

Introduction to Unity3D

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Game Engines

Game engines are designed for the creation and development of 2D/3D games



Components

- Renderer
- Physics Engine
- Sound
- Scripting
- Animation
- Artificial Intelligence
- Networking
- Scene Graph



Unity3D

- Free game engine
- Provides all the components of any modern game engine
- Cross Platform (PC, Xbox, Tablet, Phone, etc.)
- <http://unity3d.com>

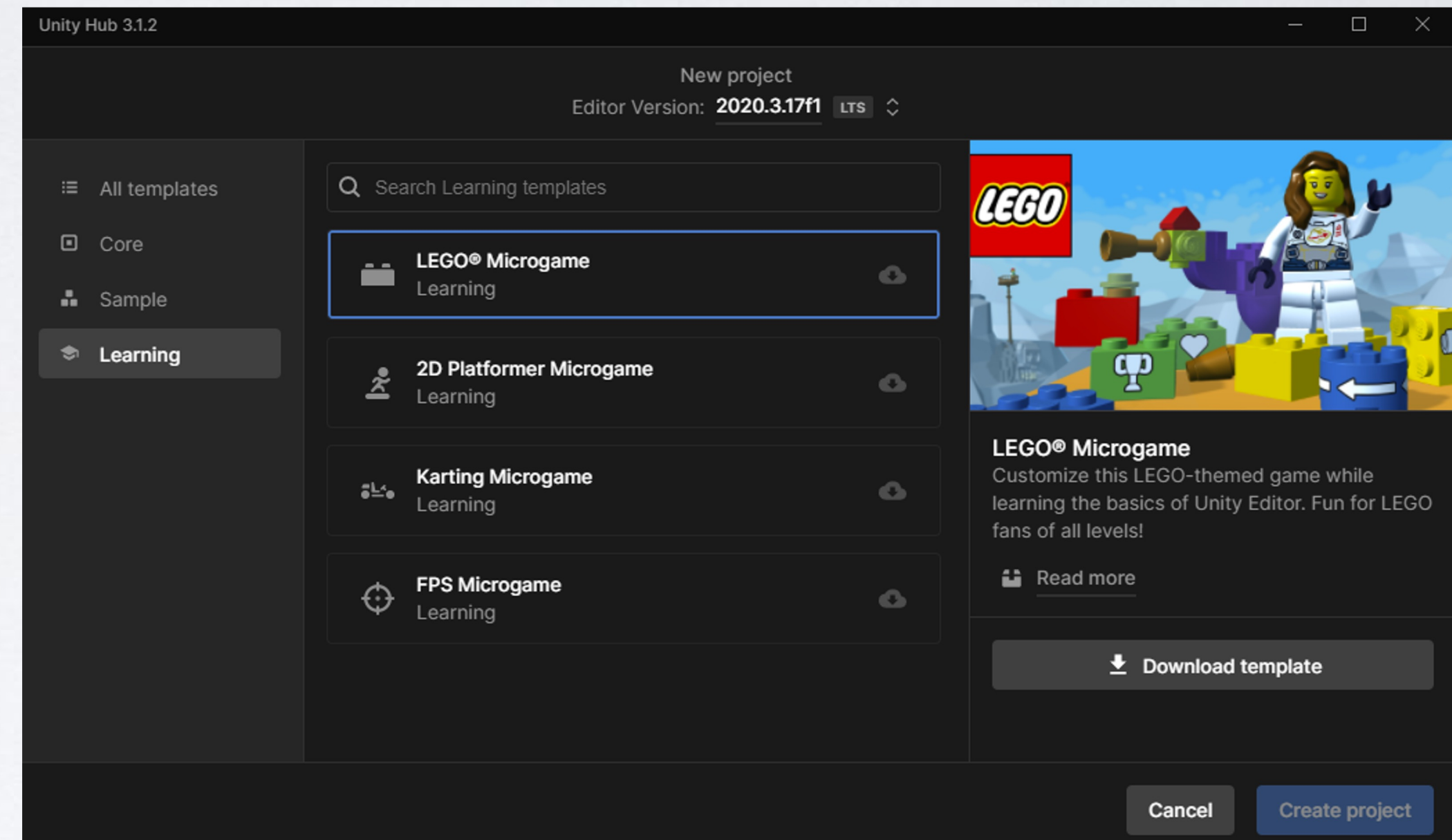




Activity

○ Create a new Unity Project

- Version: Unity 2021.3.2f1
- Choose a tutorial template
 - Lego Microgame
 - Karting Microgame
 - FPS Microgame





- Hierarchy
- Create
 - Content
 - Buildings
 - Props
 - Terrain
 - Vegetation
 - Reflection Probes
 - WorldBoundaries
 - Water
 - Light Probes
 - Occlusion Area
 - Wind Zone
 - Directional light
 - QualityManager
 - Canvas
 - EventSystem
 - WaterReflectionSceneCamera
 - WaterReflectionCameraLoop
 - WaterReflectionCamera_high
 - WaterReflectionCamera_low
 - AccessibleVolume
 - MouseLock
 - WaterReflectionPreview Camera**

Inspector

WaterReflectionPreview Can Static

Tag Untagged Layer Default

Transform

Position X 13.7295 Y -1.6752 Z 4.41912

Rotation X 0 Y -11.069 Z 0

Scale X 1 Y 1 Z 1

Camera

Clear Flags Skybox

Background

Culling Mask ReflectedInWater

Projection Perspective

Field of View 60

Clipping Planes Near 0.3 Far 1000

Viewport Rect X 0 Y 0 W 1 H 1

Depth 0

Rendering Path Forward

Target Texture None (Render Texture)

Occlusion Culling

HDR

Target Display Display 1

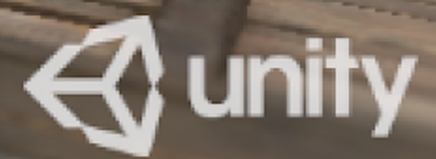
Skybox

Custom Skybox None (Material)

Add Component



- Project
- Animations
 - Editor
 - Lighting
 - Materials
 - Models
 - paintjob
 - Prefabs
 - Scenes
 - The_Viking_Village
 - The_Viking_Village
 - Scripts
 - Shaders
 - Standard Assets
 - Textures



Center Local

Play Pause Stop

Account Layers 2 by 3



Scene View

- Hierarchy
- Create
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Display 1 Free Aspect Maximize on Play Mute audio Stats Gizmos





Scene Asset Store

Shaded 2D 2D [Light Icon] [Volume Icon]

Gizmos [Search: Q All]

Hierarchy

Create [Search: Q All]

Inspector

WaterReflectionPreview Can [Static] Tag Untagged Layer Default



- Content
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Transform

Position X 13.7295 Y -1.6752 Z 4.41912

Rotation X 0 Y -11.069 Z 0

Scale X 1 Y 1 Z 1

Camera

Clear Flags Skybox

Background [Color Picker]

Culling Mask ReflectedInWater

Projection Perspective

Field of View 60

Clipping Planes Near 0.3 Far 1000

Viewport Rect X 0 Y 0 W 1 H 1

Depth 0

Rendering Path Forward

Target Texture None (Render Texture)

Occlusion Culling [Off]

HDR [Off]

Target Display Display 1

Skybox

Custom Skybox None (Material)

Add Component

- Project
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Game Display 1 Free Aspect Maximize on Play Mute audio Stats Gizmos





Hierarchy View

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Inspector

WaterReflectionPreview Can Static

Tag Untagged Layer Default

Transform

Position X 13.7295 Y -1.6752 Z 4.41912

Rotation X 0 Y -11.069 Z 0

Scale X 1 Y 1 Z 1

Camera

Clear Flags Skybox

Background

Culling Mask ReflectedInWater

Projection Perspective

Field of View 60

Clipping Planes Near 0.3 Far 1000

Viewport Rect X 0 Y 0 W 1 H 1

Depth 0

Rendering Path Forward

Target Texture None (Render Texture)

Occlusion Culling

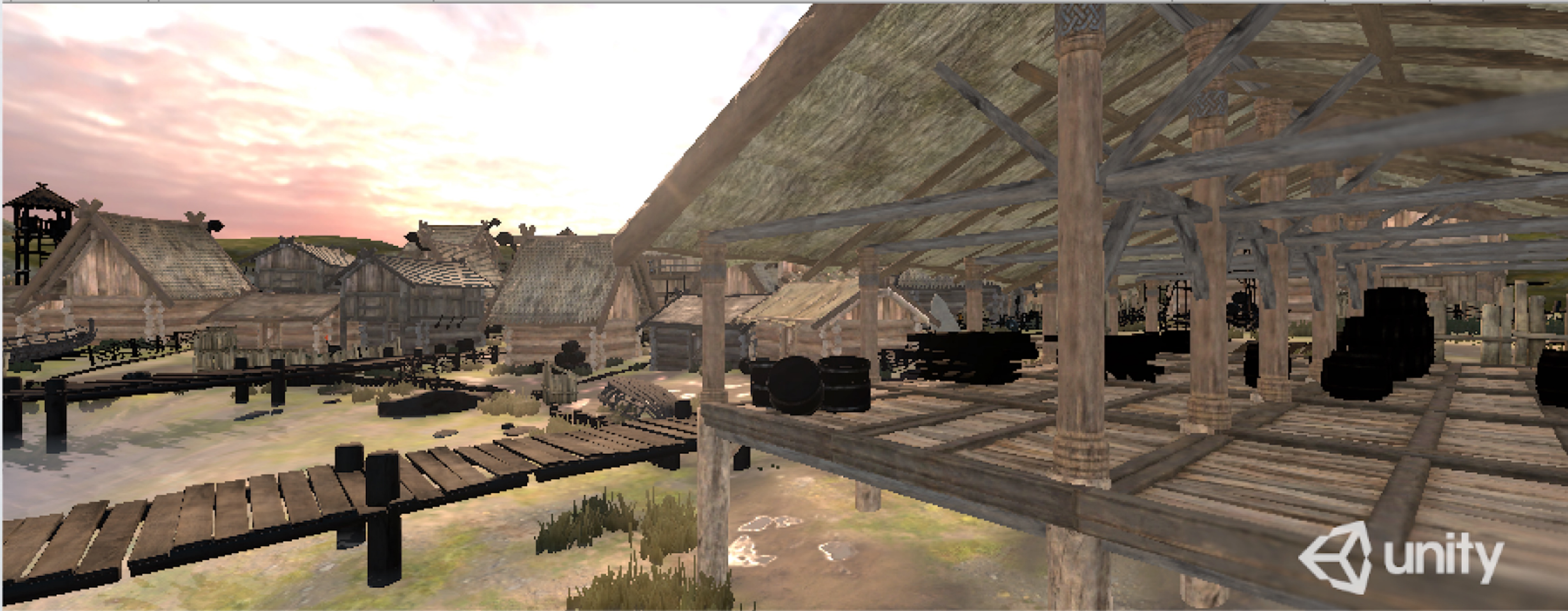
HDR

Target Display Display 1

Skybox

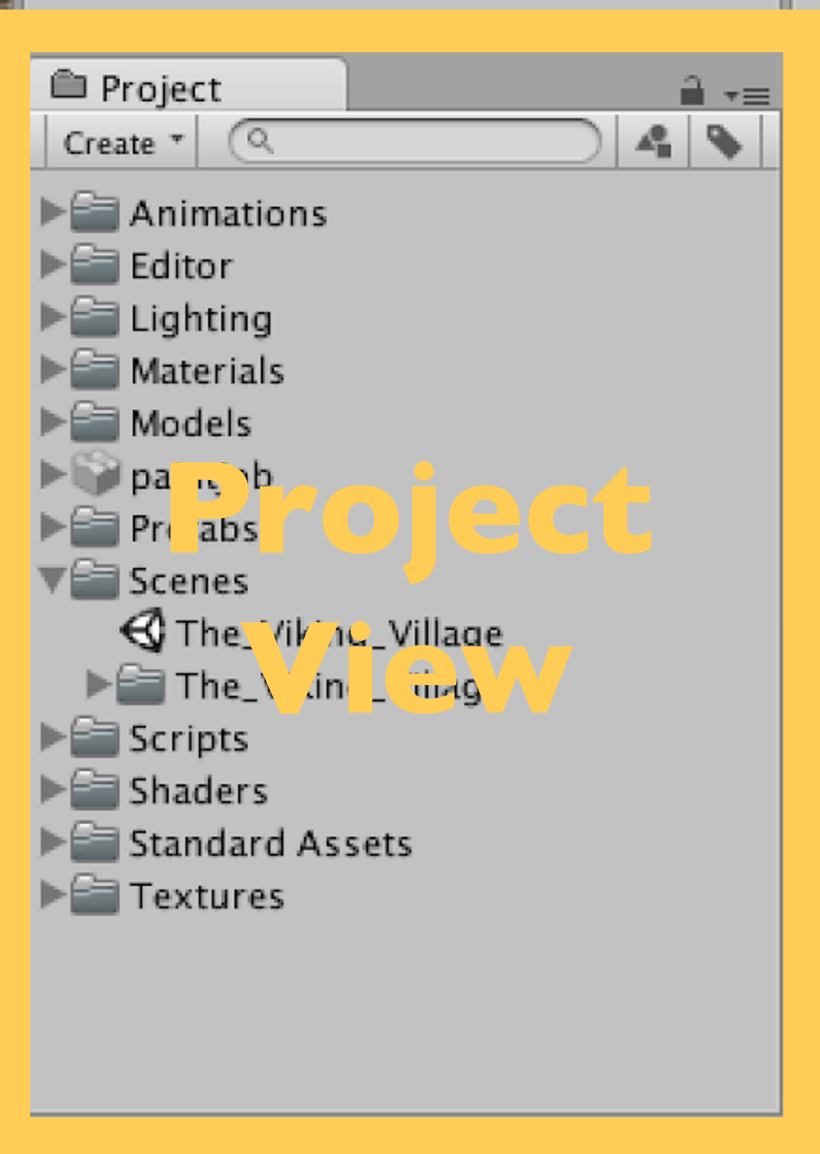
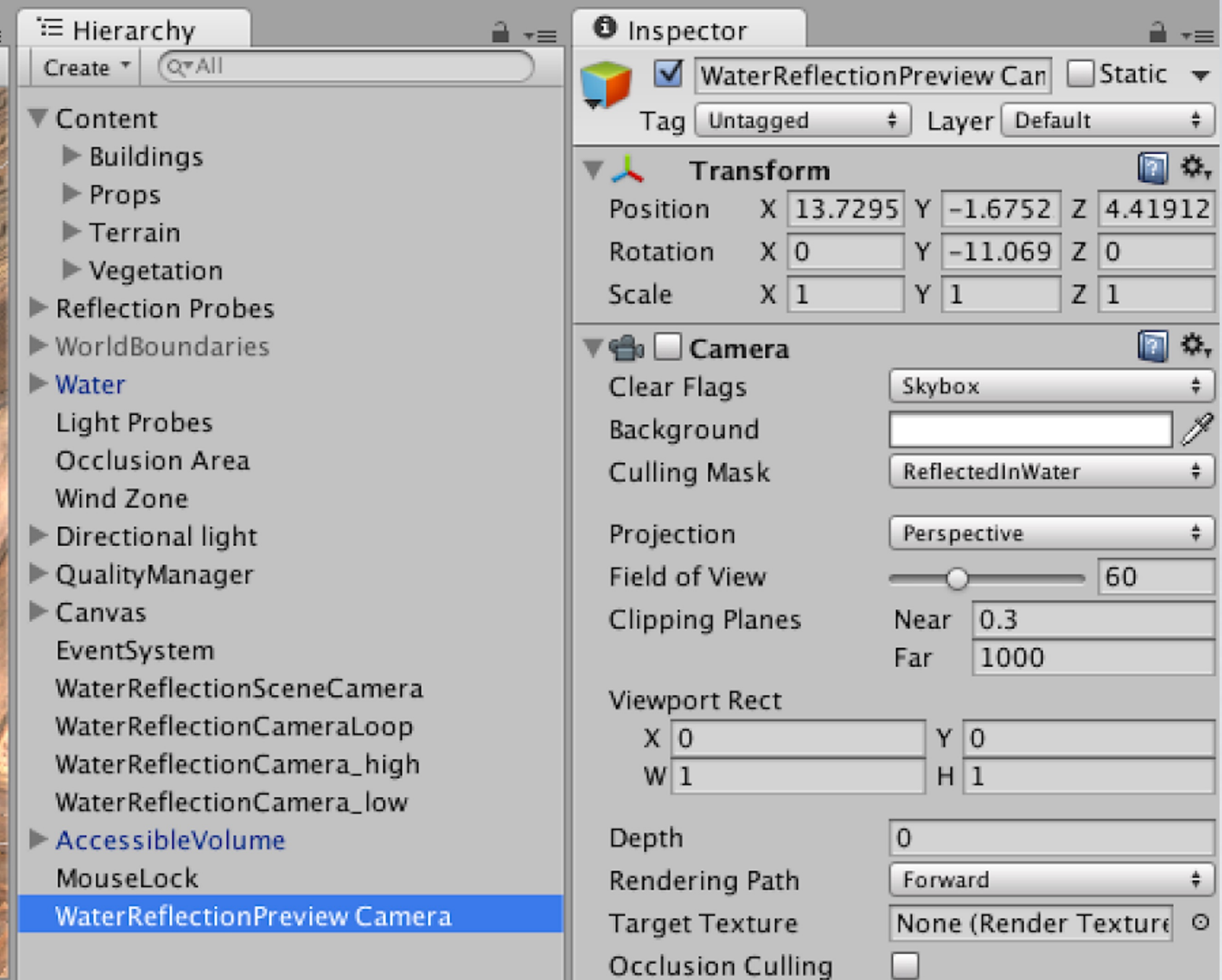
Custom Skybox None (Material)

Add Component



Project

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Scene Asset Store

Shaded 2D 3D

Gizmos Q All

Hierarchy Create Q All

Content

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Inspector

WaterReflectionPreview Can Static

Tag Untagged Layer Default

Transform

Position X 13.7295 Y -1.6752 Z 4.4191

Rotation X 0 Y -11.069 Z 0

Scale X 1 Y 1 Z 1

Camera

Clear Flags Skybox

Background

Culling Mask ReflectedInWater

Projection Perspective

Field of View 60

Clipping Planes Near 0.3 Far 1000

Viewport Rect X 0 Y 0 W 1 H 1

Depth 0

Render Queue 0

Target Texture None (Render Texture)

Occlusion Culling

HDR

Target Display Display 1

Skybox

Custom Skybox None (Material)

Inspector View

Game

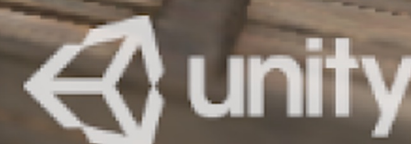
Display 1 Free Aspect

Maximize on Play Mute audio Stats Gizmos



Project Create

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Center Local

Play Controls



Account Layers 2 by 3

Scene Asset Store

Shaded 2D

Gizmos Q All

Hierarchy

Create Q All

Inspector

WaterReflectionPreview Can Static

Tag Untagged Layer Default

Transform

Position X 13.7295 Y -1.6752 Z 4.41912
Rotation X 0 Y -11.069 Z 0
Scale X 1 Y 1 Z 1

Camera

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Background
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Rendering Path Forward
Target Texture None (Render Texture)
Occlusion Culling
HDR
Target Display Display 1

Skybox Custom Skybox None (Material)

Add Component

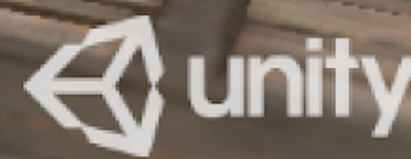
Project

Create

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Game Display 1 Free Aspect Maximize on Play Mute audio Stats Gizmos



Unity Help Pages

Scripting Documentation - <http://docs.unity3d.com/Manual/index.html>

Tutorials - <http://unity3d.com/learn/tutorials>

User Forums - <http://forum.unity3d.com>

Basic Unity Concepts

- Game Objects & Components

- Prefabs

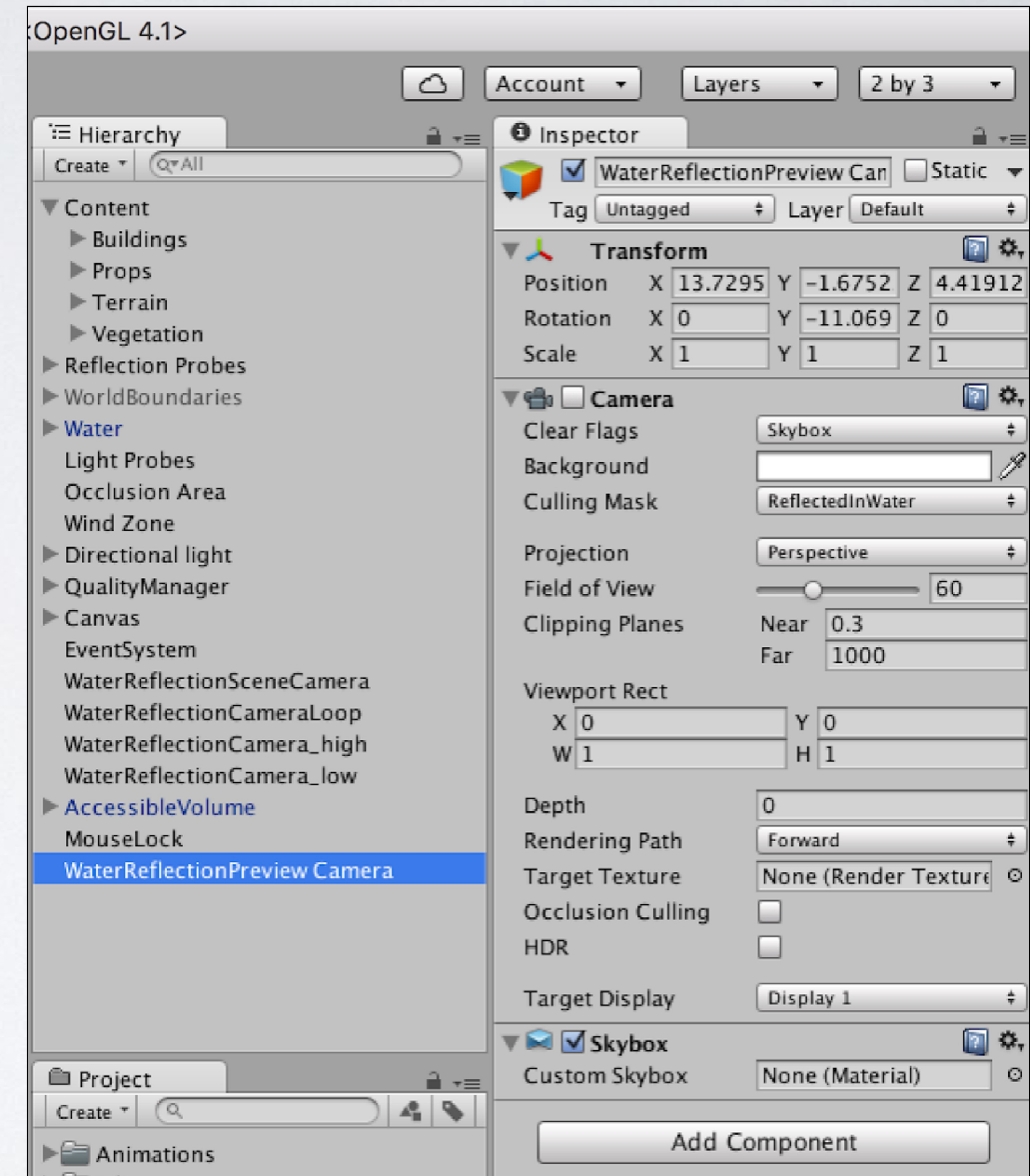
- Tags

- Layers

Game Objects & Components

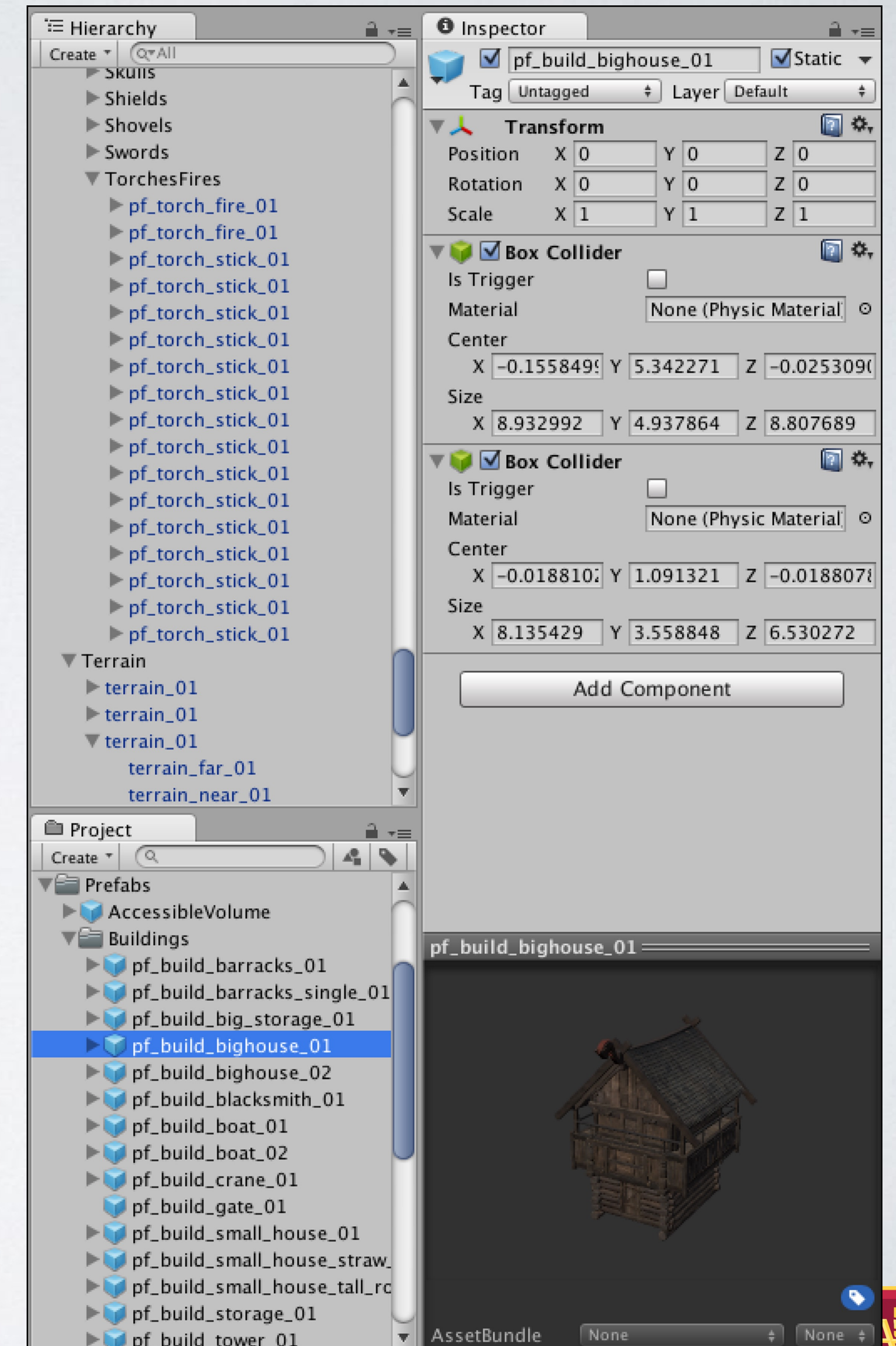
Game Object: Anything within your Unity scene (Hierarchy)

Component: Every Game Object is made up of Components (e.g., Transform)



Prefabs

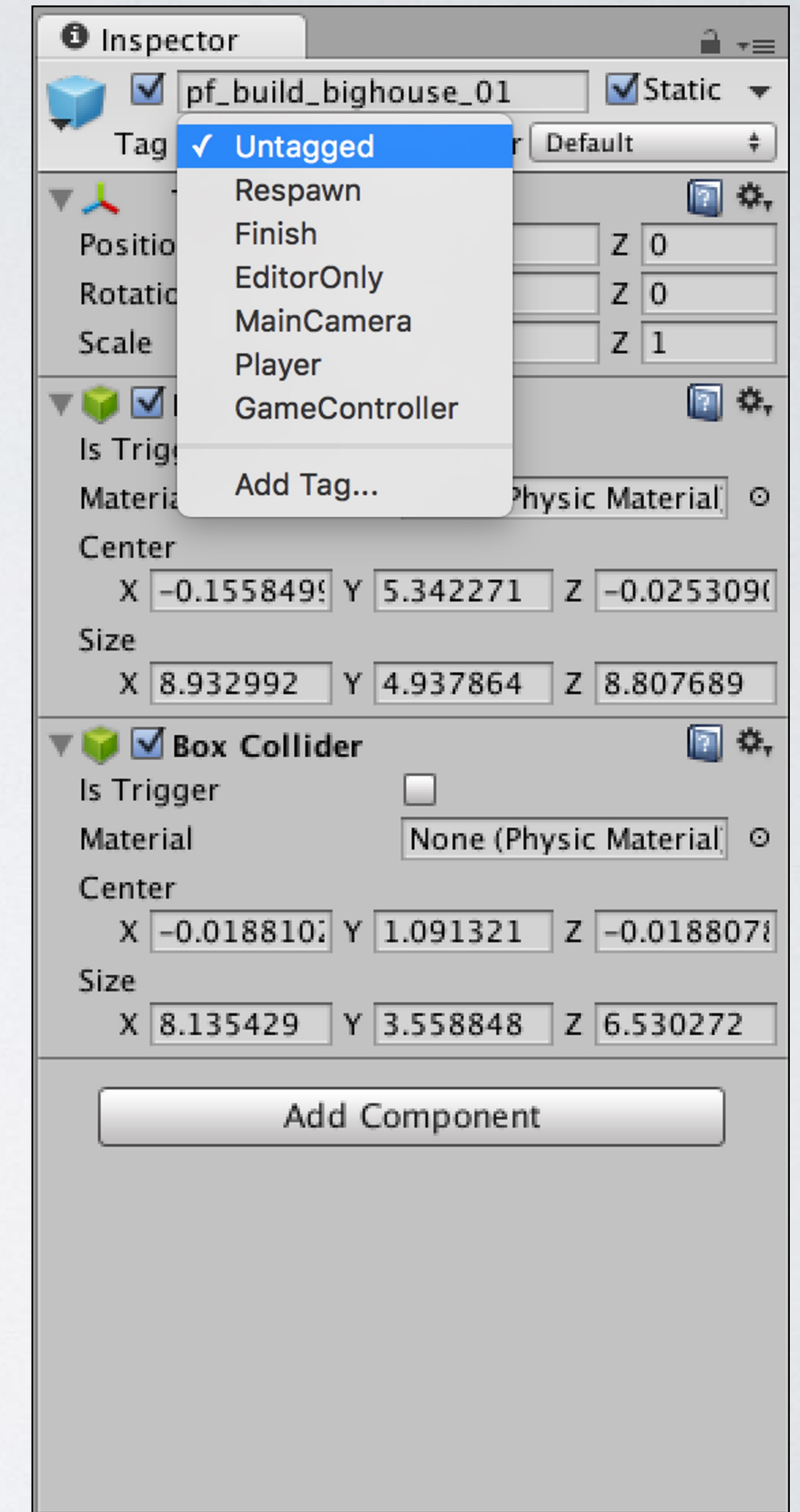
- Prefab = Preconfigured Game Object
- Prefabs are something you wish to use over and over again with minor tweaks, such as buildings, characters, levels, cameras, etc.
- Making changes to a Prefab Game Object allows you to push those changes to all other Game Objects of that type if desired



Tags

Allows you to group Game Objects together (e.g., enemy)

Allows you to search for objects in code

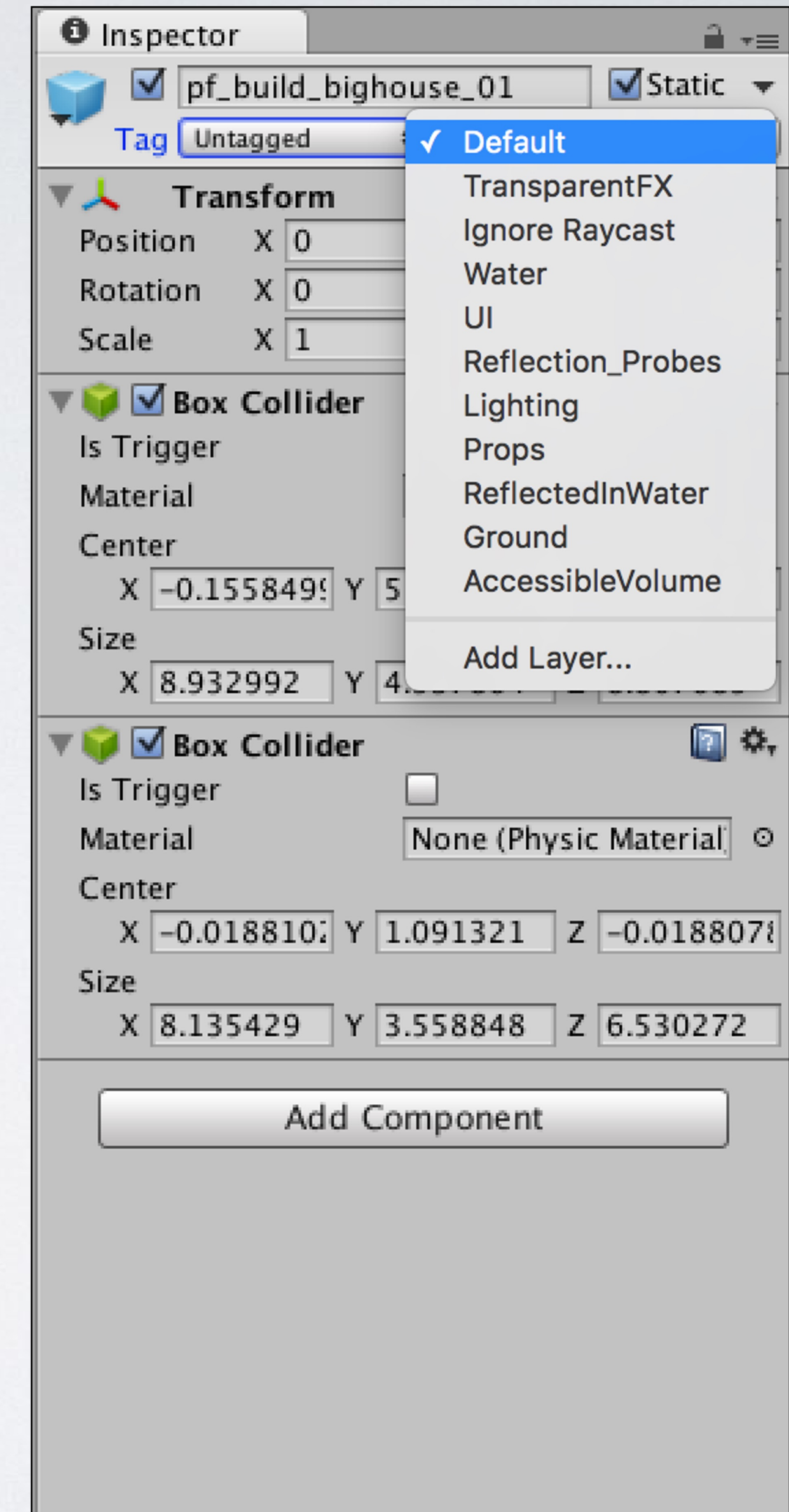


Layers

Another way of grouping things

You can show or hide layers in the Scene View

Often used to control rendering objects differently



Navigating Unity



Pan: Left Mouse Button

Zoom: Right Mouse Button + Alt

Rotate: Left Mouse Button + Alt

Unity Camera

- Used to render the scene
- Must have one camera but can have more
- Every camera has a View Frustum shown by the pyramid
- Orthographic/Perspective Projection

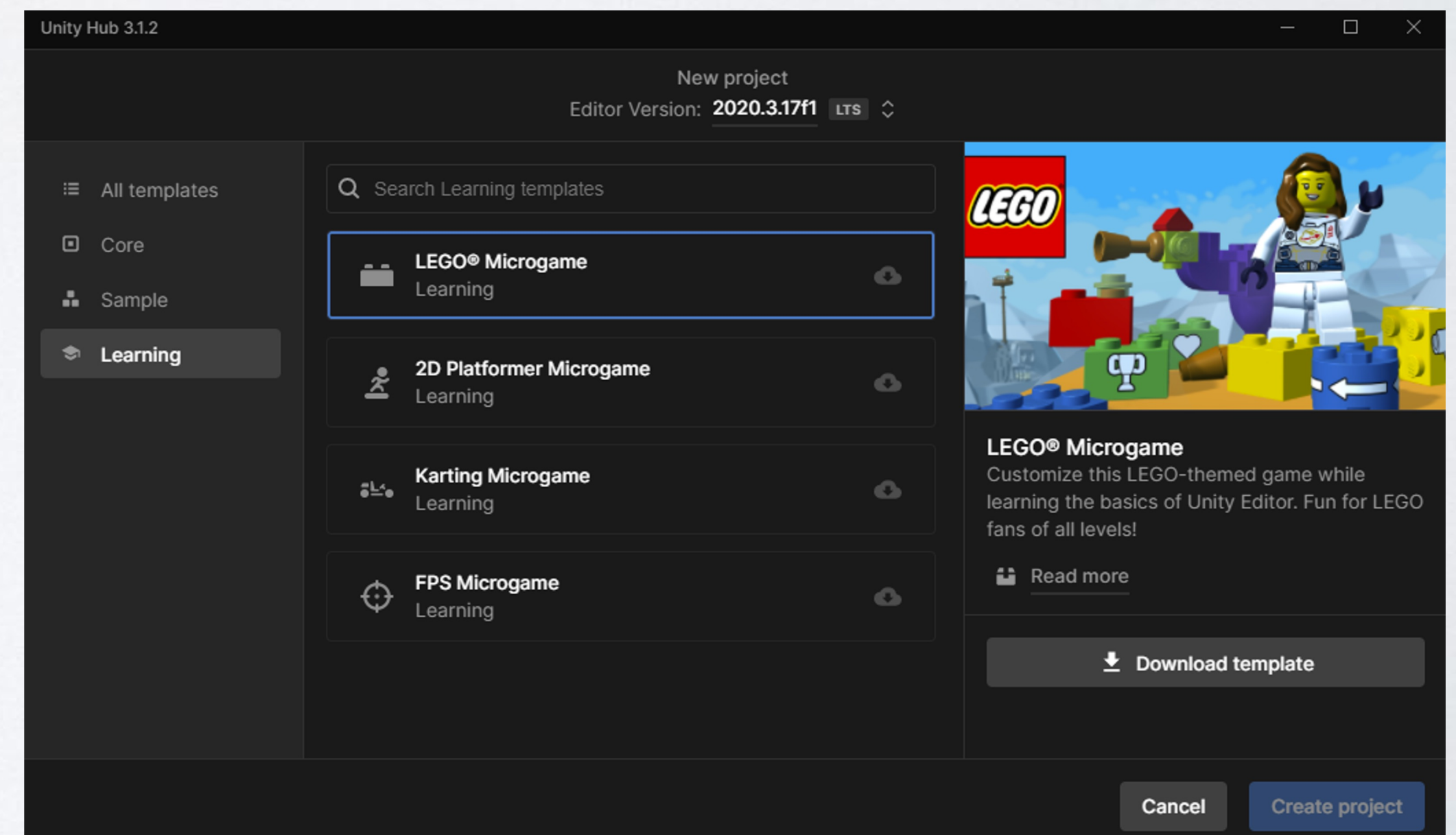
Unity Lighting

- Unity models how light behaves in the real world
- You can add as many lights as you want
- Directional/Area/Spot
- Realtime/Baked lighting

Activity

◦ Complete tutorial

- Go through tutorial if you are unfamiliar
- Feel free to skip tutorial if you have experience
- Have fun and try new things!



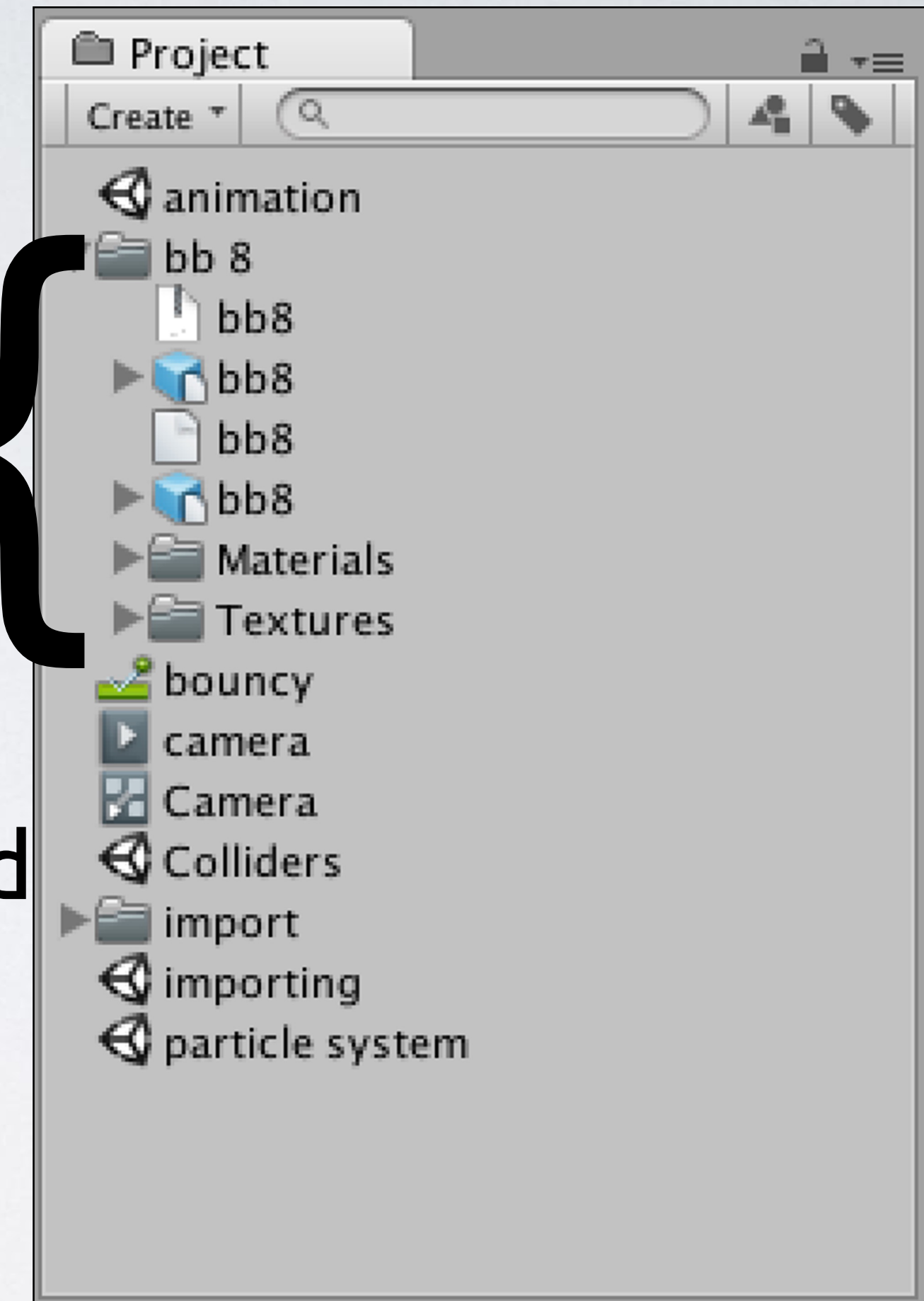
Importing Models

◦Unity can read

- .fbx, .dae (collada), .dxf, .obj, and .skp files

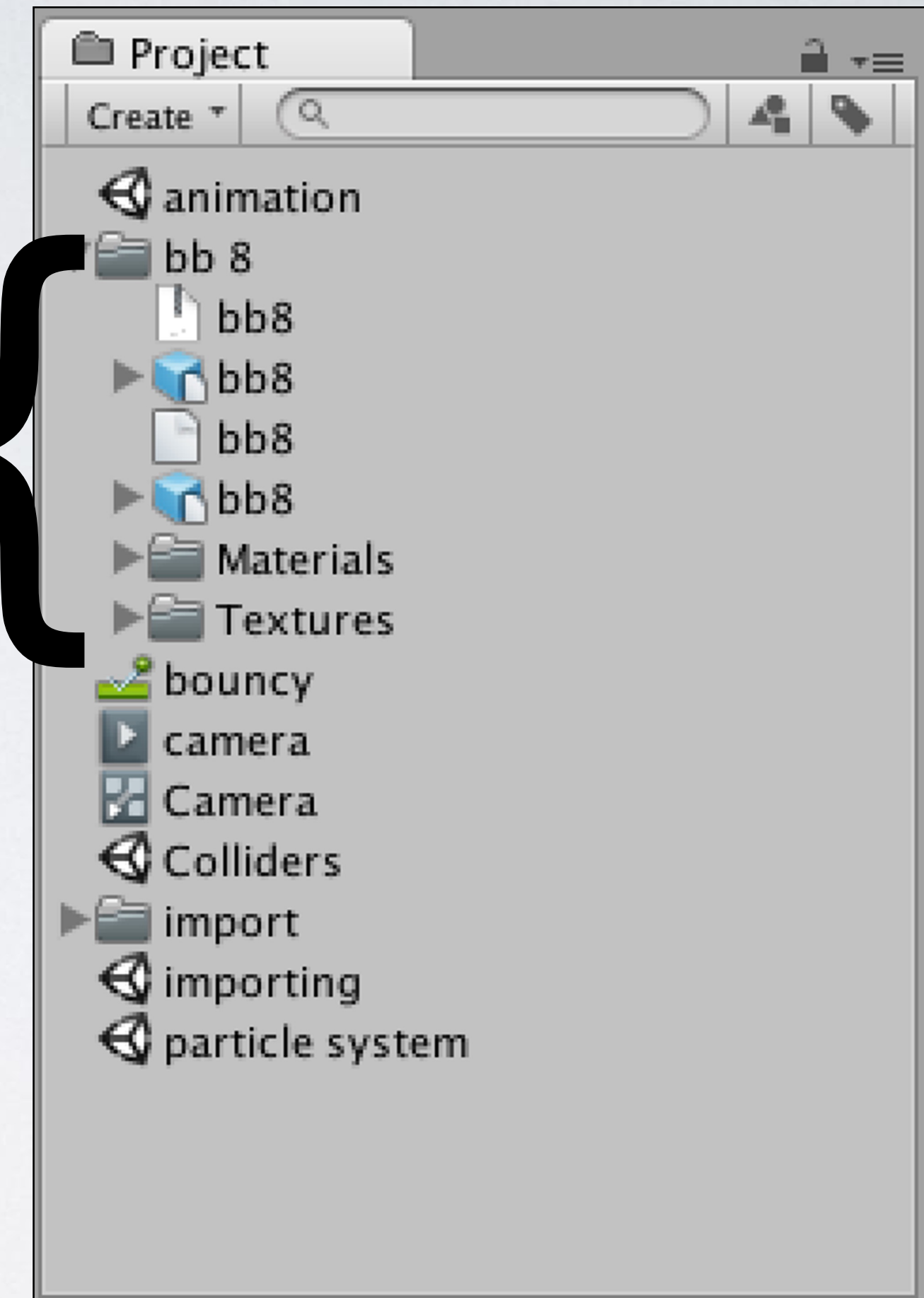
◦Drag and drop model files into Assets folder

◦Make sure the geometry, materials, textures are dragged together into Unity project



Importing Models

- Proprietary application support
 - 3D Studio Max, Maya, Blender, Cinema4D, etc
- Unity converts proprietary files into .fbx during import
- User exported .fbx preferred
- <https://docs.unity3d.com/Manual/3D-formats.html>



Places to Find Models

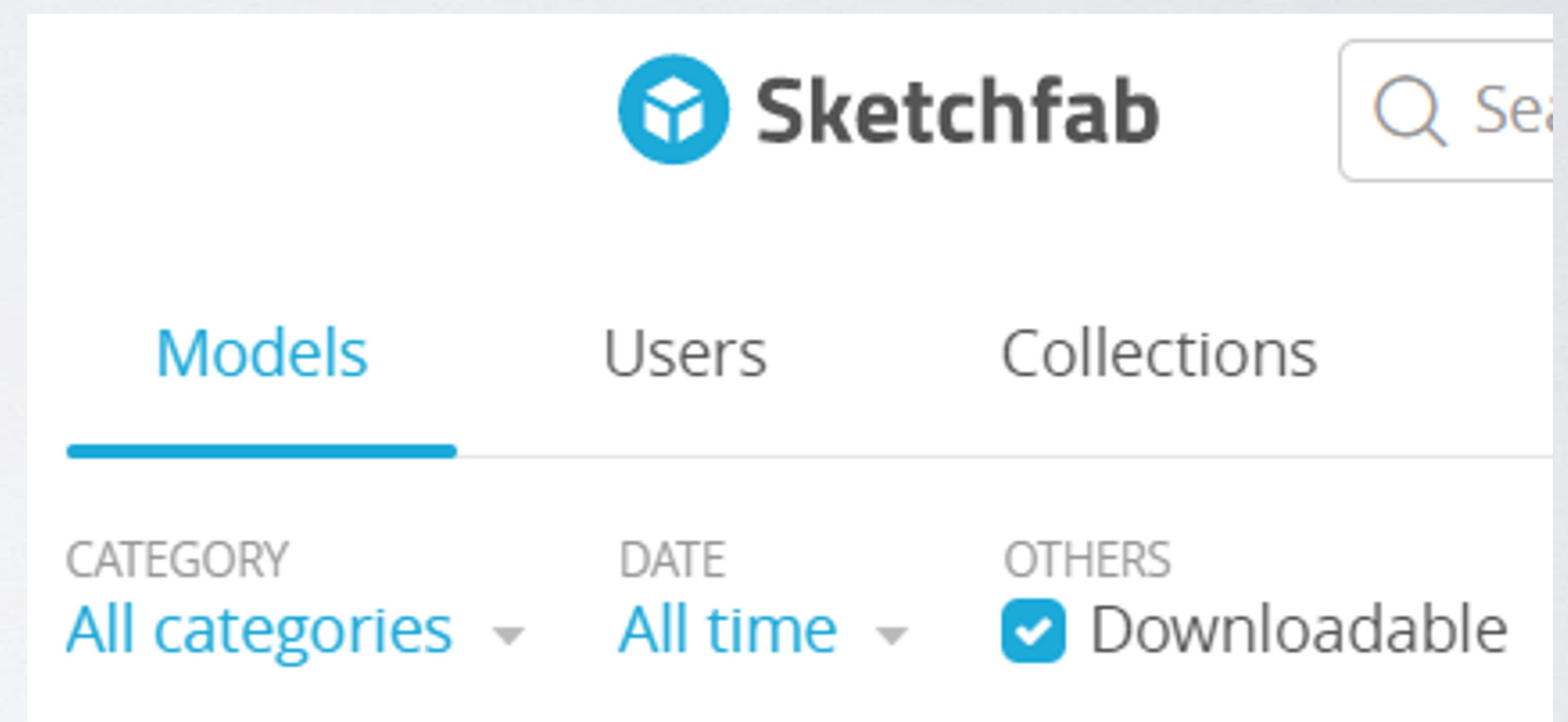
◉ [Sketchfab.com](https://sketchfab.com)

◉ turbosquid.com

◉ www.cgtrader.com

◉ <https://3dwarehouse.sketchup.com>

◉ Dozens of others



Unity Asset Store

○ Models

○ Prefabs

○ Scripts

○ Textures

○ Projects

The screenshot displays the Unity Asset Store interface. At the top, there are navigation icons for hand, pan, rotate, and zoom, along with camera mode buttons for 'Center' and 'Local'. Below this is a toolbar with icons for home, menu, download, cart, and heart. The main content area is titled 'Most Popular' and features a grid of asset listings. Each listing includes a thumbnail, the asset name, a brief description, the creator's name, a star rating with the number of reviews, and the price. Some listings are highlighted with an orange 'SALE' banner. The interface also shows a language dropdown set to 'English' and a user profile labeled 'unknown'.

Asset Name	Description	Creator	Rating	Price	Special
Horizon Based Am...	Shaders/Fullscreen ...	Michaël Jimenez	★★★★★ (33)	\$25	
Lowpoly Township...	3D Models/Environ...	Evgenia	★★★★★ (45)	\$25	
Mobile 10 Cars	3D Models/Vehicles...	Yunus Emre Yaman	★★★★★ (20)	\$30	
Easy Ropes 2D	Editor Extensions/2...	KiltAssets	★★★★★ (26)	\$18	
G2U	Editor Extensions/U...	Litteratus LLC	★★★★★ (163)	\$25 \$20	SALE
MCS Male	3D Models/Charact...	Morph 3D	★★★★★ (39)	\$50 \$40	SALE
Obfuscator	Scripting	Beebyte	★★★★★ (16)	\$60 \$48	SALE
Playmaker	Editor Extensions/Vi...	Hutong Games LLC	★★★★★ (2487)	\$45	
Easy Movie Textur...	Scripting/Video	JaeYunLee	★★★★★ (272)	\$65	
Gaia - Terrain Cre...	Editor Extensions/T...	Adam Goodrich	★★★★★ (381)		
Universal Sound FX	Audio/Sound FX	Imphenzia	★★★★★ (696)		
I2 Localization	Editor Extensions/L...	Inter Illusion	★★★★★ (171)		SALE

In-class Assignment

- Add solidworks / blender models to your project
- Have fun and explore!
 - Add new models
 - Add new functionality
 - Break things
 - etc.