

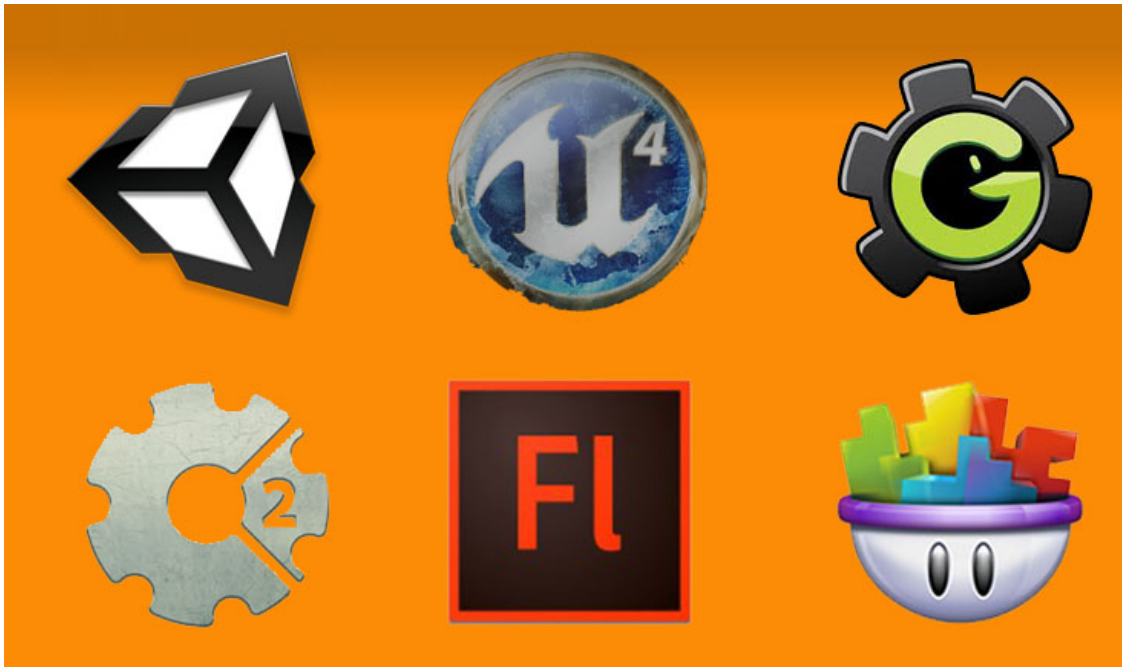


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# Game Engine Analysis and Comparison

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(<http://www.gamesparks.com/wp-content/uploads/2014/06/Engine-images.jpg>)(Engines Under Review)

Hi there fellow sparks. Jamie “the all spark” O’ Flanagan here. Today I’m going to do something a little different than the usual blogs. Before I start I just want to state that the opinions I express in this blog are my own and not those of GameSparks Ltd (<http://www.gamesparks.com>).

I am going to talk about a few different game engines that are currently available. More specifically, I will be talking about game engines that I have experience with. I have developed games, apps and various prototypes using all of the following engines. Some of which went on to be published, most of which were not published ... but that’s a different story.

So I’m going to go into detail of what I think of each of these engines; the benefits, the downfalls and whether or not I liked the engine

### **3 Key points for each engine.**

- Usability (UI, how easy it was to learn and develop with)
- Functionality (What exactly the engine can do)

- Price Point (speaks for itself)

### Engines/SDK's I will cover.

- Unity3d (<http://unity3d.com/unity>)
- Unreal Engine 4 (<https://www.unrealengine.com/>)
- Game Maker Studio (<https://www.yoyogames.com/studio>)
- Construct2 (<https://www.scirra.com/construct2>)
- Flash Pro (<http://www.adobe.com/ie/products/flash.html>)
- Game Salad. (<http://www.gamesalad.com>)

## UNITY 3d

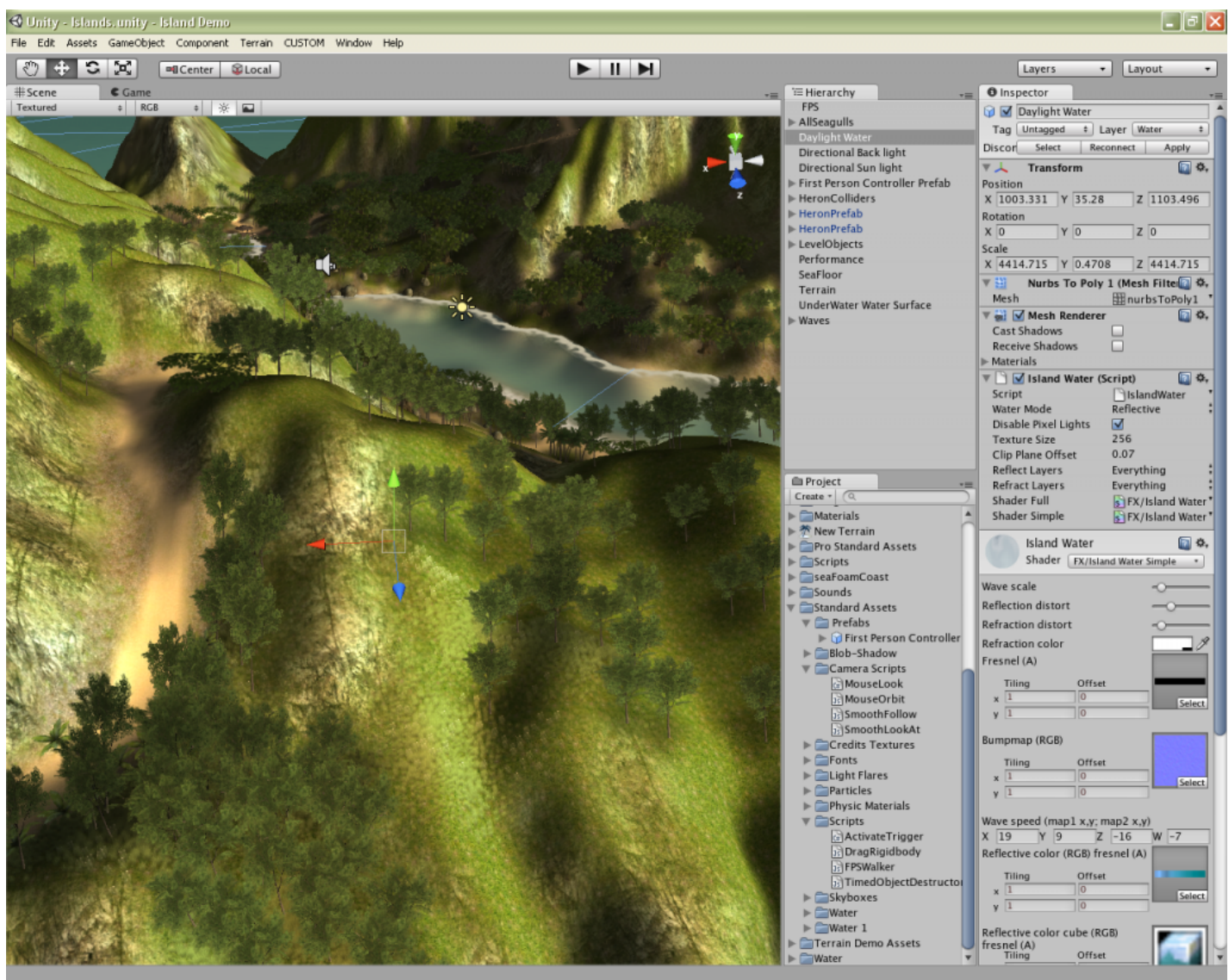


(<http://unity3d.com/unity>)(Unity 3d)

This is the goliath of independent game development and more recently larger studios have started using it and with good reason. I used Unity (<http://unity3d.com/unity>) for the first time in 2012 but it was actually released at Apple's Worldwide Developers Conference (<https://developer.apple.com/wwdc/>) as early as 2005. I started using it around the time version 4.0 came out.

By the time I started using Unity, I had already used tools like Game Maker and Game Salad but was still relatively new to game development and was still learning the ropes. Unity, itself, was just starting to make real traction with the established game development studios. Any of the studios I spoke to were using Unity – and rightly so. Unity has a fantastic interface that lets the developer manage the project really efficiently from the get-go. It's free to use and you can even publish your game to certain platforms without a license. This is appealing to every young studio. Those who are just starting out and can't afford expensive licenses.

It is a very well rounded engine. Most engines cater for either 3d or 2d game development – not many support both. Yes, you can make 2d games with a 3d engine but 9 times out of 10 you are better off with a 2d specific engine. Unity changes that – it allows you to build both.



(<http://unity3d.com/unity>)(Unity 3d User Interface)



While Unity is relatively easy to pick up and use it does have a learning curve for newbies. That said, it does have an abundance of online tutorials, great documentation and a community of people willing to help. It makes publishing to multiple platforms easy with a one-click process and supported platforms include PC, mobile, major consoles like PS4 (<http://ie.playstation.com/ps4/>), Xbox One (<http://www.xbox.com/en-ie/>) and Nintendo Wii U (<http://www.nintendo.com/>). It also supports multiple languages like C#, JavaScript and Action Script 3.

Overall it is extremely reliable and highly recommended. Rating 9/10.

## UNREAL ENGINE 4



(<https://www.unrealengine.com/>)(Unreal Engine 4)

Unreal Engine 4 (<https://www.unrealengine.com/>) is Epic games (<http://epicgames.com/>) very own engine developed in house. The first version was released in 1998. This Engine was used to develop Unreal Tournament. Epic released the 4<sup>th</sup> iteration of the Unreal Engine to public use in March 2014. I haven't used this engine very much. I have a bit more experience with UDK 3. What I can say is that the Unreal Engine is used to produce some of the highest quality AAA games on the market.

Games like the Batman Arkham ([http://batman.wikia.com/wiki/Category:Arkham\\_Series](http://batman.wikia.com/wiki/Category:Arkham_Series)) series on last gen consoles, Epics own "Gears of War" (<http://gearsofwar.xbox.com/en-US/AgeGate?source=%252f>) series were all made on udk3 as well as Indie hits like Toxic Games "Qube" (<http://qube-game.com/>). More recently games such as "Daylight" (<http://www.zombie.com/games/daylight>) for PC and PS4 by Zombie Studios (<http://www.zombie.com/games/daylight>) and another Epic Games title called "Fortnite" (<https://www.fortnite.com/>) were developed on Unreal Engine 4.



(<https://www.unrealengine.com/>)(Unreal Engine 4 User Interface)

The quality of these titles speaks for themselves. My personal experience with Unreal was that it crashed a lot. I had to save my project after each little change to avoid it. This is mainly because my PC was unable to run the engine. This is the only engine I had used that caused this issue. Overall I really liked it and would have loved to get into a little more but the constant crashing was a huge turn off. However the UI and navigation controls were very polished and easy to use.

The price point was free until the game made a certain amount of money then the developer had to pay for a license. The new model is a subscription starting at \$19 per month. There is also a large learning curve so would not be suited to new aspiring game developers.

Overall it is obvious this is a top engine for major studios but maybe not ideal for small Indie teams on a low budget. Rating: 8/10

## Game Maker Studio



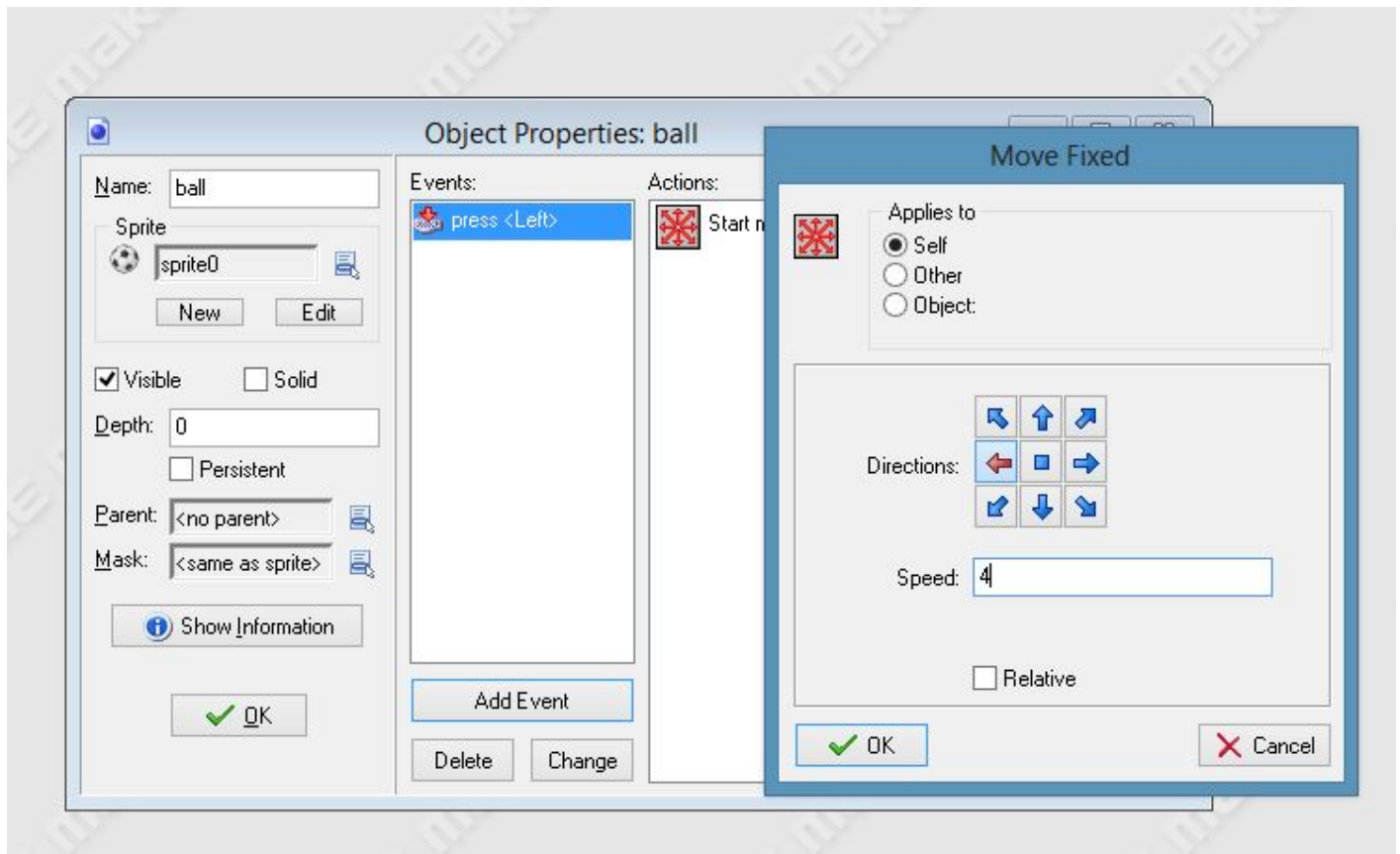
(<https://www.yoyogames.com/studio>)(Game Maker Studio)

This was the first game engine I ever used. Yo Yo games (<https://www.yoyogames.com/studio>) originally released it in 1999 under the name Animo. It was originally for creating 2d animations. It quickly moved on to being a very robust 2d game development tool. I think I first downloaded it in 2004 when I was finishing school and thinking about a career. I didn't end up spending too much time with it but I did come back to it a few years later.

Overall this engine is known as an introduction to game dev tool or a hobbyist tool. That can be the case but some fantastic games have come out of this engine. Personal favourites of mine are Dennaton Games' (<http://www.dennaton.com/>) wonderfully violent "Hotline Miami"

(<http://www.dennaton.com/>) and Derek Yu's (<http://www.mossmouth.com/>) and Andy Hall's "Spelunky" (<http://spelunkyworld.com/>). The evidence is there that it can be used to make really good games.

Games made in Game Maker Studio are generally made using pre-defined events. When you select create new event you can then select "When Left Button is pressed" and then select a pre-defined action like "Move Left". This means when the Left is pressed the assigned character moves left. This makes it easy for people to make simple games without knowing how to program.

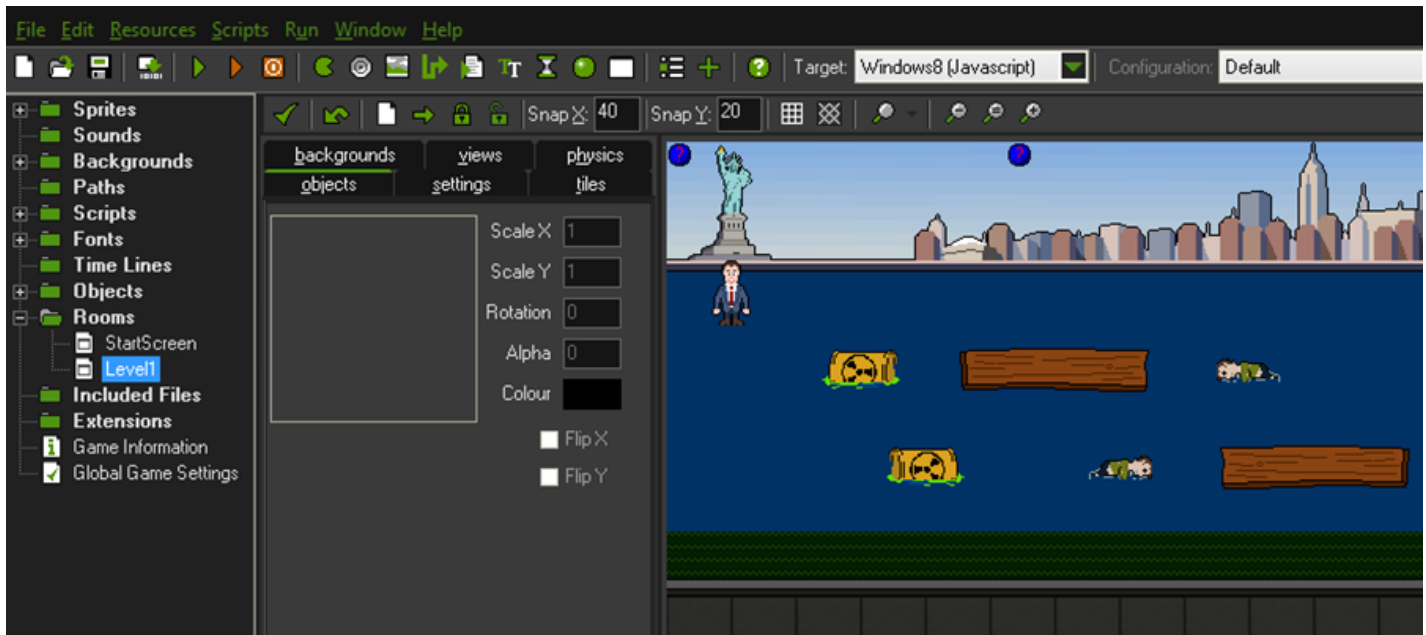


(<https://www.yoyogames.com/studio>)

(Game Maker Event Example)

The engine also has a bespoke language called "Game Maker Language" or GML for short. Some people complain about it and its performance but the fact that it includes a language as well as pre defined events means it is much more diverse than other similar engines and the games are more customizable.





(<https://www.yoyogames.com/studio>)

(Game Maker Studio UI)

The UI is very slick and easy to use. Yoyo games have been iterating on Game Maker for a long time and it is obvious when you start using it. Easy to navigate and very efficient.

Overall rating 8/10

## Construct2

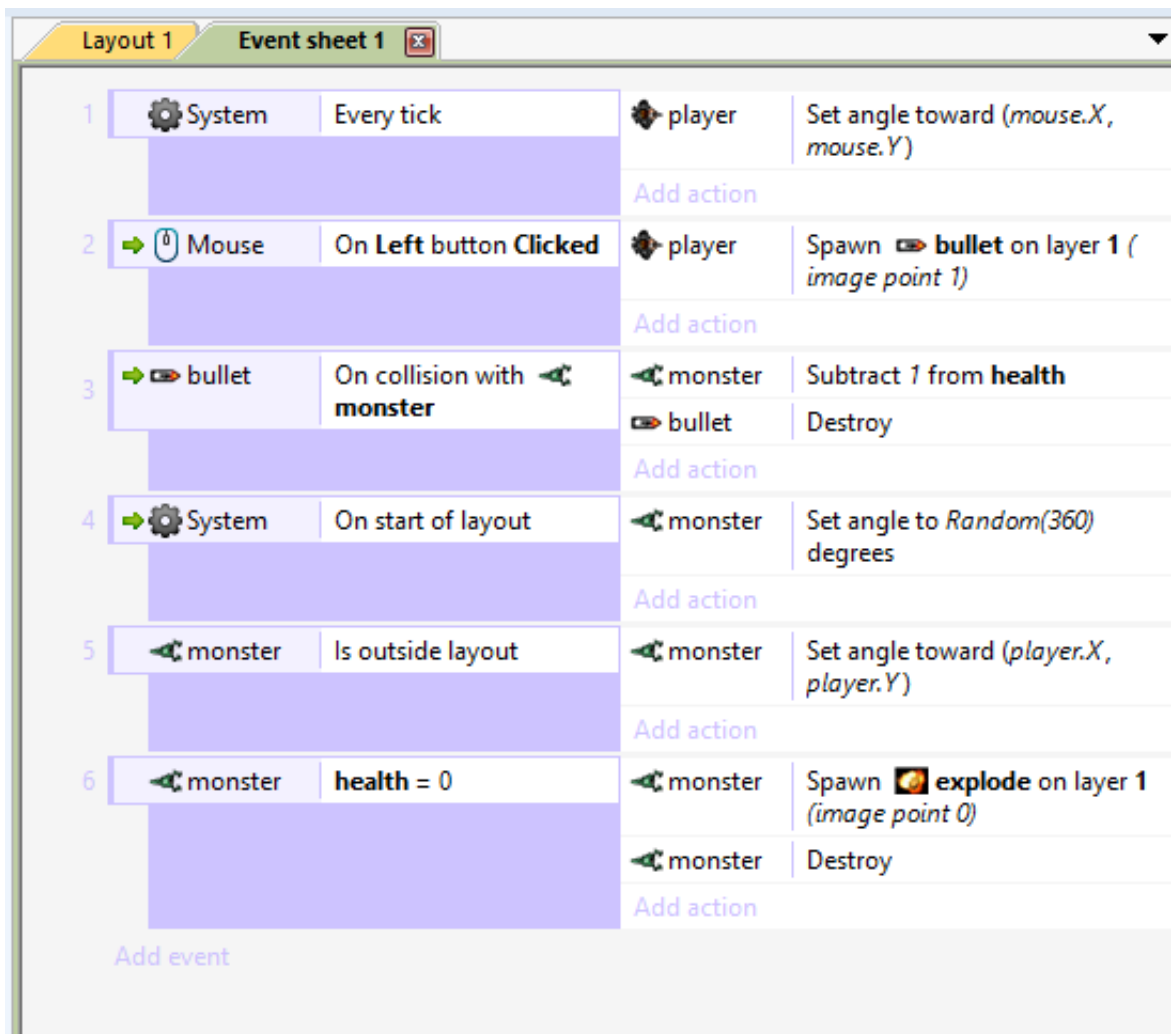


(<https://www.scirra.com/construct2>)(Construct2)

Scirras Construct2 (<https://www.scirra.com/construct2>) is the engine I am most familiar with. Throughout college, it was my engine of choice for various different reasons. The main reason being that it is super easy to get a game up and running quickly. It starts to fall down when you develop a larger project as the frame rate will start to drop if you do not manage the game perfectly from the start.

Construct2 is the newest engine on the list. As of writing, it has 172 updates including beta releases and they release an update every 2 weeks. Even now, from when I first used the engine, it has vastly improved. The first version of Construct was released on October 27, 2007 which is now known as "Construct Classic". The developers re-wrote a more stable version and called it "Construct2" which is the version out now.

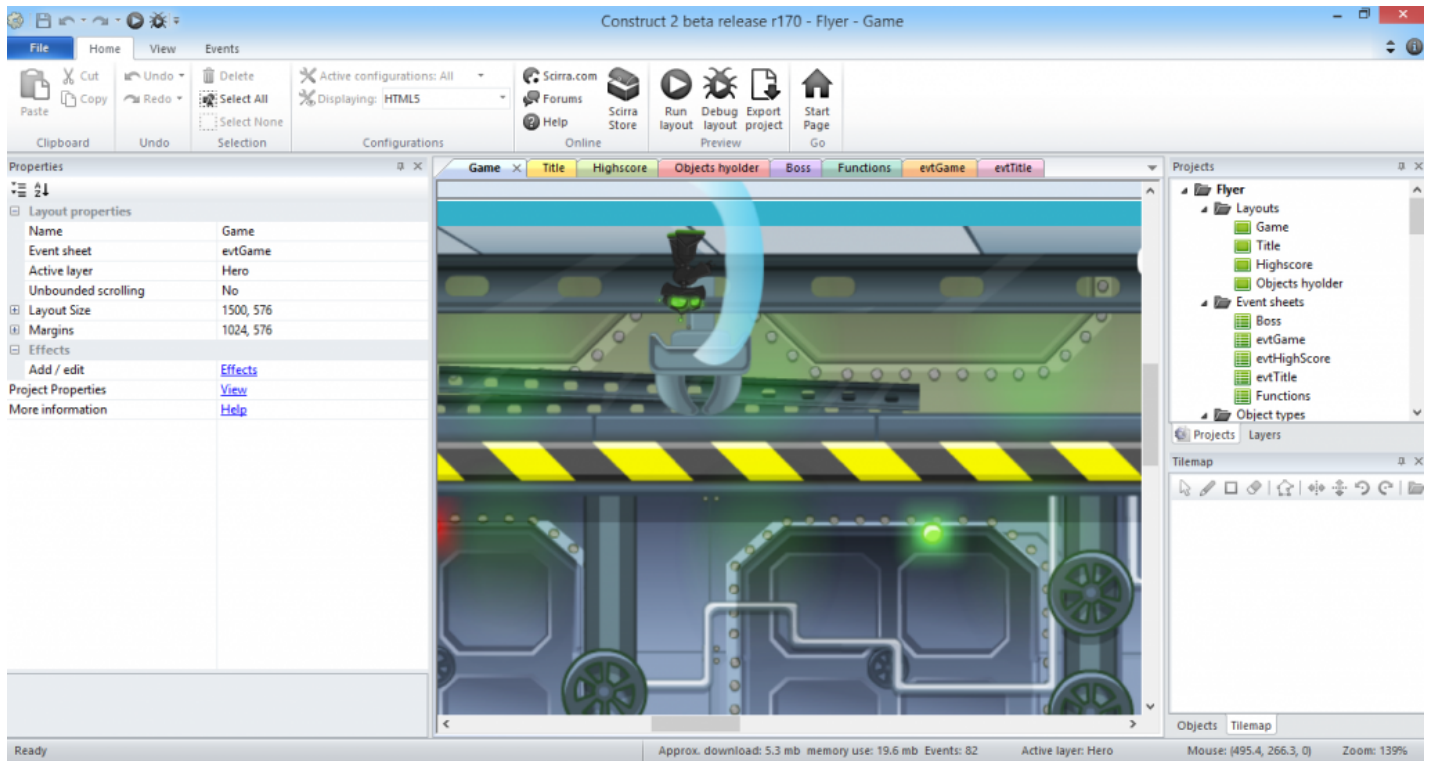
Construct2 is free to use. It has a similar style to Game Maker Studio where you make your game based around the concept of "Events" and "Behaviors". The events are the same in concept, i.e. "when space is pressed then player jumps" as opposed to writing a few lines of code to get this feature working. The behaviors are common predefined game mechanics or features. For example, the pre defined platform controls behavior gets assigned to an object (usually your player) and you can control your character to run left and right and jump straight away using the arrow keys once the game is compiled. Then in the editor you can adjust the variables like speed and jump height etc. to tweak it to your needs. I have used Construct2 to teach students the basics of making games and after 2-3 hours they have a simple 2d side scroller working.



(<https://www.scirra.com/construct2>)(Construct2 Events List)

Construct2 has a plugin feature using JavaScript. This allows you to code your own events using the same syntax as the default plugins. It, effectively, lets you make the game do whatever you want but it is a little bit more complicated than Game Maker Studio's GML.

Construct2 supports an extensive range of devices and the list is growing. It supports all of the mobile devices as well as the usual HTML 5, PC and more recently they struck a deal with Nintendo and support the porting of games to the system. They don't have a specific export function for Nintendo like they do for some other platforms but the fact they support Nintendo ports is useful. This new tool is getting more and more polished but still has a way to go. Large projects can be difficult to work with and sometimes the games run pretty badly on mobile devices but these issues improve with every update.



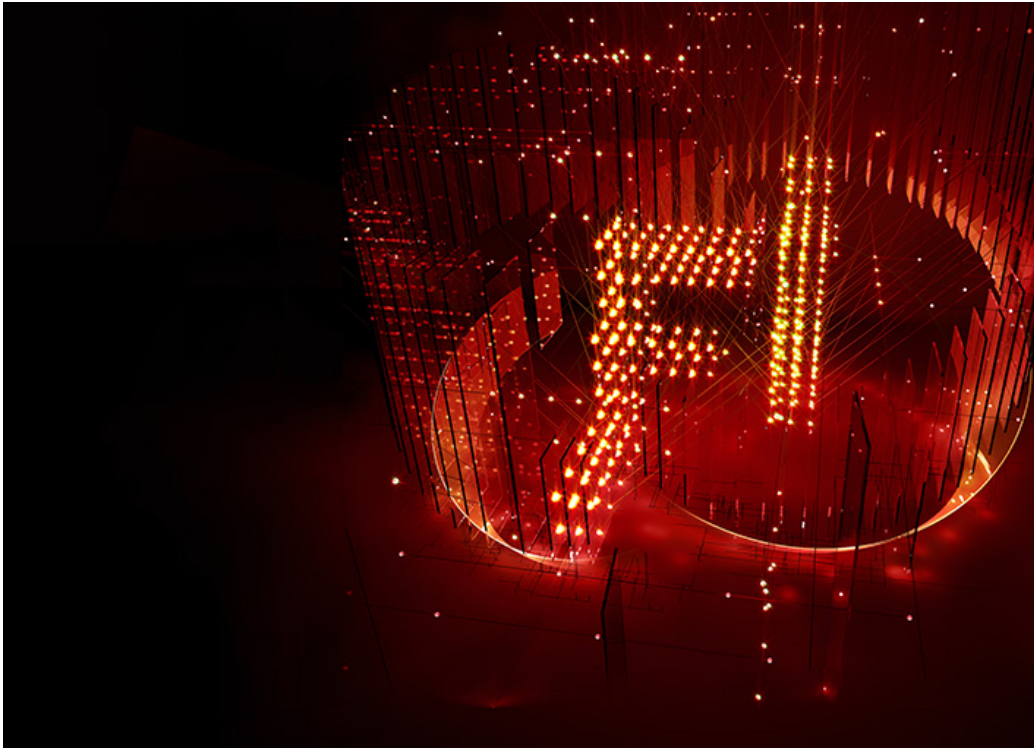
(<https://www.scirra.com/construct2>)(Construct2 User Interface)

To the best of my knowledge, no notable games have been made with Construct2 yet. Some good games have been released but nothing that really stands out. It has a solid user interface (probably the best I've used) and its quick to pick up and use. I would recommend it for prototyping a large game but not really to develop it fully. Not yet anyway.

Overall I'll give Construct2 a 7/10 with the potential to move to 8.

## Flash Professional





(<http://www.adobe.com/ie/products/flash.html>)(Flash Professional)

Flash Pro (<http://www.adobe.com/ie/products/flash.html>) is a tool I used when I worked as a developer for Savvy Bear (<http://www.savvybear.com/>). Flash is an Adobe product and used to be the #1 tool for making 2d games. The industry was awash with small studios making flash games and submitting them to the likes of Kongregate or Miniclips.com etc. There was once a case where a small indie team or solo dev could make a game in approximately a month and get sponsored to release their game using websites like Flash Game License to effectively auction their game to the highest bidder. This amount of money paid for sponsored games has significantly declined with the rise of mobile games. On top of this Flash is no longer the required engine to build with as html5 games are rising and Unity also exports swf files like Flash Professional.

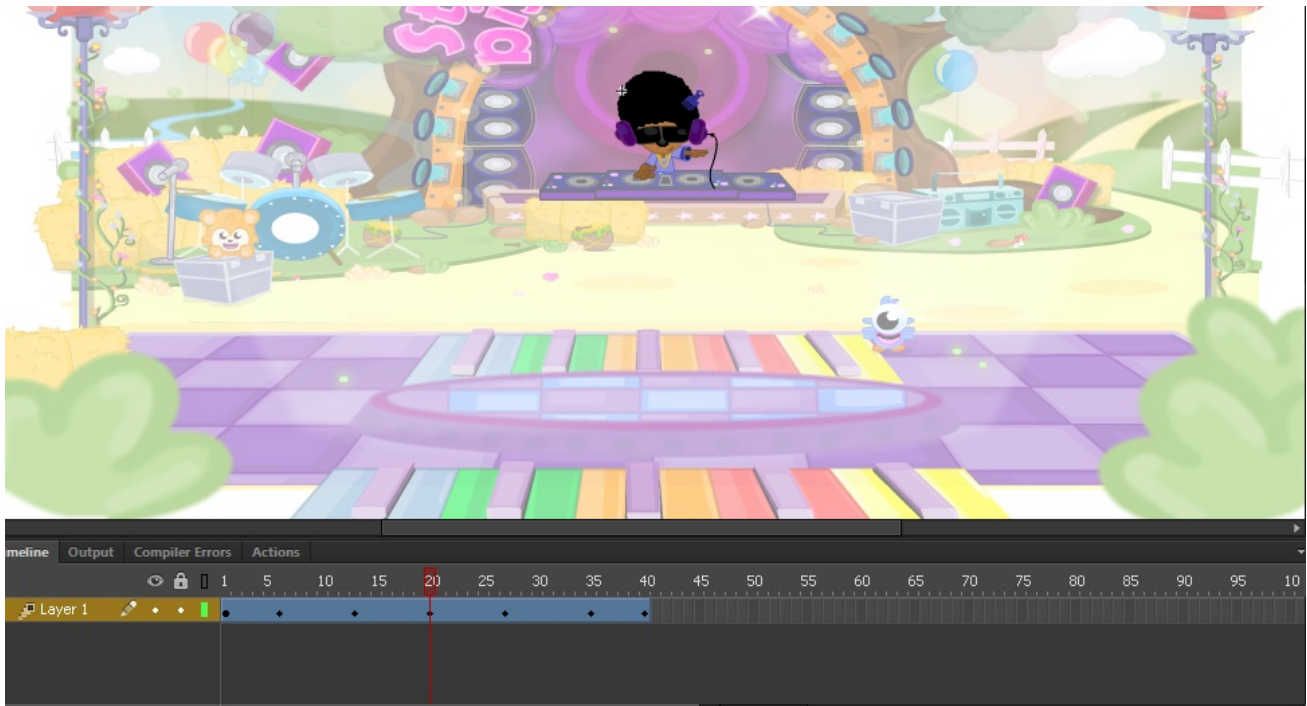
I helped port Savvy Bear, which was a browser game, to mobile devices using Flash Pro. The game was originally written for browsers, which seemed like the most ideal platform for it when development started. There probably wasn't a more suitable platform for running the type of game (think Moshi Monsters with a focus on education). Building a game for browsers was one thing but when it came to deploying on mobile it was not quite as stream

lined. We used Adobe Air and the frame rate on most devices was not good. It just wouldn't run. This was slightly improved with an update to Air and some tweaking to code and art assets. The amount of work we had to do to get the game working proved to be painful.



(<http://www.adobe.com/ie/products/flash.html>)(Flash Professional User Interface)

There are some positives about it. You can draw your art assets in the engine using vector art and also animate it in-engine using key frames which is very convenient and simple to use. Programming the animations is relatively easy as well. Flash uses the AS3 programming language which is similar in syntax to JavaScript or C#. Those familiar with either of those languages can pretty much jump right in. Flash is still widely used in development these days but you would struggle to find a team using it without also using other tools that are better equipped for certain tasks. It also has a free 30 day trial but once the trial is finished you must buy a license, unlike other engines I spoke about that have a free version that you can use as long as you like.



(<http://www.adobe.com/ie/products/flash.html>)(Flash Animation Tool uses keyframes)

Some of the more notable flash games include Bennett Foddy's (<http://www.foddy.net/>) "QWOP" (<http://www.foddy.net/2010/10/qwop/>) and Team Meats (<http://supermeatboy.com/>) "Meat Bot" (<http://www.newgrounds.com/portal/view/463241>) (not super meat boy!). There are hundreds – if not thousands – more recognizable Flash games but I can't recall many hugely successful ones.

In its time, Flash was one of the leading tools but these days, there are just better tools out there to make a game with. For animation it is still a solid tool. 5-8 years ago Flash would have got a 10/10 for game development but not these days.

Overall I think Flash is a great animation tool but not for game development. I give it 6/10

## Game Salad



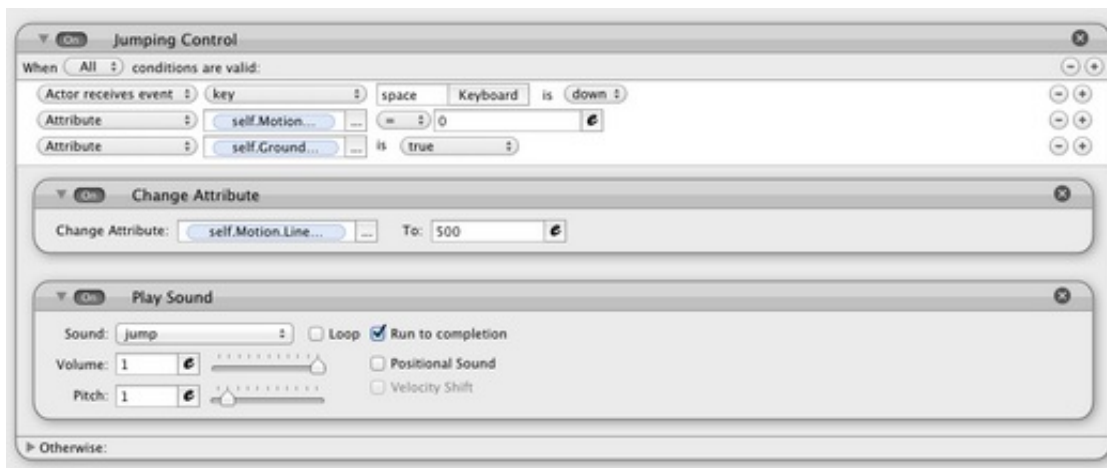
(<http://gamesalad.com/>)

(Game Salad)

Game Salad (<http://gamesalad.com/>) was developed by Gendai Games (<http://gamesalad.com/>) (now known as Game Salad Inc.). They launched the Game Salad engine in March 2009. Not long after that they partnered with Macworld Expo (<http://www.macworldiworld.com/>) for the Macworld 2010 Game Salad Challenge to promote Mac and iPhone game creation. In November 2010 they released their free version.

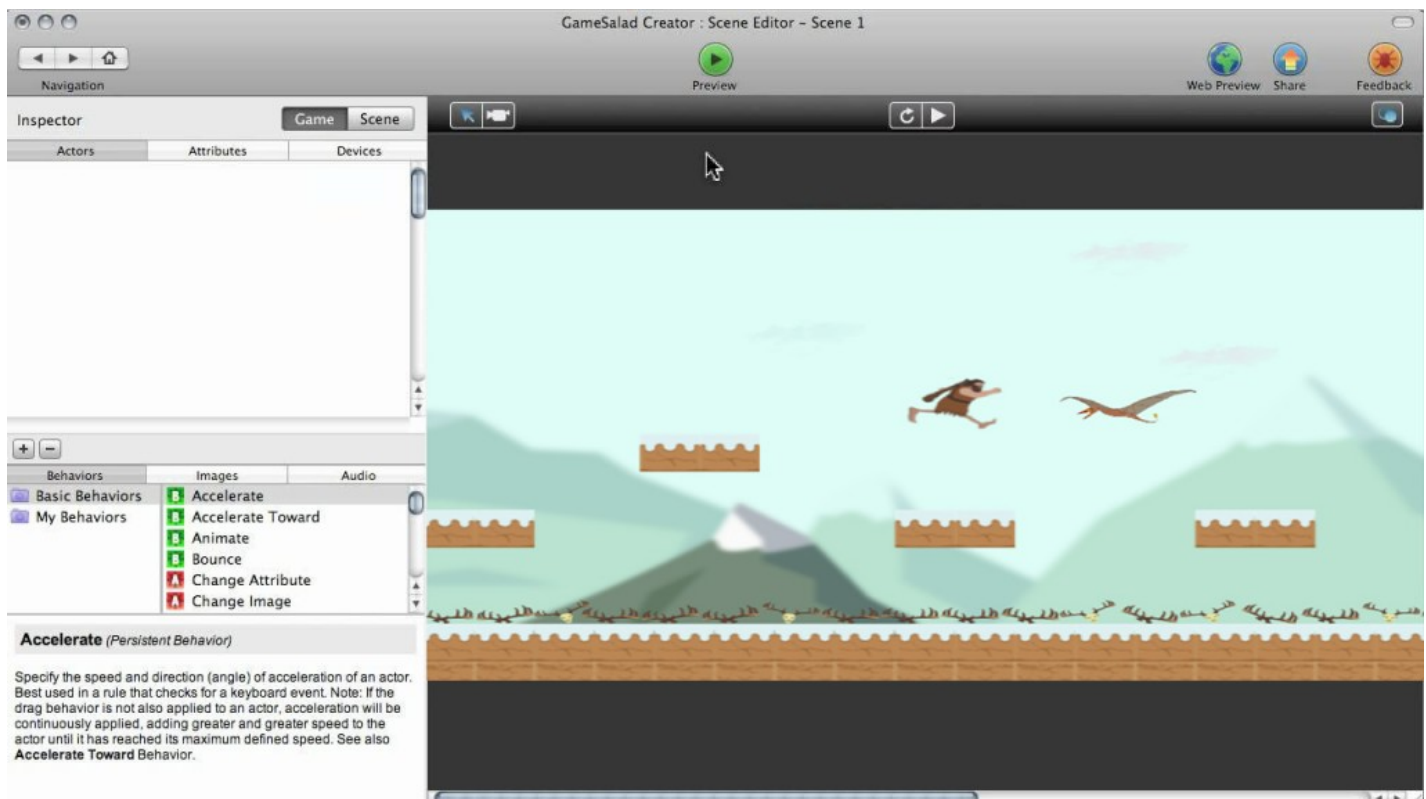
When I first went back to college to study Game Development, this was the first engine we studied. The school exclusively used Mac desktops and at the time Game Salad was Mac exclusive. They have since released a Windows version.





(<http://gamesalad.com/>)(Game Salad Event Example)

Game Salad and Construct2 are similar in style and function. In fact, knowing this, I think Construct2 deliberately focussed on the Windows market before Game Salad decided to port. I think to some extent this strategy worked. Those who wanted an event driven engine that didn't like or want to use Game Maker opted for Construct2 if they were on Windows and Game Salad if they had a Mac.



(<http://gamesalad.com/>)(Game Salad User Interface. Game is Nee and the Thaw)

Game Salad seems to have many of the same faults that Construct2 has. It is more suitable for prototyping games than for using on large game projects. It has some issues exporting to some devices but generally works well with iOS. Fire Maple Games (<https://www.firemaplegames.com/>)' "The Secret of Grisly Manor" (<https://www.firemaplegames.com/tsogm.html>)" which has a couple of million downloads is probably the only real notable game made with the engine.

Overall I'm going to rate it the same as Construct2 due to the features and faults being fairly similar 7/10.

### Overall Summary

The engines covered in this article are all ones I have some experience of working with. There are some notable omissions which I am looking forward to working with over coming months. Stencyl (<http://www.stencyl.com/>) is an pre defined event driven engine with similarities to Construct2 and Game Salad. An Irish company, Zoodazzle (<http://www.zoodazzle.com/>), are working on a pre defined event-driven 2d & 3d engine called Game Carver (<http://www.zoodazzle.com/>) which is due for full release very soon but can be downloaded now. It is definitely one to look after.



(<https://www.projectanarchy.com/>)(Project Anarchy)

Project Anarchy (<https://www.projectanarchy.com/>), from Havok (<http://www.havok.com>), is an engine I am really looking forward to using. Everything I have heard suggests it full of potential and could rival Unity. Havok are a well known technology provider in the games industry and they provide some of the best tools for things like rendering and physics. I am confident they will pull out all the stops to get the best engine they can possibly make so this is something I will be using very soon for my next project.

When considering a game engine you really have to consider what your strengths are and what you want to improve. If you are a 2d artist and want to get into game development but not focus on the programming then use either Game Maker Studio, Game Salad or Construct2. Try them both and see what you are more comfortable with.

If you are a single developer who is a good or great programmer but you're working alone then choose Unity3d. If you are a team of developers with mixed skills then try out Unity3d and Unreal Engine 4 and see what suits the team best. I would probably go with Unity myself but that doesn't mean it will suit your teams need.

The following table summarises the features of each of the tools covered and provides a simple comparison of the tools.

	UNITY 3d	Unreal Engine 4	Game Maker	Construct 2	Flash Pro	Game Salad
Full 3d support	✓ Available	✓ Available	✗ Not Available	✗ Not Available	✗ Not Available	✗ Not Available
Full 2d support	✓ Available	✗ Not Available	✓ Available	✓ Available	✓ Available	✓ Available
Free Version	✓ Available	✗ Not Available	✓ Available	✓ Available	✓ Available	✓ Available
Paid Version	✓ Available	✓ Available	✓ Available	✓ Available	✓ Available	✓ Available
PC Export	✓ Available	✓ Available	✓ Available	✓ Available	✓ Available	✓ Available
Playstation Export	✓ Available	✓ Available	✓ Available	✗ Not Available	✗ Not Available	✗ Not Available
Xbox Export	✓ Available	✓ Available	✗ Not Available	✗ Not Available	✗ Not Available	✗ Not Available
Nintendo Export	✓ Available	✗ Not Available	✗ Not Available	✗ Not Available	✗ Not Available	✗ Not Available
IOS Export	✓ Available	✓ Available	✓ Available	✓ Available	✗ Not Available	✓ Available
Android Export	✓ Available	✓ Available	✓ Available	✓ Available	✗ Not Available	✓ Available
WP8 Export	✓ Available	✓ Available	✓ Available	✓ Available	✗ Not Available	✓ Available
Mac Export	✓ Available	✓ Available	✓ Available	✓ Available	✓ Available	✓ Available
HTML5 Export	✗ Not Available	✗ Not Available	✓ Available	✓ Available	✗ Not Available	✓ Available
Available on Mac OSX	✓ Available	✓ Available	✓ Available	✗ Not Available	✓ Available	✓ Available
Available on Windows	✓ Available	✓ Available	✓ Available	✓ Available	✓ Available	✓ Available

(<http://www.gamesparks.com/wp-content/uploads/2014/06/table1.png>)(Game Engine Comparison Table)

I should point out, most of these engines work with the GameSparks platform and you can register for free here (<http://portal.gamesparks.net>).

That is me signing off. If you have any questions or disagree with anything I say please leave a comment. As I said at the start these are my opinions and my research. Follow me on twitter. (<https://twitter.com/JamieGameDev>)

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**James Cameron** • 4 months ago

You might want to research the origin of Game Maker a little better. It was originally created by Mark Overmars for his video game development class and Yoyo Games bought it from him later. It was originally called Game Maker, not Animo.

1 ^ | v • Reply • Share ›



**asdfddasd** • 4 months ago

Flash does compile for Android and iOS, and it exports to HTML5 as well.

About Flash successfull games about 80% of Facebook games are developned in Flash

About Flash successful games... about 99% of Facebook games are developed in Flash.  
Almost all the King Games are developed in that technology.

^ | v • Reply • Share ›



**JetFire** • 7 months ago

2d gaming is way easier and sometimes better if properly done.

^ | v • Reply • Share ›



**samiup** • 7 months ago

I think the only down to Unity is that it does not output HTML5.

^ | v • Reply • Share ›



**TaMereSuceDesOurs** • 8 months ago

unity before unreal ? wtf dude, I just saw that unity uses things like javascript or c# witch make it run really slowly

in that case, why not include JMonkey ?

^ | v • Reply • Share ›



**Georges Paz** → TaMereSuceDesOurs • 3 months ago

Unity have now IL2CPP, it compiles all your script code into C++ (done at build time).  
;)

^ | v • Reply • Share ›



**Jakub Michalski** • a year ago

I have one complain about GameMaker you do not mentioned that GameMaker Studio have ability to make 3D games. With addition in shaders support you can make nearly everything that unity can do but it is less efficient and it requires much more work on developer side.

^ | v • Reply • Share ›



**Bob Korte** • a year ago

Thanks for this review. I was looking for this. Hopefully you will review Stencil as well. It is one of the products I am concidering. For now, job well done! \* bow \*

^ | v • Reply • Share ›



**James Daly** • a year ago

Nice review. Looking forward to project Anarchy also. Cheers "All Spark" :P

^ | v • Reply • Share ›



**Jamie "The All Spark" O' Flana** → James Daly • a year ago

Hey James,

Thanks for the kind words. Regarding project anarchy it's available now to try. I just haven't had the time. Although for my next project I reckon I will prototype it in Anarchy to see what i is like.

^ | v • Reply • Share ›

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**Norsfell, Winterforts - As featured in over 90 countries**

Julian Maroda  
CEO



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