine.com>



- High-quality 3D games
- Multiplatform: windows, linux, ios, android.. (18)
- Tools for VR and AR.
- Proprietary license: free for creation and 5% Royalties for commercialization
- Code in C++ and Blueprint
- Graphical editor based on nodes and connections
- It is said to have a better rendering engine than Unity, but a more difficult learning curve
- AAA+ games

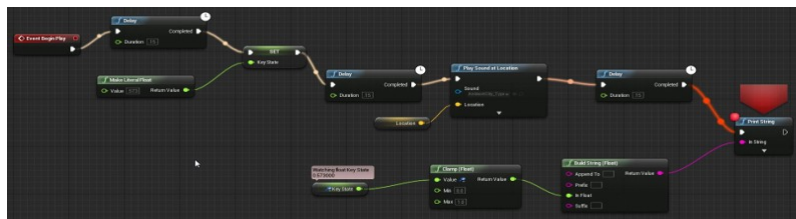


Image from Unreal documentation

# Godot

<https://godotengine.com>



- 2D and 3D
- Open source MIT license
- Free
- Windows, MacOs, Linux, Android, IOs and web (6)
- Scripting with *GScript*, Visual Scripting, C#, and C++
- Based on nodes
- Provides tools for AR and VR
- Said to be ideal for Indie games

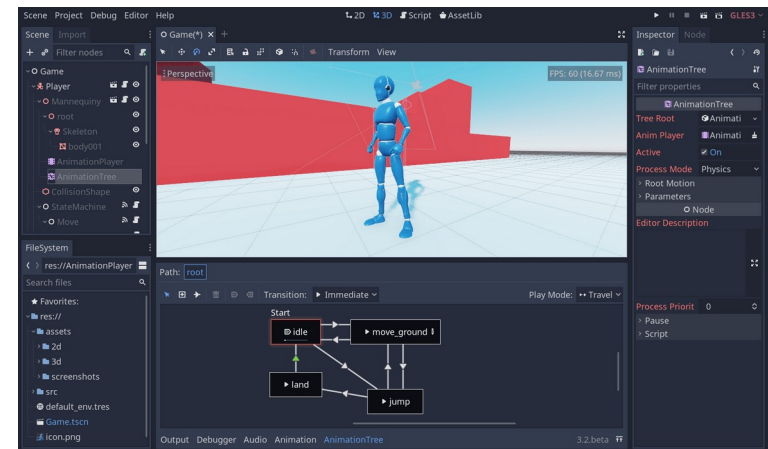


Image from Godot documentation

# Game Maker

<https://www.yoyogames.com/>



- For 2D games (+ limited 3D)
- Drag and drop graphical editor suitable to non-programmers
- Used through an interpreter xml like language : **GameMaker Language (GML)**
- Cross platform
- Proprietary
- It provides many editors, e.g sprites editors

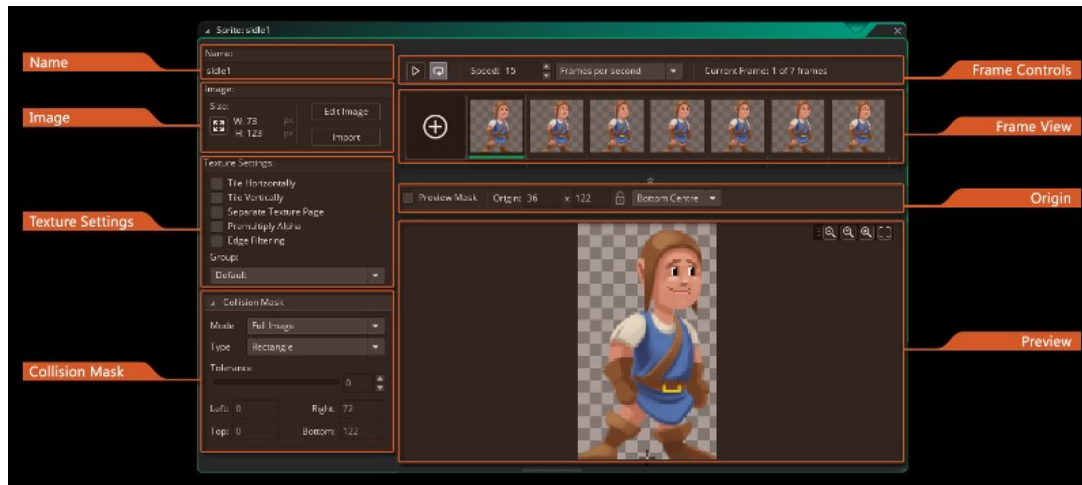


Image from game maker documentation

# RPG maker

[https://  
www.rpgmakerweb.com/](https://www.rpgmakerweb.com/)



2D  
Easy learning curve  
Not free

Image from website



# Voxel farm



<https://>

[www.voxelfarm.com](https://www.voxelfarm.com)

- For 3D raster games, specially for terrain creation
- Compatible with Unreal and Unity
- Modular (Voxel Farm Indie, Voxel Farm Triple A, Voxel Farm Pro)
- See also voxeljs for web-game

<http://>

[www.voxeljs.com/](http://www.voxeljs.com/)



Image from voxel farm documentation

# SpriteKit



- <https://developer.apple.com/spritekit/>
- **Sprite Kit** is a iOS/Mac graphics framework for 2D games
- Offers an API to control sprites (position, size, mass)
- Supports physics laws of gravity and inertia
- Provides a Particle System for fire explosions and smoke

# Felgo (V-play)



- <https://felgo.com>
- Part of the Felgo SDK, a toolkit that provides extends the Qt core with components for app and game development
- Qt widgets and Felgo widgets are defined in an QML and javascript
- Felgo Games provide widgets specifically designed for games
- Felgo apps and games are supported on iOS, Android, Windows Phone, embedded devices and desktop devices



# Corona and Cocos2D

- Suitable for 2D games
- Development in Lua
- Free and open-source
- Cocos2D is more generic, Corona is suitable for actionside scroller and arcade games
- Cocos2D is a software framework:  
Coco2D-x, Coco2D-Swift, Coco2d-XNA, Cocos2D-python

```
-- show()
function scene:show( event )

    local sceneGroup = self.view
    local phase = event.phase

    if ( phase == "will" ) then
        -- Code here runs when the scene is still off screen

    elseif ( phase == "did" ) then
        -- Code here runs when the scene is entirely on screen

    end
end
```



<https://coronalabs.com/>



<https://cocos2d-x.org/>

# Pygame

<https://www.pygame.org/>



2D raster game engine

Python library

Not a game development environment

Open-source

Free

Programming oriented

Simple enough to illustrate all concepts

Main drawback: not exportable to mobile platforms (by now)