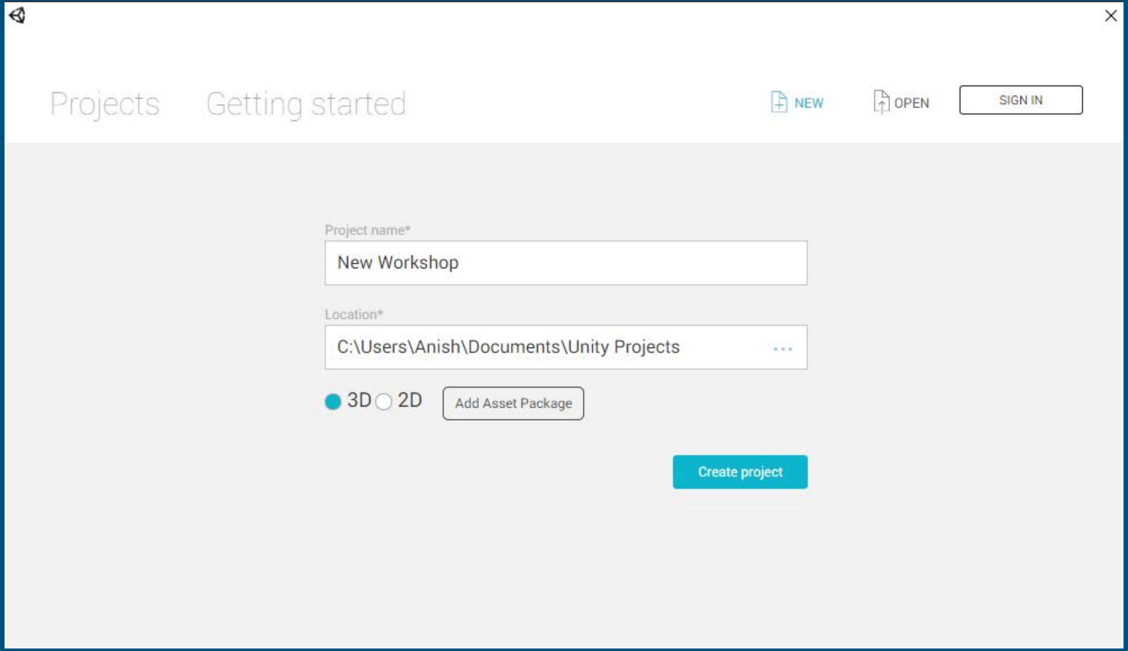
The Unity Interface

Presented by Virtual Reality Club at UCSD

Unity: Introduction

- You will need Unity: *https://unity3d.com/*
- Let's do this!
  - 1. Open Unity and create a new project
  - 2. Save your scene (File -> Save Scene)
    - Your "Project" is your entire game.
    - Your "Scene" is a single level inside of the project
    - You can make a new scene by going to File -> New Scene
- Then, to make Virtual Reality work:
  - Edit -> Project Settings -> Player -> Other Settings -> VR Supported
- **Project**: The entire game.
- **Scene**: A level of the game.

Unity: Interface



Project name*

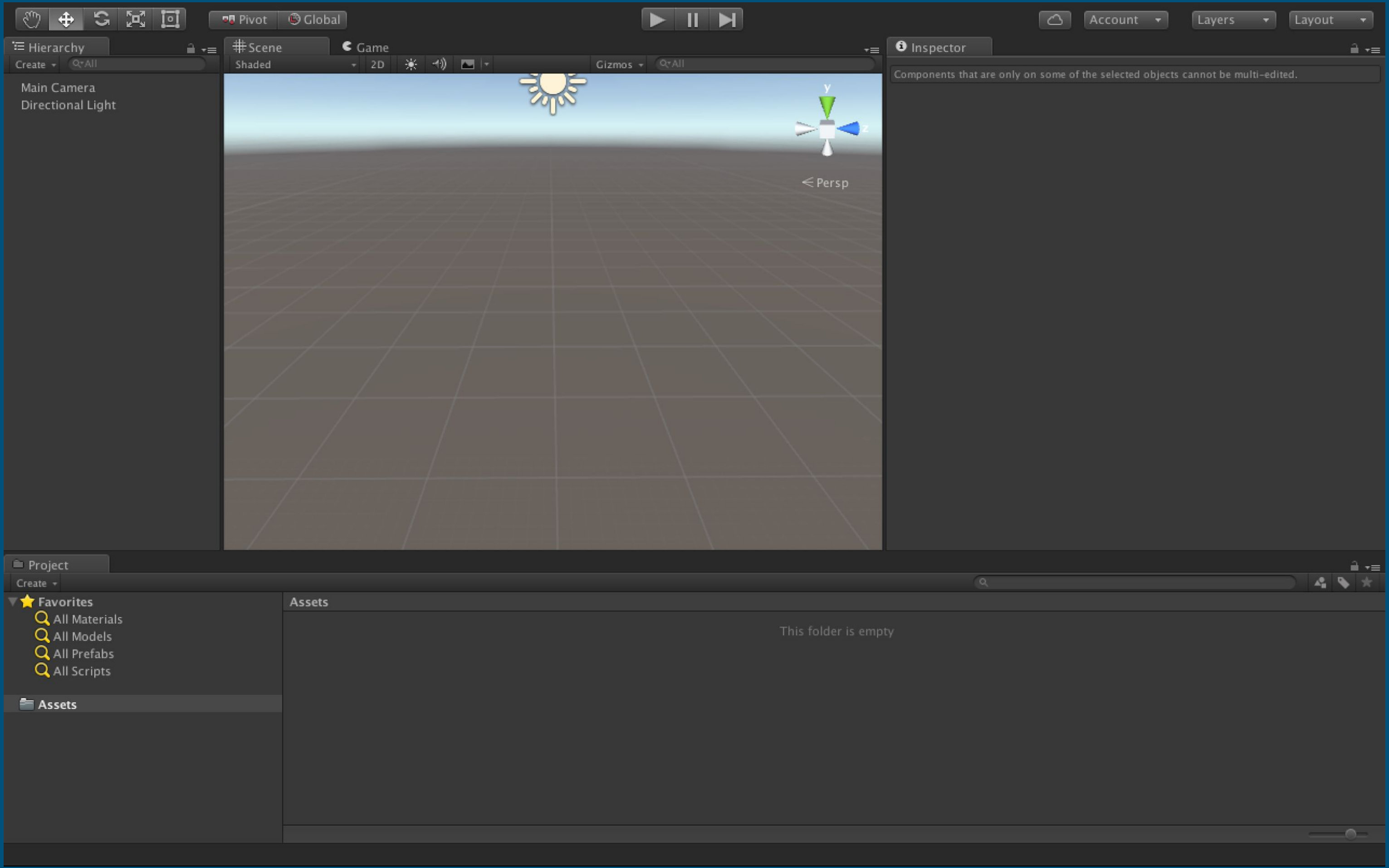
New Workshop

Location*

C:\Users\Anish\Documents\Unity Projects ...

● 3D ○ 2D

New Project Interface.



Main Camera
Directional Light

Components that are only on some of the selected objects cannot be multi-edited.

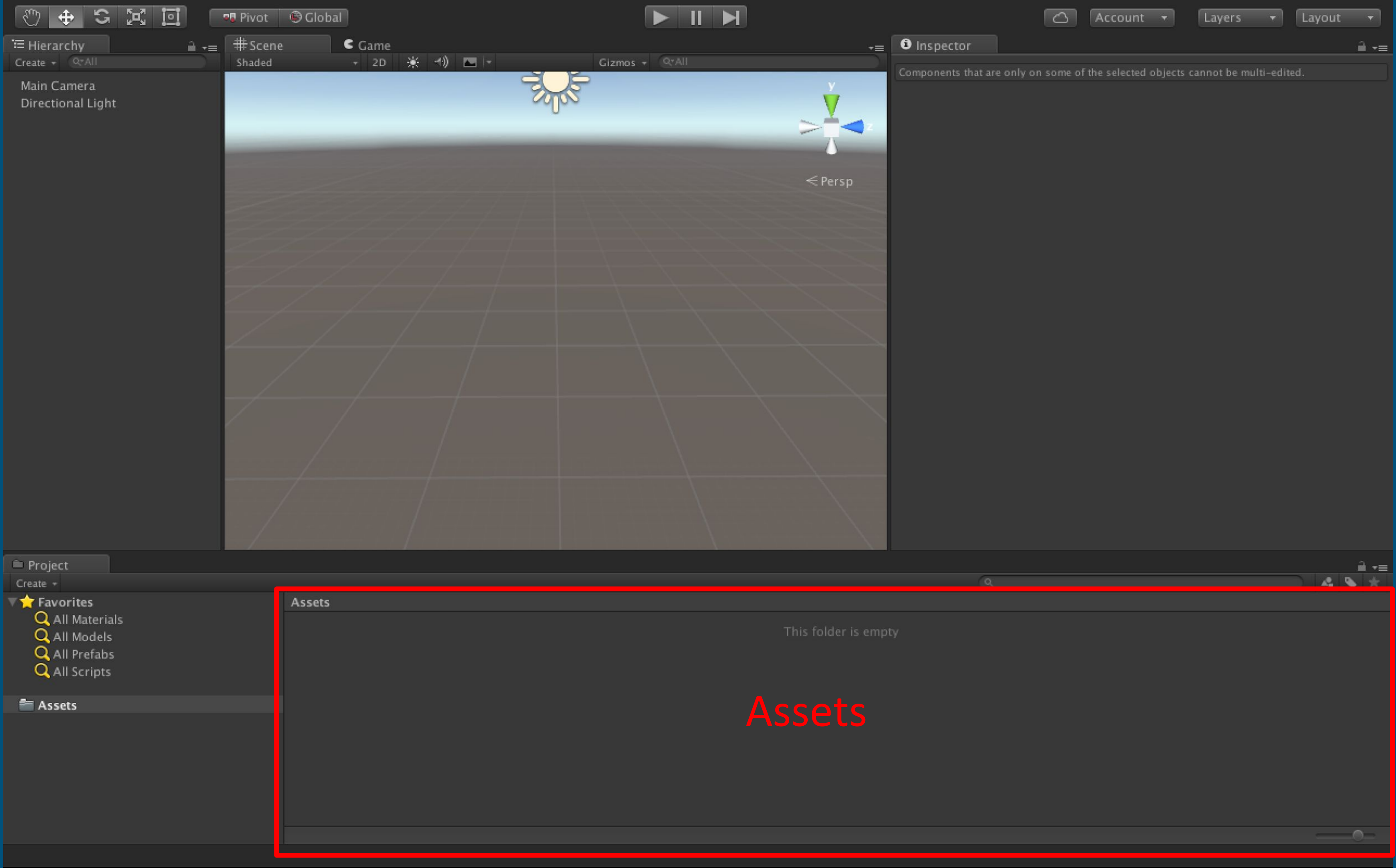
Assets

This folder is empty

Don’t Panic

Key Terms: Assets

- **Assets** are your tools for creating an experience
- Your “Assets” folder contains all the resources you will use
  - This can include objects, models, scripts, materials, etc
- It’s a good idea to keep your assets organized.
  - I.e. a “Scenes” folder, a “Scripts” folder, a “Materials” folder…
- There are many assets available online!
  - Standard Unity packages, online asset store, etc...



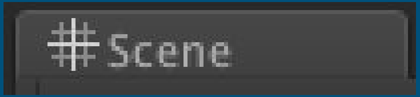
Components that are only on some of the selected objects cannot be multi-edited.

This folder is empty

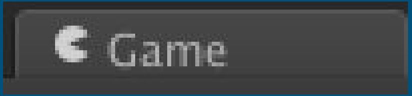
Assets

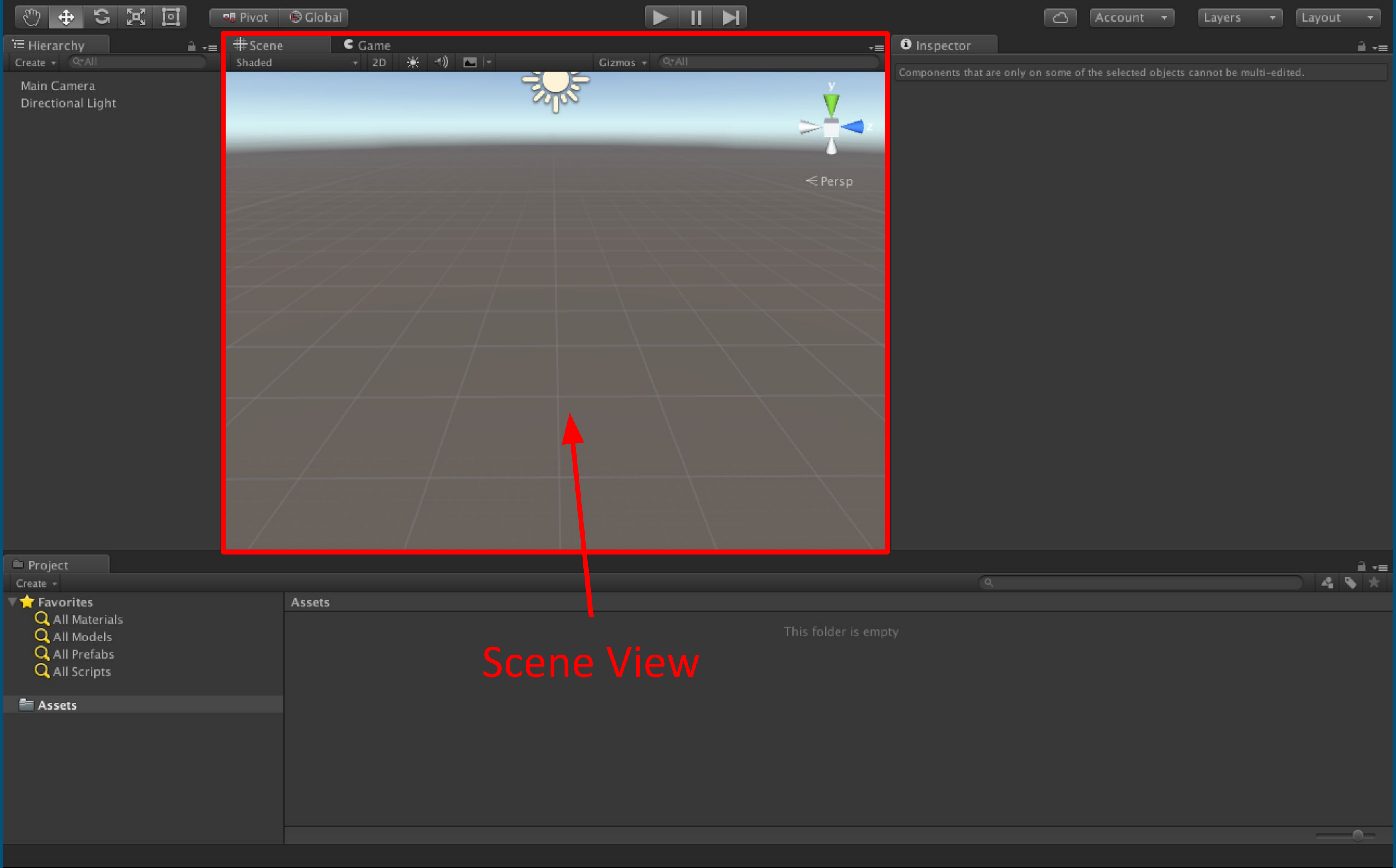
Key Terms: Scene View

- The **Scene View** is a developer’s view of the game
- You can navigate freely and change objects
- Not bound by the game’s camera perspective



- The **Game View** is the player’s view of the game
- This is what an actual player will see!

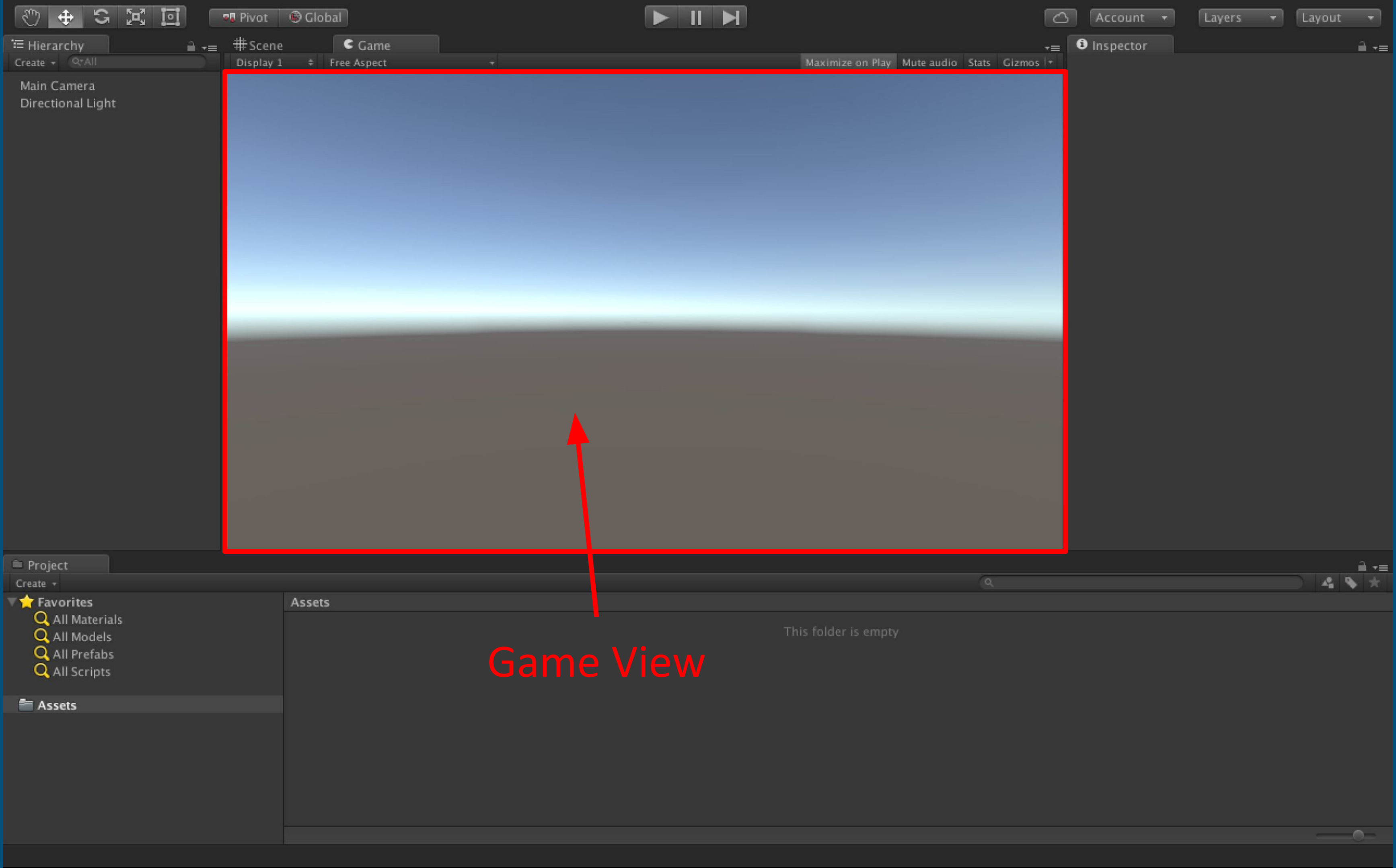




Components that are only on some of the selected objects cannot be multi-edited.

This folder is empty

Scene View

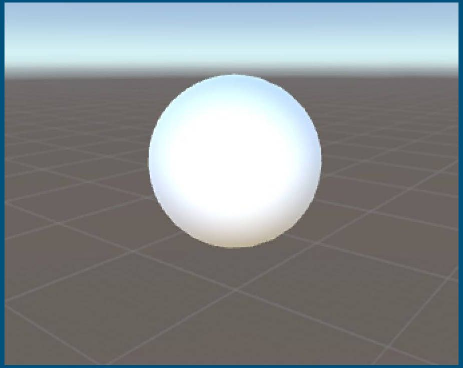


Game View

Pivot
Global
Account
Layers
Layout
Hierarchy
Create
All
Main Camera
Directional Light
Scene
Game
Display 1
Free Aspect
Maximize on Play
Mute audio
Stats
Gizmos
Inspector
Project
Create
Favorites
All Materials
All Models
All Prefabs
All Scripts
Assets
Assets
This folder is empty

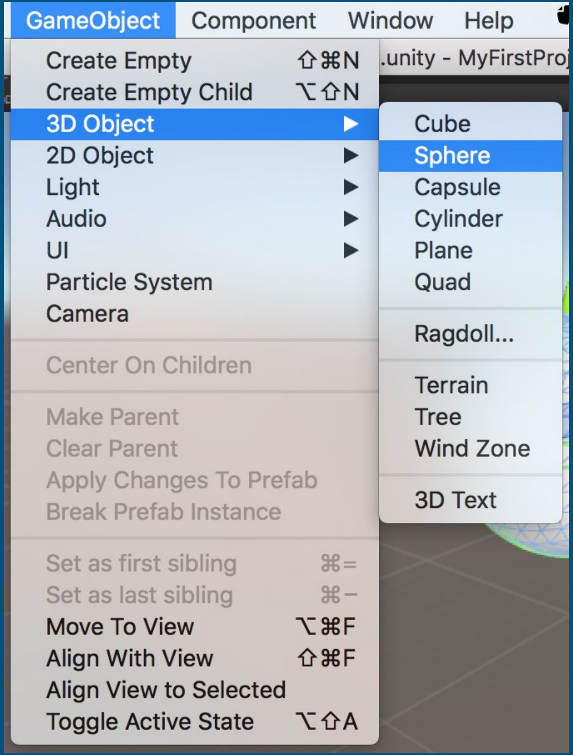
Key Terms: GameObjects & Components

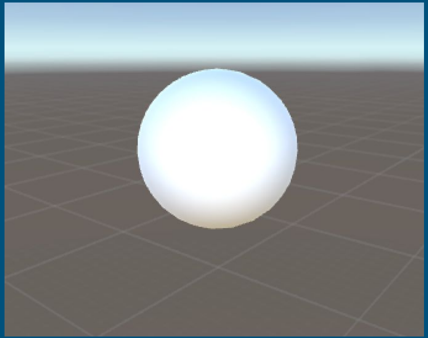
- A **GameObject** is anything that exists inside your **scene**.
- **GameObjects** consist of **Components**
- **Components** are what give a **GameObject** it's properties and behaviour
  - A GameObject is only as unique as the components it has
- In this sense, all **GameObjects** are just collections of **Components**
- **GameObjects** appear in the Hierarchy
- **Components** appear in the Inspector



Key Terms: GameObjects & Components

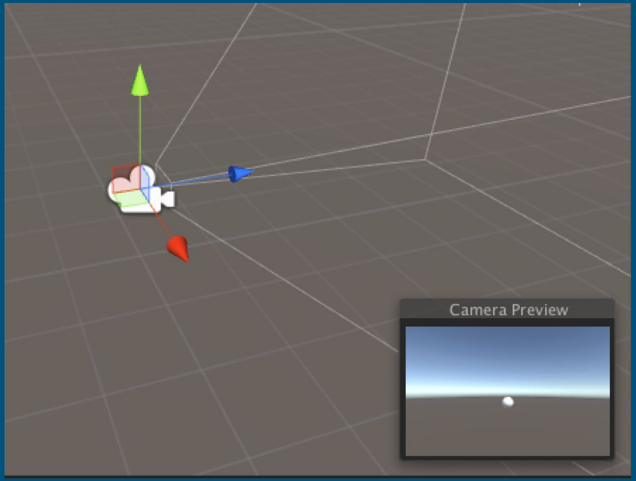
- To create a GameObject…
- 1. Go to GameObject Menu
- 2. Select “3D Object”
- 3. Choose a shape!
- What about “Create Empty”?
    - Creates a GO with no Components
    - Called an Empty GameObject
    - Does nothing!
- Your shape is in the **Hierarchy**
    - It’s components in the **Inspector**

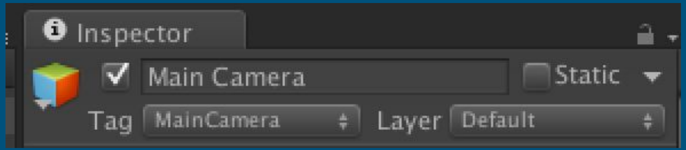




Key Components: The Camera

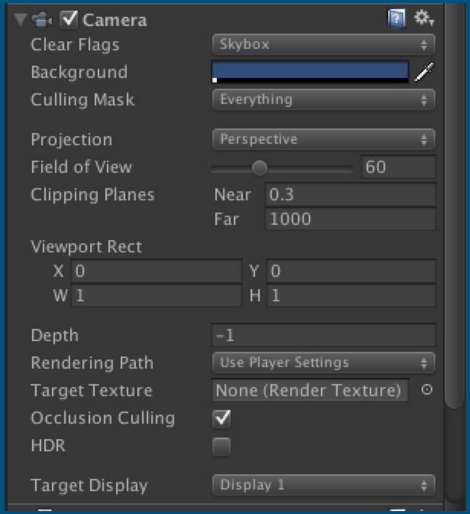
- The Camera: What the user will see
  - An object containing a “Camera” component and the “Main Camera” tag
  - Note: The **only** thing making this a camera is the “Camera” component
  - You can see the camera’s field of view in Scene view





☑ Main Camera □ Static

Tag MainCamera Layer Default



☑ Camera

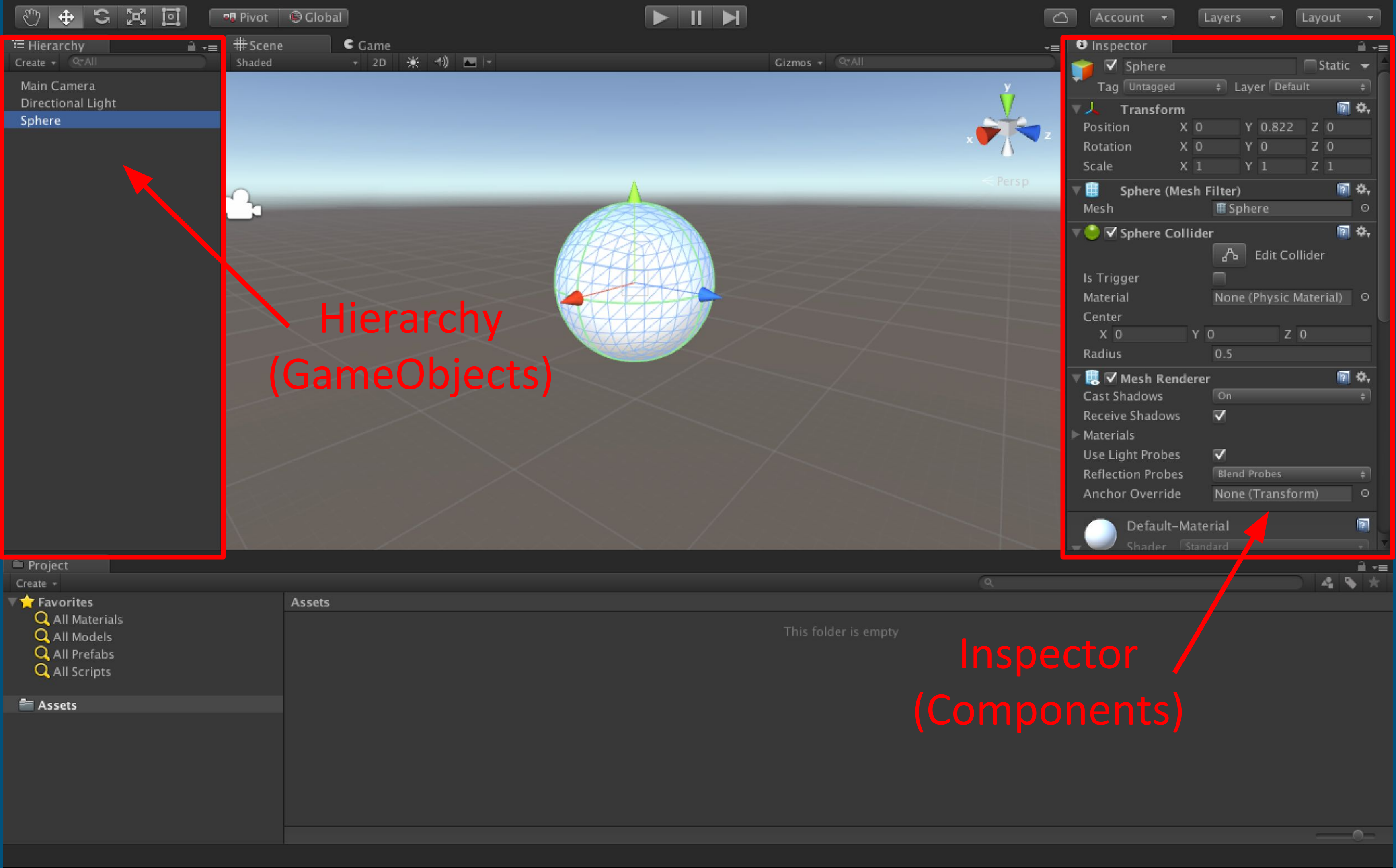
Clear Flags: Skybox
Background
Culling Mask: Everything

Projection: Perspective
Field of View: 60
Clipping Planes: Near 0.3, Far 1000

Viewport Rect: X 0, Y 0, W 1, H 1

Depth: -1
Rendering Path: Use Player Settings
Target Texture: None (Render Texture)
Occlusion Culling: ☑
HDR: □

Target Display: Display 1



Hierarchy
(GameObjects)

Inspector
(Components)

Sphere ☑ □ Static
Tag Untagged Layer Default

Transform

	X	Y	Z
Position	0	0.822	0
Rotation	0	0	0
Scale	1	1	1

Sphere (Mesh Filter)
Mesh Sphere

☑ **Sphere Collider**
Edit Collider
Is Trigger □
Material None (Physic Material)
Center X 0 Y 0 Z 0
Radius 0.5

☑ **Mesh Renderer**
Cast Shadows On
Receive Shadows ☑
Materials
Use Light Probes ☑
Reflection Probes Blend Probes
Anchor Override None (Transform)

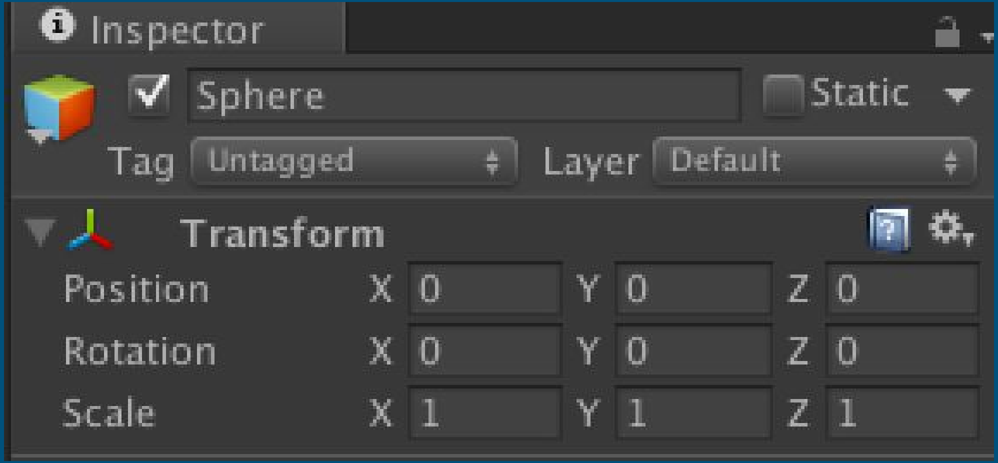
Default-Material
Shader Standard

Navigation

- Ways to navigate scene view:
- Recommended: Hold down right mouse button and use WASDQE keys
- Mouse wheel to zoom in.
- Right mouse to rotate view.
- Double click GameObject to center on it
- “F” key to focus on an object, when it’s selected
- Arrow keys with scene selected.

Key Components: Transform

- Transform: Position and rotation of an object
  - This is the 3D location, rotation, and scale of the object in your world
  - This location is *relative* to the object's parent in the hierarchy
  - **All GameObjects have the "Transform" component**



☑ Sphere □ Static

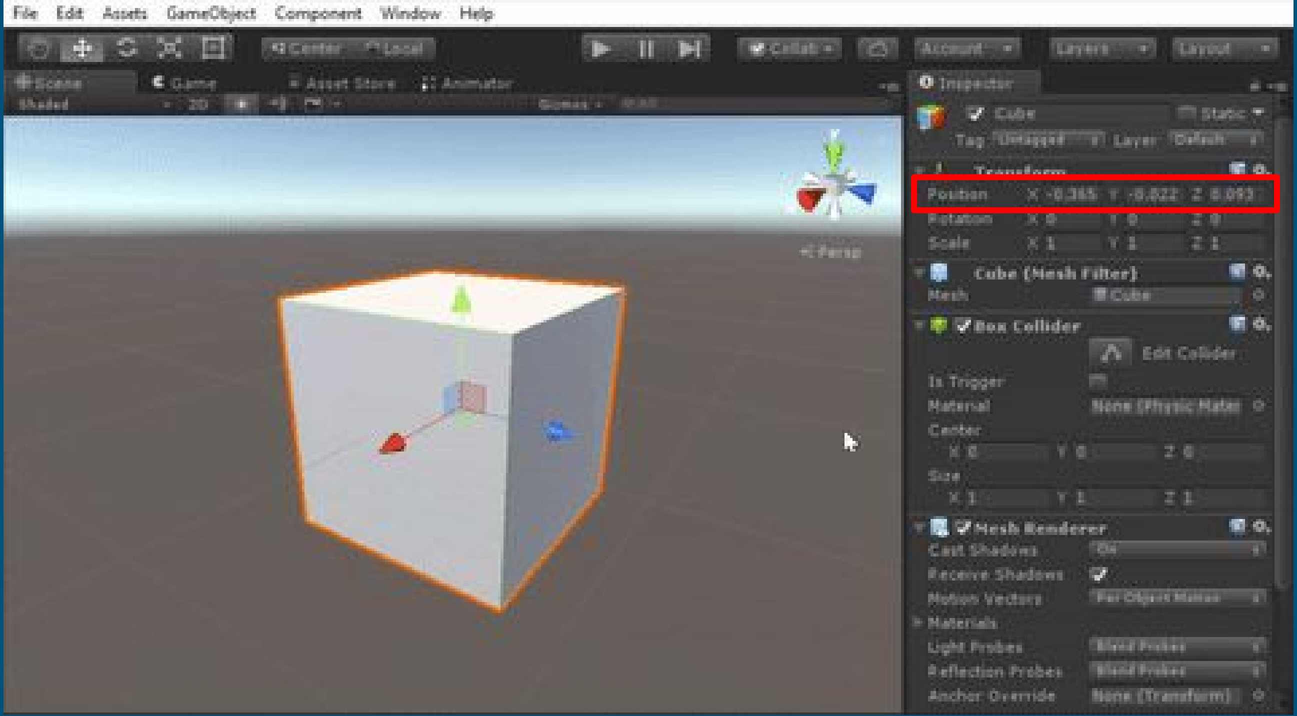
Tag: Untagged

Layer: Default

Transform

	X	Y	Z
Position	0	0	0
Rotation	0	0	0
Scale	1	1	1

How to move things?



Cube ☐ Static

Tag Untagged Layer Default

Transform

Position X -0.365 Y -0.022 Z 0.093

Rotation X 0 Y 0 Z 0

Scale X 1 Y 1 Z 1

Cube (Mesh Filter)

Mesh Cube

☑ Box Collider

Edit Collider

Is Trigger ☐

Material None (Physic Mater

Center X 0 Y 0 Z 0

Size X 1 Y 1 Z 1

☑ Mesh Renderer

Cast Shadows On

Receive Shadows ☑

Motion Vectors Per Object Motion

Materials

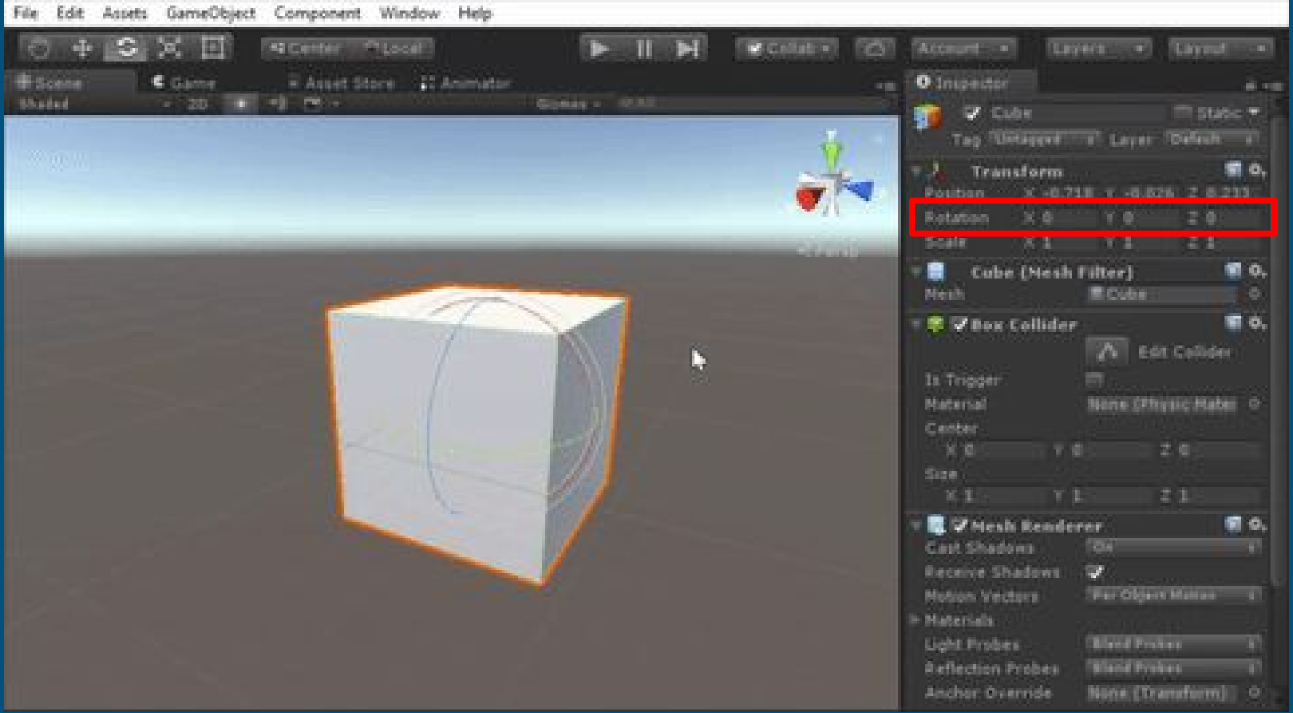
Light Probes Blend Probes

Reflection Probes Blend Probes

Anchor Override None (Transform)

Press W to move object

How to move things?



Cube Static
Tag Untagged Layer Default

Transform
Position X -0.718 Y -0.026 Z 0.233
Rotation X 0 Y 0 Z 0
Scale X 1 Y 1 Z 1

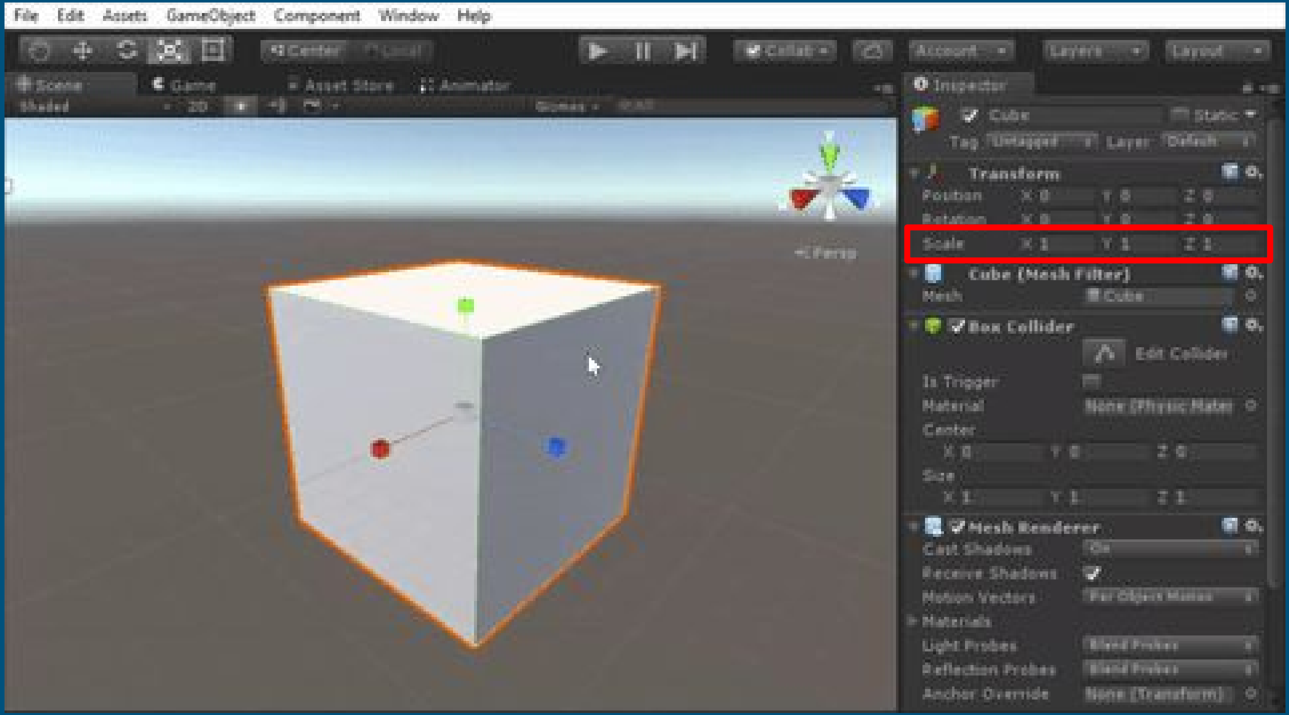
Cube (Mesh Filter)
Mesh Cube

Box Collider
Is Trigger
Material None (Physic Mater
Center
X 0 Y 0 Z 0
Size
X 1 Y 1 Z 1

Mesh Renderer
Cast Shadows On
Receive Shadows ✓
Motion Vectors Per Object Motion
Materials
Light Probes Blend Probes
Reflection Probes Blend Probes
Anchor Override None (Transform)

Press E to rotate

How to move things?



Cube ☐ Static
Tag Untagged Layer Default

Transform
Position X 0 Y 0 Z 0
Rotation X 0 Y 0 Z 0
Scale X 1 Y 1 Z 1

Cube (Mesh Filter)
Mesh Cube

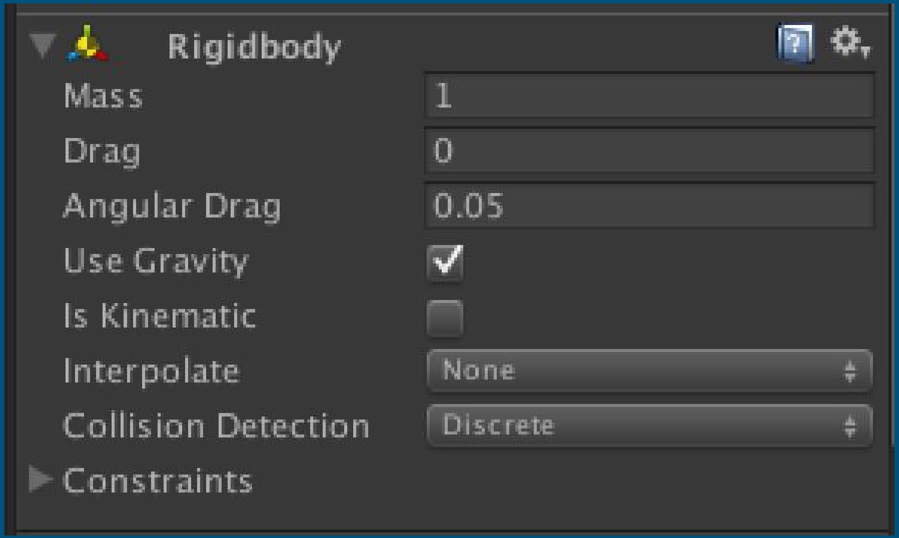
☑ Box Collider
Edit Collider
Is Trigger ☐
Material None (Physic Mater
Center
X 0 Y 0 Z 0
Size
X 1 Y 1 Z 1

☑ Mesh Renderer
Cast Shadows On
Receive Shadows ☑
Motion Vectors Per Object Motion
Materials
Light Probes Blend Probes
Reflection Probes Blend Probes
Anchor Override None (Transform)

Press R to scale object

Key Components: Rigidbody

- **Rigidbody:** Allows the object to work with physics.
- A Rigidbody applies physics to an object:
  - Falling
  - Colliding
  - Bouncing
  - Etc…
- Needed for collisions as well!



Rigidbody

Mass 1

Drag 0

Angular Drag 0.05

Use Gravity ☑

Is Kinematic ☐

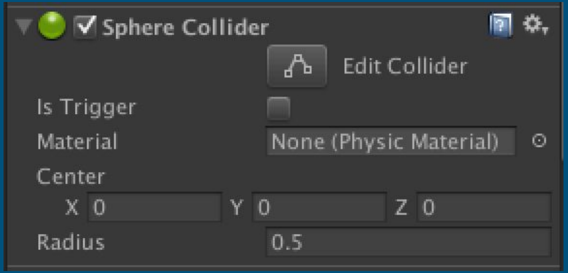
Interpolate None

Collision Detection Discrete

Constraints

Key Components: Collider

- Collider: A physical barrier or trigger that handles collisions.
- There are several different types of colliders
  - Box Collider
  - Sphere Collider
  - Capsule Collider
  - Mesh Collider (Fits to any model)



☑ Sphere Collider

Edit Collider

Is Trigger □

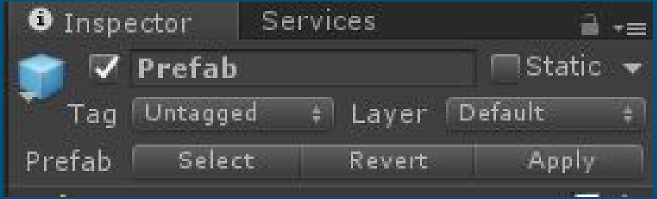
Material: None (Physic Material)

Center: X 0 Y 0 Z 0

Radius: 0.5

- Activated when two objects with colliders come into contact
- If a collider has **“Is Trigger”** checked, it won’t respond to physics.
  - I.e. No bouncing from objects with Rigidbodies
  - It still sends collision data though! Just not a “physical” wall.
- If an object doesn’t have a collider, things will pass right through it.

Unity: Prefabs



☑ Prefab □ Static

Tag Untagged Layer Default

- A **Prefab** is a saved GameObject that can be used outside of a scene.
  - It saves any components, children, and everything else!
- You need prefabs:
  - To make copies of something.
  - To create something at runtime.
    - Eg. a soda can out of a machine, bullets out of a gun, etc.
- To create a prefab from a GameObject, just drag it from the scene to Project
  - You can also add Prefabs back to the scene by dragging them from Project to Hierarchy
- Changing one will change the others!
  - You can “Save” your changes to a Prefab by clicking the “Apply” button on it.
  - Yes, this changes all versions of the prefab!

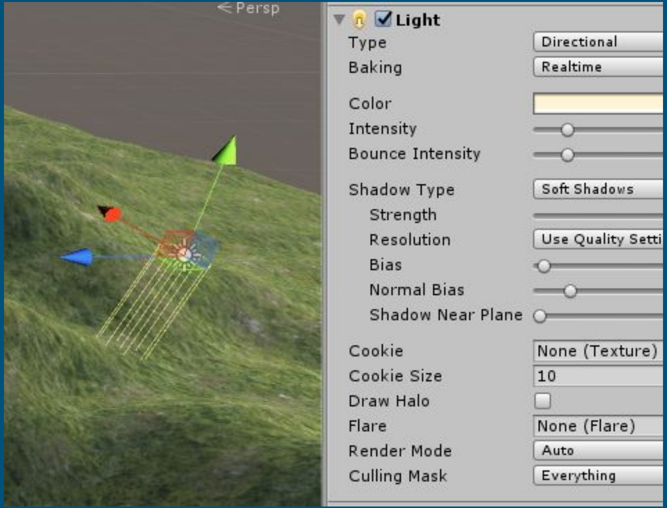
Testing Without VR

- First import the Utility package from Standard Assets
- Put SimpleMouseRotator.cs on a Main Camera
- Play!
- The mouse then simulates looking around.

Additional Information

- The following slides may be useful as a supplement.

Unity Tools: Light

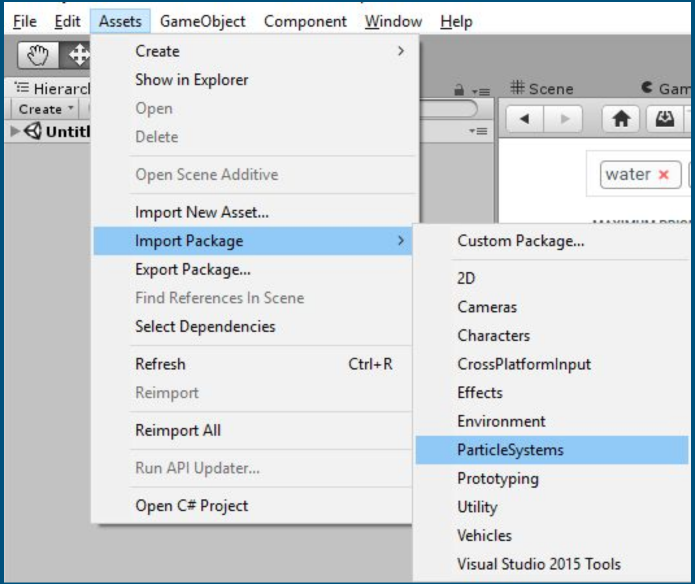


☑ Light
Type: Directional
Baking: Realtime
Color
Intensity
Bounce Intensity
Shadow Type: Soft Shadows
Strength
Resolution: Use Quality Setti
Bias
Normal Bias
Shadow Near Plane
Cookie: None (Texture)
Cookie Size: 10
Draw Halo: □
Flare: None (Flare)
Render Mode: Auto
Culling Mask: Everything

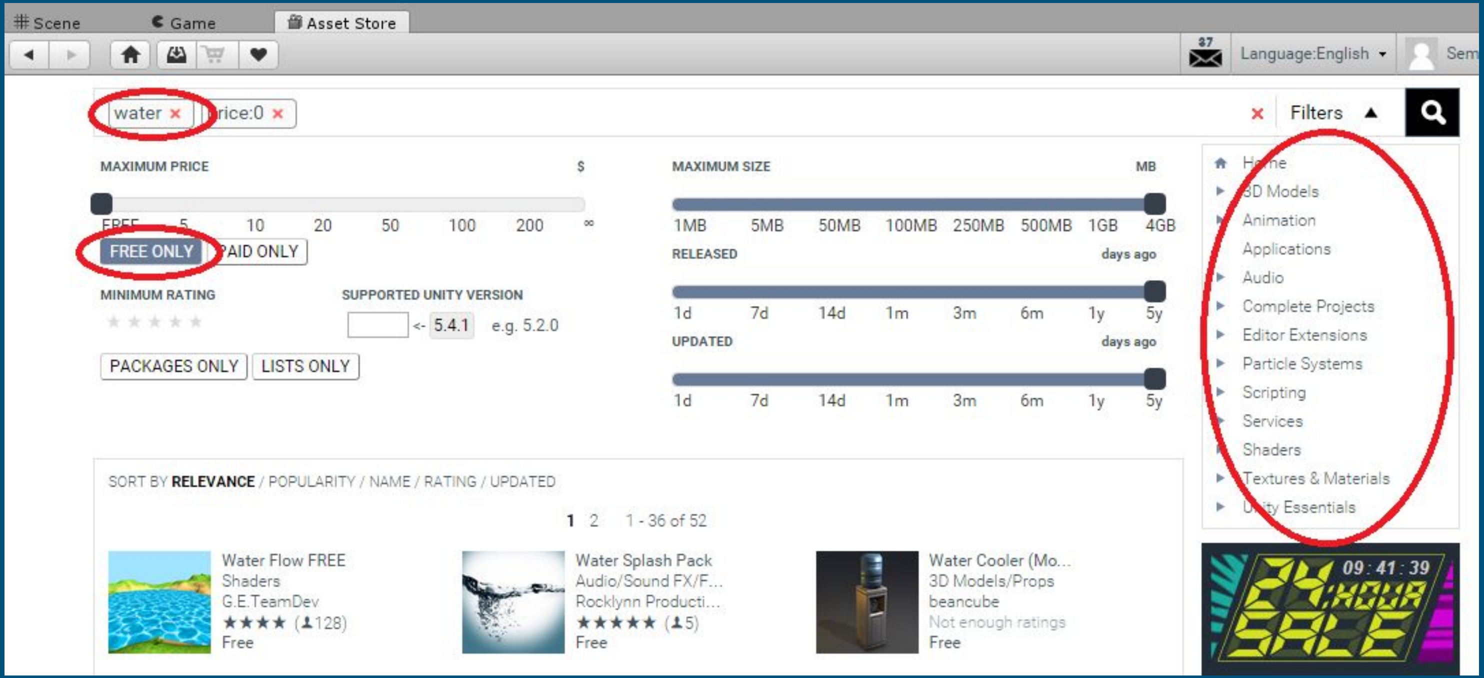
- Makes things visible!
- 3 Types:
  - Point: Like a light bulb, Sends rays from a point.
  - Spot: Like a flashlight, Sends rays from a point, but within a cone.
  - Directional: Like the sun, All rays are parallel in a direction.

Unity: Importing Assets

- Unity provides some default assets.
- Check out Environment, Vehicles, Effects, and ParticleSystems for art.
- Check out Utility and Characters for useful code and prefabs.



Unity: Importing Assets + Asset Store



water × Price:0 ×

MAXIMUM PRICE $
FREE 5 10 20 50 100 200 ∞
FREE ONLY | PAID ONLY

MINIMUM RATING ☆☆☆☆☆

SUPPORTED UNITY VERSION □ <- 5.4.1 e.g. 5.2.0

PACKAGES ONLY | LISTS ONLY

MAXIMUM SIZE MB
1MB 5MB 50MB 100MB 250MB 500MB 1GB 4GB

RELEASED days ago
1d 7d 14d 1m 3m 6m 1y 5y

UPDATED days ago
1d 7d 14d 1m 3m 6m 1y 5y

SORT BY **RELEVANCE** / POPULARITY / NAME / RATING / UPDATED

1 2 1 - 36 of 52

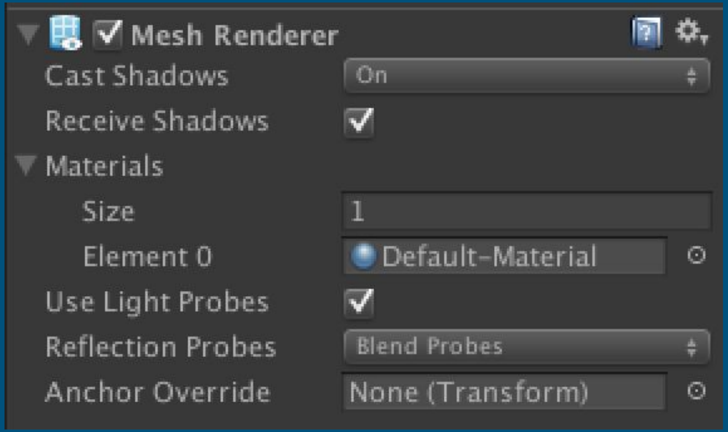
Water Flow FREE
Shaders
G.E.TeamDev
★★★★ (128)
Free

Water Splash Pack
Audio/Sound FX/F...
Rocklynn Producti...
★★★★★ (5)
Free

Water Cooler (Mo...
3D Models/Props
beancube
Not enough ratings
Free

Key Components: Renderer

- Renderer (or MeshRenderer): What makes the object visible
- Without a renderer, the object will be completely invisible!
- Rendering is the process of displaying something graphically
- The object can **still exist** without a renderer - just no physical appearance



☑ Mesh Renderer

Cast Shadows: On

Receive Shadows: ☑

Materials

Size: 1

Element 0: Default-Material

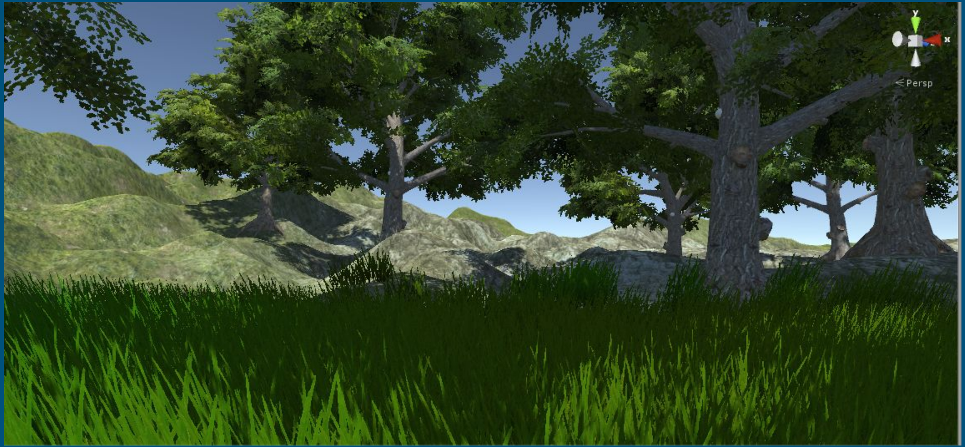
Use Light Probes: ☑

Reflection Probes: Blend Probes

Anchor Override: None (Transform)

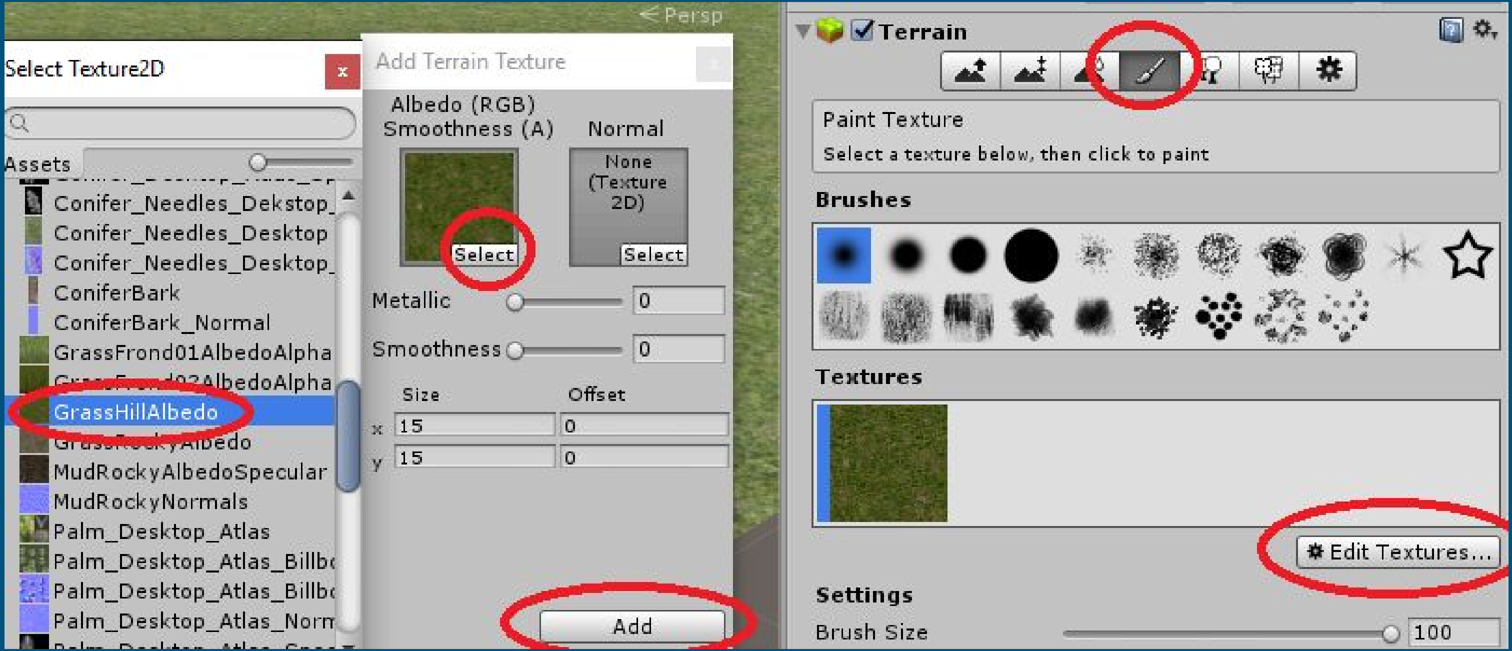
Unity Tools: Terrain

- If you haven't already, import the environments package
- Check the terrain component for useful tools.
- Note that trees and grass are expensive in terms of frame rate.



Unity Tools: Terrain

- How to set terrain texture.



Metallic 0

Smoothness 0

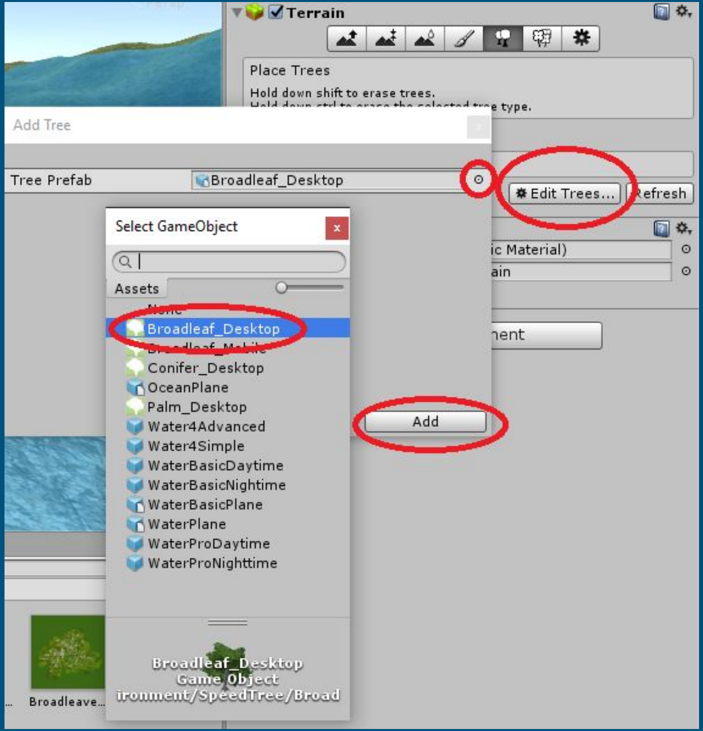
	Size	Offset
x	15	0
y	15	0

Paint Texture

Select a texture below, then click to paint

Brush Size 100

Unity Tools: Terrain



Place Trees

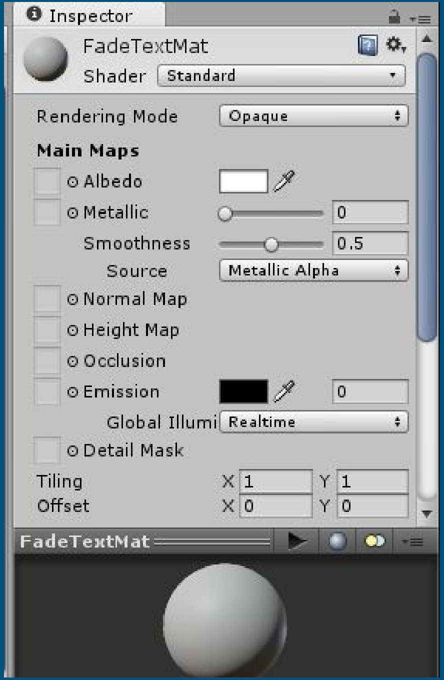
Hold down shift to erase trees.
Hold down ctrl to erase the selected tree type.

Add Tree

Tree Prefab: Broadleaf_Desktop

- How to set trees. Similar process for grasses.
- After that is painting them.

Unity Tools: Materials



Inspector

FadeTextMat

Shader: Standard

Rendering Mode: Opaque

Main Maps

○ Albedo

○ Metallic: 0

Smoothness: 0.5

Source: Metallic Alpha

○ Normal Map

○ Height Map

○ Occlusion

○ Emission: 0

Global Illumi: Realtime

○ Detail Mask

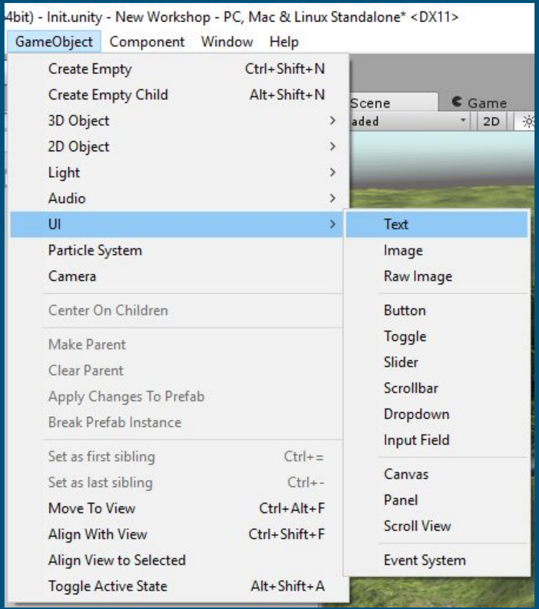
Tiling: X 1 Y 1

Offset: X 0 Y 0

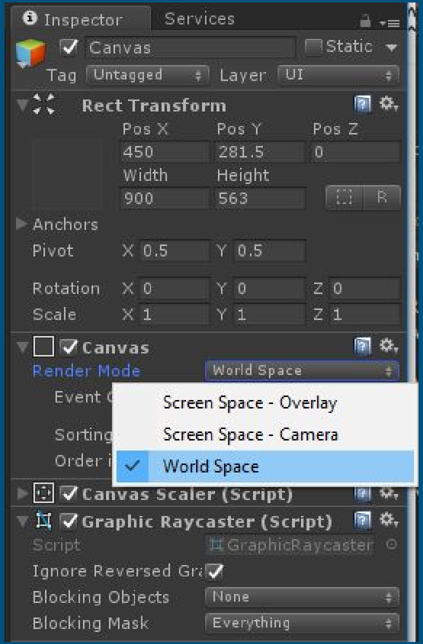
FadeTextMat

- Gives visual properties to objects.
- Albedo is color.
- Emission is released light.
- Old asset store assets may use legacy shaders.

Unity Tools: UI



- Don’t use screen space, keep UI in world space.
- Consider placing on controllers
- You can use:
  - Text
  - Panels
  - Images
  - Buttons
  - Dropdowns
- To get text to look good…
  - Put large font size and scale down



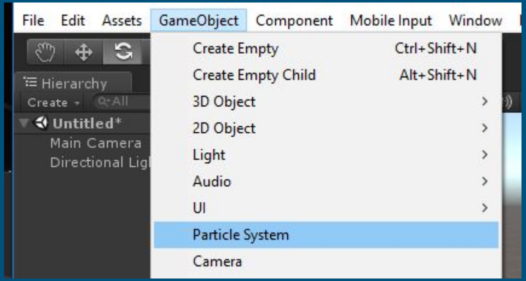
Canvas ☐ Static
Tag Untagged Layer UI

Pos X 450 Pos Y 281.5 Pos Z 0
Width 900 Height 563
Anchors
Pivot X 0.5 Y 0.5
Rotation X 0 Y 0 Z 0
Scale X 1 Y 1 Z 1

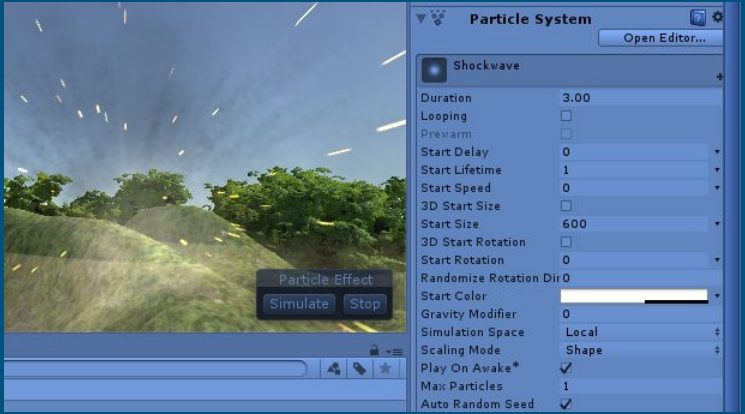
Render Mode World Space
Event C
Sorting
Order i

Script GraphicRaycaster
Ignore Reversed Gra ☑
Blocking Objects None
Blocking Mask Everything

Unity Tools: Particle Systems



- Do this when you’re sick of working on everything else.
- Start from the standard assets particle systems.
- Really fun to just try new combinations.



Duration	3.00
Looping	□
Prewarm	□
Start Delay	0
Start Lifetime	1
Start Speed	0
3D Start Size	□
Start Size	600
3D Start Rotation	□
Start Rotation	0
Randomize Rotation Dir	0
Start Color	
Gravity Modifier	0
Simulation Space	Local
Scaling Mode	Shape
Play On Awake*	✓
Max Particles	1
Auto Random Seed	✓

- Particle Systems are special effects
- Explosions, fountains, etc…
- Lots of customization!