CIS367 Computer Graphics Introduction to Unity

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Wot is it?

Cross-platform graphics/game development framework

Comprises an engine and full-featured IDE

C# / Mono

Develop applications for:

- PC
- Consoles
- Mobile
- Web
- ...

Based on what we know so far...

Think of it kind of as a mashup of Blender and WebGL

- Facilities for modeling objects in the Scene Editor
- Ability to script out actions (and everything)
- (plus much, much more!)

\$\$\$

Unity Pro: not free

Unity Personal: free

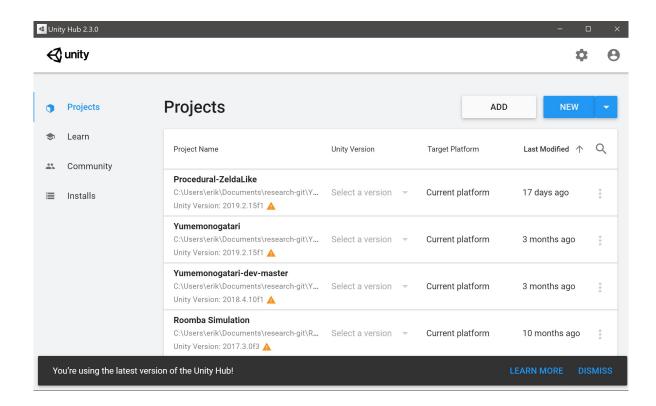
	Personal	Plus	Dro	Enterprise
	Free Start creating with the free version of Unity	\$399 /yr per seat More functionality and resources to power your projects	Pro \$2,040 /yr per seat Complete solution for professionals to create and operate	Enterprise Success at scale for large organizations with ambitious goals
	Get started Are you a student? Get the free Student plan	Choose plan	Choose plan	Contact us For large teams
Create				
① Unity real-time development platform	~	~	~	~
① Unity Visual Scripting	~	~	~	~
Unity Version Control (3 users and 5GB storage)	✓	~	~	~
Splash screen customization	_	~	~	~
① Deploy to game consoles	_	_	~	~
① Unity Mars authoring tools for AR/MR	-	_	~	~
Havok Physics for Unity	-	_	~	~
① Extended LTS support for 3 years	_	_	_	~
O Build Committee				,

Interested?

http://unity3d.com/learn/tutorials/modules

(Highly recommend the roll-a-ball video ... we'll be going through that one ourselves though)

Unity Hub



Full 3D

2D or 3D?







Full 2D







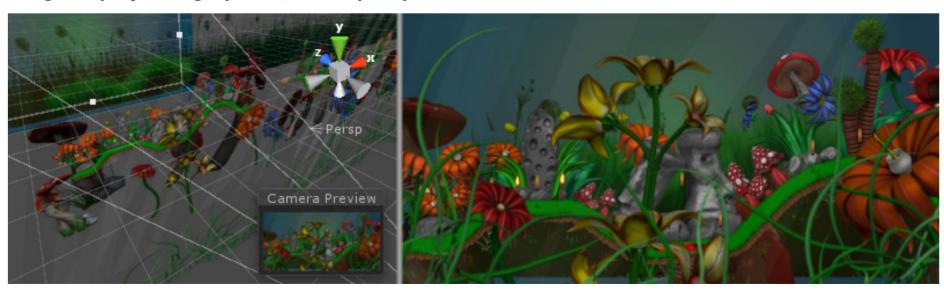
2D gameplay with 3D graphics



https://docs.unity3d.com/Manual/2Dor3D.html

Can even do this!

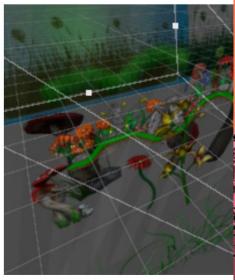
2D gameplay and graphics, with a perspective camera



Creates a "parallax" effect!

Can even do

2D gameplay and grap







Let's dive right in

New 3D project

Basics:

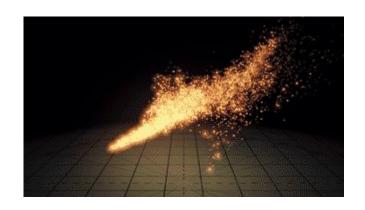
- Game objects
- Prefabs (a mind-blowing object ... we'll see how later)
- Physics
- Scripting

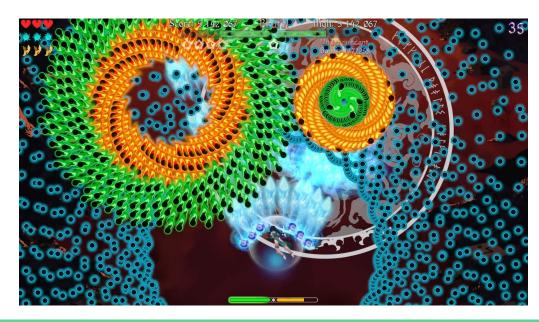
Make sure you save your 'scene' as you go

Assets

Can import various things as well (free or paid)

- Cameras
- Characters
- Effects
- Particle systems
- Physics
- etc.





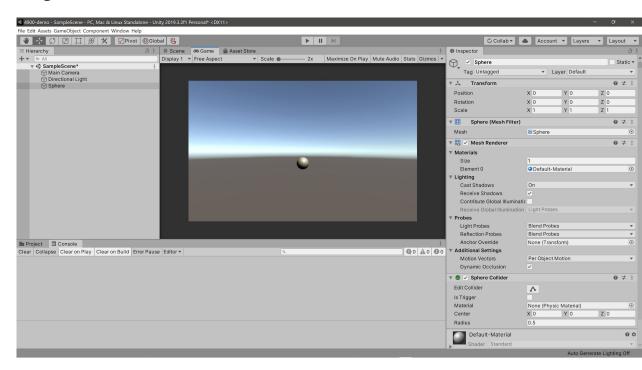
Let's create some objects

GameObject → 3D Object → Sphere (or your favorite polygon)

Can transform either by entering raw numbers or drag the **label**

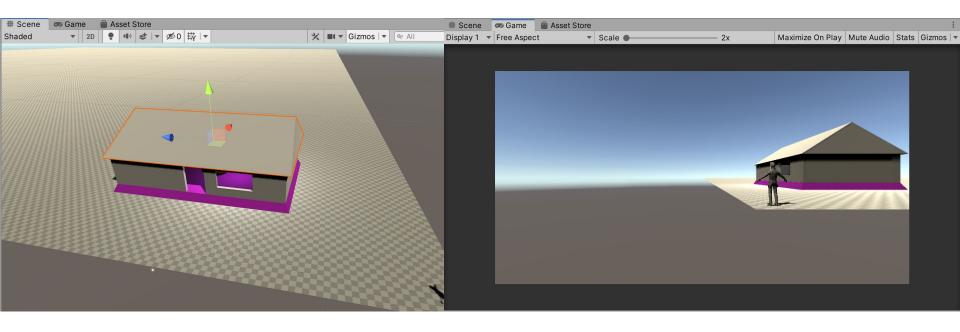
(Note, Y is up/down for the frame)

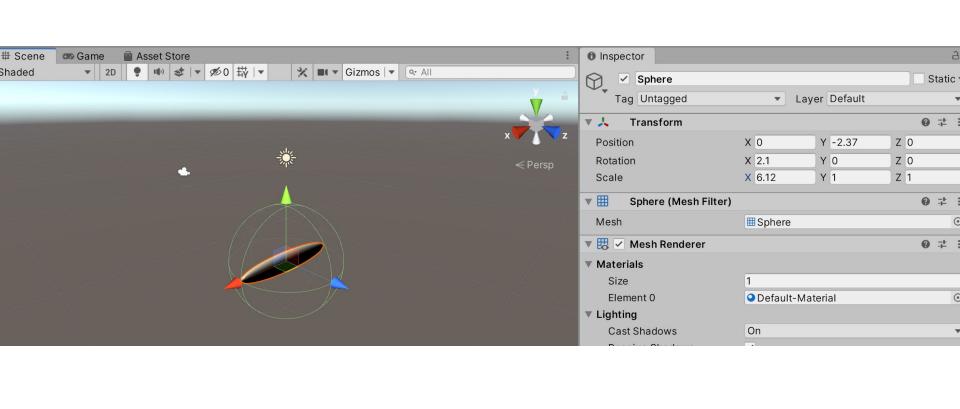
In Scene → Frame Selected will orient camera to the 'frame'





Scene vs. Game





We can turn our object into a component

Select the (object) and Component → Physics → RigidBody

Rigid objects:

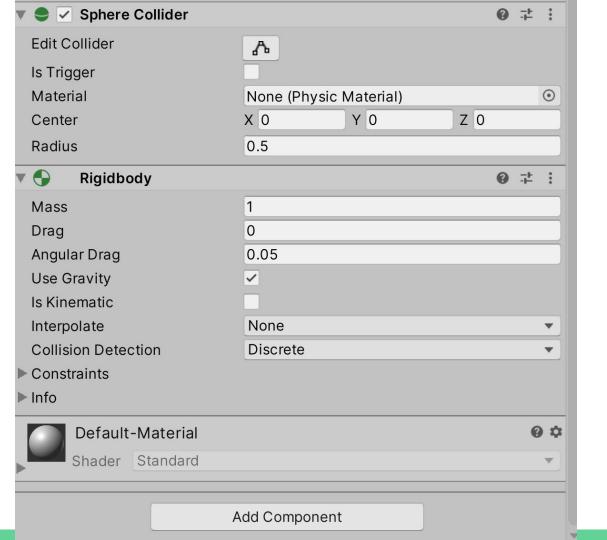
- Non-deformable
- Has physical properties (gravity, inertia, etc.)

Non-rigid objects:

- Deformable (geometry can change)
- Breakable (topology can change)

Intangible objects:

- No predefined shape
 - o Fire, clouds, smoke, etc.



Animation! (basic anyway)

Window → Animation

Select object

Component → Miscellaneous → Animation

In Animation window:

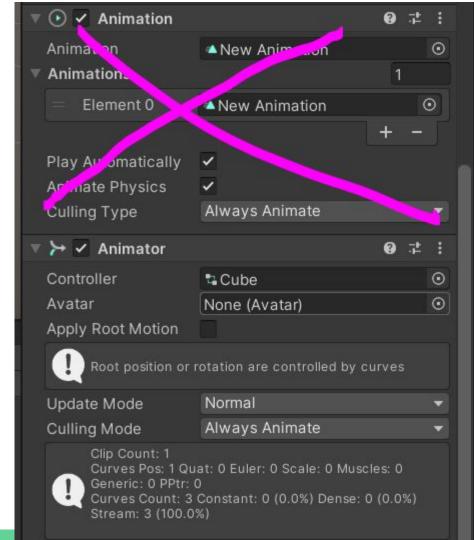
- Create new animation clip
- Record (enables keyframes)
- Curves (helps to visualize)
- Add transform property
 - Pick a new time, move around, and play!

Animation?

In Inspector → Animation, change name of 'Animation Clip' to what was just recorded → LEGACY ANIMATION!

Drag the animation in your Project onto the object and it will add an Animator component

Now go to main scene editor and click Play → What happened?



???

Uncheck Animator → Object disappeared?

IT HAS PHYSICS!

Remove rigid body component and replay!

Lighting

Game Object → Light → (light) Directional Light

Translates as normal (similar to Blender really)

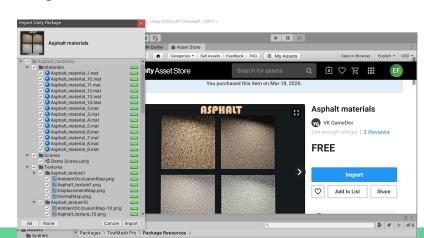
Material

Huuuuuge rabbit hole!

- Apply all our various strategies to make our objects look good
- Textures, UV maps, colors, normals, etc.

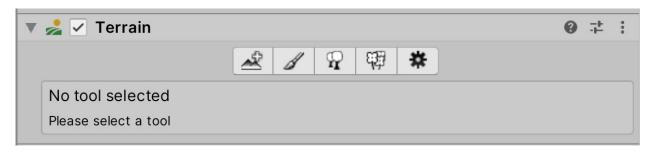
Simplest approach: add a Material component to objects

- Select an appropriate material
- Download one off the Asset store
- Make your own
- ...
- etc.!



Terrain

Game Object → 3D Object → Terrain
$$x = -5$$
, $y = 0$, $z = -5$



Raise/lower terrain (hold Shift to lower)
Paint height
etc.

→ Brush size of 1!

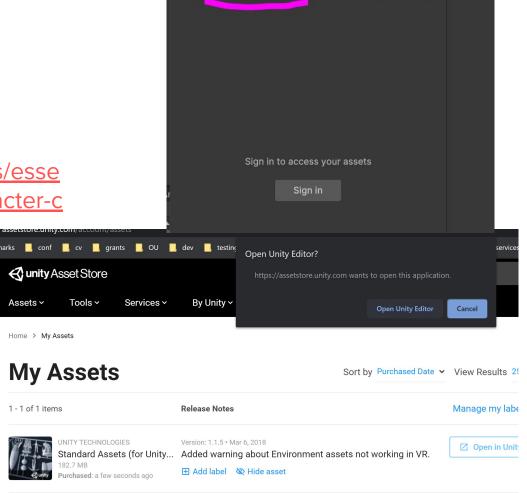
Trees? Grass?

Need an object/texture!

https://assetstore.unity.com/packages/esse ntials/starter-assets-first-person-character-c

ontroller-urp-196525

Download and Import
Window → Package Manager



■ Package Manager

+ ▼ Packages: My Assets ▼ Sort: Name ↓ ▼ Filters ▼ Clear Filters

Then we need to define a tree

Game Object → 3D Object → Tree

Then, in the terrain painter from before, 'Edit Trees'

- Pick the tree
- Paint! (or Mass Place)

https://docs.unity3d.com/Manual/tree-FirstTree.html

Tree Editor → add branches, leaves, etc.



Physics

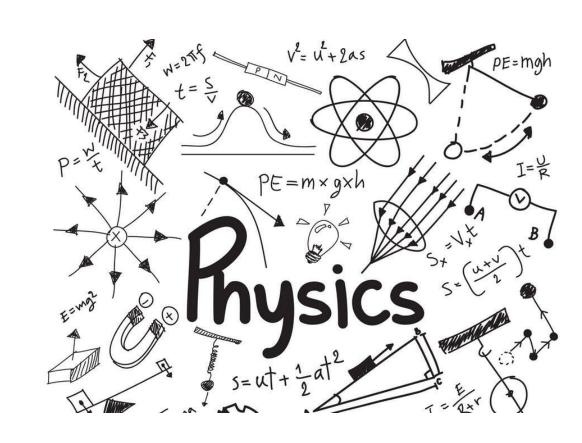
Library built into Unity!

- Rigid body
- Collider
- Joints
- Forces
- etc.

Rigid body → has gravity

Collision detection callbacks:

- OnCollisionEnter
- OnCollision
- OnCollisionExit



Let's add a PC

Need to add the 3rd person character Asset + CrossPlatformInput

- Save Scene
- Asset Store → Import 3rd person character asset
 - Need CrossPlatformInput as well, otherwise you'll get compiler errors!
- Drag Prefab onto scene and move
- Make camera a child of the character to "follow"

Click Play and you can use your arrow keys!

→ I ended up using

https://assetstore.unity.com/packages/templates/systems/3rd-person-controller-fly-mode-28647

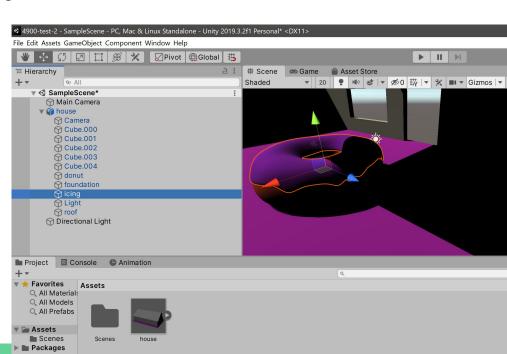
Importing Blender model

Save/copy .blend file into the Assets directory of your Unity project

- Imported automagically into the Project View
- Drag into Scene View

Or, import asset

All objects editable!

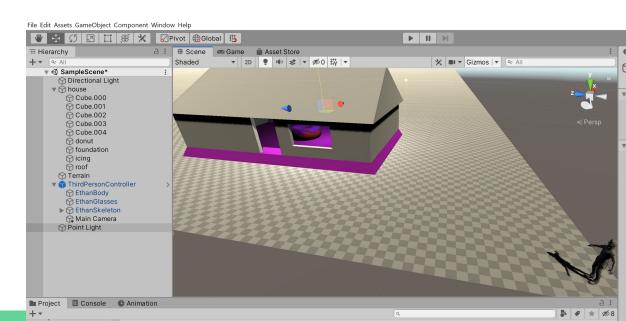


No collision?

Add rigid body / collider components!

Play with scale, jump power, etc.

Add a point light inside!



In-Class Work

You'll be eventually rolling a ball around a Unity 3D scene

- Sketch out a dungeon that you'd like to model
- What components do you think you'll need?