



DEFOLD GAME ENGINE & WEB GAMES



AGENDA

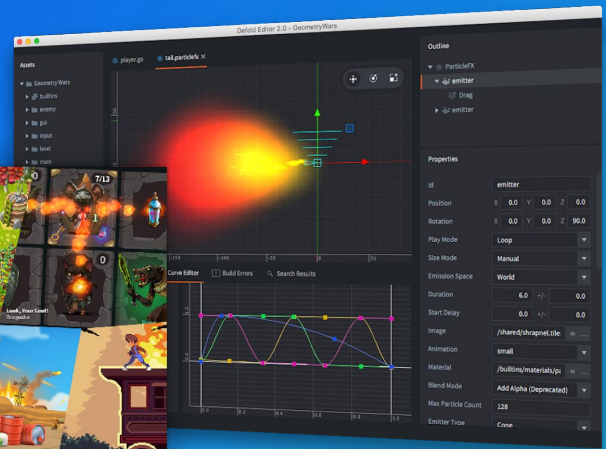
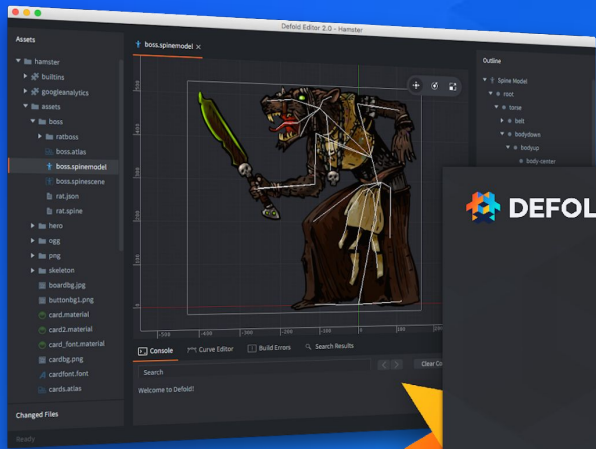
- Defold intro
- Games on the web
- Defold tech
- Q & A / Discussion



DEFOLD INTRO







DEFOLD FOUNDATION

- Owned by King from 2014 to 2020
- Defold Foundation from May 2020
 - Independent foundation
 - Stockholm, Sweden
 - Source code
 - Trademark
- Team of six developers
- Funding
 - Donations
 - Partnerships

King



Defold
Foundation





defold

Overview

Repositories 181

Projects 9

Packages

Teams 8

People 28



Defold

131 followers

Sweden

<https://defold.com>

@defold

info@defold.se

Sponsor

README.md

Defold is a completely free to use game engine for development of console, desktop, mobile and web games. It has no licensing costs, no licensing fees and no royalties. The Defold editor runs on Windows, Linux and macOS and includes a complete set of tools for game development. It is a cross-platform engine with a focus on performance and ease of use.

FREE

- No upfront cost
- No licensing fee
- No revenue share
- Even for consoles



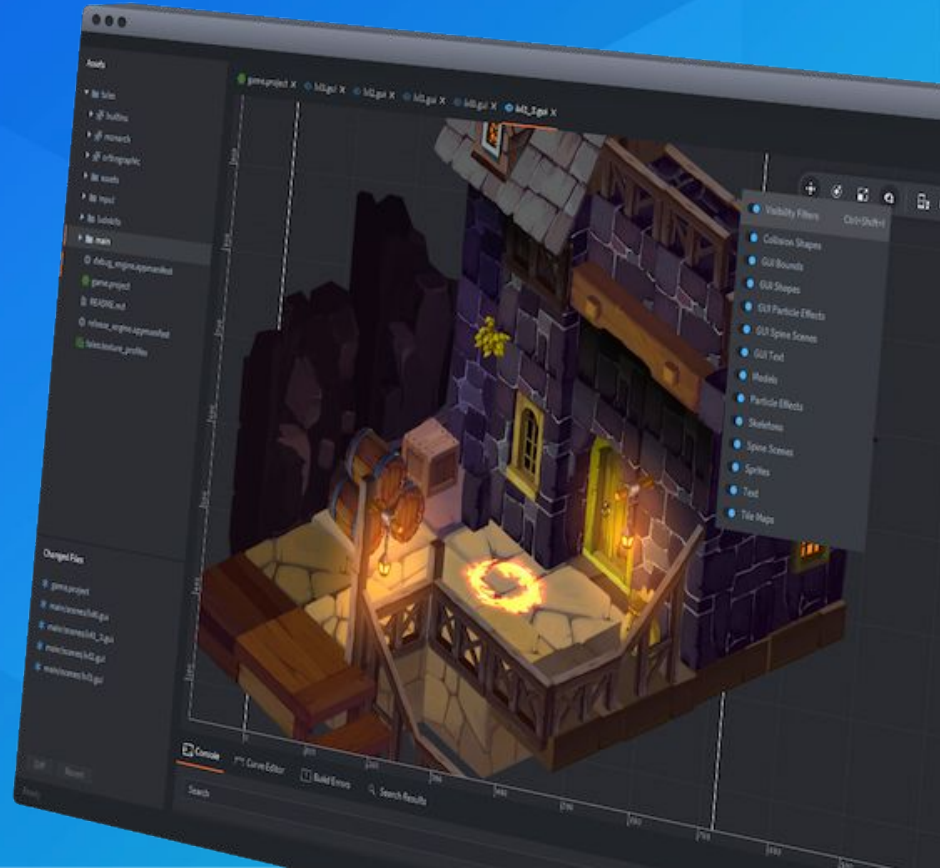
FEATURES

- 2D and 3D
 - Tilemaps
 - Sprites
 - Meshes
 - Models
 - Particle effects
 - ...
- Physics
- Scene and GUI editor
- Code editor and debugger
 - Lua scripting



ZERO SETUP POLICY

- One download
 - Editor for macOS, Windows and Linux
 - Automatic updates
- Build for all supported platforms
 - No additional tools required
 - No Xcode
 - No Android Studio
 - No SDKs
 - No build tools



SMALL

Small engine binary.

PLATFORM	DEFOLD 1.4.7	UNITY 2022.3.3f1	GODOT 4.0.3
Android (32+64)	3.4MB	18.9MB	39.6MB
iOS	1.3MB	7.3MB	-
HTML5 (wasm, gzip)	956kB	2.7MB	9.8MB

(Test made using an empty project. Exported to target platform using default settings. Release builds.)



PERFORMANCE AND STABILITY

- Performance
 - Defold delivers stable 60+ fps on the web, even on mobile
 - Low memory usage
 - Web games can even run on KaiOS (with some care!)
- Stability
 - Battle tested engine used in many commercial games
 - Monthly release cycle
 - No breaking changes





Threat: 31
Difficulty up!

Void Scrapers

8BitSkull

[Steam](#), [Web](#), [Nintendo Switch](#)

player 11193

17

933 / 3 500

0:33

38 / 78

101

372 / 375

6

Family Island
Melsoft Games / Moon Active
[Android](#), [iOS](#)



255



1/4



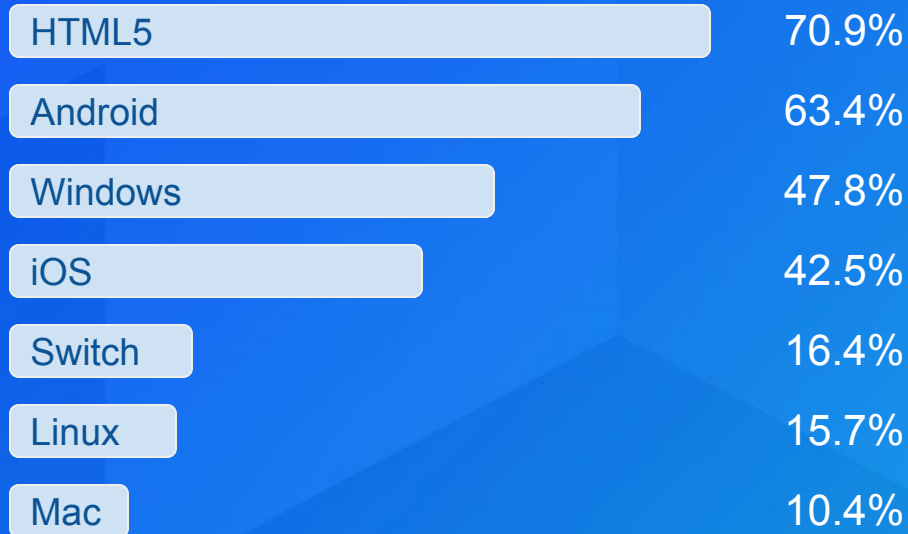
Monkey Mart
Tiny Dobbins
Poki.com

GAMES ON THE WEB



MAY 2023 DEFOLD DEVELOPER SURVEY

What platforms are the most important for you? (max. 3)



DISTRIBUTION CHANNELS

- Poki.com - 1000 games, curated
- CrazyGames - 7000 games, open
- GameDistribution - 16500 games, open
- Yandex Games - 6000 games, open
- Itch.io - 337000 games, open, game jams
- Google GameSnacks, Facebook Instant Games, Kongregate, Rune and many more
- Playable Ads!
- ...

(numbers show total # games on the platform)







Games made with Defold had
220M plays on Poki in 2022





iOS





It's a good time to be a web game dev!

DEFOLD TECH



ENGINE DESIGN

- C-like C++
 - No templates. No inheritance. No STL.
 - Simple POD types w. loops over data - cache coherence!
- Protobuf for game project data
 - Merge friendly text format while editing
 - Compact binary format at runtime
- Modular game systems
 - Audio, Physics, Input, Graphics, Render, etc
 - Remove what you don't need - nullable implementations of systems
- Extend with additional native code



ENGINE DESIGN

- Game logic written in Lua
 - Excellent interoperability with C
 - Small runtime
 - LuaJIT for performance
- Small public API surface
 - Less than 300 functions in total
 - Low-level building blocks
- Scene view hierarchy
 - Game objects - transform, can be nested
 - Components - sprite, sound, script, model, factory etc



DEFOLD ON THE WEB

- Emscripten
 - OpenGL to WebGL
 - OpenAL to Web Audio
 - TCP to WebSocket
- WebAssembly (fallback to asm.js)
- Gamepad API
- Lua for game logic
 - Lua 5.1 and not LuaJIT



DEFOLD ON THE WEB

- No WebGPU
 - Not planned
 - Cost of maintenance
 - OpenGL, WebGL, Vulkan+MoltenVK (Metal), consoles
- No WebTransport
 - Possibly in 2024
- No WebXR
 - Not planned



EXTENSIONS

- Plugin/extension system
 - Add additional native code
 - Interface with 3rd party SDKs (Facebook, Poki, AdMob, Gameanalytics etc)
 - C++ entry point
 - Lua bindings to C++ code
 - C++ code calling platform specific native code (JavaScript, Java, Obj-C)
- Cloud builds
 - Build servers provided for free - run your own if you want to!
 - Compile and link extension code
 - Returns custom engine
 - Cached locally



Example: Facebook SDK

Facebook SDK extension

- Android, iOS, web
- A single Lua API to interact with the SDK
 - Cross-platform - no porting required
- Layers of wrapper code around the SDK
 - C++ binding code for the Lua API
 - Generic C++ code per API function
 - Platform specific C++ code per API function (for calling native code)
 - Platform specific native code per API function



Example: facebook.cpp - Entrypoint

Macro to declare an extension and set up lifecycle functions



254

255

256

```
DM_DECLARE_EXTENSION(FacebookExtExternal, "Facebook", AppInitializeFacebook, AppFinalizeFacebook, InitializeFacebook, UpdateFacebo
```



Example: facebook.cpp - Lua API

```
145 static const luaL_reg Facebook_methods[] =
146 {
147     {"init", Facebook_Init},
148     {"get_version", Facebook_GetVersion},
149     {"logout", Facebook_Logout},
150     {"access_token", Facebook_AccessToken},
160     {0, 0}
161 };
```

```
162
163 static void LuaInit(lua_State* L)
164 {
165     int top = lua_gettop(L);
166     luaL_register(L, MODULE_NAME, Facebook_methods);
```

Corresponding Lua API:

```
facebook.init()
facebook.get_version()
facebook.logout()
facebook.access_token()
...
```

Public Lua API



Example: facebook.cpp - generic implementation

```
112  static int Facebook_Init(lua_State* L)
113  {
114      DM_LUA_STACK_CHECK(L, 0);
115
116      if (Platform_FacebookInitialized()) ← Calling a platform
117      {                                     specific implementation
118          return luaL_error(L, "Facebook has already been initialized");
119      }
120      Platform_FacebookInit(L);
121
122      return 0;
123  }
```

facebook_android.cpp - Calling JNI (Java)

```
387
388     bool Platform_FacebookInitialized()
389     {
390         return g_Facebook.m_FBApp != 0 && g_Facebook.m_FB != 0;
391     }
392
393     int Platform_FacebookInit(lua_State* L)
394     {
395         dmAndroid::ThreadAttacher threadAttacher;
396         JNIEnv* env = threadAttacher.GetEnv();
397
398         // FacebookAppJNI
399         {
400             jclass fb_app_class = dmAndroid::LoadClass(env, "com.defold.facebook.FacebookAppJNI");
401
402             g_Facebook.m_Activate = env->GetMethodID(fb_app_class, "activate", "()V");
403             g_Facebook.m_Deactivate = env->GetMethodID(fb_app_class, "deactivate", "()V");
```

facebook_emscripten.cpp - Calling JavaScript

```
237 int Platform_FacebookInit(lua_State* L)
238 {
239     DM_LUA_STACK_CHECK(L, 0);
240
241     dmFacebookInitialize(g_Facebook.m_appId, dmFacebook::GRAPH_API_VERSION);
242     dmLogDebug("FB initialized.");
243     g_Facebook.m_Initialized = true;
244
245     return 0;
246 }
247
```

```
42 extern "C" {
43     // Implementation in library facebook.js
44     void dmFacebookInitialize(const char* app_id, const char* version);
45     void dmFacebookAccessToken(OnAccessTokenCallback callback, lua_State* L);
46     void dmFacebookShowDialog(const char* params, const char* method, OnShowDialogCallback callback, dmScript::LuaCallbackInfo* lu
47     void dmFacebookDoLogout();
48     void dmFacebookLoginWithPermissions(int state_open, int state_closed, int state_failed, const char* permissions, OnLoginWithPe
49     void dmFacebookPostEvent(const char* event, double valueToSum, const char* keys, const char* values);
50     void dmFacebookEnableEventUsage();
51     void dmFacebookDisableEventUsage();
```

**JavaScript
implementation**



library_facebook.js - Interacting with the SDK

```
1  var LibraryFacebook = {
2      $FBinner: {
3          loginTimestamp: -1,
4          needsReauth: false
5      },
6
7  ✓  dmFacebookInitialize: function(app_id, version) {
8      // We assume that the Facebook javascript SDK is loaded by now.
9      // This should be done via a script tag (synchronously) in the html page:
10     // <script type="text/javascript" src="//connect.facebook.net/en_US/sdk.js"></script>
11     // This script tag MUST be located before the engine (game) js script tag.
12     try {
13         FB.init({
14             appId      : UTF8ToString(app_id),
15             status     : false,
16             xfbml      : false,
17             version     : UTF8ToString(version),
```


THAT'S A WRAP!

THANK YOU!



Q & A / DISCUSSION

- Links

- Web: www.defold.com
- Discord: <https://discord.gg/cHBde7J>
- Twitter: <https://twitter.com/defold>
- Mastodon: <https://mastodon.gamedev.place/@defold>

- Dev team

- <https://twitter.com/bjornritzl>
- <https://twitter.com/mwesterdahl76>
- <https://twitter.com/agulev>
- <https://twitter.com/jhonnygoransson>
- <https://twitter.com/v1aad>
- <https://twitter.com/matgis>

