

CS 134

What is a Game Engine?

Game Engine Architecture
Sections 1.1 – 1.6

Today in Video Games

Dragon Ball FighterZ review

It's Krillin time.



Games in this article



[Dragon Ball Fighters](#)
Xbox One, PlayStation 4, PC

[+ Follow](#) 164

Dragon Ball FighterZ is a fantastic fighting game, and worth playing whether you're into Dragon Ball and fighters or not.



CS 185C

Roll Call

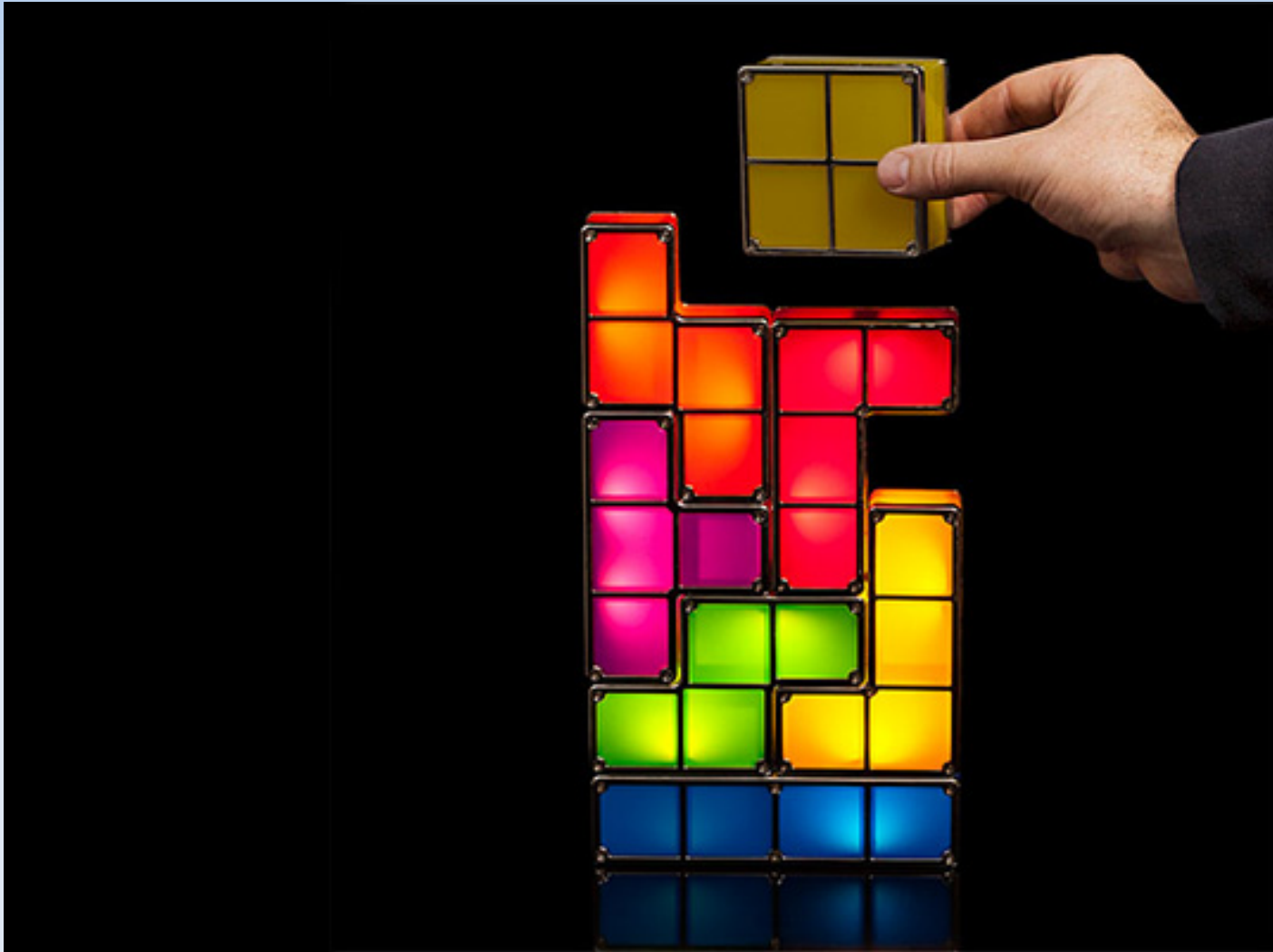
Wanna make a game?

Who makes video games?

What is a game engine?

How are game engines different?

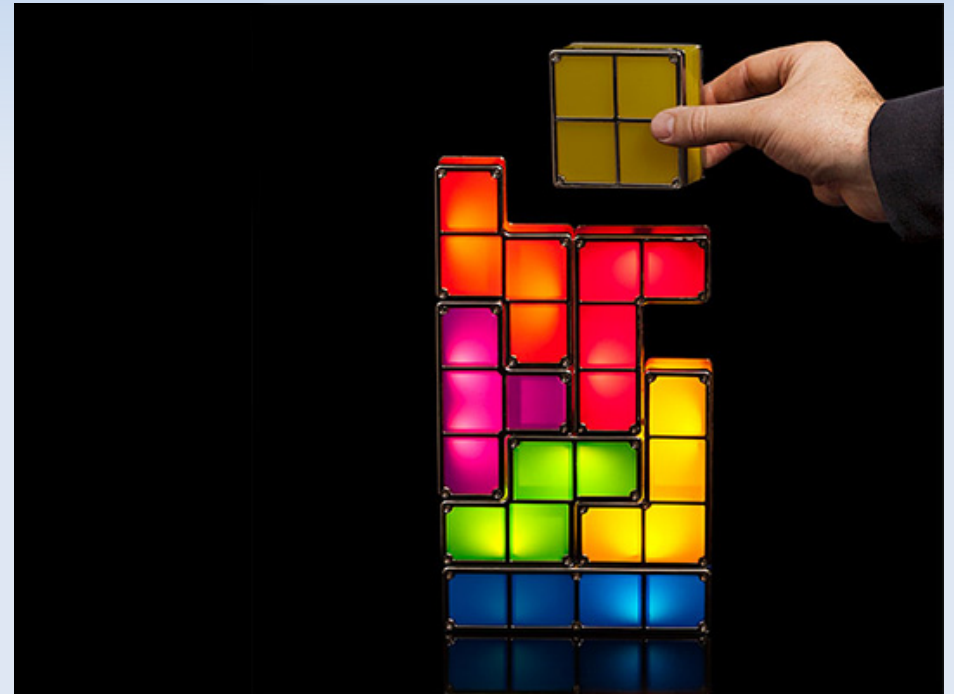
Who makes video games?



Who makes video games?

- Programming
- Art
- Design
- Production

- QA
- Publishing
- Community



Who makes video games?

- Programming, Design, Art, and Production make up the "Core Team"
- Common ratios are 1 Prog : 2 Design : 4 Art
 - 1 Prod per 5 – 10 people
- Classic Doom's team:
 - Programming: John Carmack
 - Design: John Romero, Sandy Peterson
 - Art: Adrian Carmack, Kevin Cloud, Don Ivan Puchatz, Gregor Puchatz

Who makes video games?

- Programming

- Engine programmer Networking programmer
- Graphics programmer Gameplay programmer
- Tools programmer Server programmer
- AI programmer and more...

- Art

- Concept artist Environment artist
- Character artist User Interface Artist
- Animator Art Director

Who makes video games?

Questions?

What is a Game Engine?

Most studios nowadays are using an existing engine like Unity or Unreal.

Understanding what it takes to make a game engine is helpful for using existing engines.

What is a Game Engine?

Unity3D

UNITY 4 FEATURES TO GET GOING WITH RIGHT NOW

INTUITIVE 2D TOOLS

Designed to make your life easier, Unity's 2D solution features amazingly efficient workflows. Get a simple game up and running in no time or use advanced features to create sophisticated 2.5D content.

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THE ANIMATION SOLUTION

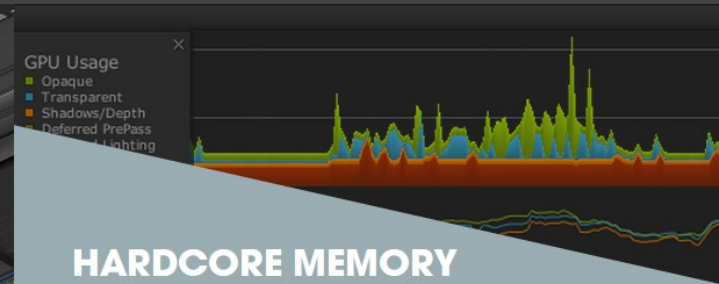
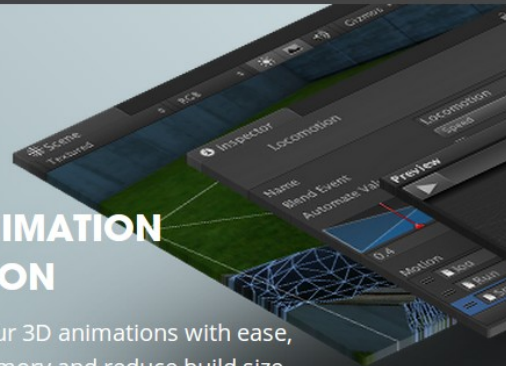
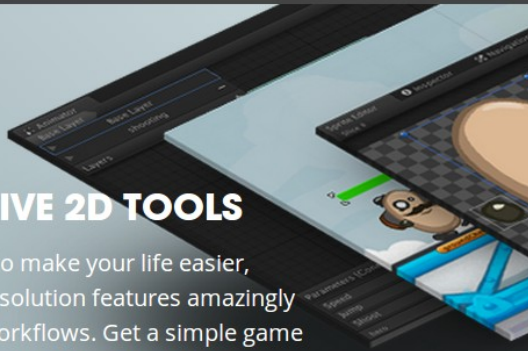
Retarget your 3D animations with ease, save on memory and reduce build size. Plus, animate in 2D with our dopesheet animation window.

[Learn more](#)

HARDCORE MEMORY PROFILING

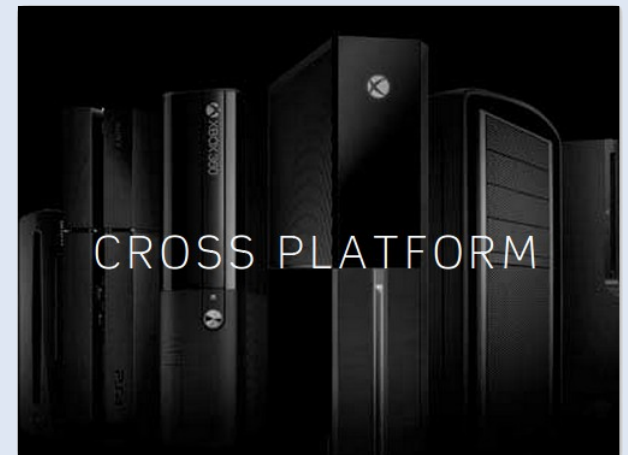
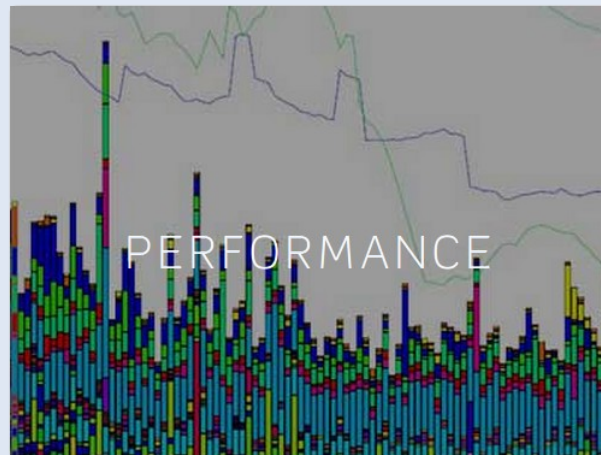
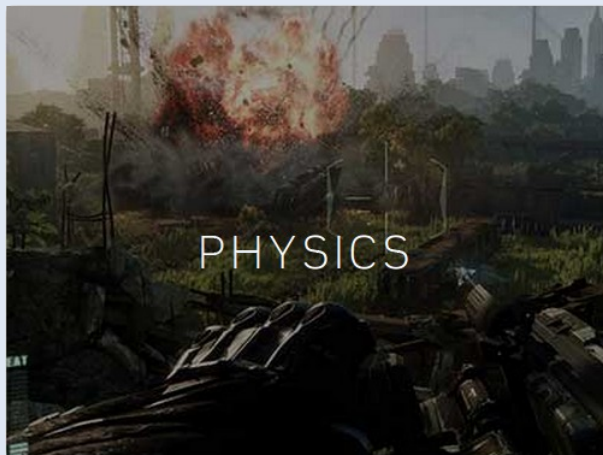
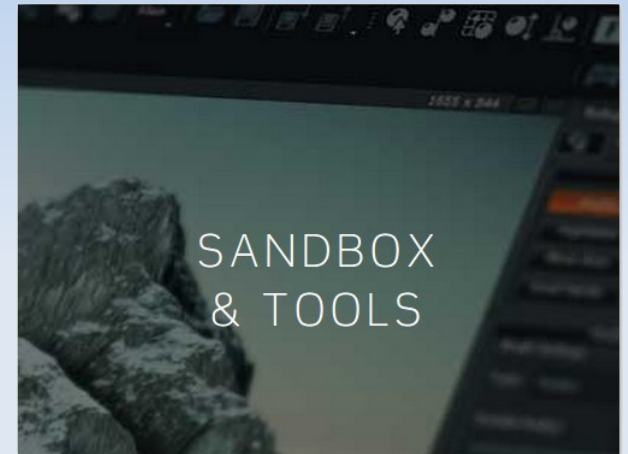
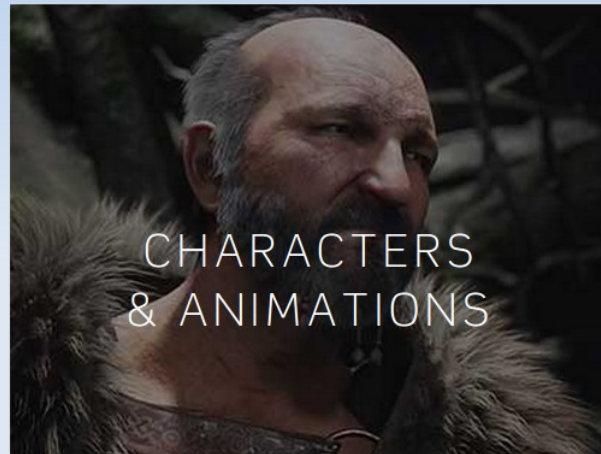
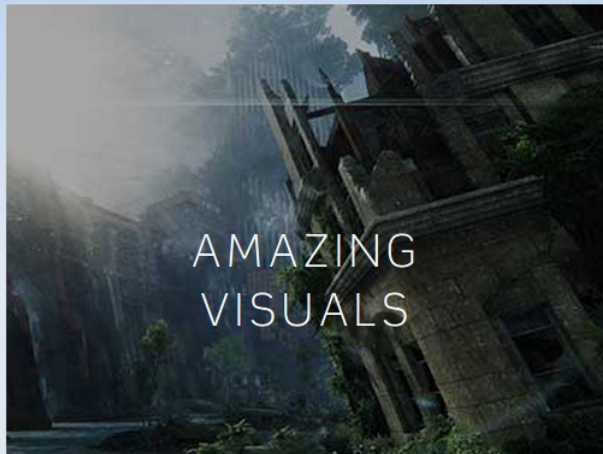
Dig deep into your build to identify performance bottlenecks with total precision.

[Learn more](#)



What is a Game Engine?

CryEngine



What is a Game Engine?

Unreal Engine

- DirectX 11 Rendering Features
- Cascade Visual Effects
- New Material Pipeline
- Blueprint Visual Scripting
- Live Blueprint Debugging
- Content Browser
- Persona Animation
- Matinee Cinematics
- Terrain & Foliage
- Post-Process Effects
- Full Source Code Access
- Professional Source Control
- C++ Code View
- Hot Reload Function
- Simulate & Immersive Views
- Instant Game Preview
- Possess & Eject Features
- Artificial Intelligence
- Audio
- Leading Middleware Integrations

What is a Game Engine?

Infinity Engine

GAME FEATURE

INFINITY ENGINE **2**

Year 2 of the award-winning Infinity Engine brings both a more polished physics simulation and introduces the all-new Force Impact System.

Power moves including the Hit Stick, Truck, dive tackle and more have been completely redesigned to harness the full potential of Infinity Engine 2, giving you more control over the outcome of a play than ever before.



DISCOVER INFINITY ENGINE 2

ARTICLE
PLAYING D

VIDEO
DEFENSIVE CONTROL

What is a Game Engine?

- Wikipedia says:
 - A game engine is a software framework designed for the creation and development of video games.
 - The core functionality typically provided by a game engine includes a rendering engine (“renderer”) for 2D or 3D graphics, a physics engine or collision detection (and collision response), sound, scripting, animation, artificial intelligence, networking, streaming, memory management, threading, localization support, and a scene graph.

What is a Game Engine?

- Graphics
 - Drawing, LODs, FX, Culling, ...
- Physics
 - Collision Detection, Collision Resolution, Raycasts
- Sound
 - 3D Positioning, Reverb
- Network
 - Synchronization, Prediction
- Integrated Editors
 - Edit live games, Behavior (AI) editing
- Multiple platforms
 - Xbox, PlayStation, Mobile, PC, ...
- Game-type specific Logic

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What is a Game Engine?

- In this class, we will cover how to write the following things:
 - Graphics
 - Physics
 - Input
 - Sound
 - AI
 - Data files

What is a Game Engine?

Questions?

How are Game Engines Different?

```
/*  
 * HelloWorldSwing.java requires no other files.  
 */  
import javax.swing.*;  
  
public class HelloWorldSwing {  
    public static void main(String[] args) {  
        //Schedule a job for the event-dispatching thread:  
        //creating and showing this application's GUI.  
        javax.swing.SwingUtilities.invokeLater(new Runnable() {  
            public void run() {  
                createAndShowGUI();  
            }  
        });  
    }  
}
```

How are Game Engines Different?

```
private static void createAndShowGUI() {  
    //Create and set up the window.  
    JFrame frame = new JFrame("HelloWorldSwing");  
    frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);  
  
    //Add the ubiquitous "Hello World" label.  
    JLabel label = new JLabel("Hello World");  
    frame.getContentPane().add(label);  
  
    //Display the window.  
    frame.pack();  
    frame.setVisible(true);  
}  
}
```

How are Game Engines Different?

- Most of the time, no code is running!
- Small init section / event based logic
- Why is this done?
 - Saves energy
 - Nicer if you are running multiple programs
 - Easy to detect if a program has locked up

How are Game Engines Different?

- These goals don't carry over to games.
- Instead, games want:
 - High framerate
 - Fun and flavorful UI
 - Maximum use of hardware
 - Run in fullscreen
- Games have a very different program structure!

How are Game Engines Different?

```
bool shouldExit = false;
```

```
int main( void )
```

```
{
```

```
    SDL_Init( SDL_INIT_VIDEO );
```

```
    SDL_GL_SetAttribute( SDL_GL_BUFFER_SIZE, 32 );
```

```
    SDL_GL_SetAttribute( SDL_GL_DOUBLEBUFFER, 1 );
```

```
    SDL_Window* window = SDL_CreateWindow(
```

```
        "TestSDL",
```

```
        SDL_WINDOWPOS_UNDEFINED, SDL_WINDOWPOS_UNDEFINED,
```

```
        640, 480,
```

```
        SDL_WINDOW_OPENGL );
```

```
    SDL_GL_CreateContext( window );
```

```
    glewInit();
```

```
    // Setup OpenGL state
```

```
    glViewport( 0, 0, 640, 480 );
```

```
    glMatrixMode( GL_PROJECTION );
```

```
    glOrtho( 0, 640, 480, 0, 0, 100 );
```

```
    glEnable( GL_TEXTURE_2D );
```


How are Game Engines Different?

```
// The game loop
while( !shouldExit ) {
    // Handle OS message pump
    SDL_Event event;
    while( SDL_PollEvent( &event ) ) {}

    GameLogic();

    SDL_GL_SwapWindow( window );
}

SDL_Quit();

return 0;
}
```

How are Game Engines Different?

- The while() loop here is the "Game Loop" of a game.
- Each iteration is a single graphics frame
 - Why graphics?
- Every function you write just need to handle enough to get the game to its next frame, NOT to the final result.

How are Game Engines Different?

- Note that not every system needs to run at the same speed as graphics
- Some often run faster:
 - Physics
- Some often run slower:
 - AI

How are Game Engines Different?

We will cover the game loop
in more depth next class.

Questions?