

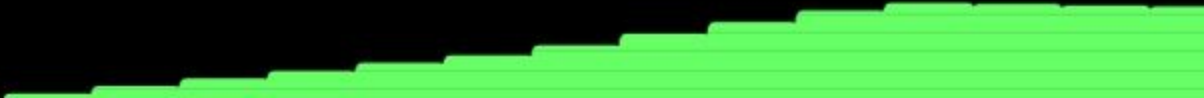
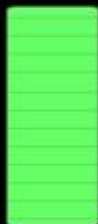
GD50

Lecture 8: Helicopter Game (3D)

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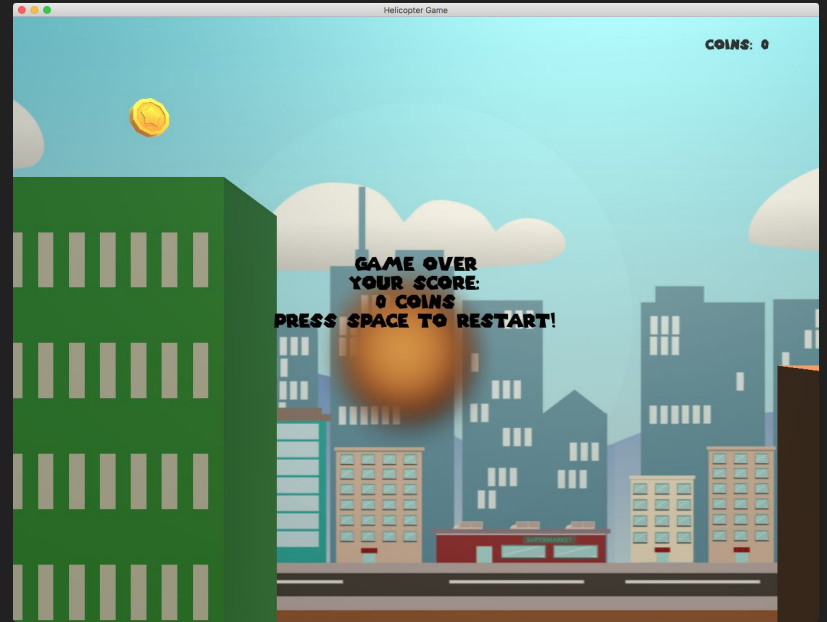


Topics

- Unity
- C#
- Blender
- Components
- Colliders and Triggers
- Prefabs and Spawning
- Texture Scrolling
- Audio

But first, a demo!

Our Goal



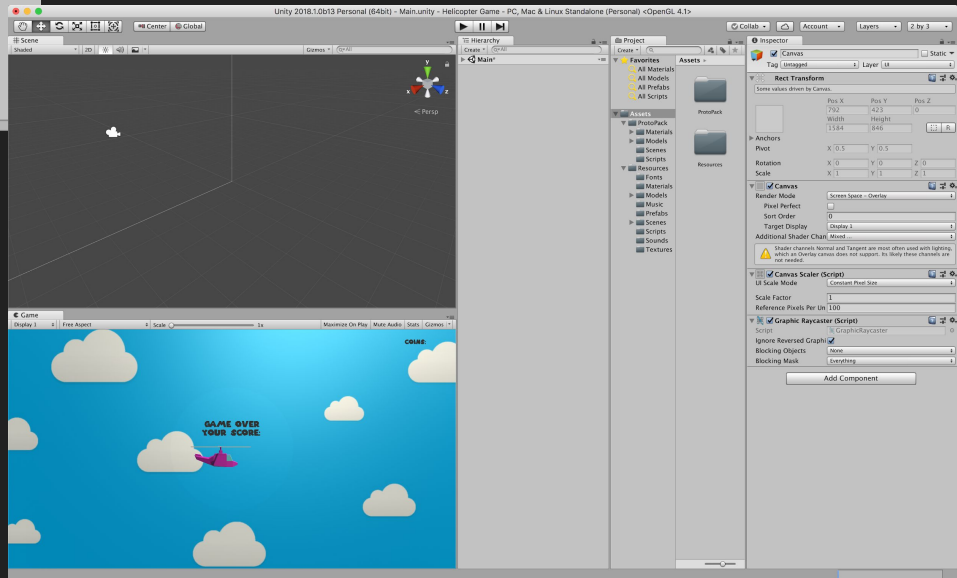
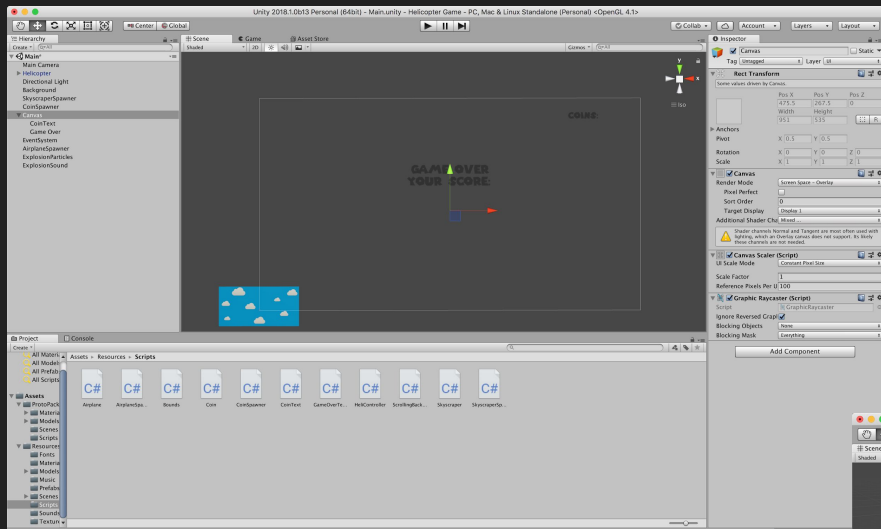
Download Unity

<https://unity3d.com/get-unity/download>

<https://unity3d.com/unity/beta>

Unity

- 3D and 2D game engine maintained and created by Unity Technologies.
- One of the top game engines in use, alongside engines like Unreal, Godot, CryEngine, and others.
- Free to use in its entirety with revenue-based restrictions (paid plans begin at \$100k gross revenue).
- Very strong mobile and VR presence compared to other game engines.
- Primarily scripted in C#, a statically-typed object-oriented language.

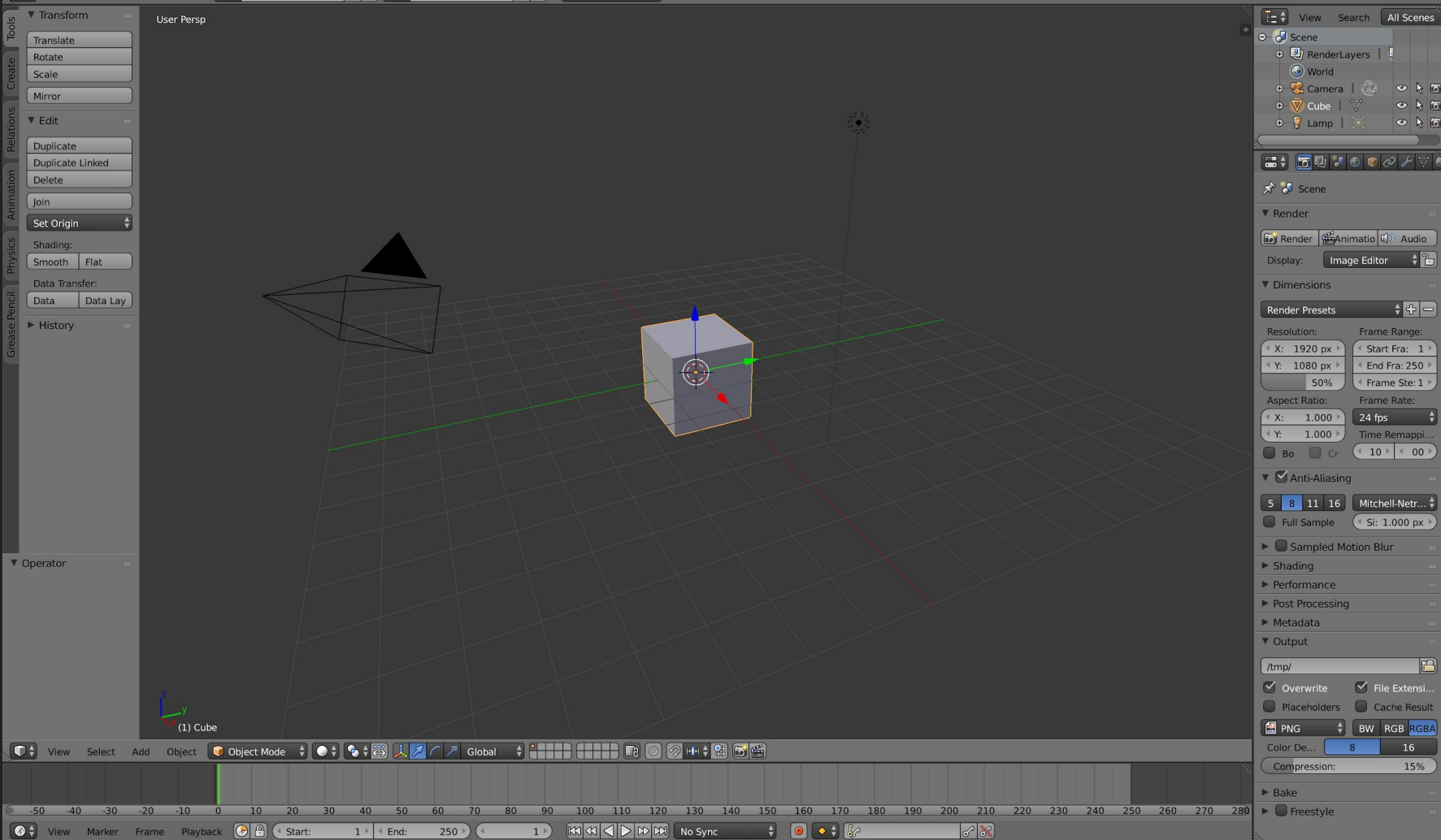




- Statically-typed object-oriented language created by Microsoft, very similar to Java.
- Primary language used to script any and all components and objects in Unity; prior languages Boo and UnityScript have been deprecated.
- Very widely used outside of Unity for games, GUI applications, .NET applications, and Mono applications.

Blender

- Completely free state-of-the-art 3D modeling software.
- Open-source.
- Not required to use in this course, but a tremendous tool to have as one starting out in 3D game development.



GameObjects

- The core class in Unity; everything is a `GameObject`.
- `GameObjects` are comprised of `MonoBehaviours`, which are effectively components in an Entity-Component System (ECS).
- `MonoBehaviours` are programmed in C# and give `GameObjects` their behavior by operating in tandem.

Inspector

Helicopter Static

Tag Untagged Layer Default

Model Select Revert Open

Transform

Position X 1.27 Y 0 Z 10

Rotation X 0 Y 90 Z 0

Scale X 0.5 Y 0.5 Z 0.5

Animation

Animation Default Take

Animations

Play Automatically

Animate Physics

Culling Type Always Animate

Rigidbody

Mass 1

Drag 1

Angular Drag 0.05

Use Gravity

Is Kinematic

Interpolate None

Collision Detection Discrete

Constraints

Audio Source

Particle System

Heli Controller (Script)

Script HeliController

Speed 20

Coin Total 0

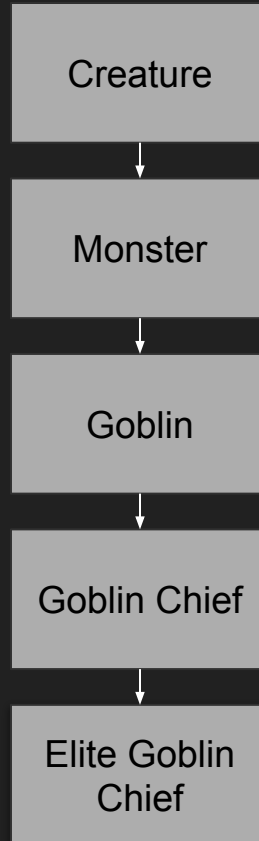
Explosion ExplosionParticles (Particle S)

Explosion Sound ExplosionSound (Audio Sourc)

Default-Particle

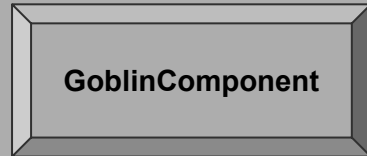
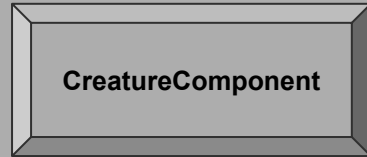
Shader Particles/Alpha Blended Premultiply

Inheritance



Composition

GameObject

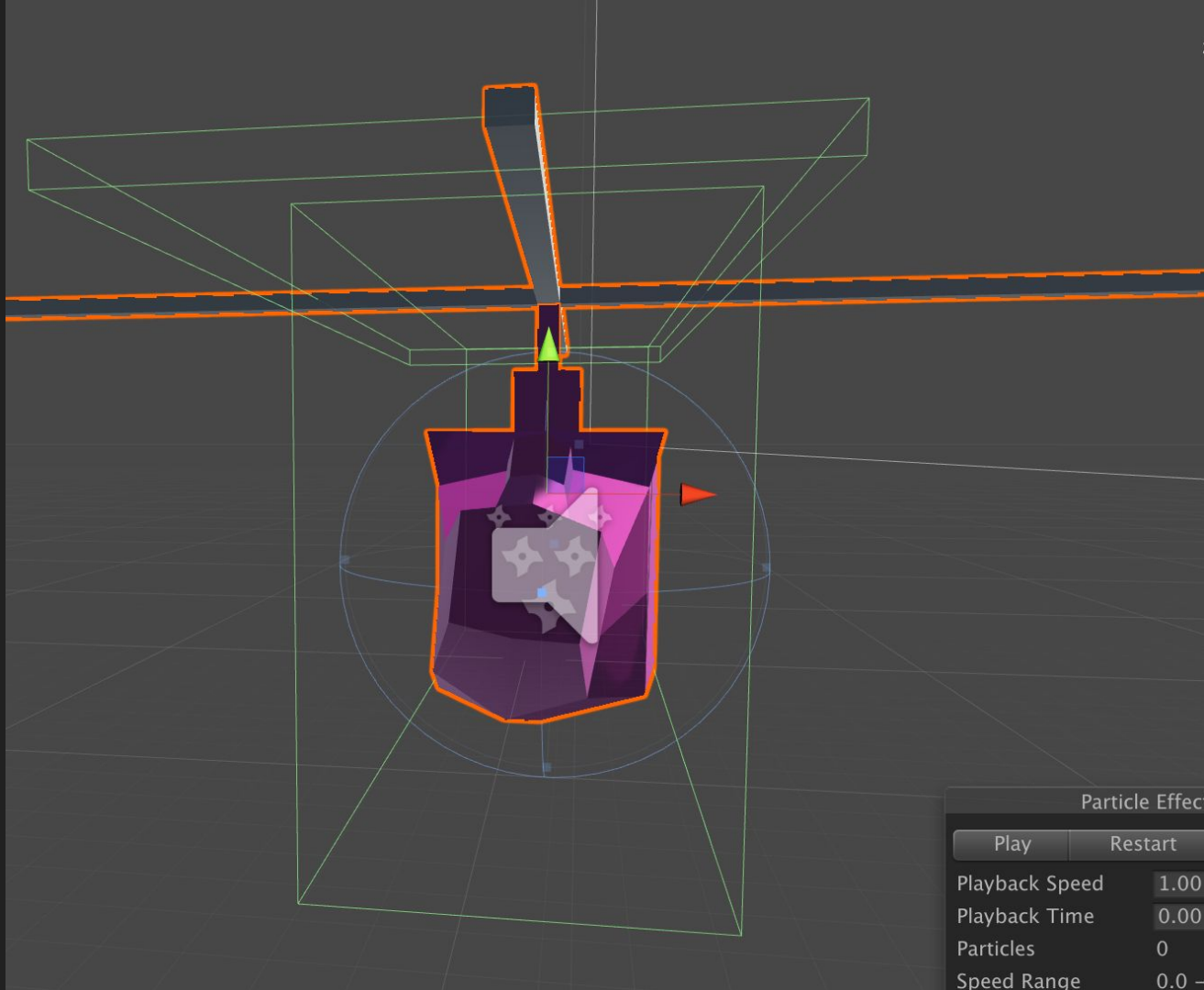


MonoBehaviours

- The core of all behavior in Unity; attached to GameObjects and updated on a frame-by-frame basis.
- MonoBehaviours implement a particular interface with pre-determined methods that Unity expects, such as Update, Start, OnTrigger, and more.
- All customized behavior for every object in a game's scene will generally be implemented in code via some type of MonoBehaviour, with the exception of built-in components that can be modified through the GUI.

Colliders and Triggers

- A `Collider` defines the shape of an object in our scene for the purposes of 3D collision detection.
- A `Trigger` is an object in our scene which will fire `OnTrigger` (implemented in a `MonoBehaviour`) when it detects collision with a `Collider`.
- By combining `Colliders` and `Triggers`, we can simulate many kinds of interactions between objects and the game space, as well as objects between objects.



Particle Effect

Play

Restart

Playback Speed 1.00

Playback Time 0.00

Particles 0

Speed Range 0.0 -

Prefabs and Spawning

- Prefabs are "prefabricated" GameObjects that can be spawned at will in the game scene.
- Prefabs allow content creators to easily assemble all of the components they will want their GameObjects to have in the Unity Editor rather than in code and then spawn them in their code as needed.



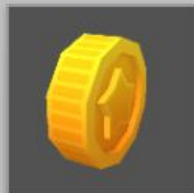
Airplane



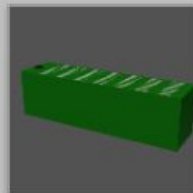
Blades



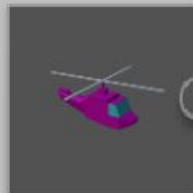
Body



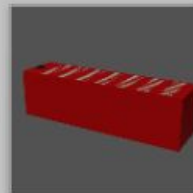
Coin



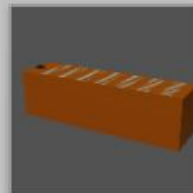
Green Skyscr...



Helicopter



Red Skyscaper



Yellow Skyscr...

Texture Scrolling

- To achieve infinite scrolling in a 3D context, we need to associate a texture with a 3D object and then perform a translation of its UV coordinates.
- UV coordinates are effectively the mapping of a texture's image data to a 3D surface.
- By offsetting the UV coordinates by some amount over time (the X axis in our case), we can simulate the appearance of an infinitely scrolling surface, assuming our object is flat.

Audio

- In Unity, an `AudioSource` is the method by which we can trigger audio playback based on conditions in our code.
- `AudioSource` is just a component provided to use by Unity, so we can access it, once attached to an object, simply by grabbing it from the `GameObject` in question with `GetComponent()` and calling its `Play()` method (much like we've done with audio sources in LÖVE until this point).
- To hear an `AudioSource` being played, an `AudioListener` needs to be present in the scene (usually attached to the default camera).

 Audio Listener



▼  Audio Source



AudioClip 

Output 

Mute

Bypass Effects

Bypass Listener Effect:

Bypass Reverb Zones

Play On Awake

Loop

Priority
High Low

Volume

Pitch

Stereo Pan
Left Right

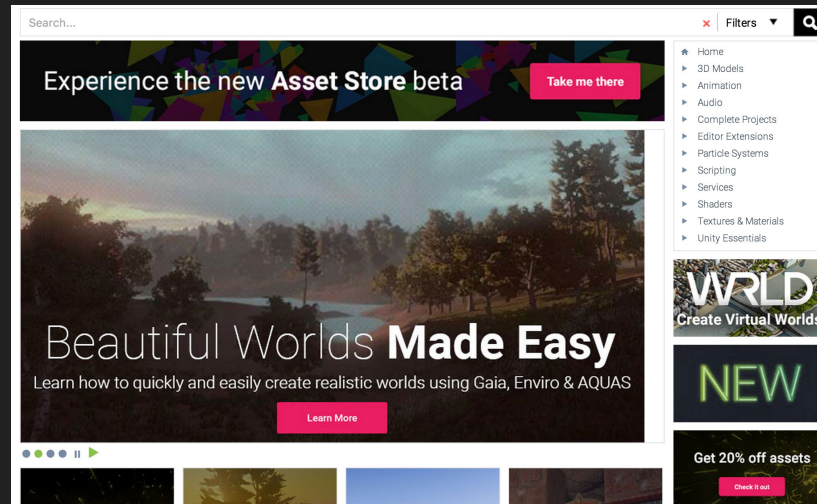
Spatial Blend
2D 3D

Reverb Zone Mix

▶ 3D Sound Settings

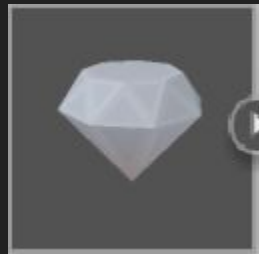
Asset Store

- Tremendous selection of free and paid assets to aid in game creation.
- Complete projects, models, effects, editor tools, and more.



Assignment 8

- Introduce gems into the game that spawn just like coins, but more rarely; each gem should be worth 5 coins (model included in the Proto asset pack).
- There's currently a bug where the scroll speed of skyscrapers and coins doesn't reset on game over (hint: static variables don't refresh on scene reload); find and fix this!



Next Time...



See you next time!

