Kate Wang and Mieszko Muskala





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









Game Engines

CRYENGINE®

Components • Renderer • Physics Engine • Sound • Scripting • Animation o Artificial Intelligence • Networking • Scene Graph





• Free game engine

o Provides all the components of any modern game engine

Cross Platform (PC, Xbox, Tablet, Phone, etc.)

o<u>http://unity3d.com</u>







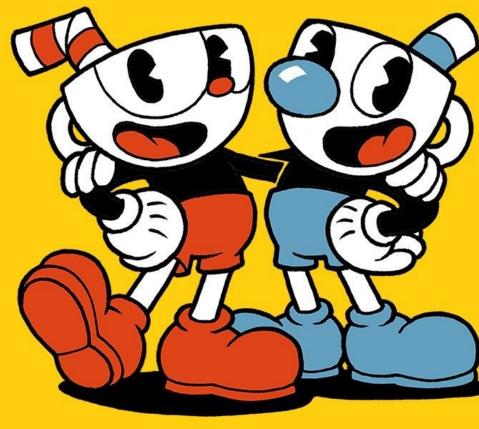
BEAT SABER















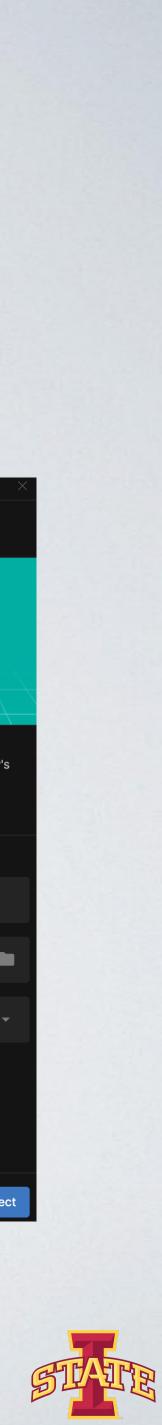


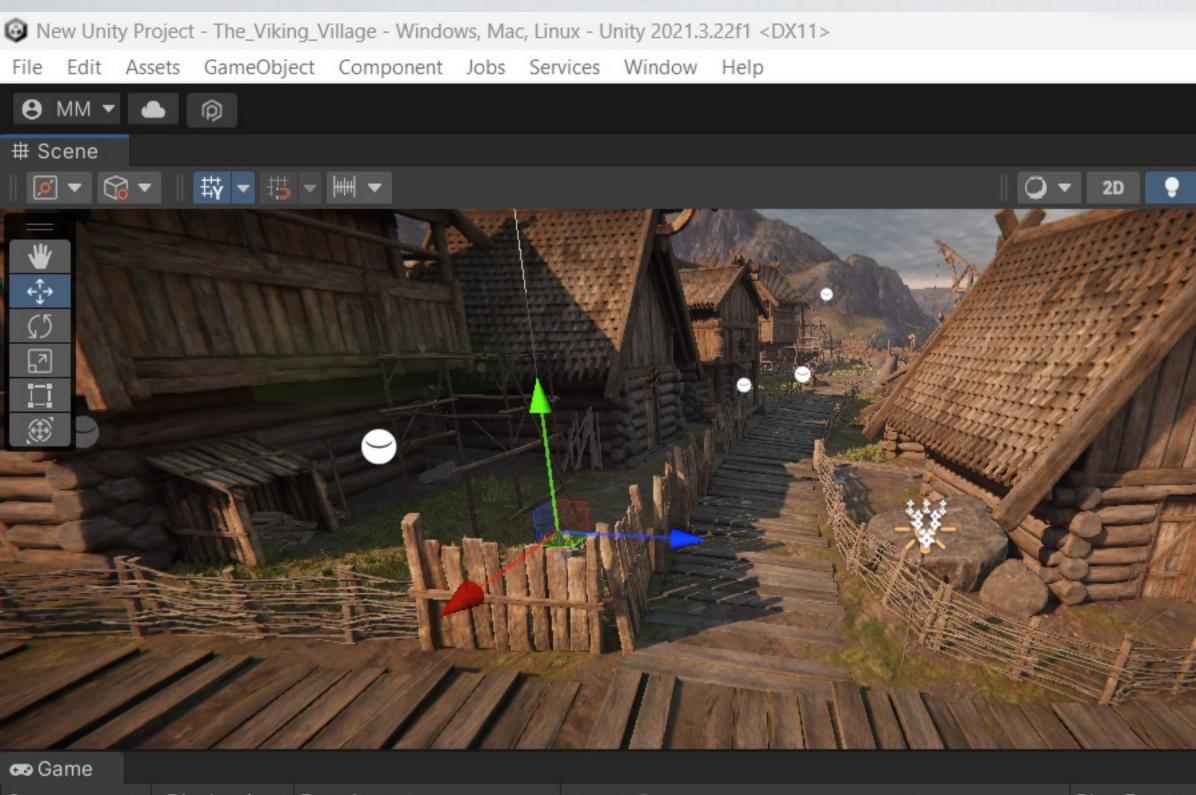
o Sign in with Google using your @iastate email

Create a new Unity Project Version: Unity 2021.3.38fl



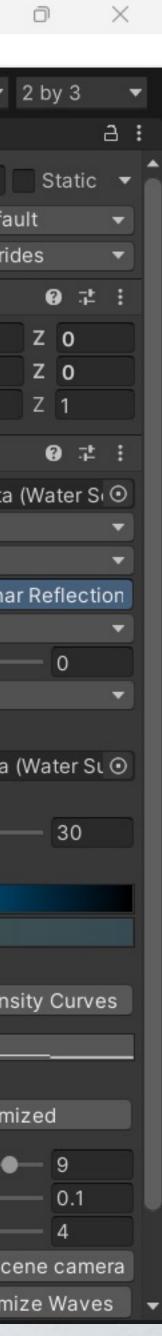
Unity Hub 3.8.0			- 0
	New project Editor Version: 2021.3.38f1 LTS 🗘		
≅ All templates	Q Search all templates		
CoreSample	Core 2D (Built-In Render Pipeline)		
Learning	3D (Built-In Render Pipeline) Core	2D (Built la Dandar Dis slips)	
	SRP Universal 2D Core		3D (Built-In Render Pipeline) This is an empty 3D project that uses Unity built-in renderer.
	SRP Universal 3D Core	۵	PROJECT SETTINGS Project name
	SRP 3D Sample Scene (URP) Sample	٥	Example Location C:\Users\kexinw
	SRP High Definition 3D Core	٥	Unity Organization kexinw
	SRP High Definition 3D sample Sample	Q	Connect to Unity Cloud ? Use Unity Version Control ?
	Core 3D Mobile	Q	
			Cancel Create proj







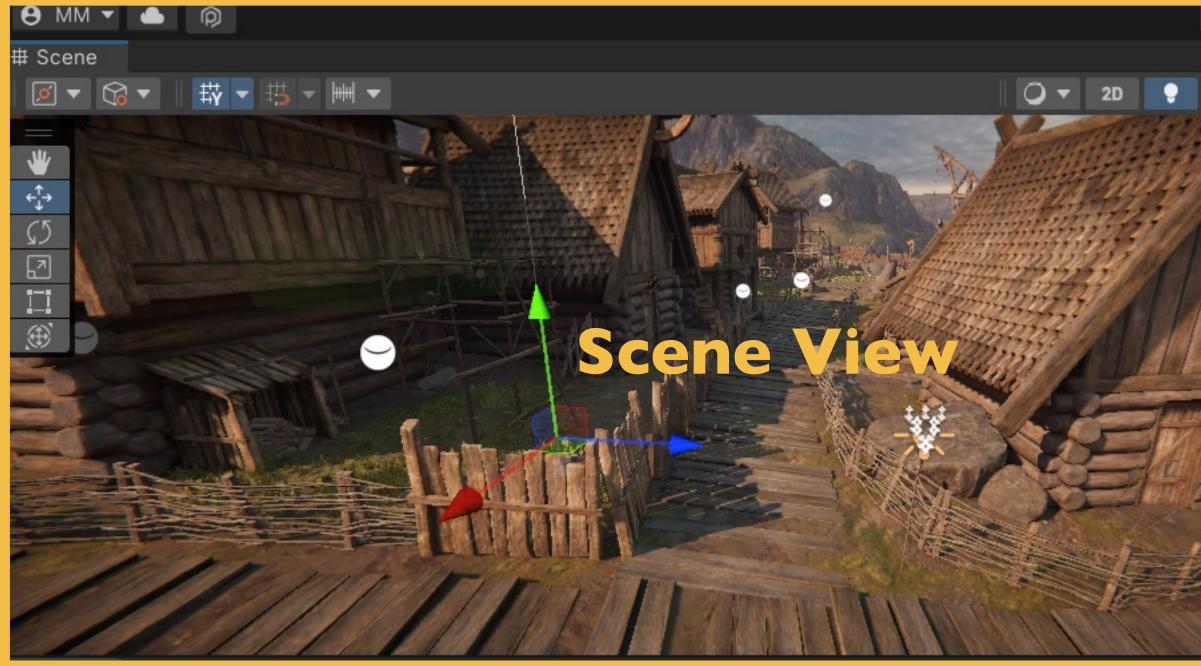
			3	Q Layers 🔻
:	'≔ Hierarchy	a :	Inspector	
	 Image: All Image: The_Viking_Village Image: Content Image: Buildings Image: Props Image: Props<		Rotation X Scale X Image: Scale X Image: Scale Image: Scale Settings Data Image: Scale Water Geom Type Image: Scale Depth Map Culling M Image: Scale Cubemap Resolution Multiplier Clip Plane Offset Image: Scale	WaterSettingsData Vertex Offset MainGround flection Probe Plana
	Project	a :	Shadows	
ed • • • E Stats Gizmos •	 Assets Resources Viking Village Animations Boat Attack Water System Book of the Dead Lighting Materials Models Prefabs Rendering Scenes Scripts 	\$	Visual Settings Maximum Visibility Coloring Controls Absorption Color Scattering Color Surface Foam	WaterSurfaceData MaterSurfaceData Custom
	 Scripts Shaders Standard Assets Textures UniversalRenderPipelineGloba Packages 	alSettinç	Wind Direction	-177 Align to sc 41580 Random



_

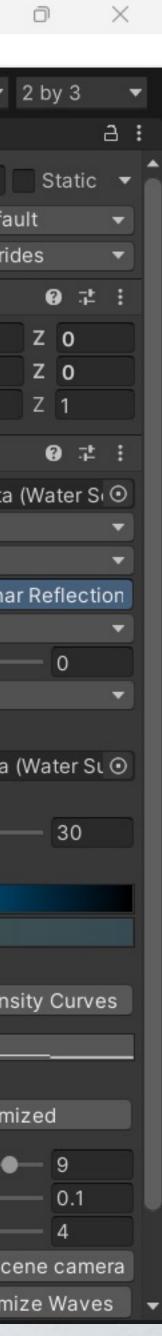
New Unity Project - The_Viking_Village - Windows, Mac, Linux - Unity 2021.3.22f1 <DX11>

File Edit Assets GameObject Component Jobs Services Window Help

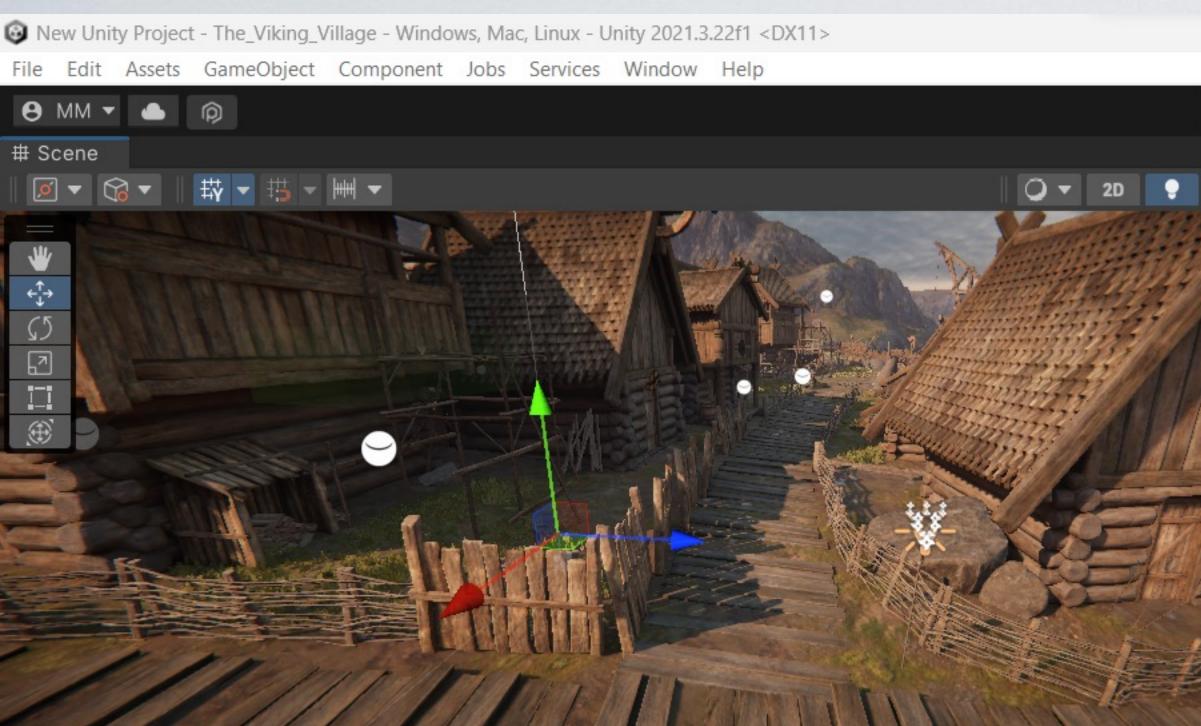


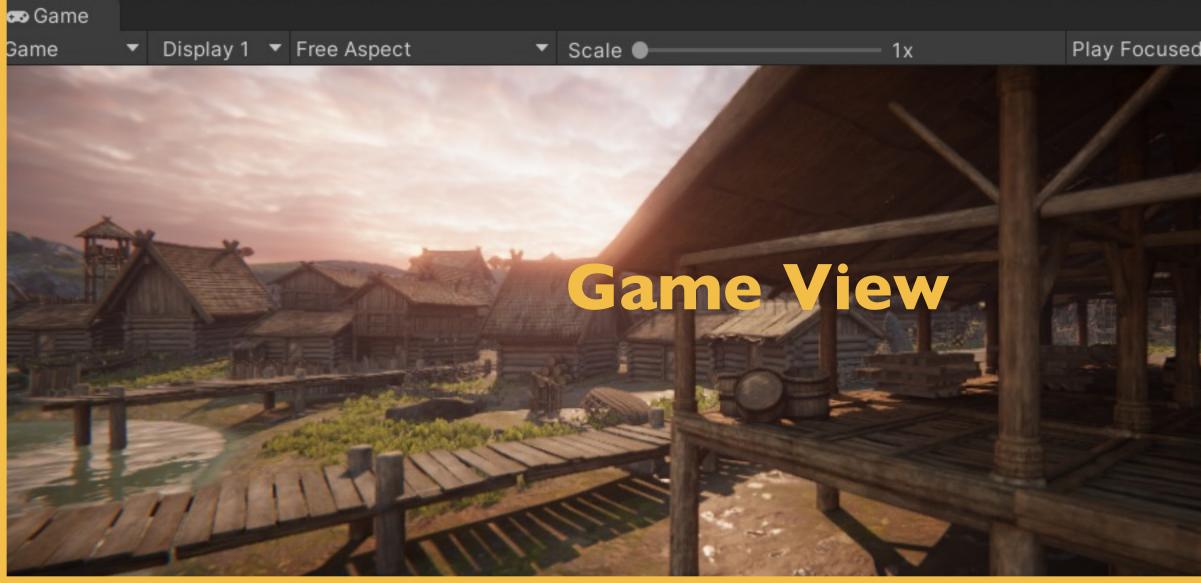


			S) O, Layers 🔻
:	≡ Hierarchy	a :	Inspector	
	 All Content Content Content Props Terrain Vegetation Vegetation Vater Baseplate Reflection Probes Clight Probes Clusion Area Vind Zone Cameras Cameras Canvas EventSystem MouseLock 	₽ • • • •	 Water Tag Untagged Prefab Open Transform Position Rotation Scale Water (Scrip) Settings Data Water Geom Type Depth Map Culling I 	WaterSettingsData Vertex Offset MainGround Reflection Probe Plana
	Project	: E	Snadows Surface Data	SurfaceData SurfaceData
ed V II Etats Gizmos V	 Assets Resources Viking Village Animations Boat Attack Water S Book of the Dead Lighting Materials Models Prefabs Rendering 		Visual Settings Maximum Visibili Coloring Controls Absorption Color Scattering Color Surface Foam Automatic Foam Profile Wave Settings	t <u>.</u> –
	 Scenes Scripts 		Automatic	Custom
	 Shaders Standard Assets Textures UniversalRenderPipelin Packages 	neGlobalSettinç	Wave Count Avg Swell Height Avg Wavelength Wind Direction Random Seed	-177 Align to sc
			Random Seed	41580 Random

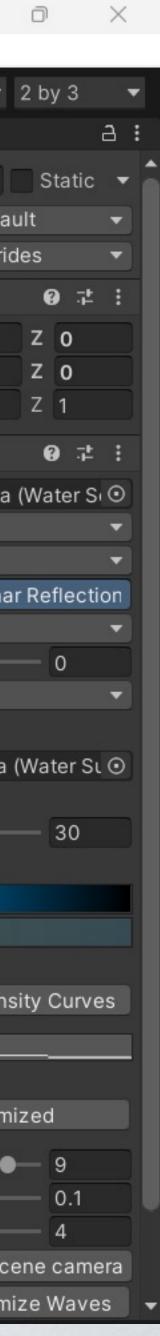


_

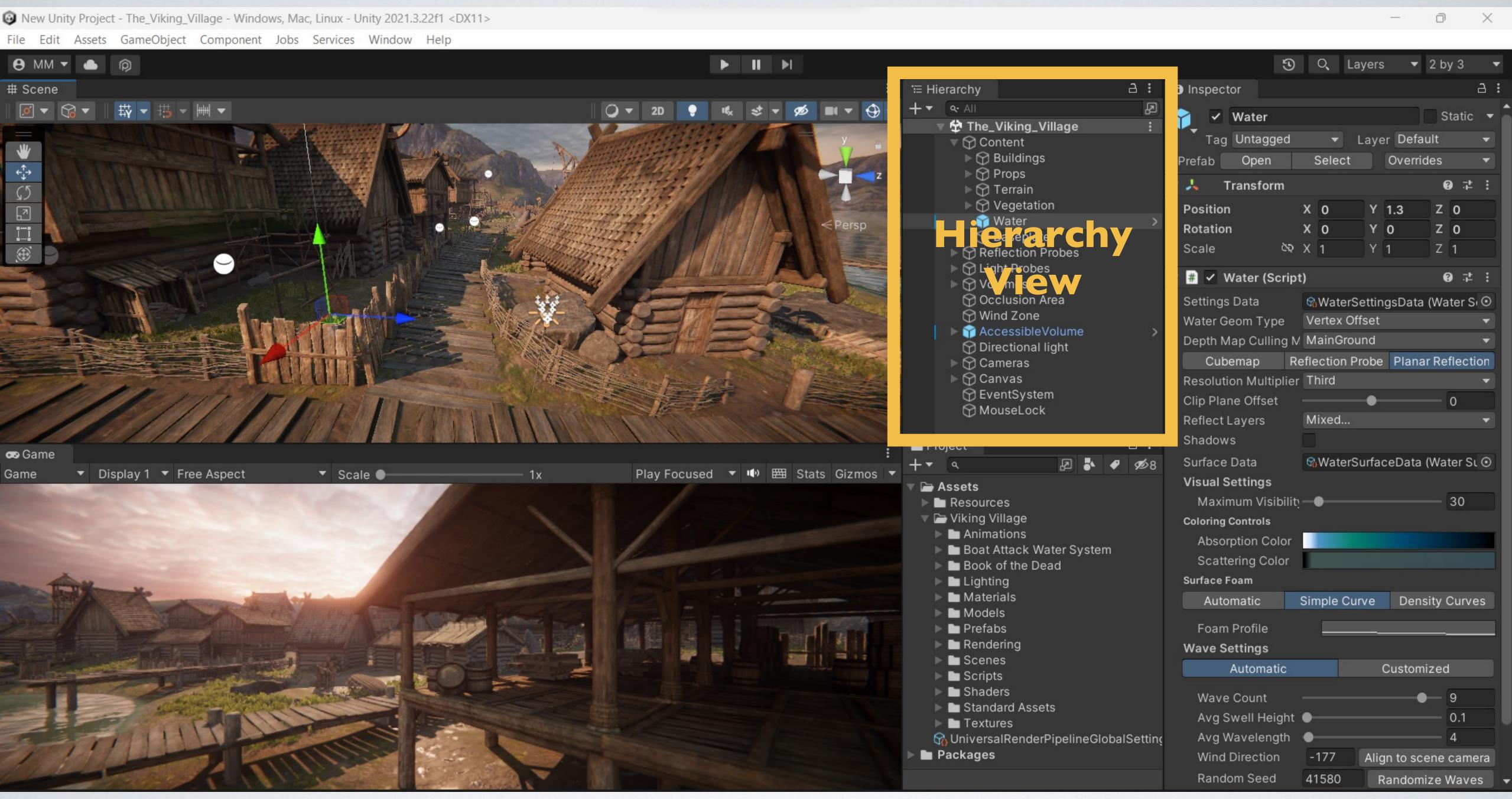


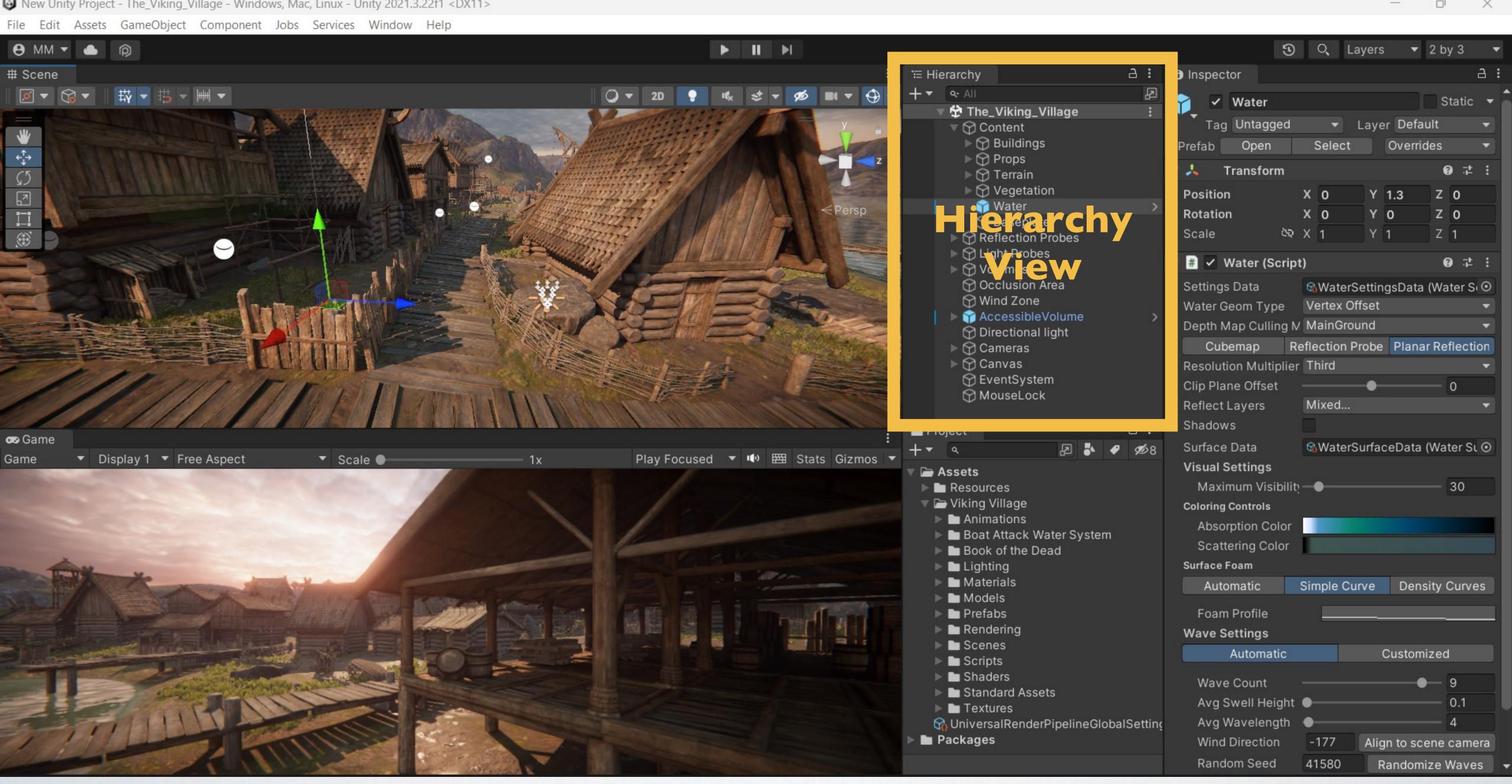


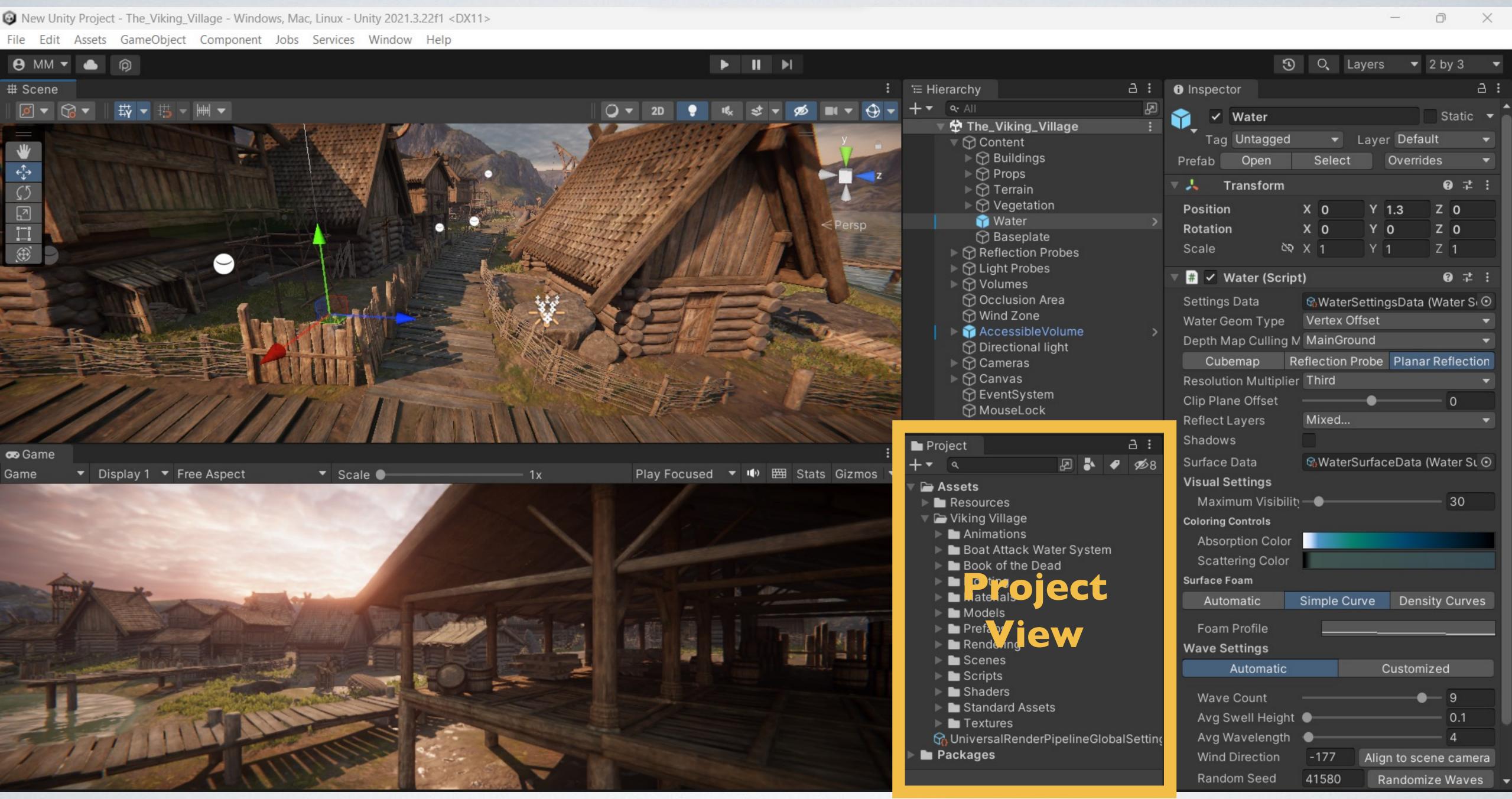
		🙂 🔍 Layers 🔻
:	'≔ Hierarchy	금 : O Inspector
	 All Content Content Content Content Props Props Terrain Vegetation Vegetation Water Baseplate Coclusion Probes Coclusion Area Vind Zone Vind Zone Cameras Cameras Canvas EventSystem MouseLock 	Image: Image
:	Project	A : Shadows
ed • • • E Stats Gizmos	 Assets Assets Resources Viking Village Animations Boat Attack Water System Book of the Dead Lighting Materials Models Prefabs Rendering Scenes Scripts Shaders Standard Assets Textures UniversalRenderPipelineGlobal Packages 	

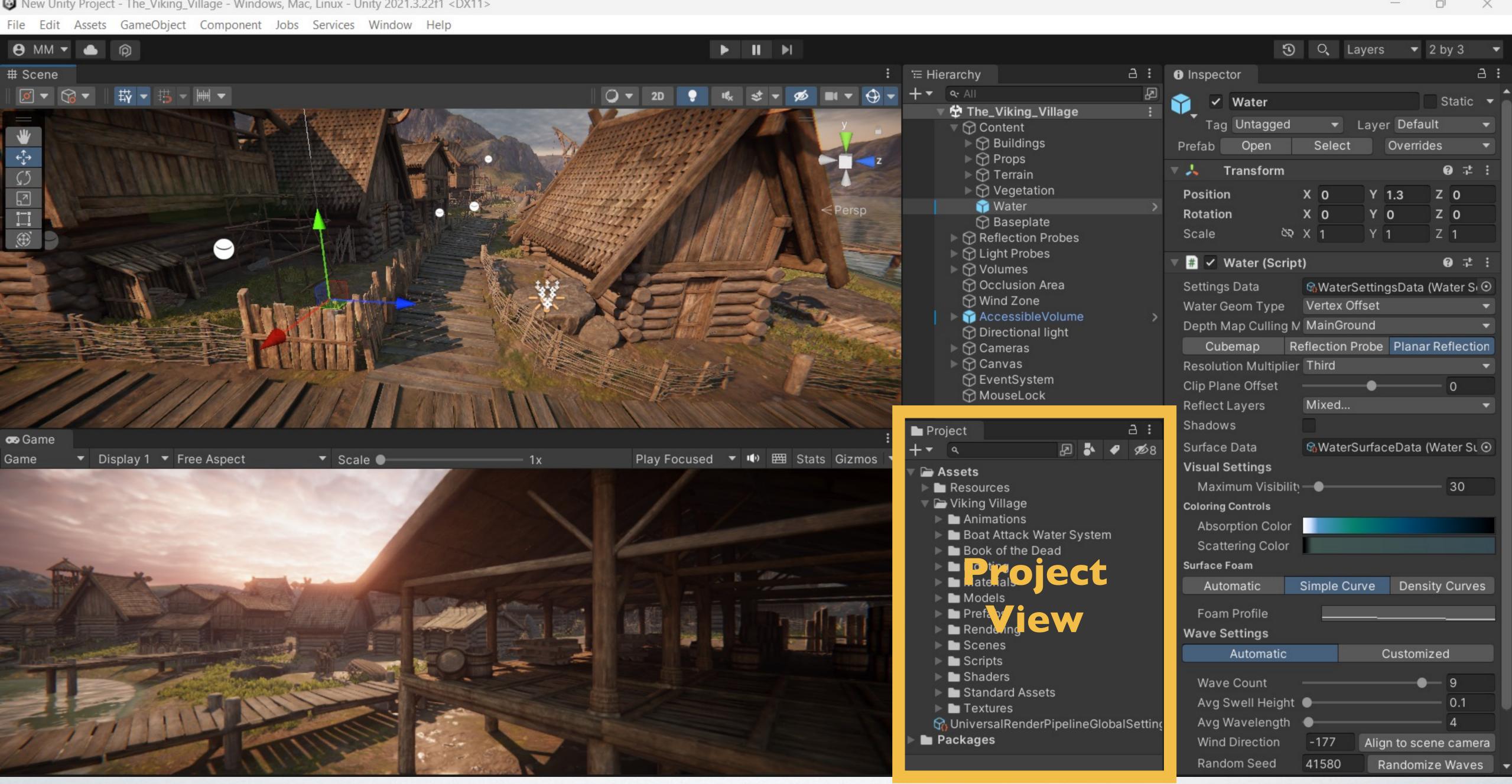


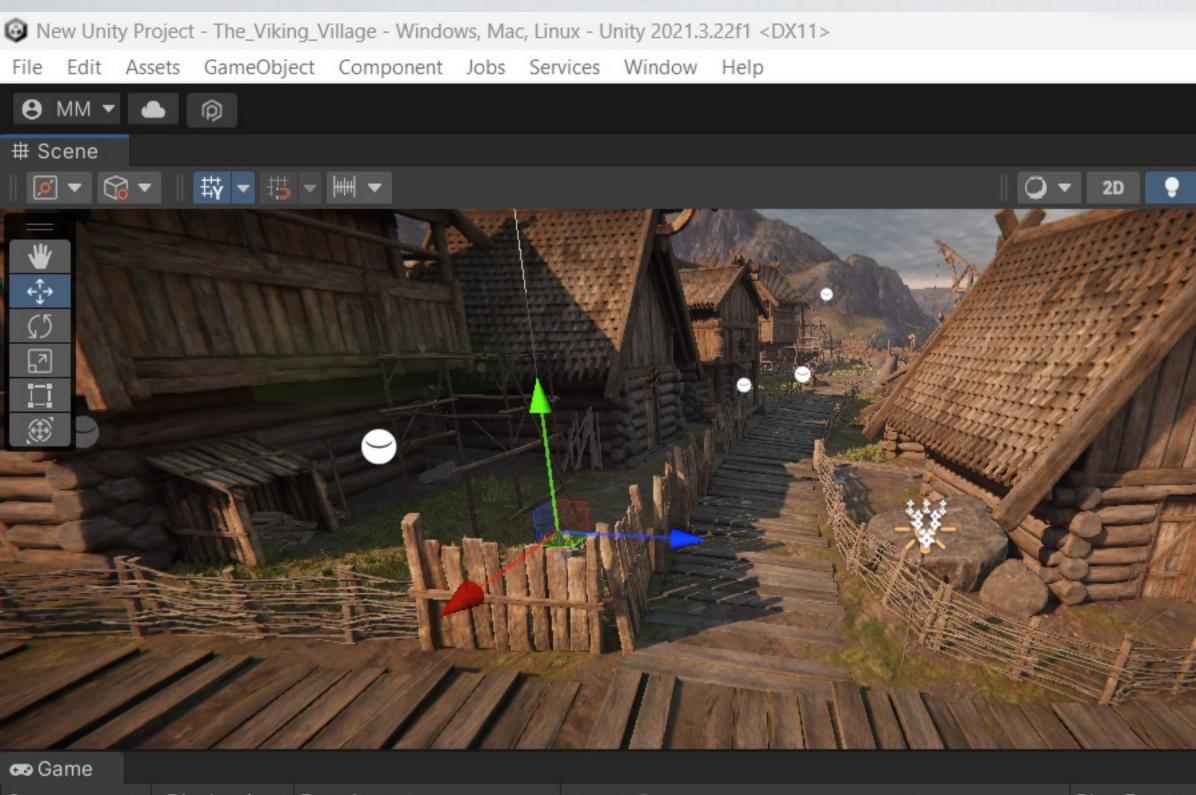
_







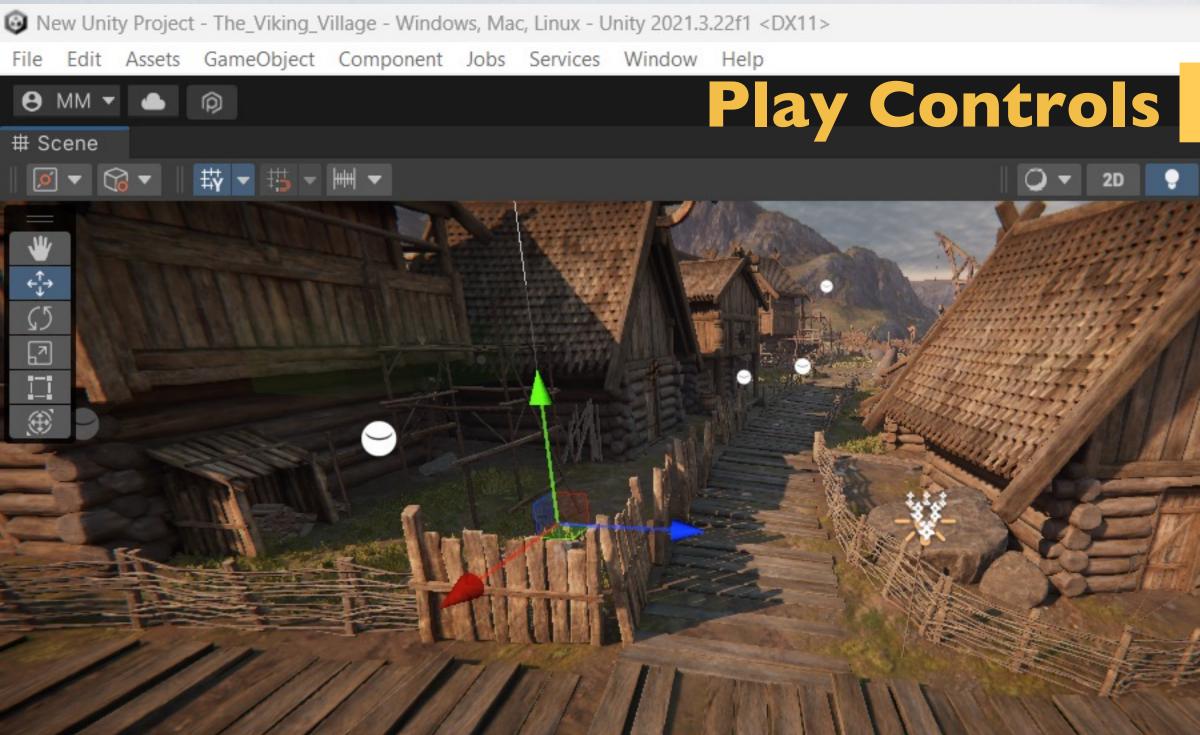


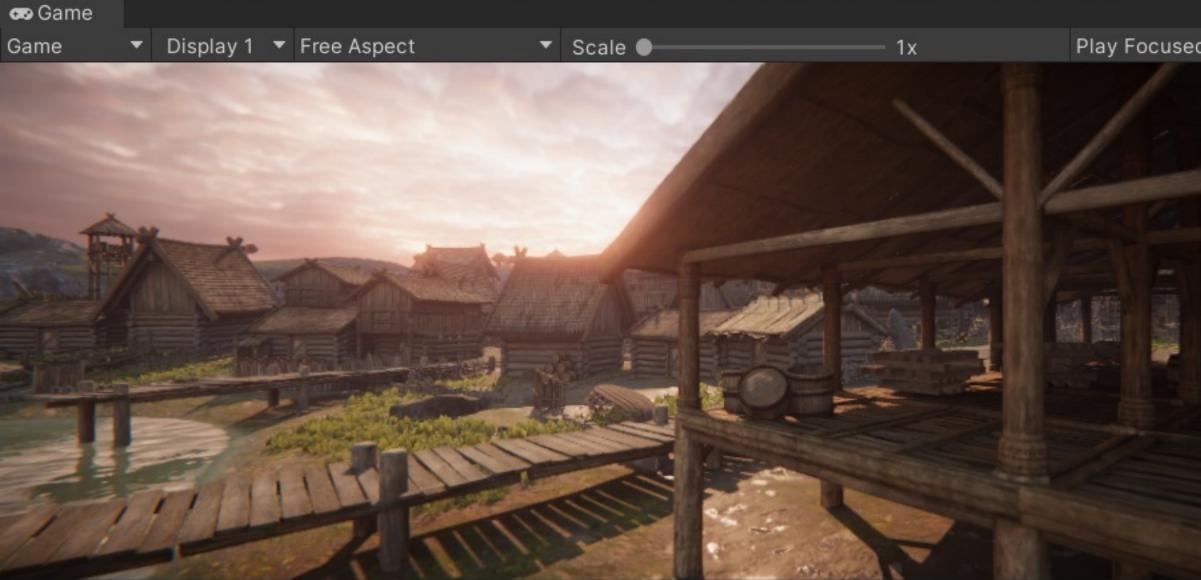




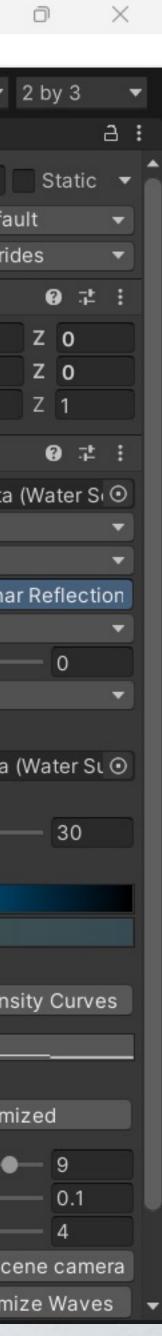
		🕤 Q Lavers 🔻
:	ੰ≡ Hierarchy 🔒 🗄	Inspector
	 Hierarchy All The_Viking_Village Content Ocontent Operation Props Operation Vegetation Vegetation Vegetation Reflection Probes Operation Conclusion Area Volumes Occlusion Area Wind Zone Nind Zone Operational light Cameras Canvas EventSystem MouseLock 	Water Tag Untagged Layer Defau Prefab Open Select Overrid Transform Position X 0 Y 1.3 Rotation X 0 Y 1.3 Rotation X 0 Y 1.3 Rotation X 0 Y 0 Scale № X 1 Y 1 Image: Settings Data Water Geom Type Vertex Offset Depth Map Culling M MainGround Cubemap Reflect Layers Image: Settings Image: Setti
ed V V E Stats Gizmos V	 Project Project Assets Resources Viking Village Animations Boat Attack Water System Book of the Dead Lighting Materials Models Prefabs Rendering Scenes Scripts Shaders Standard Assets Textures UniversalRenderPipelineGlobalSetti Packages 	Shadows Surface Data Surface Data Visual Settings Maximum Visibility Coloring Controls Absorption Color Scattering Color Surface Foam Automatic Simple Curve Dens Foam Profile Wave Settings Automatic Customi Wave Count Avg Swell Height







► II ►			3 C	🔍 Layers 🔻
:	[•] ≡ Hierarchy	а:	Inspector	
	+ ▼ • All ▼ The_Viking_Village ▼ Content ● Buildings ● Props ● Props ● Yegetation ● Vegetation ● Reflection Probes ● Props ● Reflection Probes ● Volumes ● Volumes ● Volumes ● Occlusion Area ● Directional light ● Cameras ● Canvas ● EventSystem ● MouseLock		▼ Transform Position X Rotation X Scale № X Scale № X ▼ ✓ Water (Script) Settings Data № W Water Geom Type Ver Depth Map Culling M Ma Cubemap Reflect Resolution Multiplier Thi Clip Plane Offset —	Y 0 Y 1 VaterSettingsData tex Offset inGround tion Probe Plana rd
	Project	a :	Reflect Layers Mix Shadows	(ed
ed • • E Stats Gizmos •	 Assets Assets Resources Viking Village Animations Boat Attack Water System Book of the Dead Lighting Materials Models Prefabs Rendering Scenes 	95 8	Visual Settings Maximum Visibility Coloring Controls Absorption Color Scattering Color Surface Foam Automatic Foam Profile Wave Settings	VaterSurfaceData
	 Scripts Shaders Standard Assets Textures UniversalRenderPipelineGloba Packages 	alSetting	Automatic Wave Count Avg Swell Height Avg Wavelength Wind Direction Random Seed 415	



—



Scripting Documentation - https://docs.unity3d.com/Manual/index.html Tutorials - <u>https://learn.unity.com/</u> User Forums - <u>https://forum.unity.com/</u>









oGame Objects & Components

oPrefabs

oTags

oLayers





Game Object: Anything within your Unity scene (Hierarchy)

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



Game Objects & Components

[•] ⊟ Hierarchy		a :	Inspector		
+ - All		R	Directional light		
The_Viking Content	The_Viking_Village Content		Tag Untagged Layer Default		
► 💮 Vegeta 🈭 Water	 Props Terrain Vegetation Water Baseplate Reflection Probes Light Probes Volumes Occlusion Area 	>	▼ Transform Position X -55.8 Y 116.3 Z Rotation X 35.43 Y -42.1 Z Scale № X 1 Y 1 Z		
Reflectio			▼ ☆ ✓ Light		
► 💮 Volumes ۞ Occlusio			▶ General▼ Emission		
+	ssibleVolume		cessibleVolume >		Light Appearance Color Color
 Cameras Canvas 			Intensity 5 Indirect Multiplier 1.5		
	🕜 EventSystem		▶ Rendering		
			Shadows		
			Light Cookie		
			🔻 🗯 Universal Additional Light Data (Script		
			Add Component		







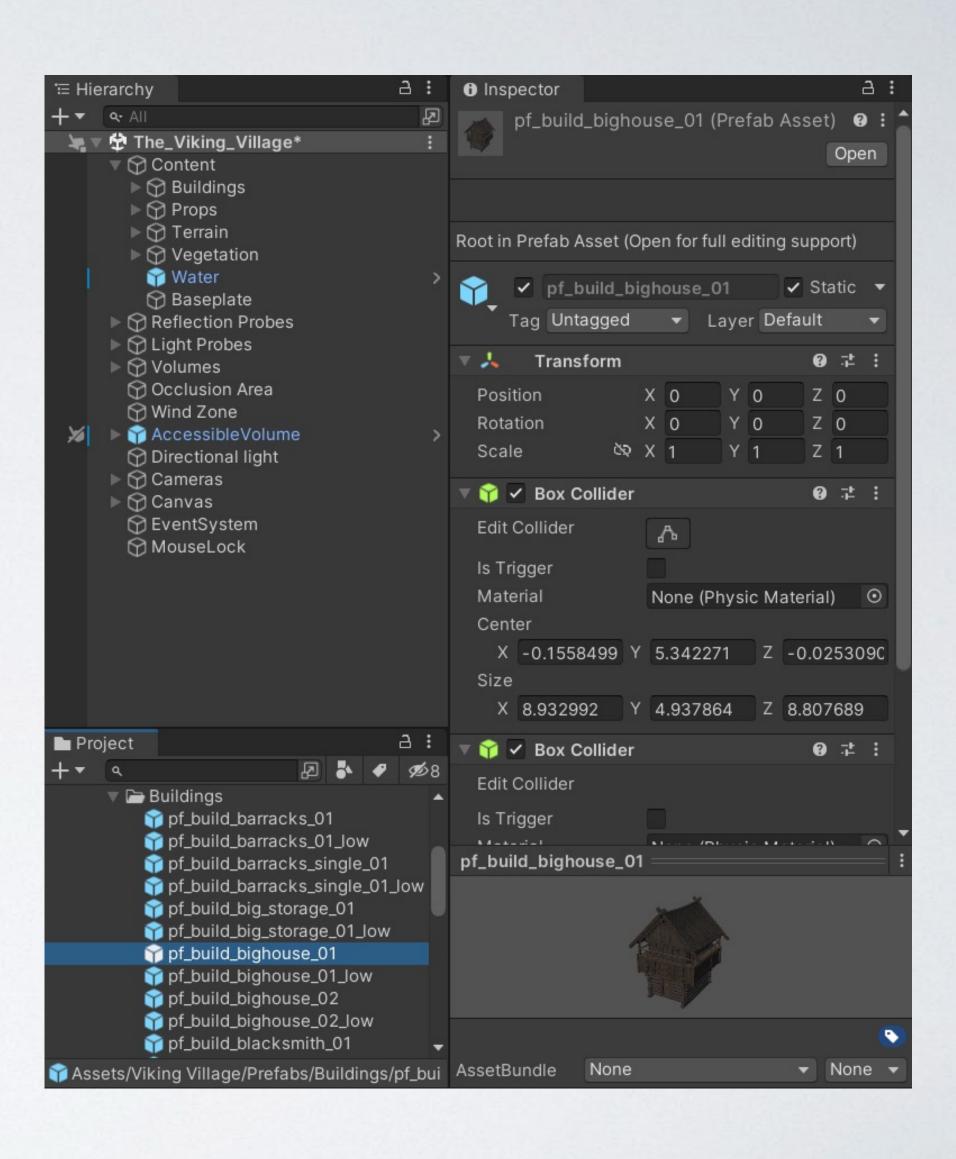
oPrefab = Preconfigured Game Object

oPrefabs 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



Prefabs







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

Allows you to search for objects in code



Inspecto	r					Ċ
pf_b	uild_bigh	nouse <u>.</u>	_01 (Pre	efab A	Asset)	Ope
Root in Prefa	ab Asset	(Open 1	for full e	diting	suppo	ort)
😭 🔽 🛛	of_build_	bighou	ise_01		🗸 Sta	tic
Tag	Untaggeo	r b	Lay	er De	fault	
∀ 🙏 — т	 ✓ Unta 	agged			0	
Position	Res	pawn			Πz	0
Rotation	Finis	sh	z	0		
Scale		EditorOnly Z 1				
- 🗢 🔽 n	Mai	nCame	ra		-	-+
🔻 🎁 🗹 В	Play				U	-i÷
Edit Colli	Gan	neConti	roller			
Is Trigge	Add	Tag				
Material		Nor	ne (Phys	sic Ma	aterial))
Center						
X -0.1	558499	Y 5.3	42271	Z	-0.02	530
Size				_		
X 8.93	32992	Y 4.9	37864	Z	8.807	689
🔻 🍞 🔽 Bo	ox Collide	r			0	
Edit Collic	der					
Is Trigger						
		1	(2)			8

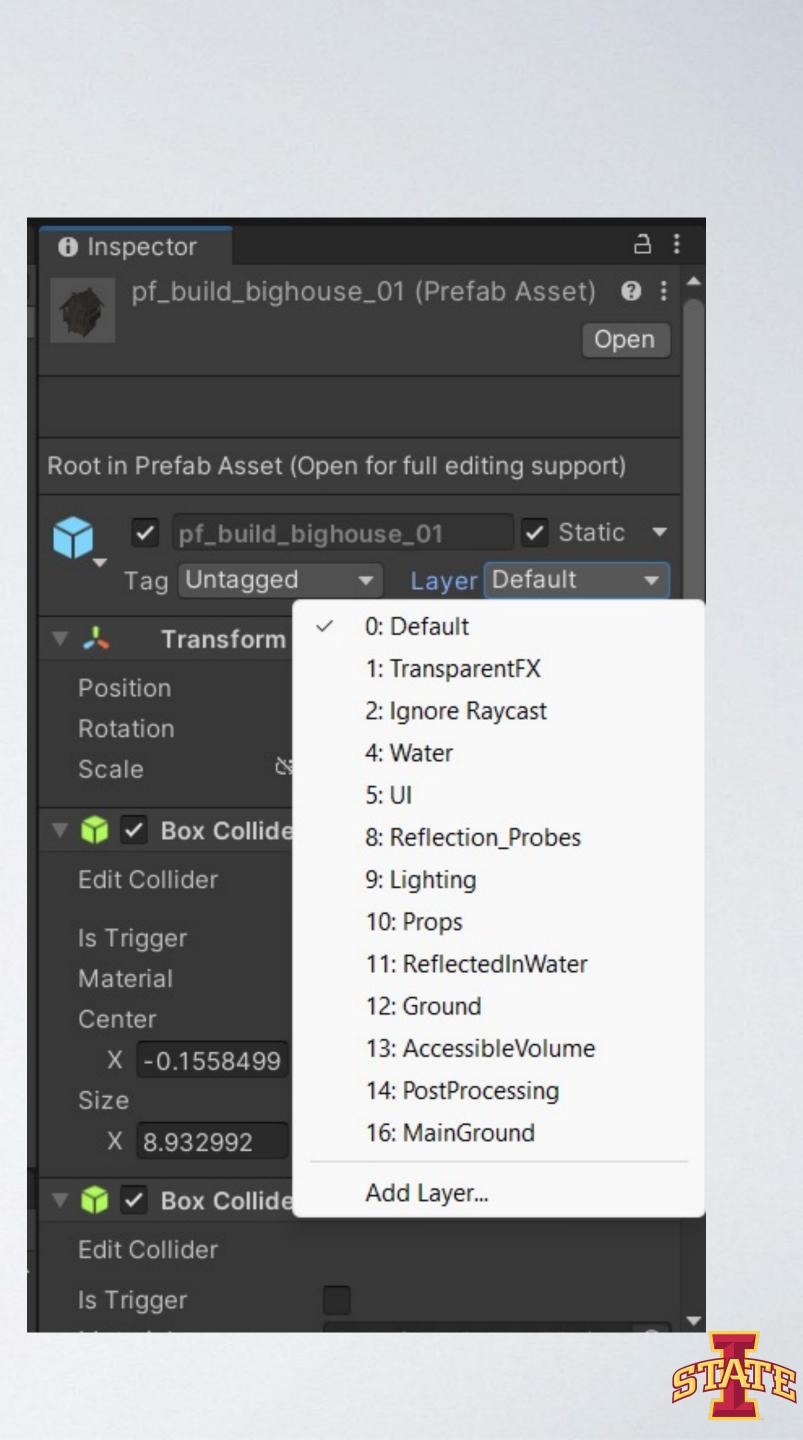




Another way of grouping things You can show or hide layers in the Scene View Often used to control rendering objects differently



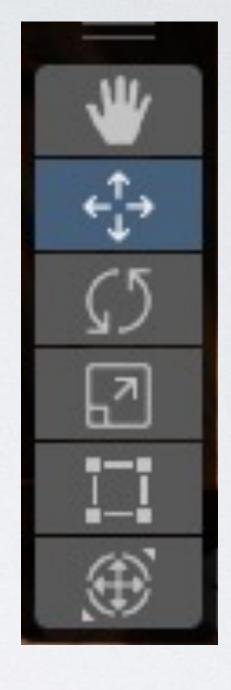






Pan: Left Mouse Button Zoom: Right Mouse Button + Alt / Scroll Wheel Rotate: Left Mouse Button + Alt / Right Mouse Move: Right Mouse Button + WASD Keys









oUsed to render the scene •Must have one camera but can have more oEvery camera has a View Frustum shown by the pyramid Orthographic/Perspective Projection







Ounity models how light behaves in the real world •You can add as many lights as you want oDirectional/Area/Spot oRealtime/Baked lighting









Oreate a cube and an empty GameObject •Make the cube as a child of the empty GameObject oTurn the entire GameObject into a prefab Familiarize yourself with Unity's interface and functionalities



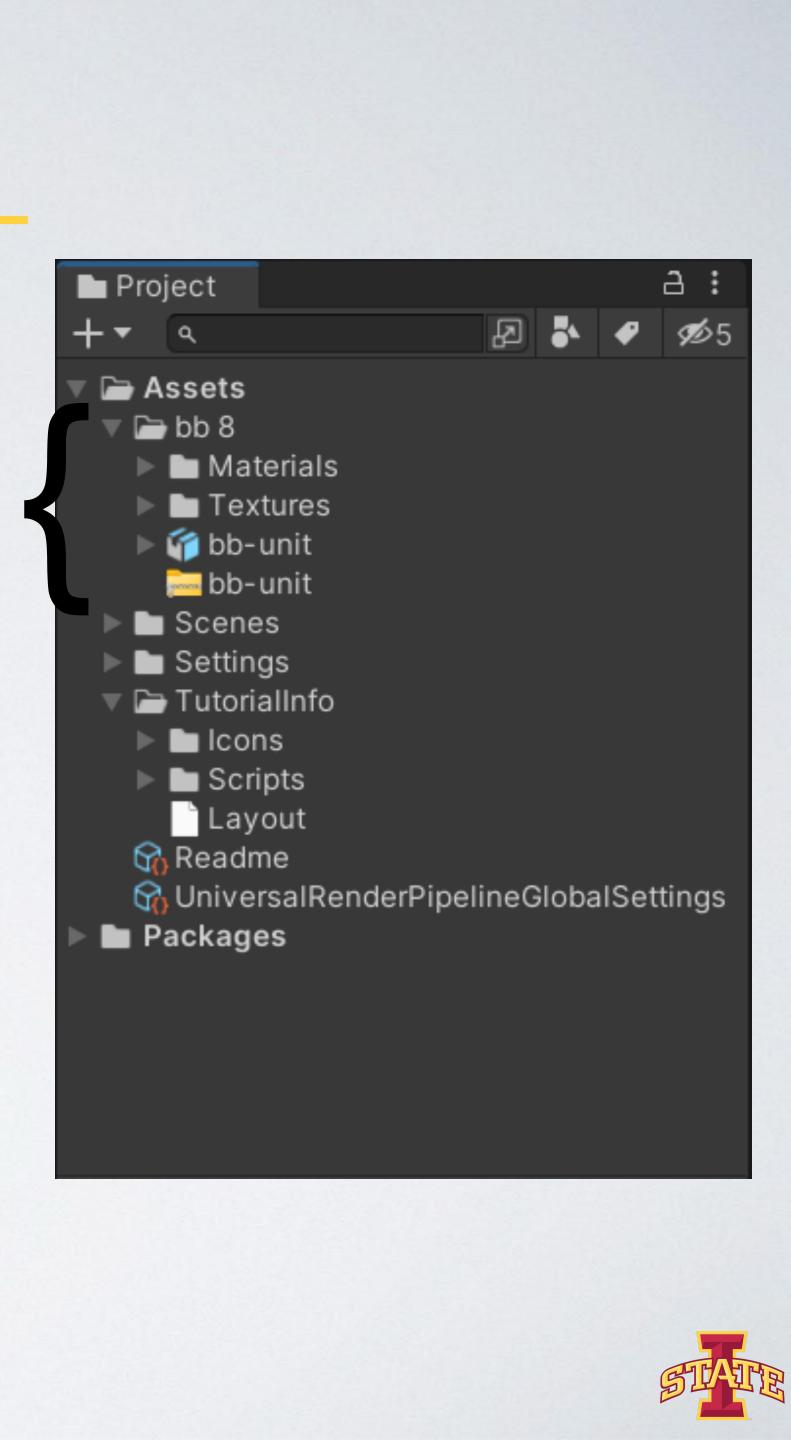


Importing Models

oUnity can read

.fbx, .dae (collada), .dxf, .obj, and .skp files - Orag and drop model files into Assets folder oMake sure the geometry, materials, textures are dragged and dropped together into Unity project





Importing Models

Proprietary application support

3D Studio Max, Maya, Blender, Cinema4D, etc

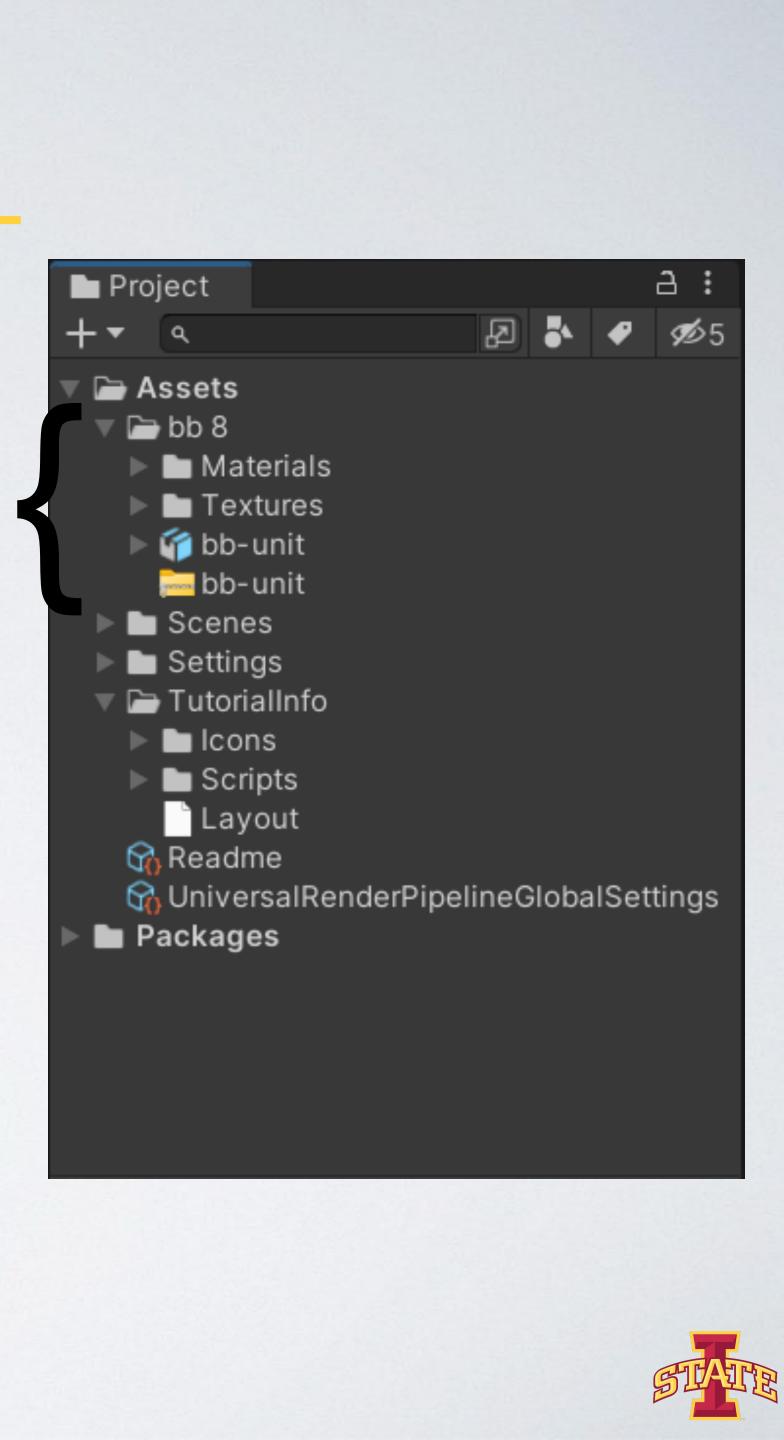
Ounity converts proprietary files into .fbx during import

oUser exported .fbx preferred

ohttps://docs.unity3d.com/Manual/3D-formats.html



-





oSketchfab.com

oturbosquid.com

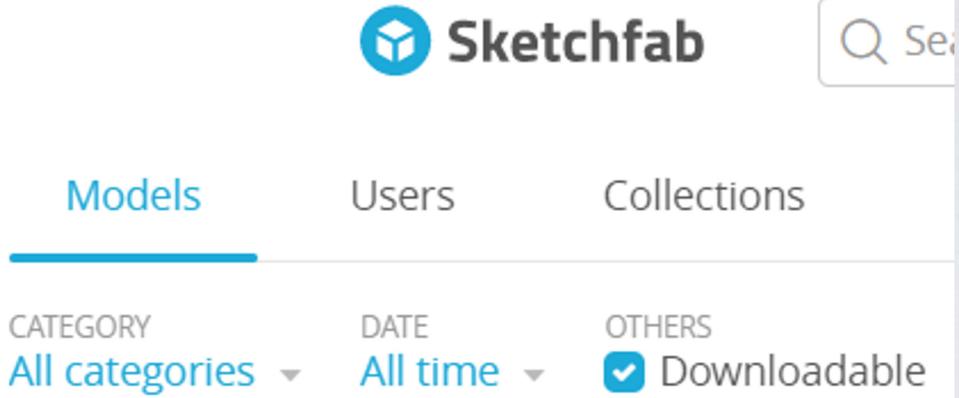
owww.cgtrader.com

ohttps://3dwarehouse.sketchup.com

• Dozens of others



Places to Find Models









oModels

oPrefabs

oScripts

oTextures

oProjects

https://assetstore.unity.com/

Unity Asset Store					Q Search for		
3D	2D	Add-Ons	s Audi	io	Decentralizati		
	0		(9)				
	Sale	e	3D (47073)		2D (11132)		

Popular assets

On sale Top selling Top new Top

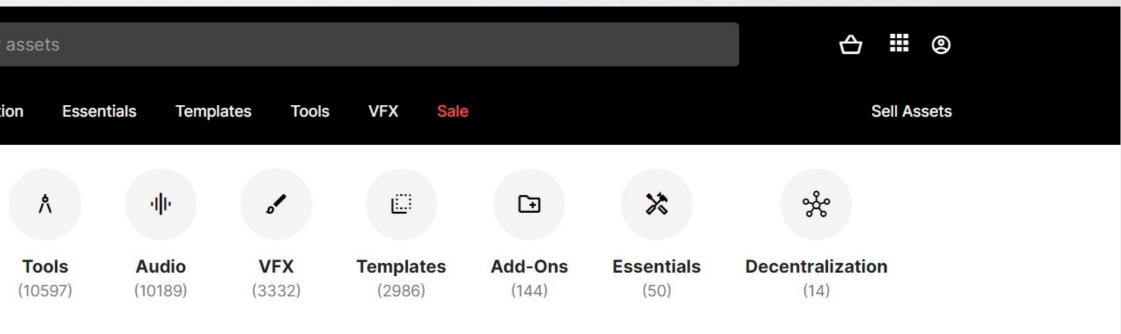




-50% IAN DEANE Mesh Baker ★★★★★ (404)

-50% SEASIDE STUDIOS All In 1 Vfx Toolkit ★★★★★ (38)





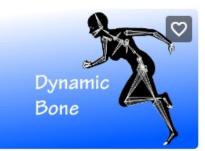
Top free Verified Solutions

See more

-50% GAMEMASTER AUDIO Pro Sound Collection ★★★★★ (86)



-50% FREYA HOLMÉR Shapes ★★★★★ (71)



WILL HONG
Dynamic Bone
★★★★★ (648)
\$20 ☆ Add to Car



-50% FIMPOSSIBLE CREATIONS Animation Designer ☆ Add to Cart ★★★★ (36)







New Unity Project - The_Viking_Village - Windows, Mac, Linux -	Window lelp	
e MM ▼ ▲ @	Paneis	
# Scene 🔮 Asset Store	Next Window	Ctrl+Tab
<mark>∅</mark> ▼	Previous Window	Ctrl+Shift+Tab
	Layouts	
	Search	
<u>(</u>) ⊡	Unity Version Control	
	Package Manager	
2	Asset Management	
	Text	
	TextMeshPro	
	General	
	Rendering	
A AND THE THE	Animation	
	Audio	
o Game	Sequencing	
ame 🔻 Display 1 🔻 Free Aspect 🔹 Sca	Analysis	
	2D	
	AI	
	UI Toolkit	
	Visual Scripting	

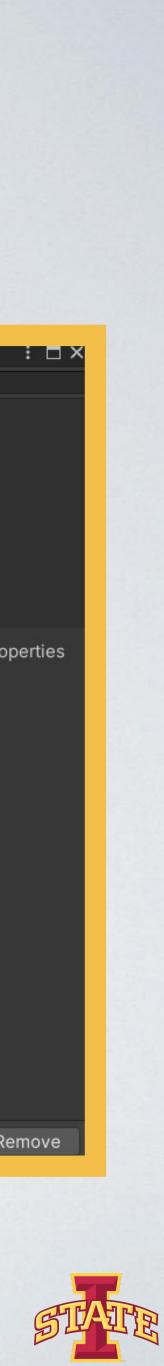


View Unity Store Assets

3.

E Package M

+ ▼ Packages: In Project ▼ Sort: Name ↓ ▼		\$ <
Packages - Unity		2D Sprite Release
2D Sprite	1.0.0 🗸	
2D Tilemap Editor	1.0.0 🗸	Unity Technologies Version 1.0.0 - March 21, 2023
Analytics Library	3.6.12 🗸	Registry Unity
▶ Burst	1.8.2 🗸	com.unity.2d.sprite
In App Purchasing	4.7.0 🗸	View documentation • View changelog • View licenses
JetBrains Rider Editor	3.0.18 🕜	Use Unity Sprite Editor Window to create and edit Sprite asset prop
Test Framework	1.1.31 🕤	like pivot, borders and Physics shape
TextMeshPro	3.0.6 🗸	
▶ Timeline	1.6.4 🕤	
▶ Unity UI	1.0.0 🗸	
Universal RP	12.1.10 🗸	
Version Control	2.0.1 🕤	
Visual Scripting	1.8.0 🗸	
Visual Studio Code Editor	1.2.5 🗸	
Visual Studio Editor	2.0.17 🕥	
XR Legacy Input Helpers	2.1.10 🗸	
Last update May 16, 00:48	C -	Re
	 2D Sprite 2D Tilemap Editor Analytics Library Burst In App Purchasing JetBrains Rider Editor Test Framework TextMeshPro Timeline Unity UI Universal RP Version Control Visual Scripting Visual Studio Code Editor Visual Studio Editor 	+ ▼ Packages: In Project ▼ Sort: Name ↓ ▼ Packages - Unity 2D Sprite 1.0.0 ✓ 2D Tilemap Editor 1.0.0 ✓ Analytics Library 3.6.12 ✓ Burst 1.8.2 ✓ In App Purchasing 4.7.0 ✓ JetBrains Rider Editor 3.0.18 ● Test Framework 1.1.31 ● TextMeshPro 3.0.6 ✓ Unity UI 1.0.0 ✓ Universal RP 12.1.10 ✓ Version Control 2.0.1 ● Visual Scripting 1.8.0 ✓ Visual Studio Editor 2.0.17 ● XR Legacy Input Helpers 2.1.10 ✓





Add solidworks / blender models to your projectHave fun and explore!

- Add new models
- Add new functionality
- Break things
- etc.



