

# Open Source Tools for Game Development

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# A few notes...

- Please tweet with #flourish
- Feel free to interrupt!
- Slides are at <http://icculus.org/flourish/>

# Who am I?

- Game developer, porter, hacker
- Ports video games, builds tools
- @icculus on Twitter
- icculus@icculus.org
- <http://icculus.org/resume>



**ACTIVISION®**





GOOGLE™





But enough about me.

# DISCLAIMER:

This is by no means a  
complete list.

SDL

# Simple Directmedia Layer

- Video, Audio, Input, Plumbing
- Low level
- Lots of platforms
- Easy to use!
- <http://libsdl.org/>

A simple Direct3D example.

```
WNDCLASSEX winClass;
MSG        uMsg;

memset(&uMsg, 0, sizeof(uMsg));

winClass.lpszClassName = "MY_WINDOWS_CLASS";
winClass.cbSize        = sizeof(WNDCLASSEX);
winClass.style         = CS_HREDRAW | CS_VREDRAW;
winClass.lpfnWndProc   = WindowProc;
winClass.hInstance     = hInstance;
winClass.hIcon         = LoadIcon(hInstance, (LPCTSTR)IDI_DIRECTX_ICON);
winClass.hIconSm       = LoadIcon(hInstance, (LPCTSTR)IDI_DIRECTX_ICON);
winClass.hCursor       = LoadCursor(NULL, IDC_ARROW);
winClass.hbrBackground = (HBRUSH)GetStockObject(BLACK_BRUSH);
winClass.lpszMenuName  = NULL;
winClass.cbClsExtra    = 0;
winClass.cbWndExtra    = 0;

if( RegisterClassEx(&winClass) == 0 )
    return E_FAIL;

g_hWnd = CreateWindowEx( NULL, "MY_WINDOWS_CLASS",
                        "Direct3D (DX9) - Full Screen",
                        WS_POPUP | WS_SYSMENU | WS_VISIBLE,
                        0, 0, 640, 480, NULL, NULL, hInstance, NULL );

if( g_hWnd == NULL )
    return E_FAIL;

ShowWindow( g_hWnd, nCmdShow );
UpdateWindow( g_hWnd );
```





```

// Can we get a 32-bit back buffer?
if( FAILED( g_pD3D->CheckDeviceType( D3DADAPTER_DEFAULT,
                                     D3DDEVTYPE_HAL,
                                     D3DFMT_X8R8G8B8,
                                     D3DFMT_X8R8G8B8,
                                     FALSE ) ) )
{
    // TO DO: Handle lack of support for a 32-bit back buffer...
    return;
}

// Can we get a z-buffer that's at least 16 bits?
if( FAILED( g_pD3D->CheckDeviceFormat( D3DADAPTER_DEFAULT,
                                       D3DDEVTYPE_HAL,
                                       D3DFMT_X8R8G8B8,
                                       D3DUSAGE_DEPTHSTENCIL,
                                       D3DRTYPE_SURFACE,
                                       D3DFMT_D16 ) ) )
{
    // TO DO: Handle lack of support for a 16-bit z-buffer...
    return;
}

//
// Do we support hardware vertex processing? if so, use it.
// If not, downgrade to software.
//

D3DCAPS9 d3dCaps;

if( FAILED( g_pD3D->GetDeviceCaps( D3DADAPTER_DEFAULT,
                                   D3DDEVTYPE_HAL, &d3dCaps ) ) )
{
    // TO DO: Respond to failure of GetDeviceCaps
    return;
}

DWORD flags = 0;

if( d3dCaps.VertexProcessingCaps != 0 )
    flags = D3DCREATE_HARDWARE_VERTEXPROCESSING;
else
    flags = D3DCREATE_SOFTWARE_VERTEXPROCESSING;

```

```
//
// Everything checks out - create a simple, full-screen device.
//

D3DPRESENT_PARAMETERS d3dpp;
memset(&d3dpp, 0, sizeof(d3dpp));

d3dpp.Windowed                = FALSE;
d3dpp.EnableAutoDepthStencil  = TRUE;
d3dpp.AutoDepthStencilFormat  = D3DFMT_D16;
d3dpp.SwapEffect               = D3DSWAPEFFECT_DISCARD;
d3dpp.BackBufferWidth         = 640;
d3dpp.BackBufferHeight        = 480;
d3dpp.BackBufferFormat        = D3DFMT_X8R8G8B8;
d3dpp.PresentationInterval    = D3DPRESENT_INTERVAL_IMMEDIATE;

if( FAILED( g_pD3D->CreateDevice( D3DADAPTER_DEFAULT, D3DDEVTYPE_HAL, g_hWnd,
                                flags, &d3dpp, &g_pd3dDevice ) ) )
{
    // TO DO: Respond to failure of CreateDevice
    return;
}
```

```
// TO DO: Respond to failure of Direct3DCreate8
```

ॐ — ॐ

The complex SDL version.

```
SDL_Init(SDL_INIT_VIDEO);
```

```
SDL_SetVideoMode(640, 480, 0,  
                 SDL_FULLSCREEN |  
                 SDL_OPENGL);
```

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—

# SDL 1.2

- Video (2D and OpenGL)
- Audio (DSP and CD)
- Events
- Timers
- Joysticks
- OS stuff: Threads, DLLs, C runtime



# SDL 2.0

- Remove limitations, modernizes features.
- Multi-window, multi-audio, multi-input.
- Android, iOS, etc.
- Work in progress, but try it now!

OpenAL

# OpenAL

- 3D positional audio
- Cross-platform
- Easy to use
- Good for 2D games, too!
- <http://openal.org/>

```
bool initOpenAL(void)
{
    ALCdevice *dev = alcOpenDevice(NULL) ;
    if (!dev)
        return false;

    ALCcontext *ctx = alcCreateContext(dev, NULL) ;
    if (!ctx)
    {
        alcCloseDevice(dev) ;
        return false;
    }

    alcMakeContextCurrent(ctx) ;

    return true;
}
```



# OpenAL

- Stateful objects, like OpenGL
- One Listener
- A handful of Sources
- Many Buffers
- Buffer queues

SQLite

# SQLite

- Powerful embedded SQL engine.
- One file per database, in-process.
- One .c file, dropped into your project.
- You're already using it.
- <http://sqlite.org/>



# Know your tools.

“SQLite doesn’t compete with Oracle. It competes with fopen().”

-- D. Richard Hipp, primary developer

PhysicsFS

# Blatant self-promotion!

- I wrote PhysicsFS.
- It's awesome.
- You should use it, so you can be awesome.
- <http://icculus.org/physfs/>

# PhysicsFS

- Virtual File System.
- Transparent archives and files.
- Makes game updates and mods easier.
- Security, functionality, flexibility.

Look, I already know it  
doesn't have anything  
to do with physics.

# So what about physics?

- Open Dynamics Engine (ODE)
- Box2D

# Ogg Vorbis and Speex

THE INTERNATIONAL FANTASY BESTSELLER!

TERRY  
PRATCHETT



SMALL GODS

A NOVEL OF DISCWORLD



# Ogg Vorbis and Speex

- Vorbis: compressed audio data
- Speex: compressed voice data
- Patent unencumbered, BSD licensed.
- <http://xiph.org/>

# ProTip

- Don't use libvorbis directly.
- Use libvorbisfile.

Ogg Theora



# Ogg Theora

- Video equivalent of Ogg Vorbis.
- Based on On2's VP3 codec.
- HD video at reasonable bitrates.
- Patent unencumbered, BSD licensed.
- <http://theora.org/>

# ProTip

There is no libvorbisfile for Theora!

# Blatant self-promotion!

- TheoraPlay makes Ogg Theora way easier.
- <http://icculus.org/theoraplay/>

Lua



# Lua

- Dirt-simple scripting language.
- Crazy powerful, yet efficient.
- Easy to embed and bridge with C.
- Very popular in current AAA titles.
- <http://lua.org/>

**zlib, libpng, libjpeg**

# ProTip

...don't use these libraries.

stb\_\*

# stb\_\*

- Sean Barrett is a ninja.
- Decoders, decompressors, etc.
- Everything is in the public domain.
- <http://nothings.org/>

# miniz

- zlib in 300 lines of C.
- Faster than zlib.
- Other features.
- <http://code.google.com/p/miniz/>

enet

# enet

- Networking is hard.
- Unreliable, fragmented, sequenced packets.
- Reliable streams over UDP.
- Channels.
- <http://enet.bespin.org/>



MojoShader

# Blatant self-Promotion!

- MojoShader makes your compiled Direct3D shaders work on OpenGL!
- GLSL shaders, ARB programs.
- Shader assembler and preprocessor.
- HLSL compiler coming soon!
- <http://icculus.org/mojoshader/>

Hey!

I thought you said  
“tools!”

Google Breakpad

Valgrind

**gdb7**

clang

Blender



# Git and Mercurial

The whole package?

# Game engines

- ioquake3, iodoom3
- OGRE
- Crystal Space
- Cube/Sauerbraten
- HGE



cool like DADDY



# That's all folks.

- Questions? Answers!
- Hire me.
- <http://icculus.org/flourish/>
- Ryan C. Gordon: [icculus@icculus.org](mailto:icculus@icculus.org)
- <http://twitter.com/icculus>
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