Unity

Multimedia Techniques & Applications

Yu-Ting Wu

Introduction

- **Game engine**
  - A **software framework** primarily designed for the development of video games, and generally includes **relevant libraries** and **support programs**
- **Top game engines**
  - **Unity**
  - **Unreal Engine (UE)**
  - Amazon Lumberyard
  - CryEngine
  - GameMaker: Studio
  - Godot
  - Cocos2d

Unity v.s. Unreal Engine

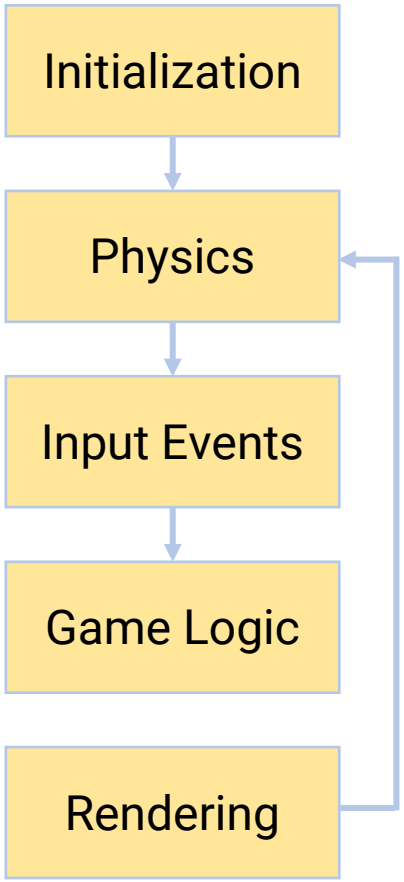
Unity v.s. Unreal Engine (cont.)

	Unreal Engine	Unity
Pros	• Better rendering quality • Better material editing system • Blueprint for prototype	• Easier to learn • Easier to deploy to various platform • More online resource
Cons	• Steeper learning curve • Fewer online assets	• Lower rendering quality

Unity

Unity Overview

- **Unity event order list (lifecycle flowchart)**



Awake, Start, OnEnable

FixedUpdate,
AnimationUpdate, PhysicsUpdate,
OnTriggerXXX, OnCollisionXXX

OnMouseXXX

Update, Coroutine, LateUpdate

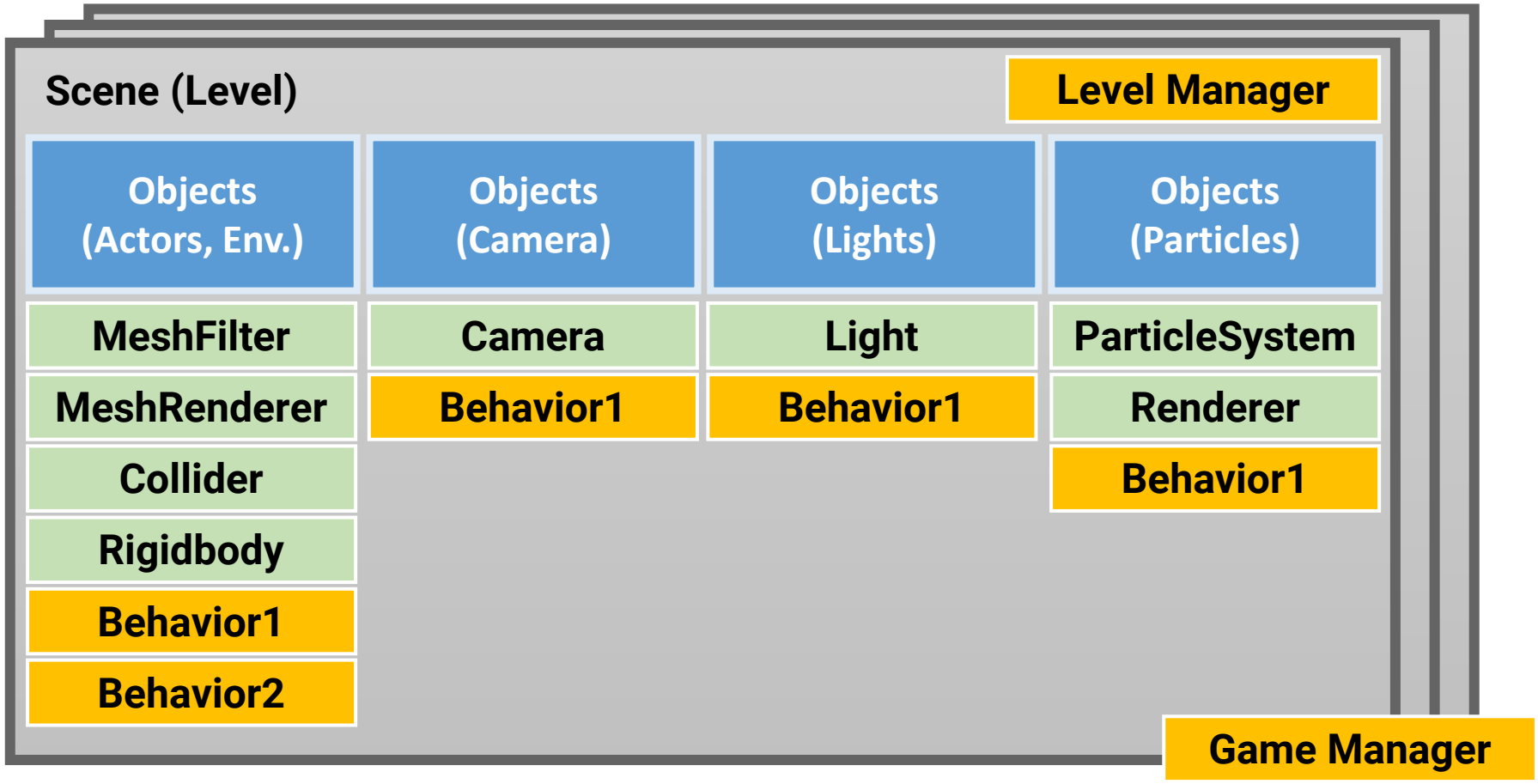
OnWillRenderObject,
OnPreRender, OnRenderObject, OnPostRender, OnRenderImage,
OnGUI

Unity Overview (cont.)

Custom

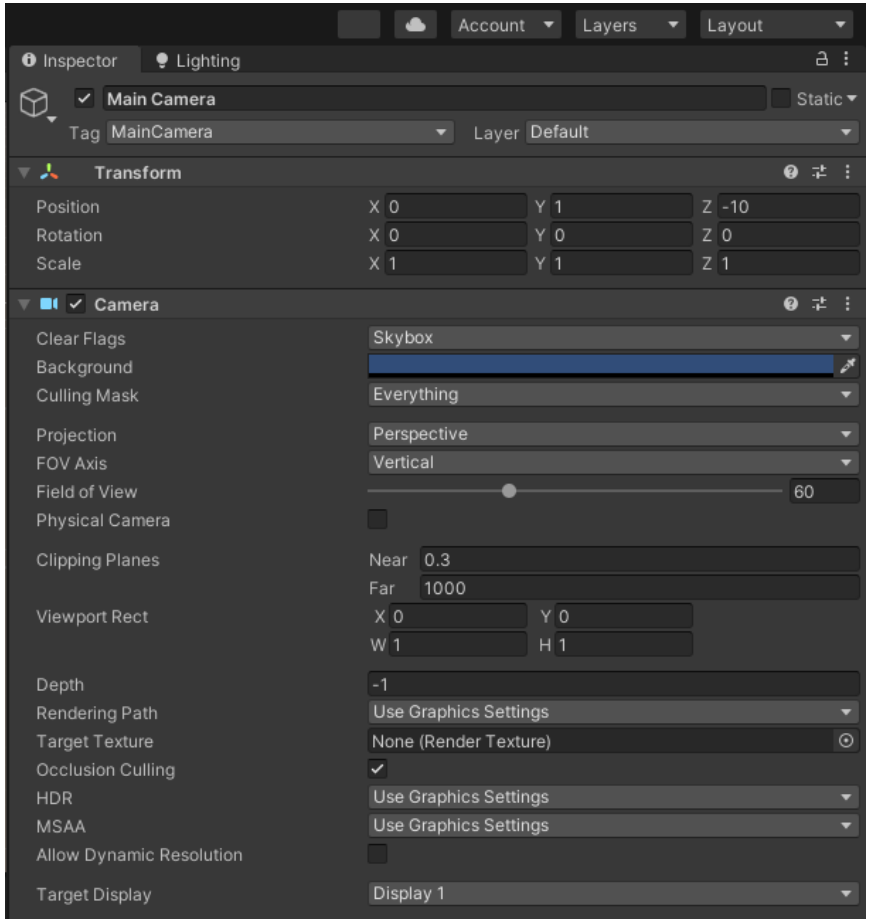
Built-in

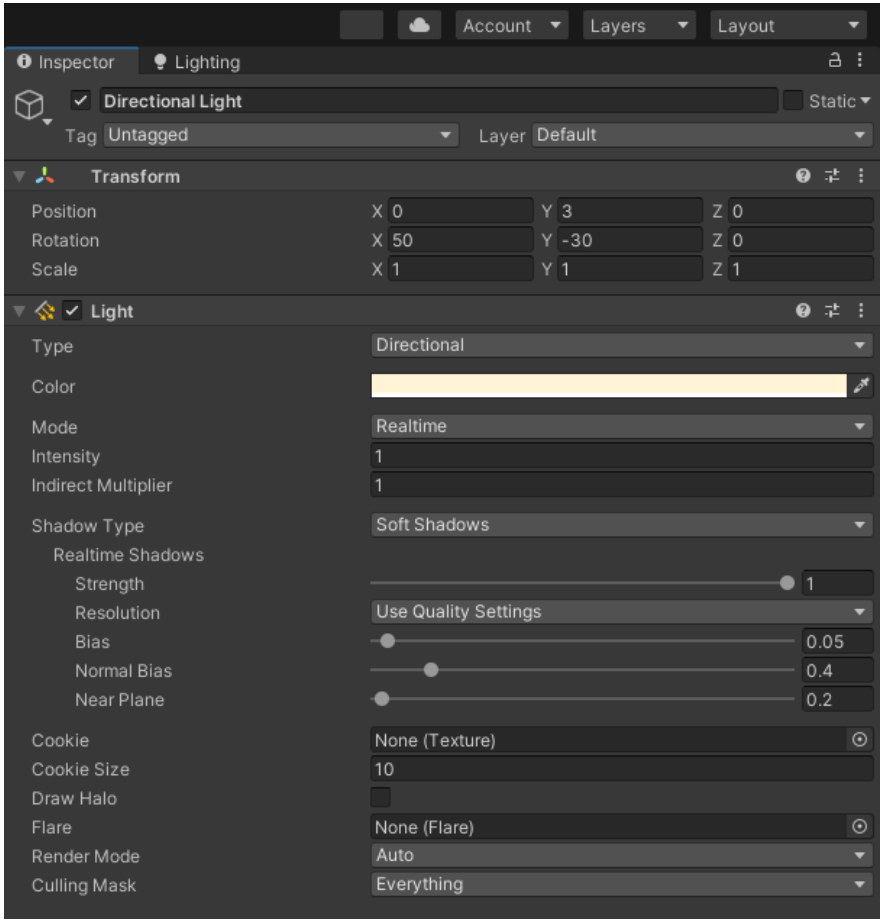
- Component-based (C# scripts)



Unity Overview (cont.)

- **Component-based (C# scripts)**





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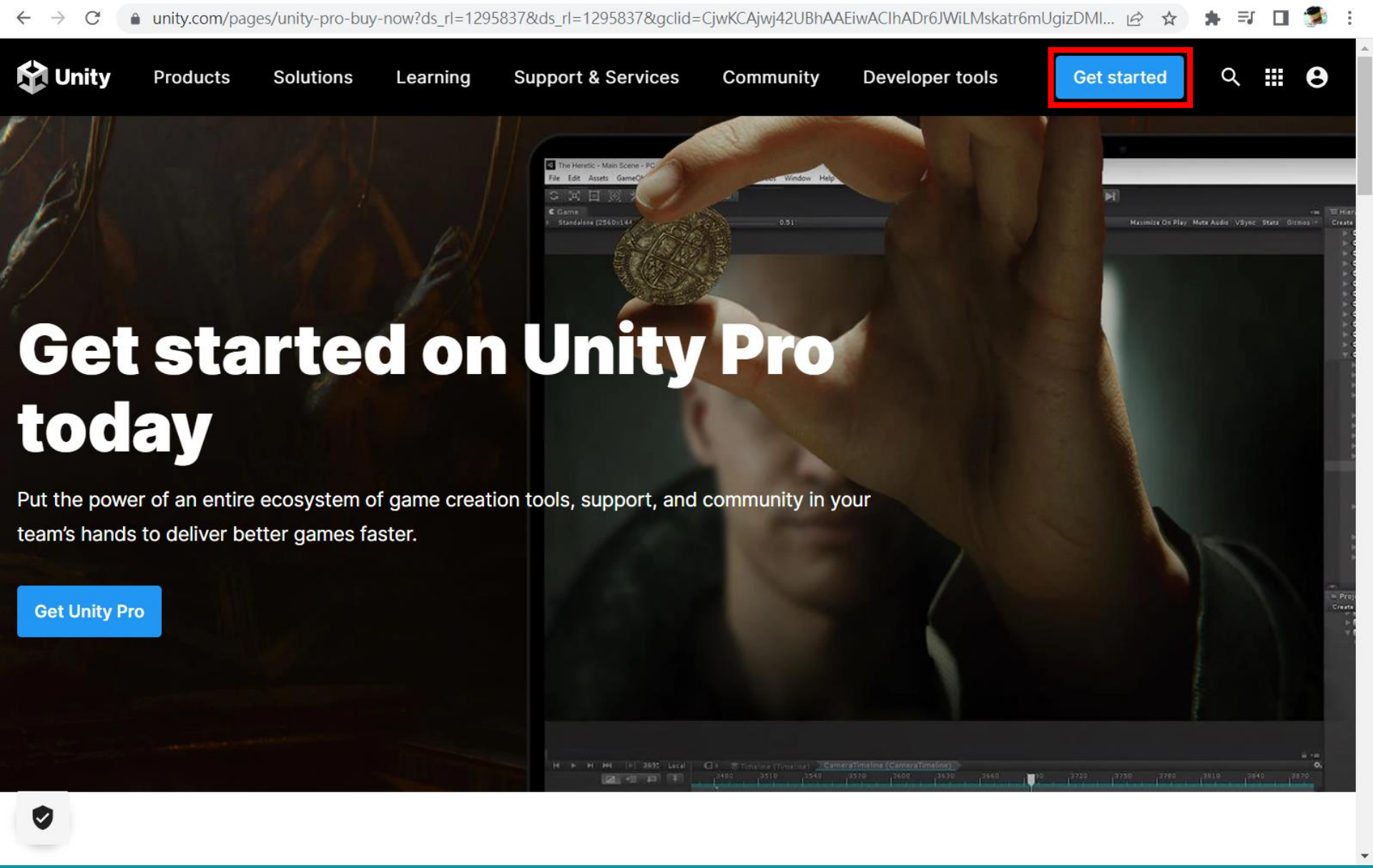

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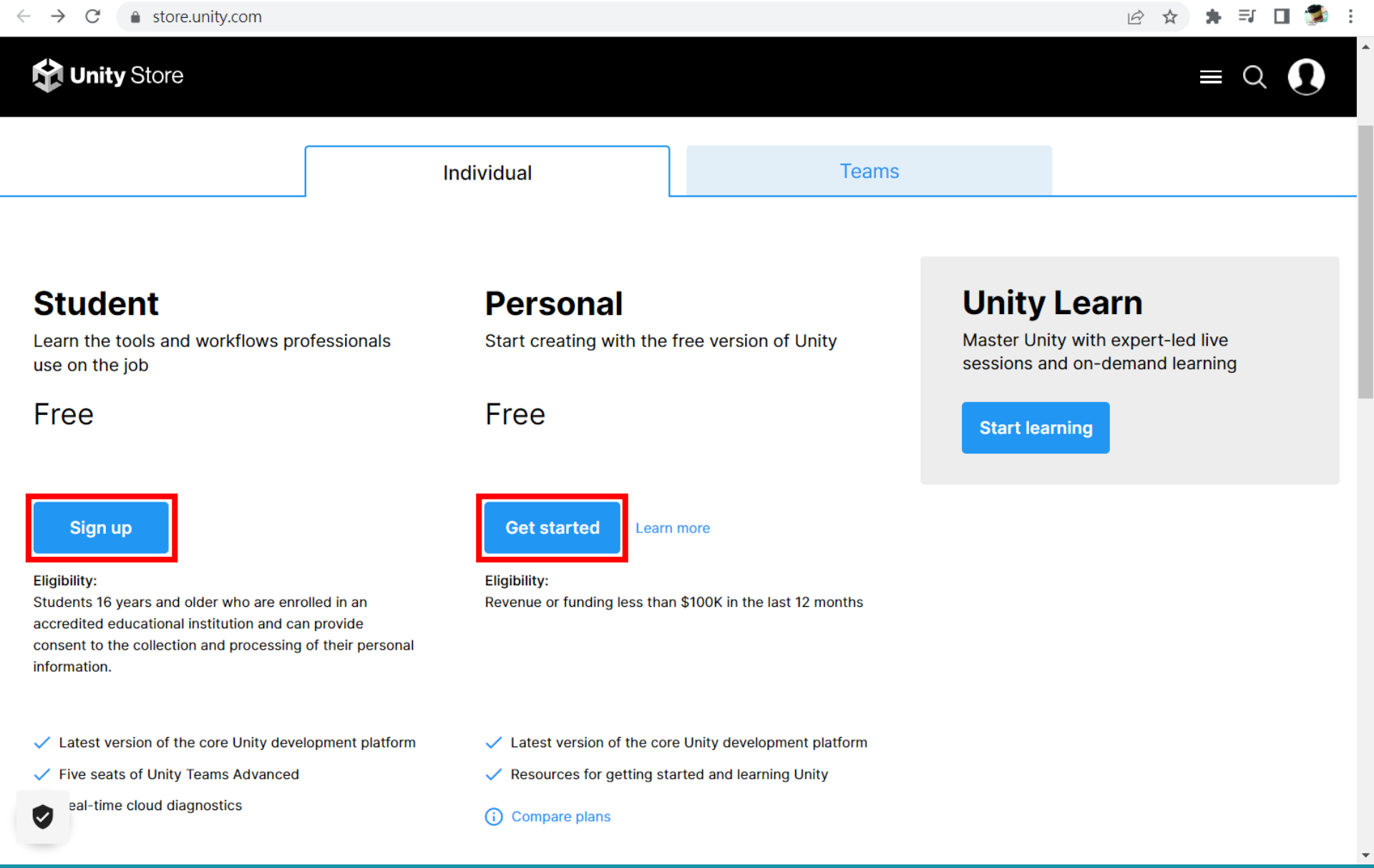

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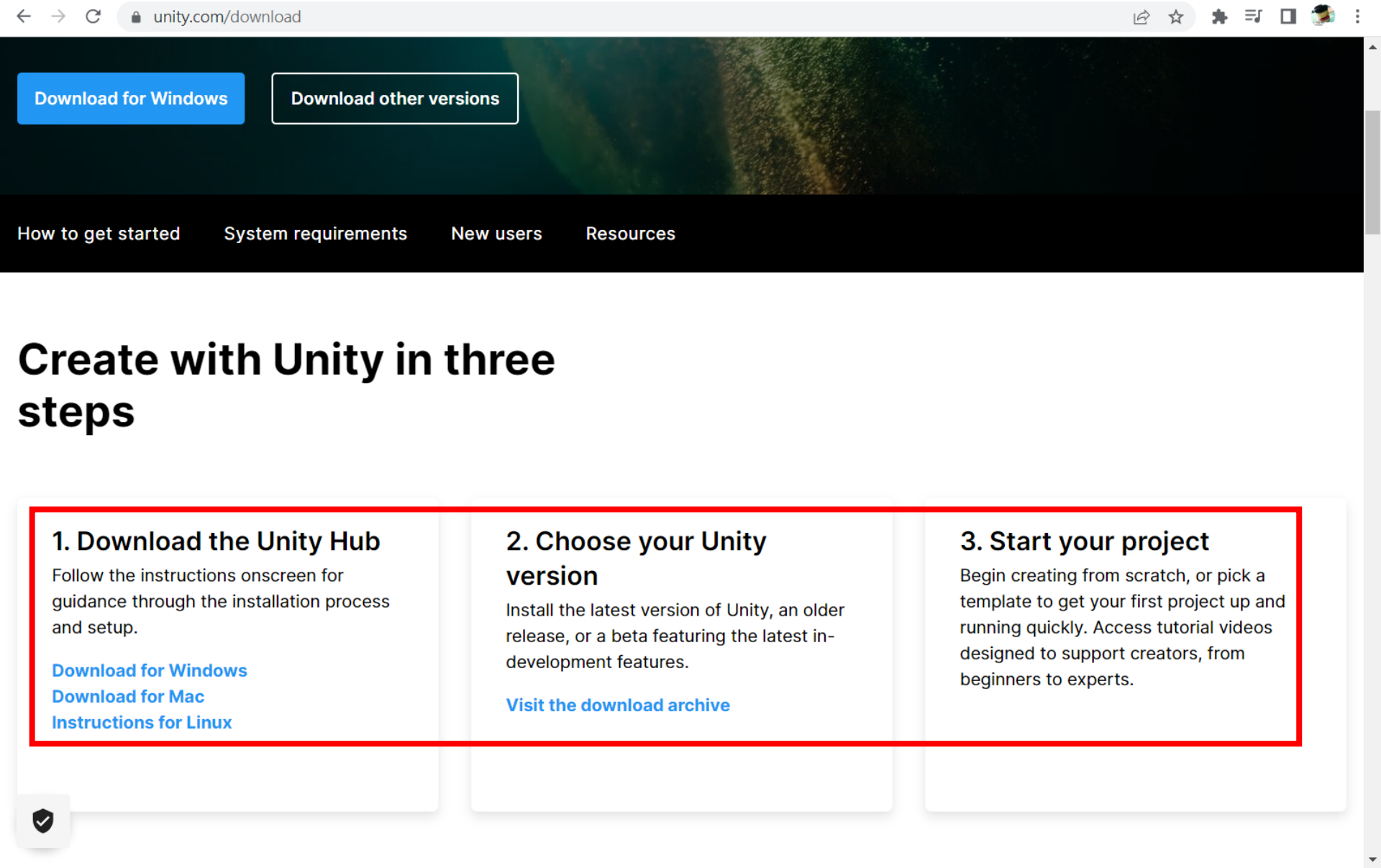
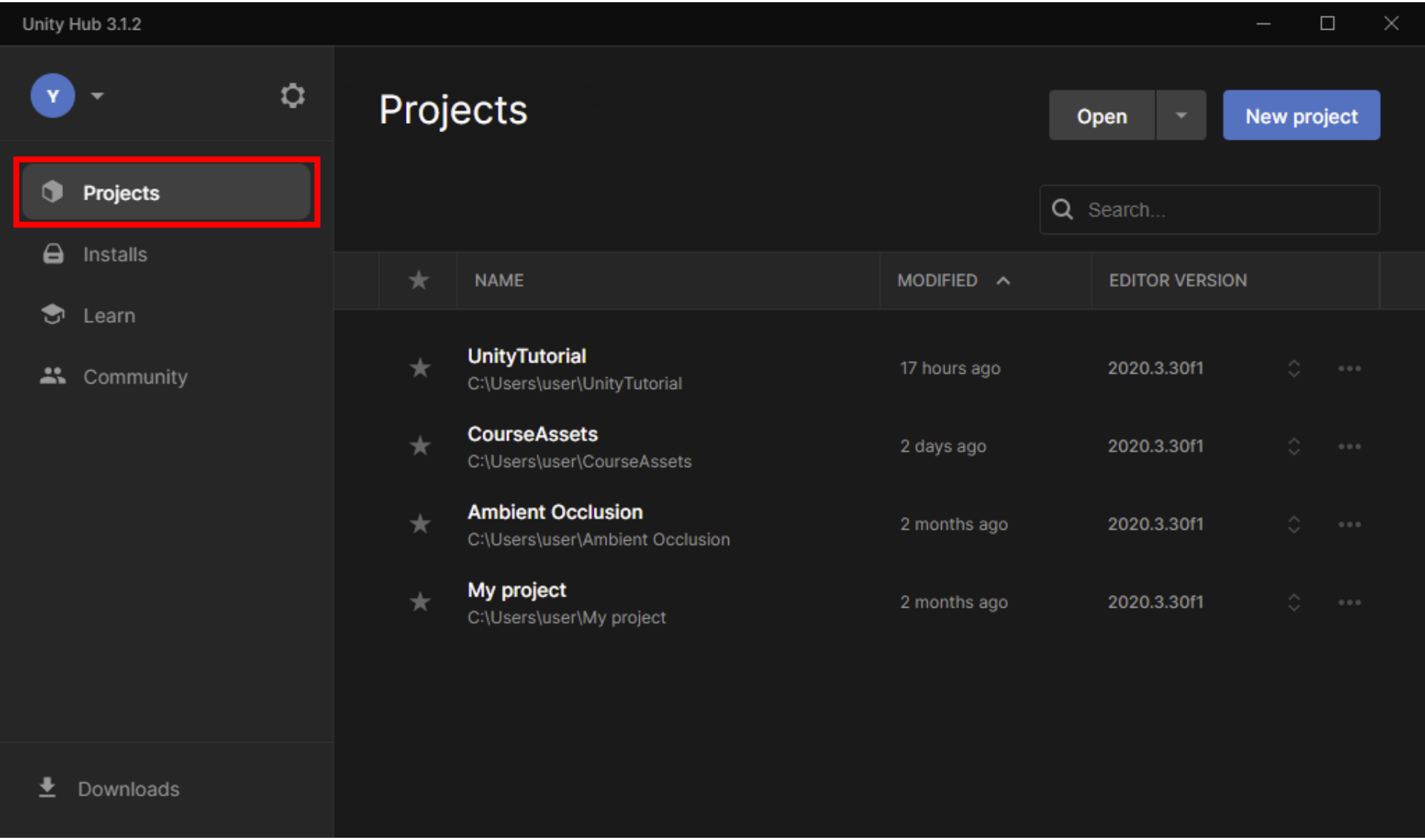


Unity Hub (1)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Projects
Installs
Learn
Community
Downloads
Projects
Open
New project
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NAME
MODIFIED
EDITOR VERSION
UnityTutorial
C:\Users\user\UnityTutorial
17 hours ago
2020.3.30f1
CourseAssets
C:\Users\user\CourseAssets
2 days ago
2020.3.30f1
Ambient Occlusion
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2 months ago
2020.3.30f1
My project
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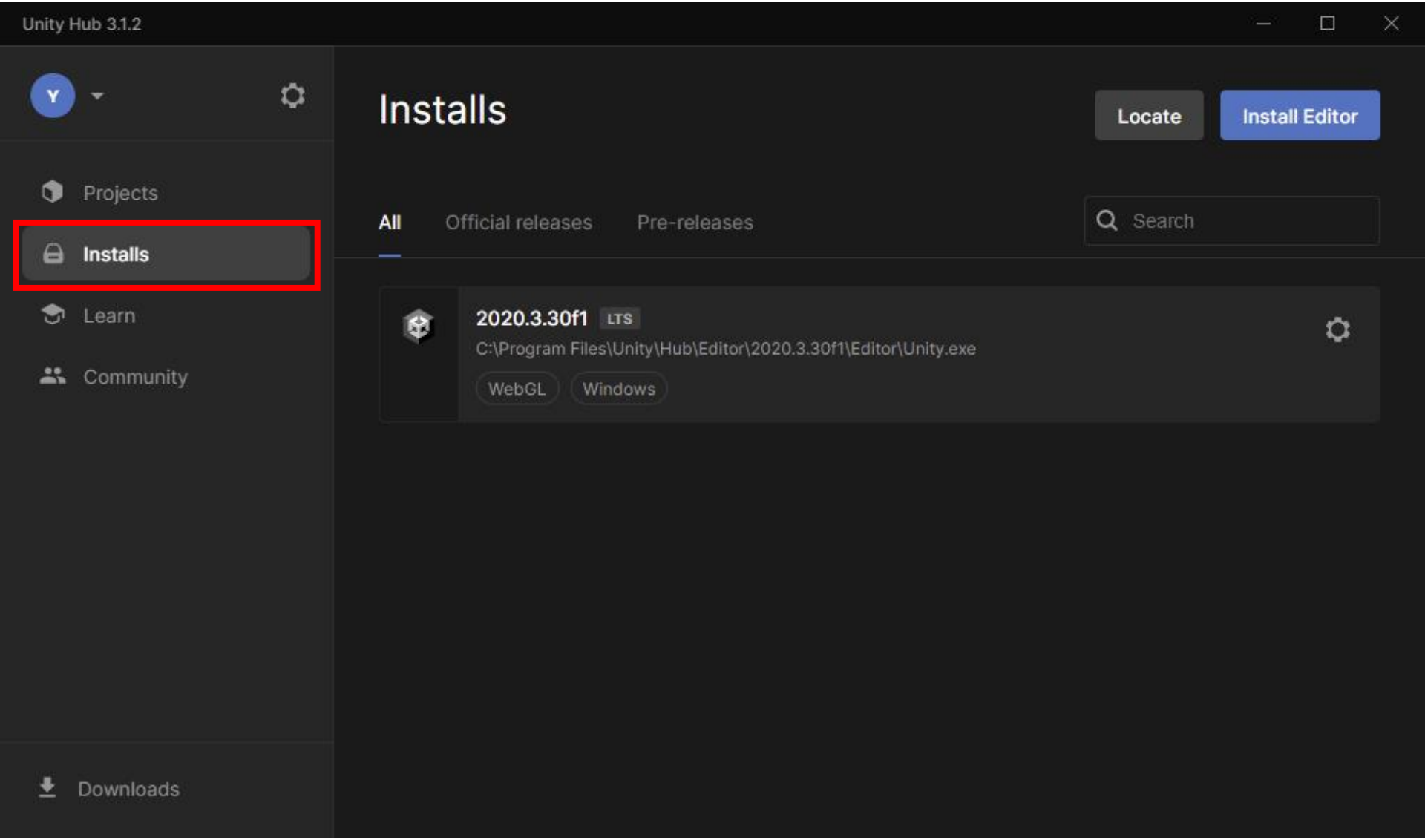
Unity Hub (2)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Install Editor
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Official releases
Pre-releases
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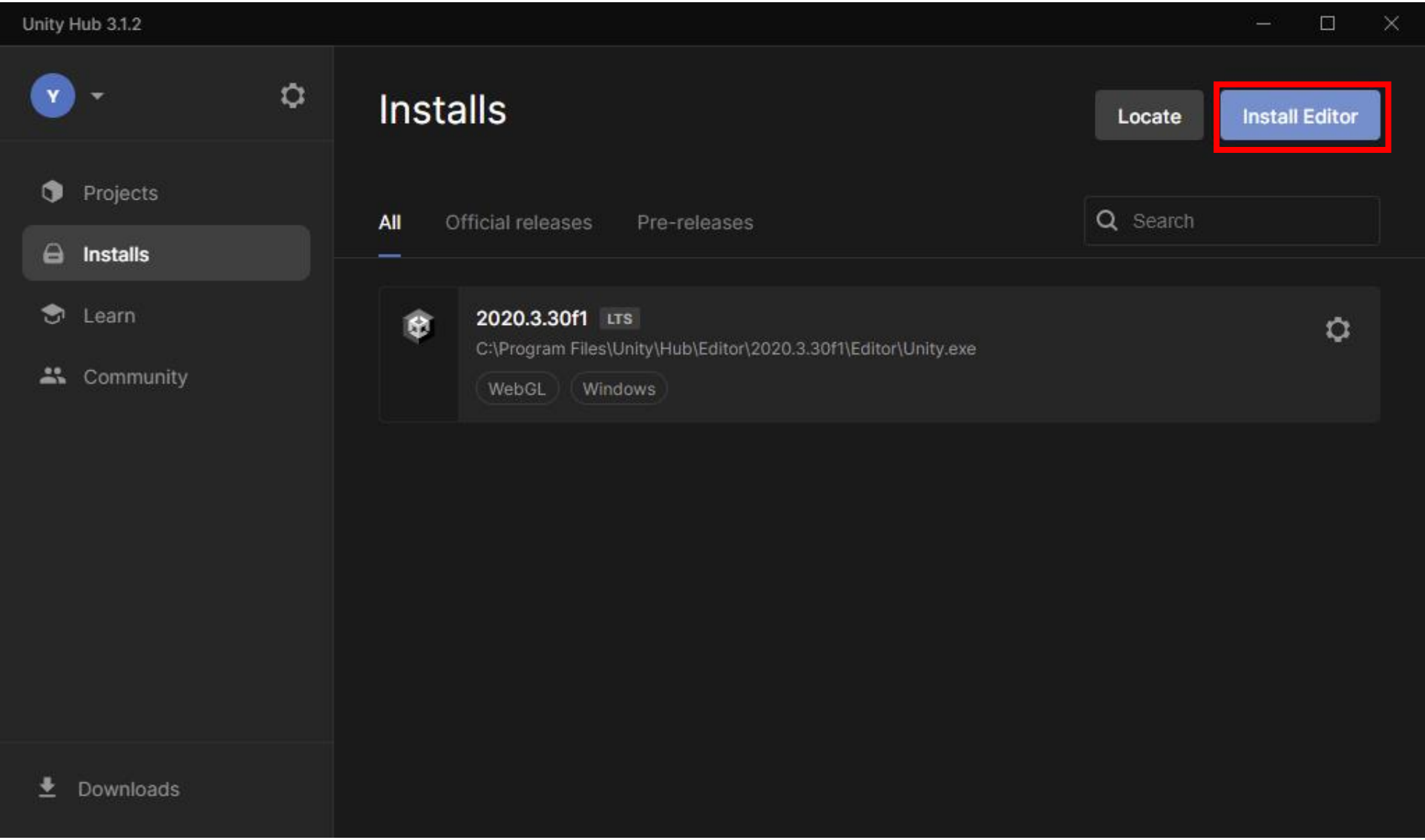
WebGL
Windows

Unity Hub (3)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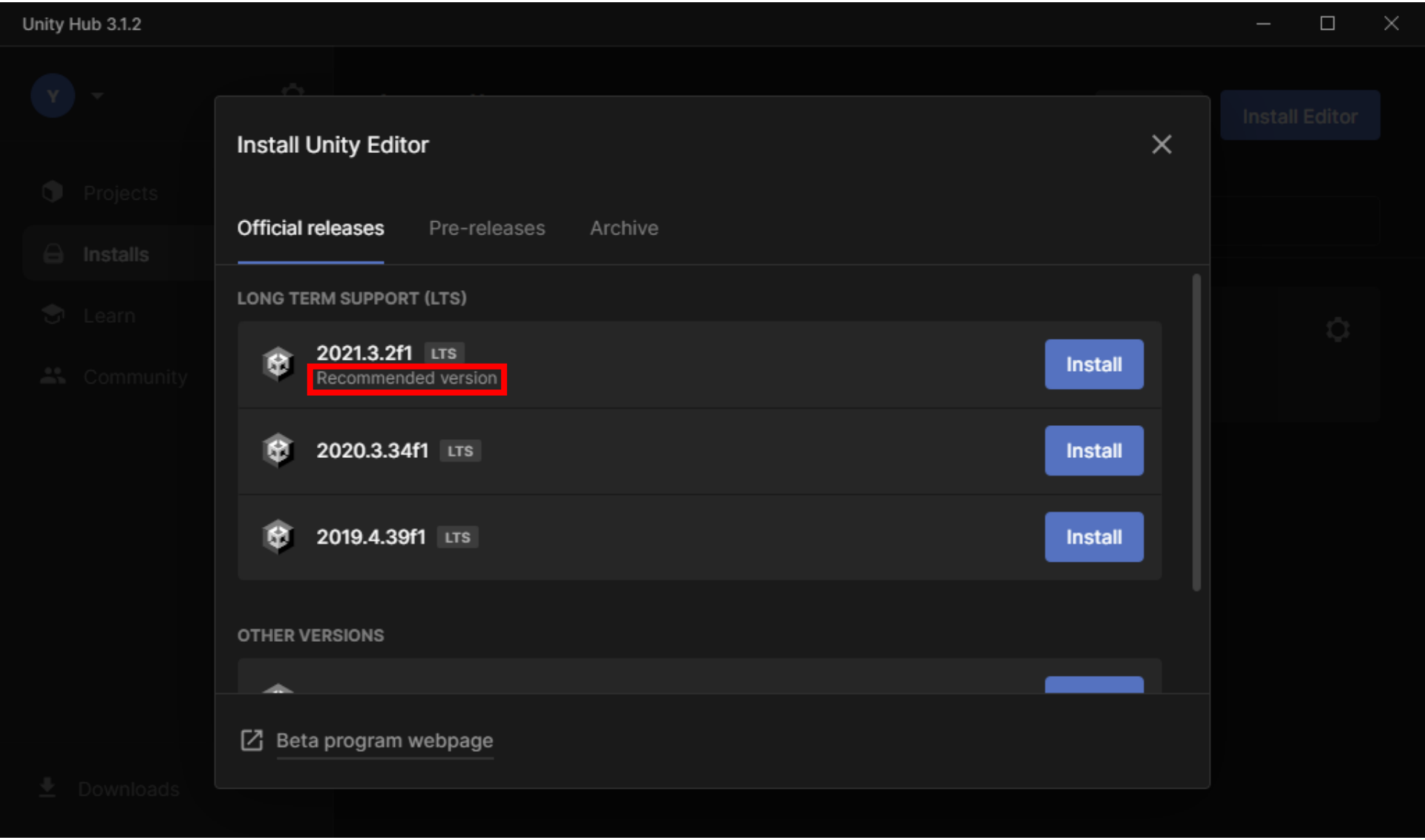
Unity Hub (4)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2021.3.2f1 LTS
Recommended version
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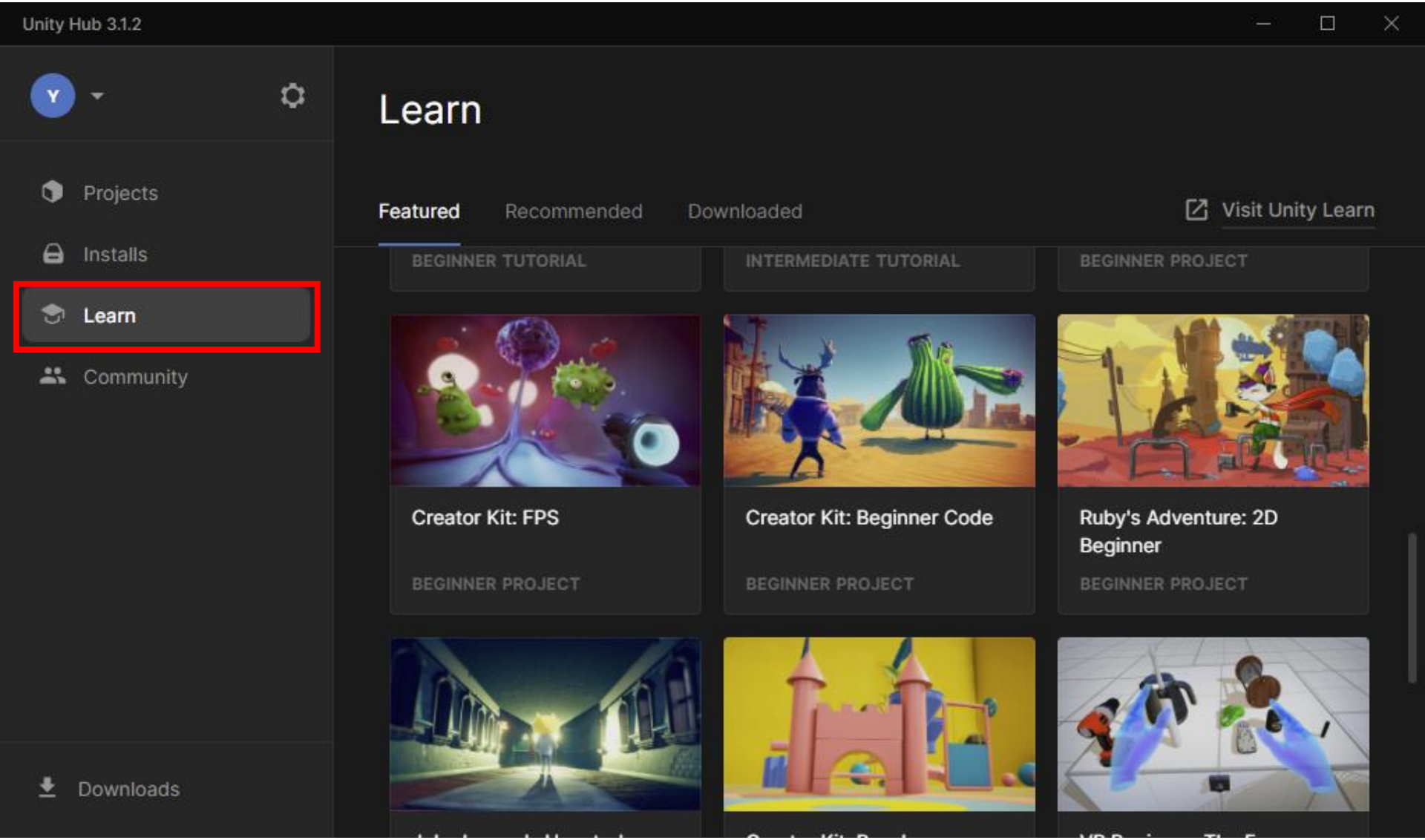
2020.3.34f1 LTS
Install
2019.4.39f1 LTS
Install
OTHER VERSIONS
Beta program webpage

Unity Hub (5)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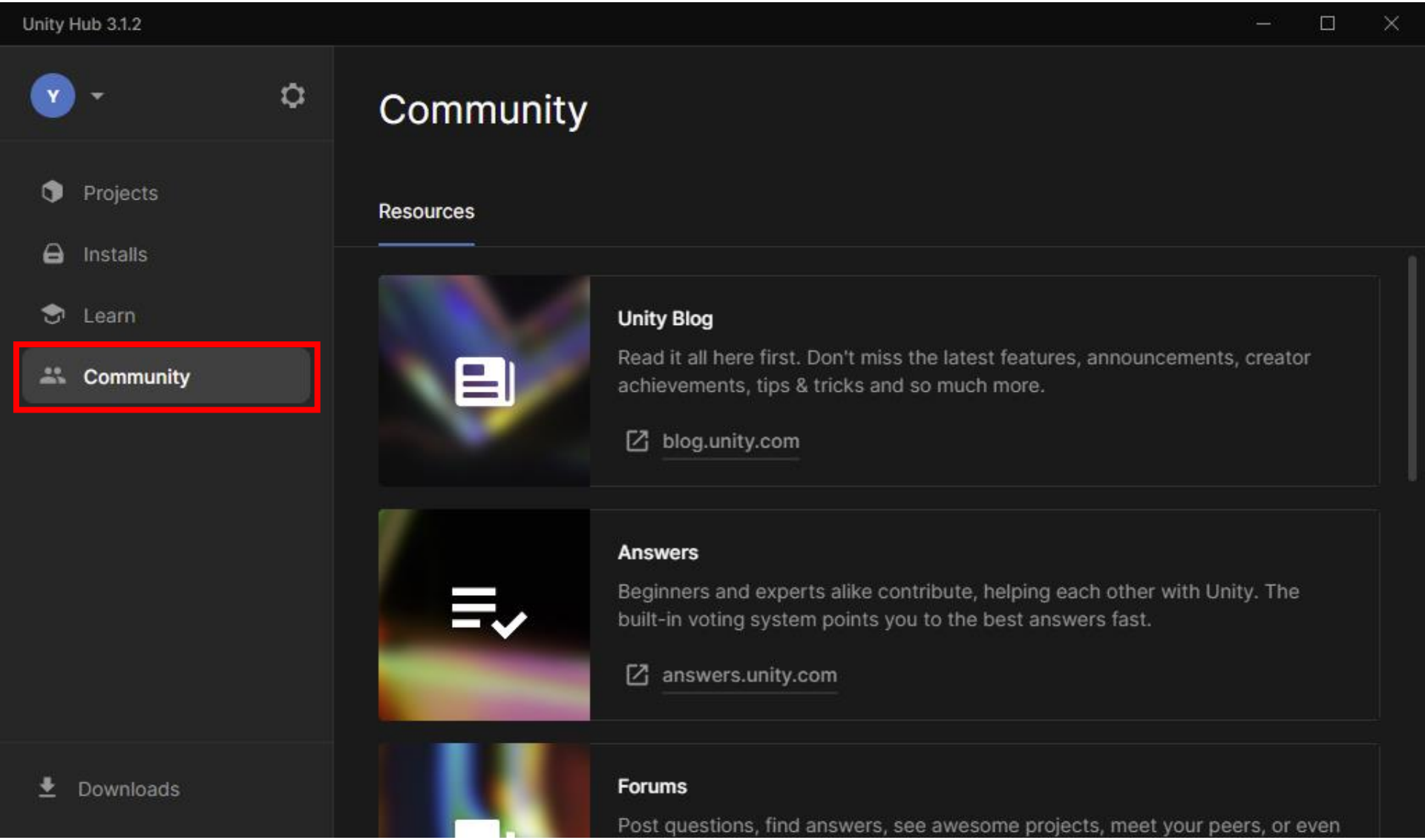
BEGINNER PROJECT
Creator Kit: Beginner Code
BEGINNER PROJECT
Ruby's Adventure: 2D Beginner
BEGINNER PROJECT

Unity Hub (6)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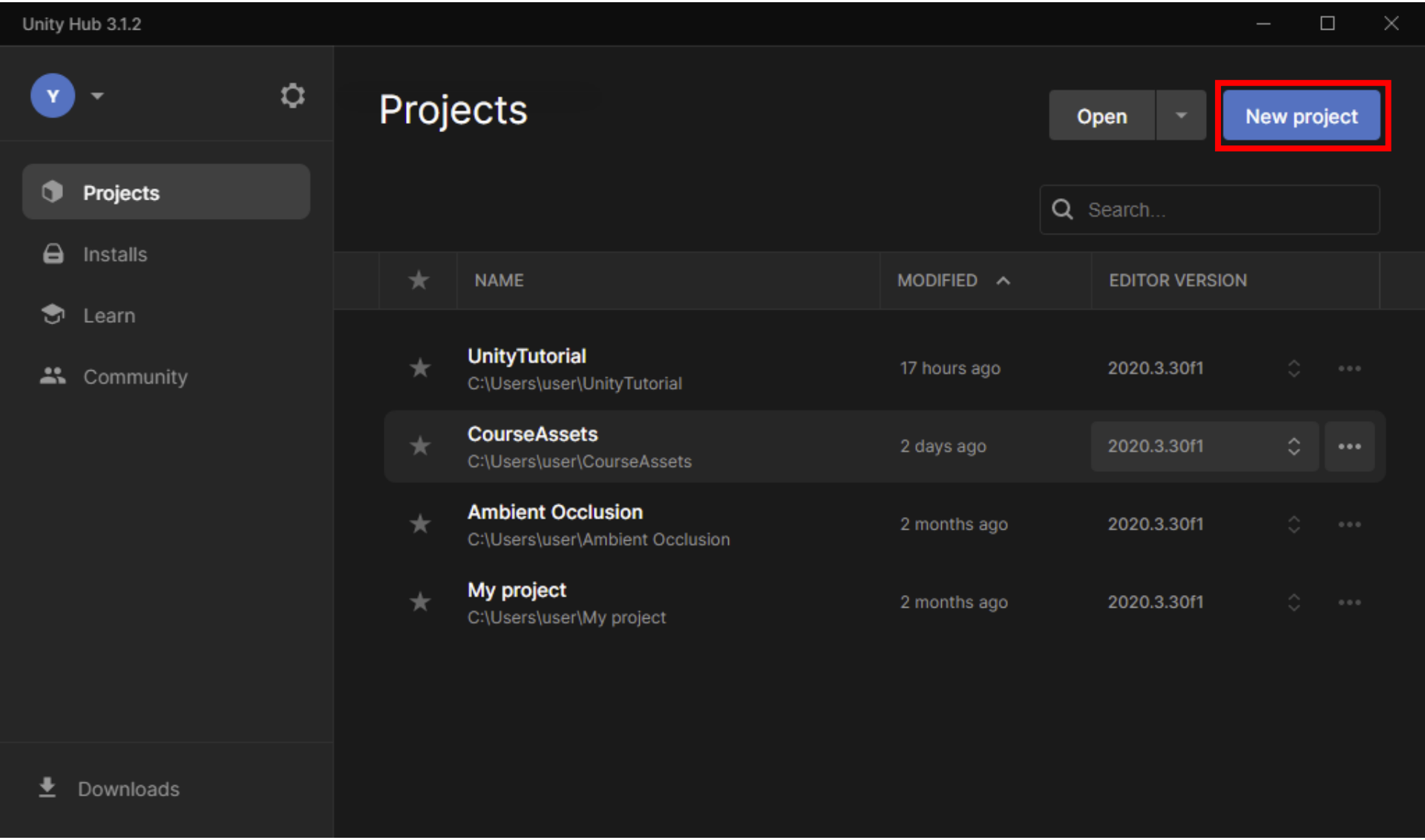
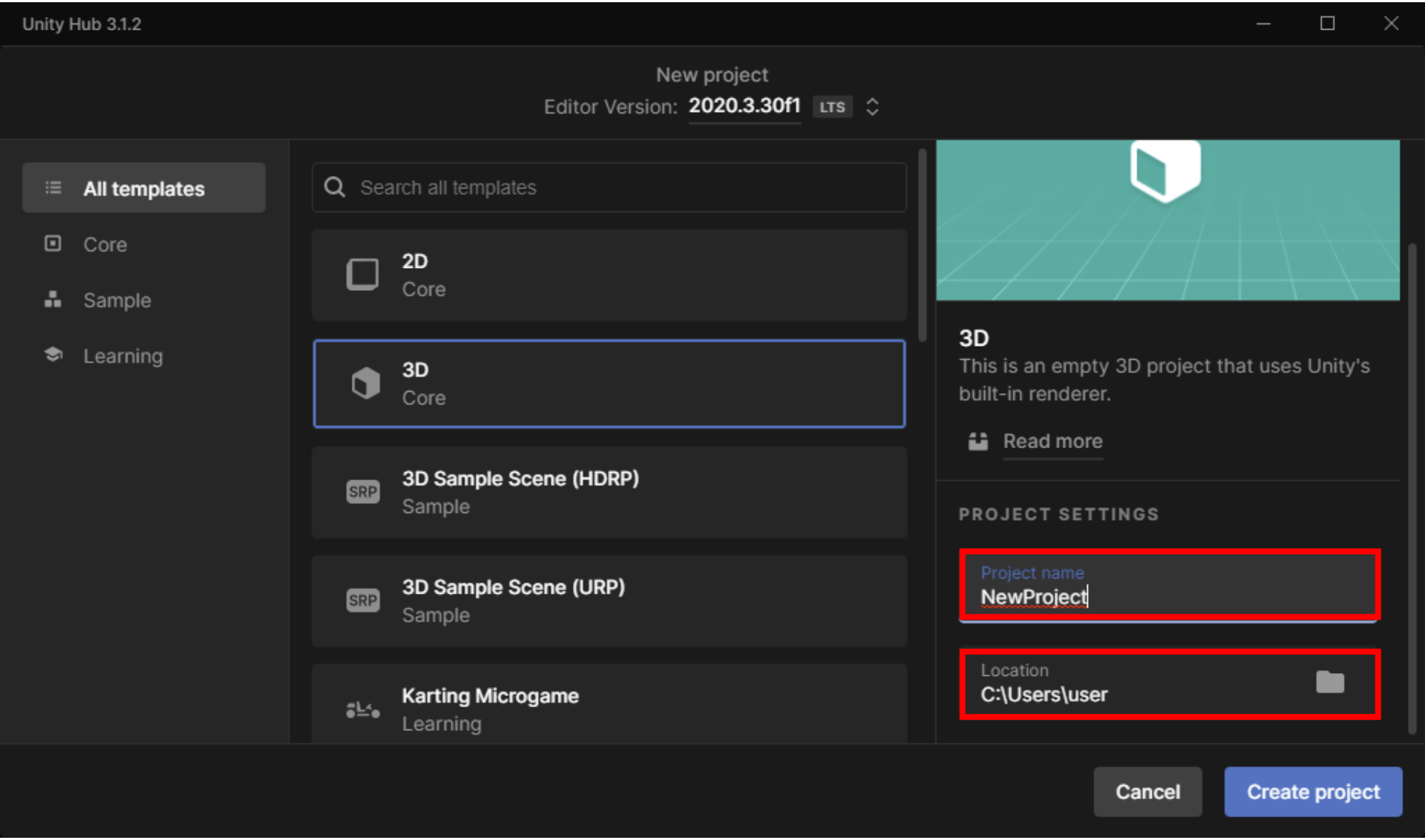
Create a new project (1)

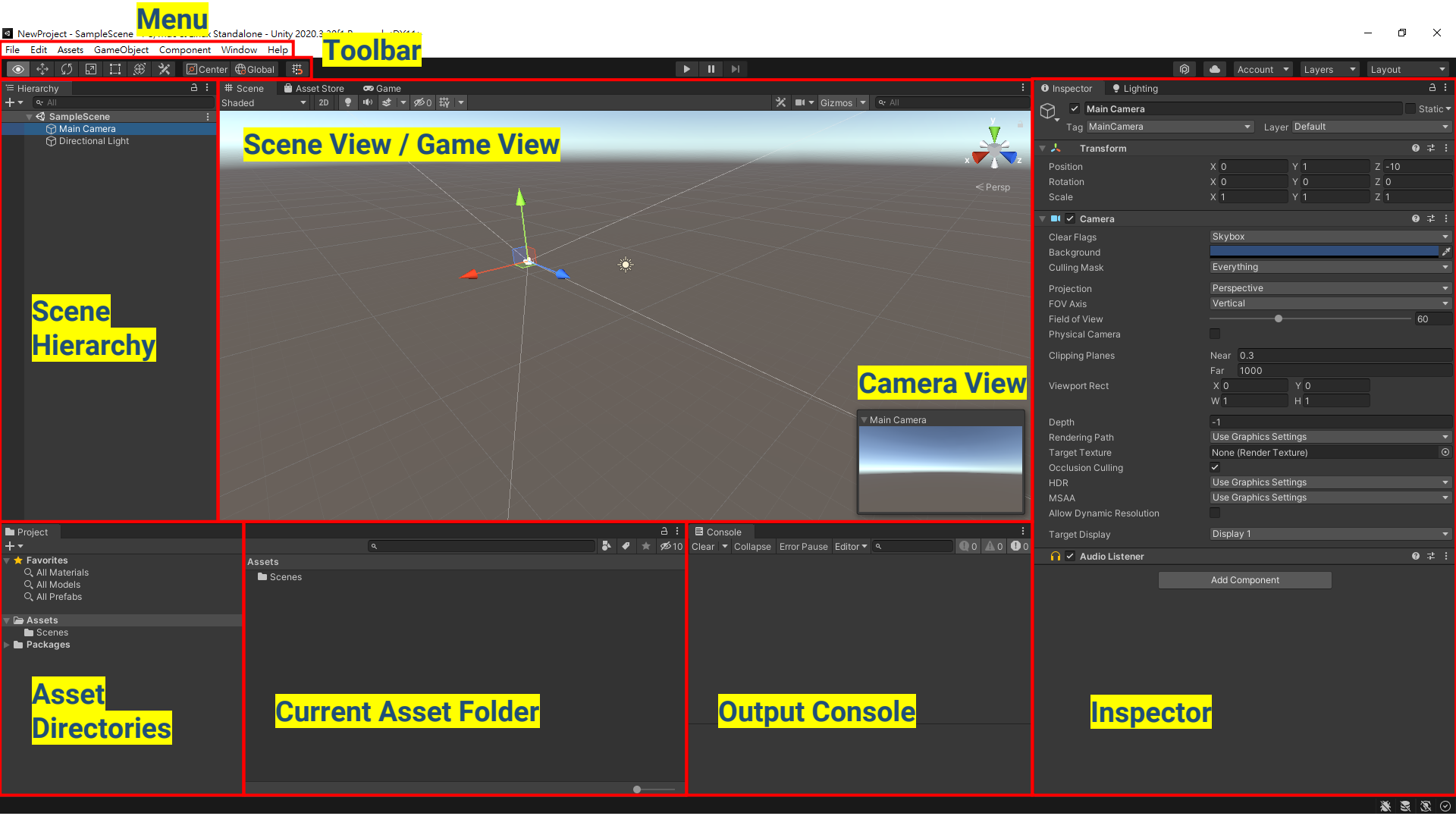


Create a new project (2)

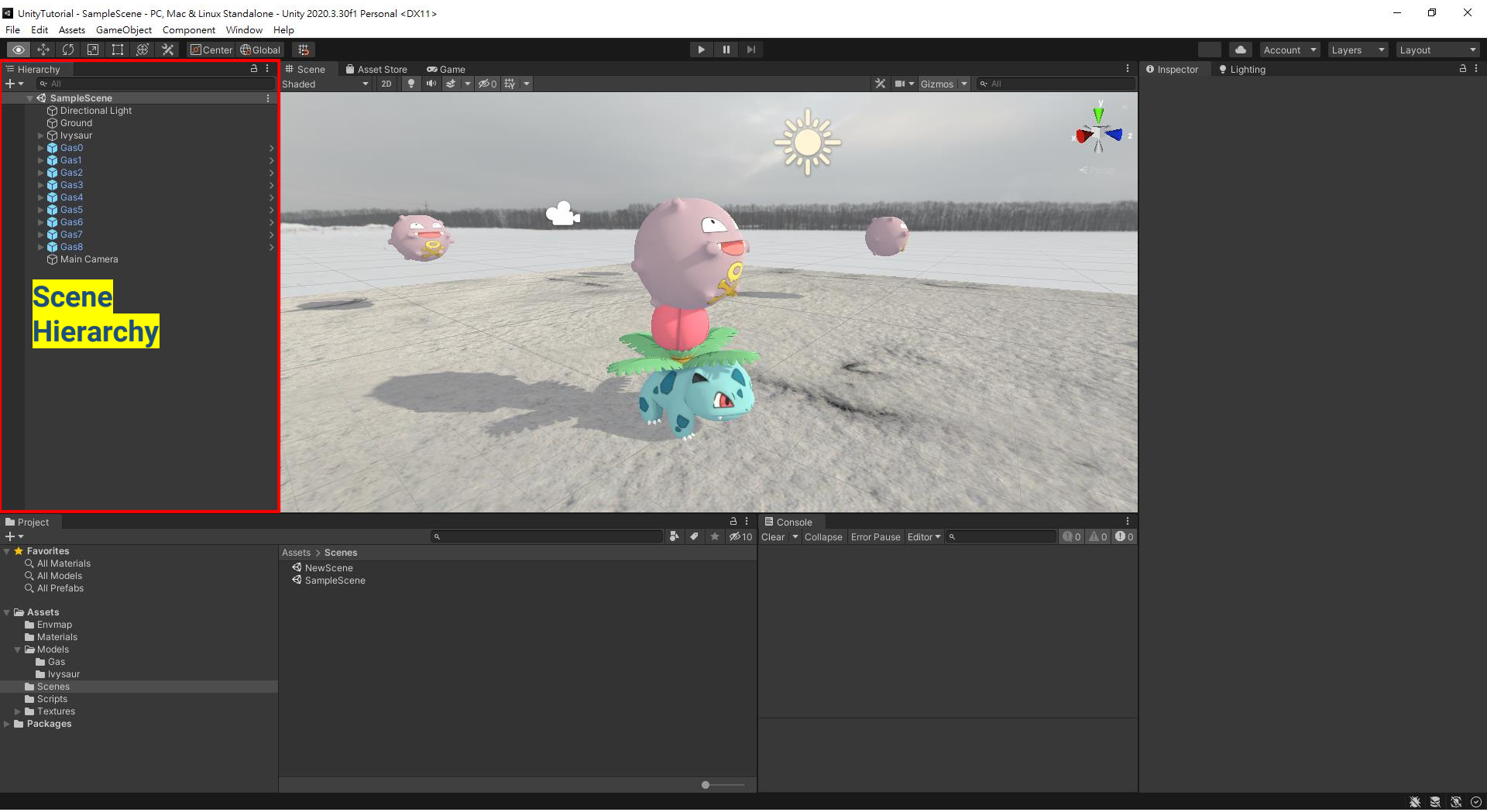


Unity Editor

Editor layout



Scene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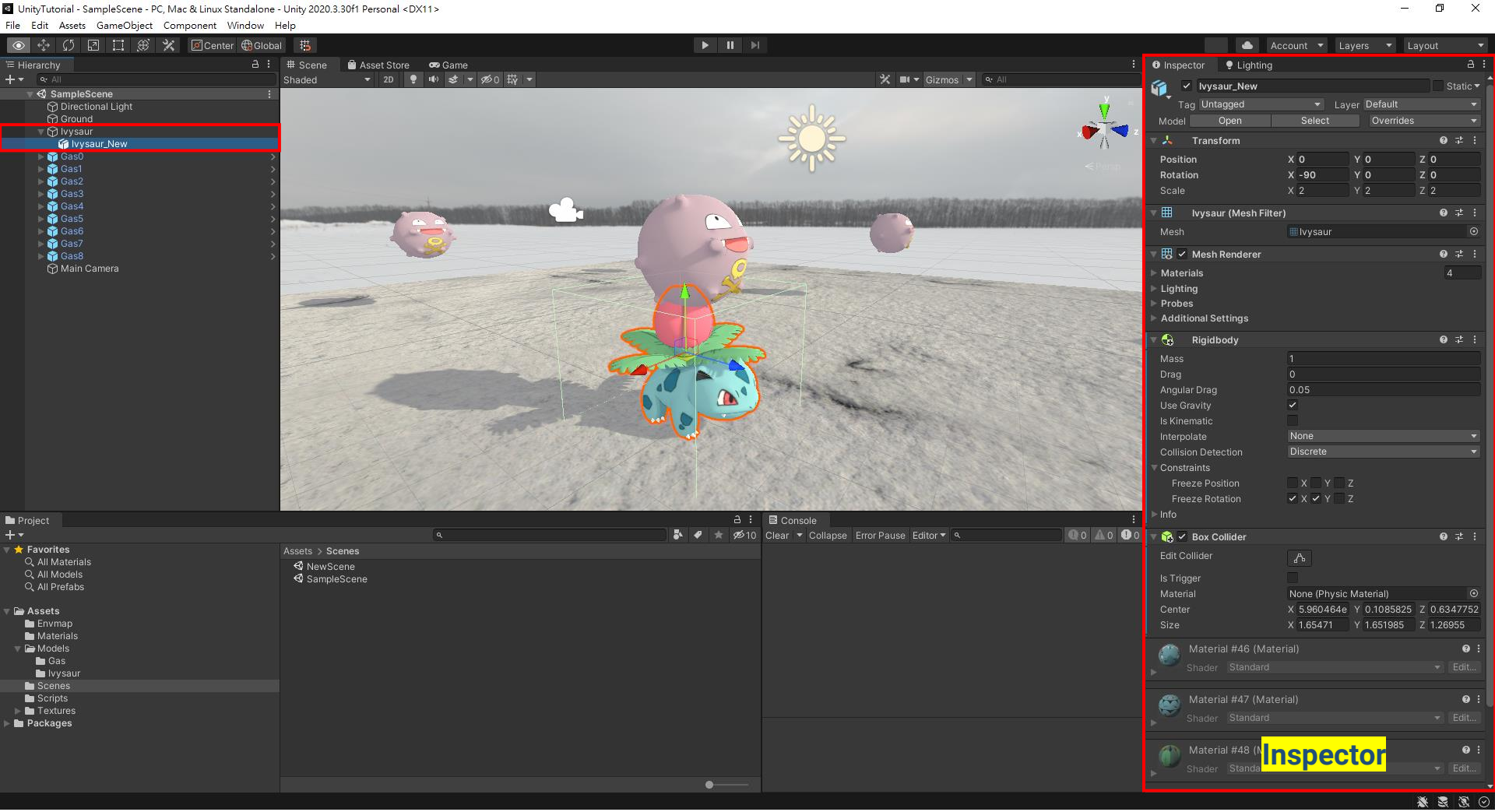
File Edit Assets GameObject Component Window Help
Hierarchy
SampleScene
Directional Light
Ground
Ivysaur
Gas0
Gas1
Gas2
Gas3
Gas4
Gas5
Gas6
Gas7
Gas8
Main Camera
Scene
Hierarchy
Scene
Asset Store
Game
Inspector
Lighting
Project
Console
Favorites
All Materials
All Models
All Prefabs
Assets
Envmap
Materials
Models
Gas
Ivysaur
Scenes
Scripts
Textures
Packages
NewScene
SampleScene

Object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Hierarchy
SampleScene
Directional Light
Ground
Ivysaur
Ivysaur_New
Gas0
Gas1
Gas2
Gas3
Gas4
Gas5
Gas6
Gas7
Gas8
Main Camera
Scene
Asset Store
Game
Project
Console
Inspector
Lighting
Ivysaur_New
Transform
Position
Rotation
Scale
Ivysaur (Mesh Filter)
Mesh
Mesh Renderer
Materials
Lighting
Probes
Additional Settings
Rigidbody
Mass
Drag
Angular Drag
Use Gravity
Is Kinematic
Interpolate
Collision Detection
Constraints
Freeze Position
Freeze Rotation
Info
Box Collider
Edit Collider
Is Trigger
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Center
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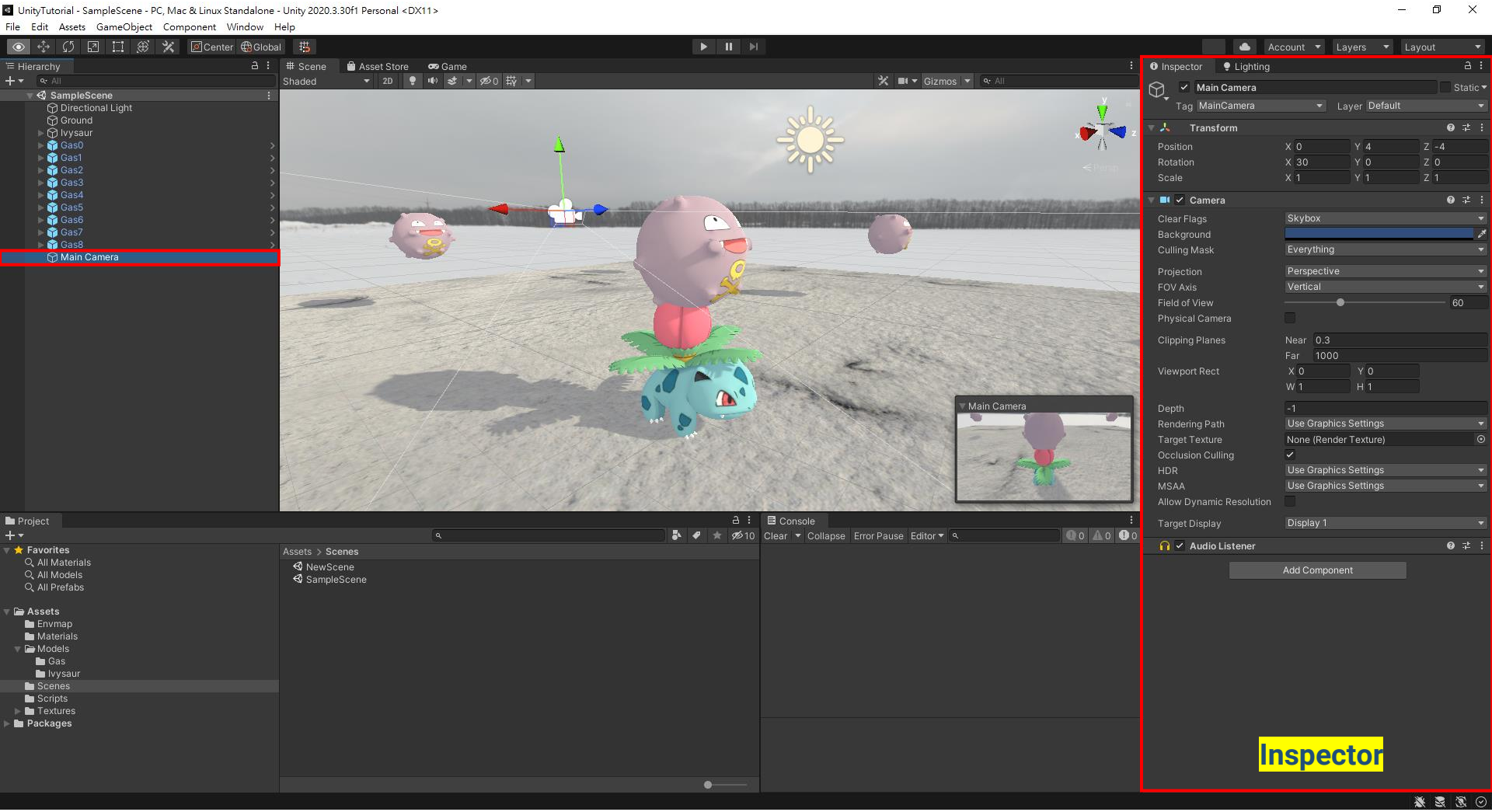
Material #46 (Material)
Material #47 (Material)
Material #48 (M
Shader
Standard
Inspector

Camera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Gas0
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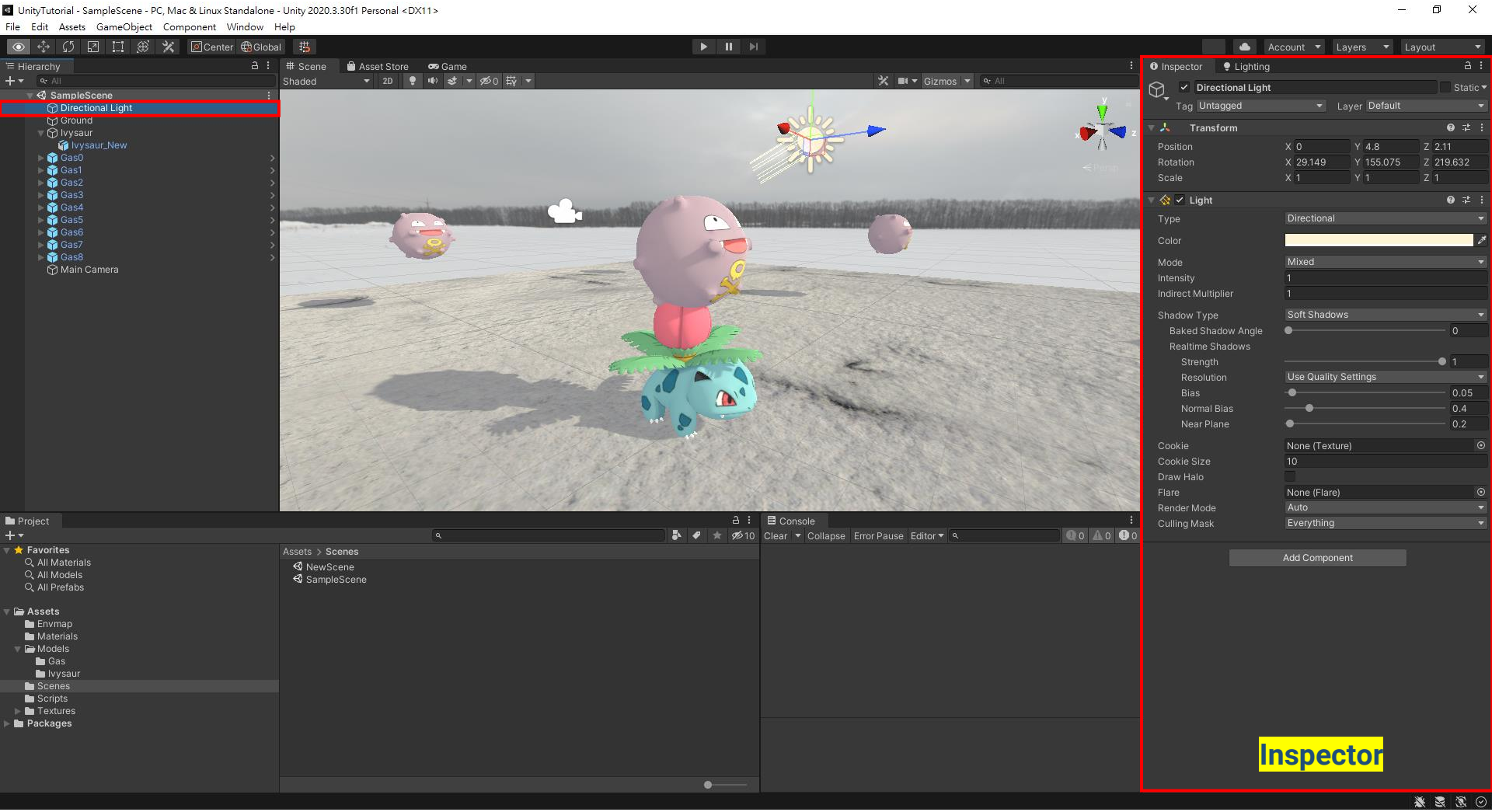
Gas2
Gas3
Gas4
Gas5
Gas6
Gas7
Gas8
Main Camera
Scene
Asset Store
Game
Shaded
2D
Gizmos
Main Camera
Project
Favorites
All Materials
All Models
All Prefabs
Assets
Envmap
Materials
Models
Gas
Ivysaur
Scenes
Scripts
Textures
Packages
Assets > Scenes
NewScene
SampleScene
Console
Clear
Collapse
Error Pause
Editor
Inspector
Lighting
Main Camera
Static
Tag MainCamera
Layer Default
Transform
Position X 0 Y 4 Z -4
Rotation X 30 Y 0 Z 0
Scale X 1 Y 1 Z 1
Camera
Clear Flags Skybox
Background
Culling Mask Everything
Projection Perspective
FOV Axis Vertical
Field of View 60
Physical Camera
Clipping Planes Near 0.3 Far 1000
Viewport Rect X 0 Y 0 W 1 H 1
Depth -1
Rendering Path Use Graphics Settings
Target Texture None (Render Texture)
Occlusion Culling
HDR Use Graphics Settings
MSAA Use Graphics Settings
Allow Dynamic Resolution
Target Display Display 1
Audio Listener
Add Component
Inspector

Light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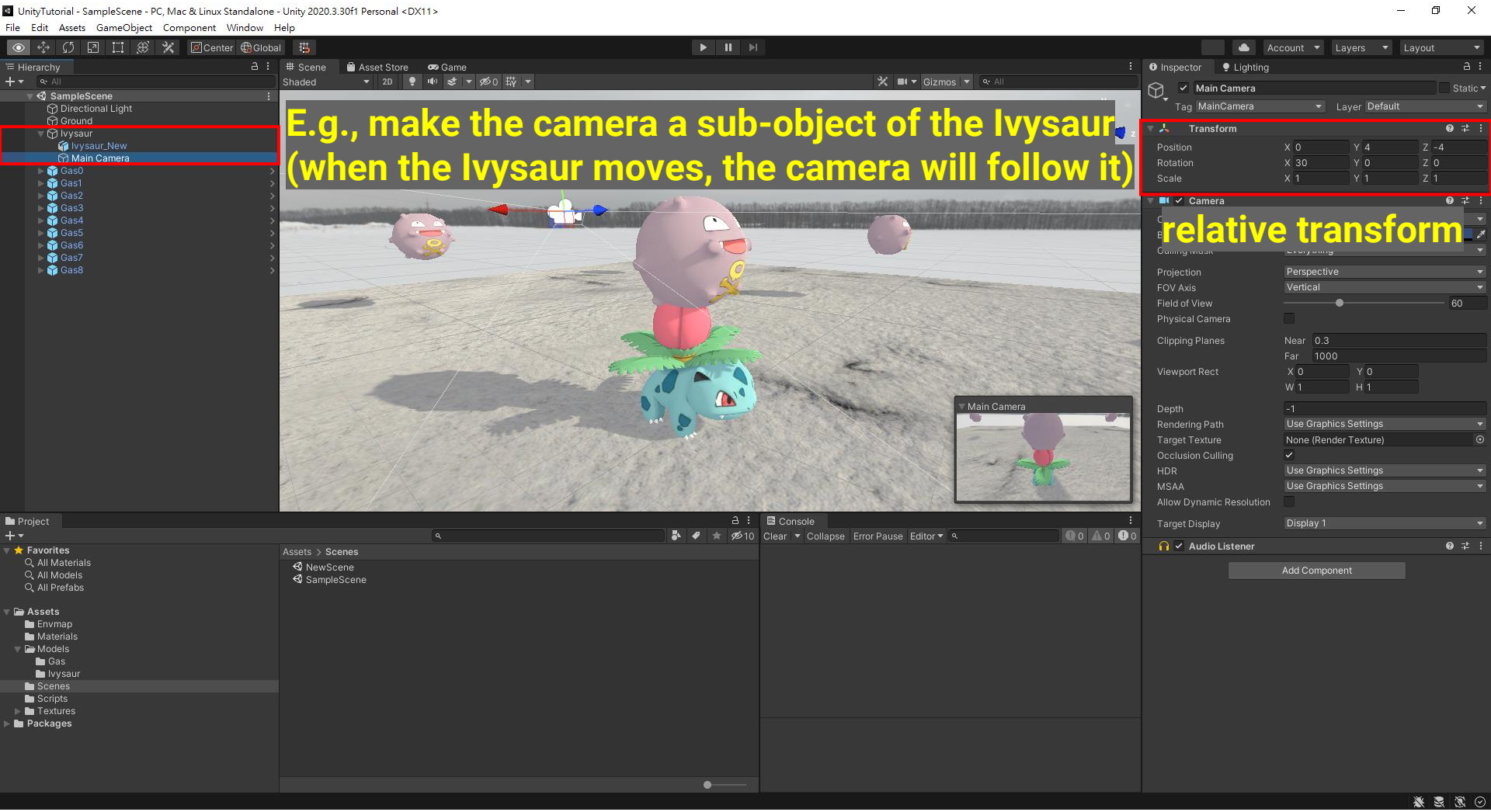
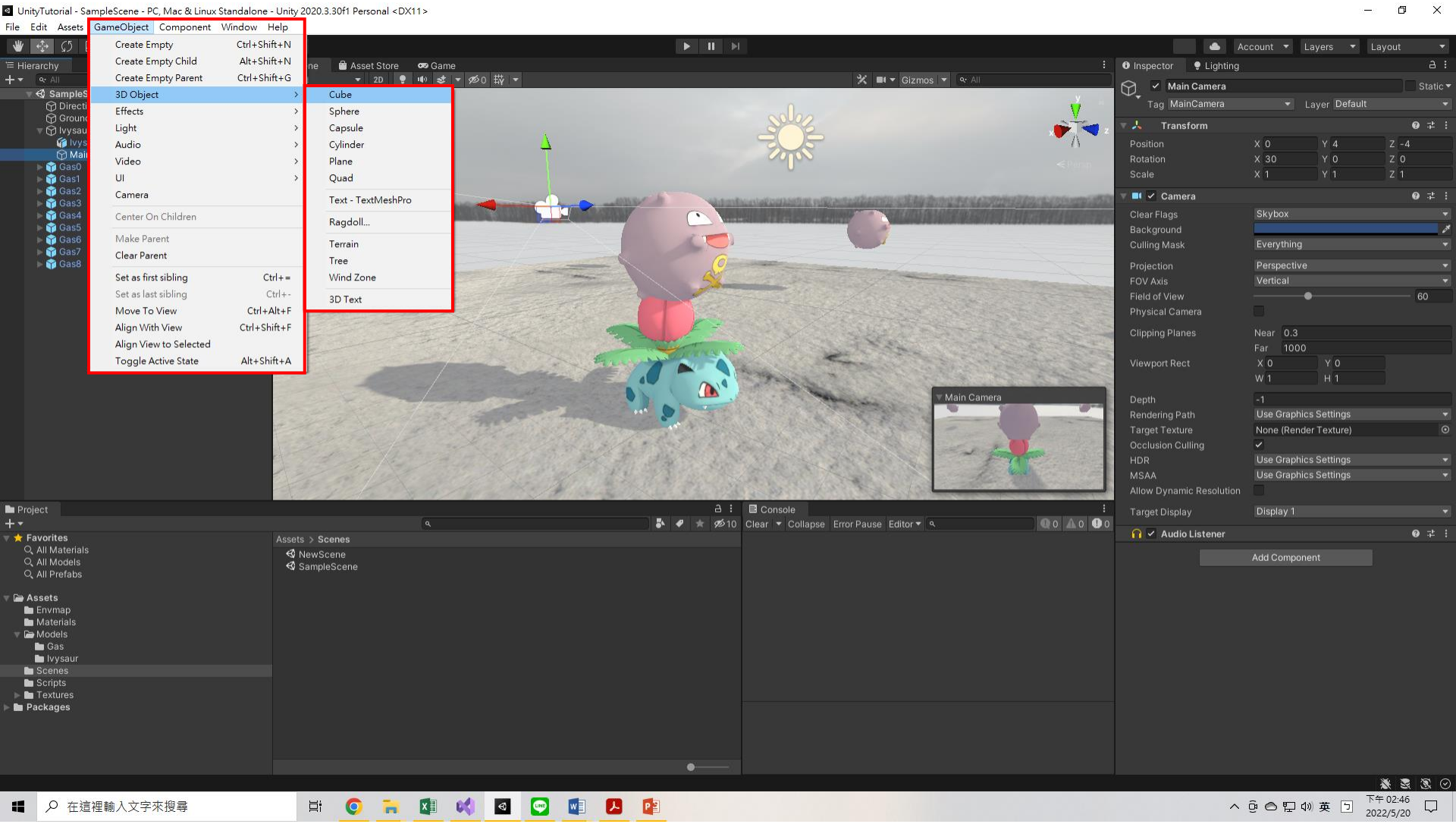
Hierarchy
SampleScene
Directional Light
Ground
Ivysaur
Ivysaur_New
Gas0
Gas1
Gas2
Gas3
Gas4
Gas5
Gas6
Gas7
Gas8
Main Camera
Scene
Asset Store
Game
Shaded
2D
Gizmos
Inspector
Lighting
Directional Light
Static
Tag Untagged
Layer Default
Transform
Position X 0 Y 4.8 Z 2.11
Rotation X 29.149 Y 155.075 Z 219.632
Scale X 1 Y 1 Z 1
Light
Type Directional
Color
Mode Mixed
Intensity 1
Indirect Multiplier 1
Shadow Type Soft Shadows
Baked Shadow Angle 0
Realtime Shadows
Strength 1
Resolution Use Quality Settings
Bias 0.05
Normal Bias 0.4
Near Plane 0.2
Cookie None (Texture)
Cookie Size 10
Draw Halo
Flare None (Flare)
Render Mode Auto
Culling Mask Everything
Add Component
Project
Favorites
All Materials
All Models
All Prefabs
Assets
Envmap
Materials
Models
Gas
Ivysaur
Scenes
Scripts
Textures
Packages
Assets > Scenes
NewScene
SampleScene
Console
Clear Collapse Error Pause Editor
Inspector

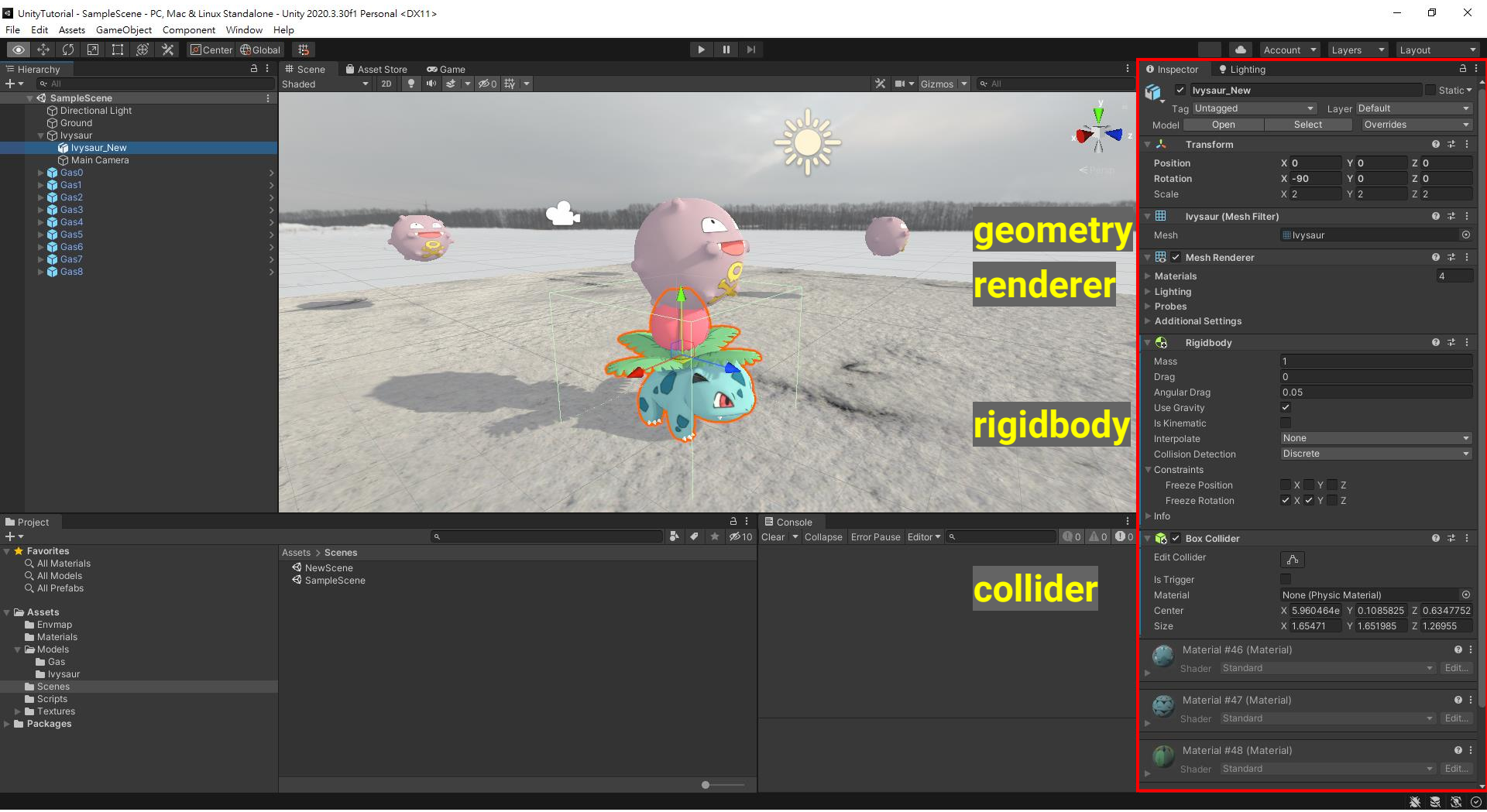
Hierarchy and transform



Add new objects



Components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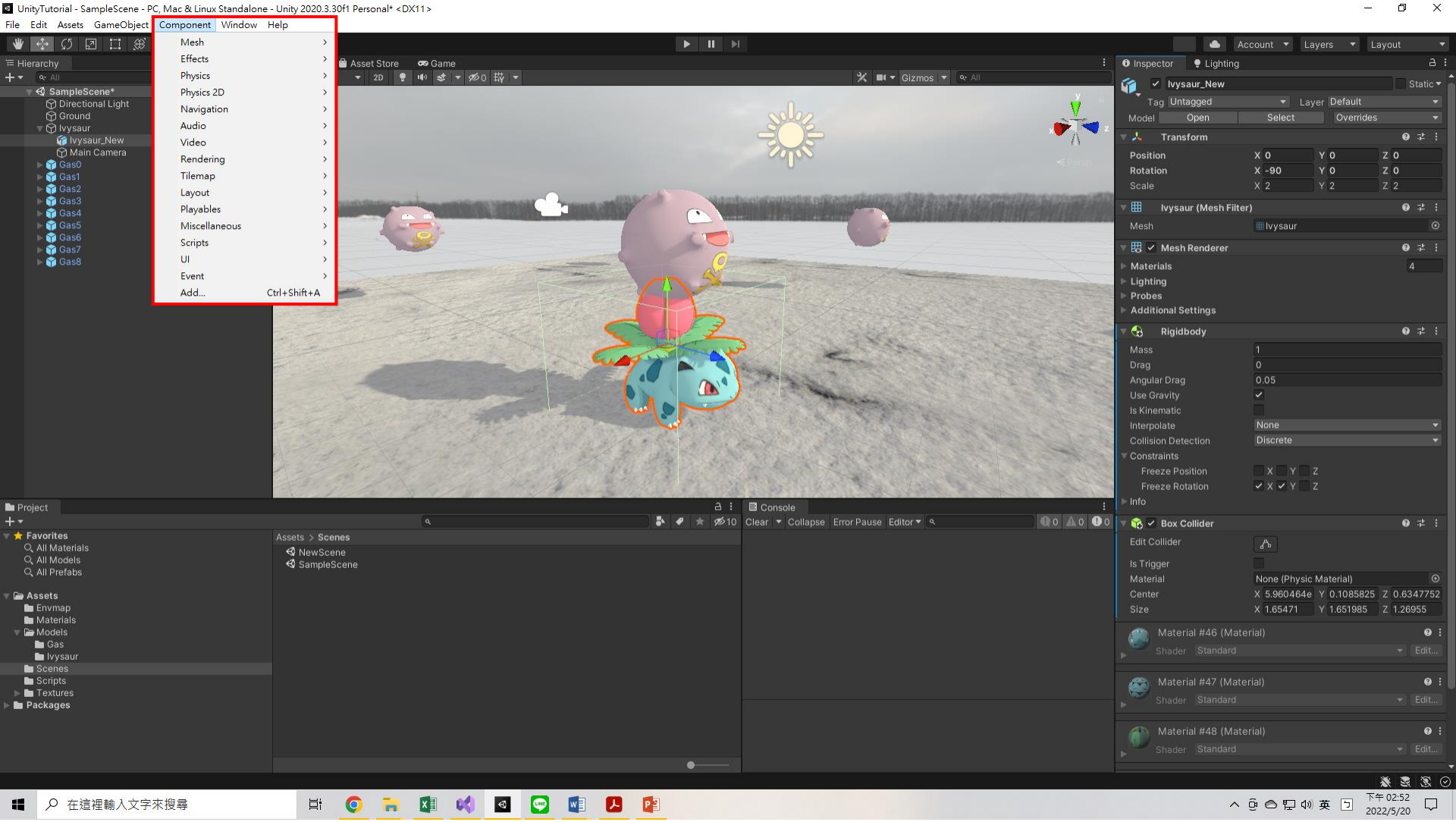
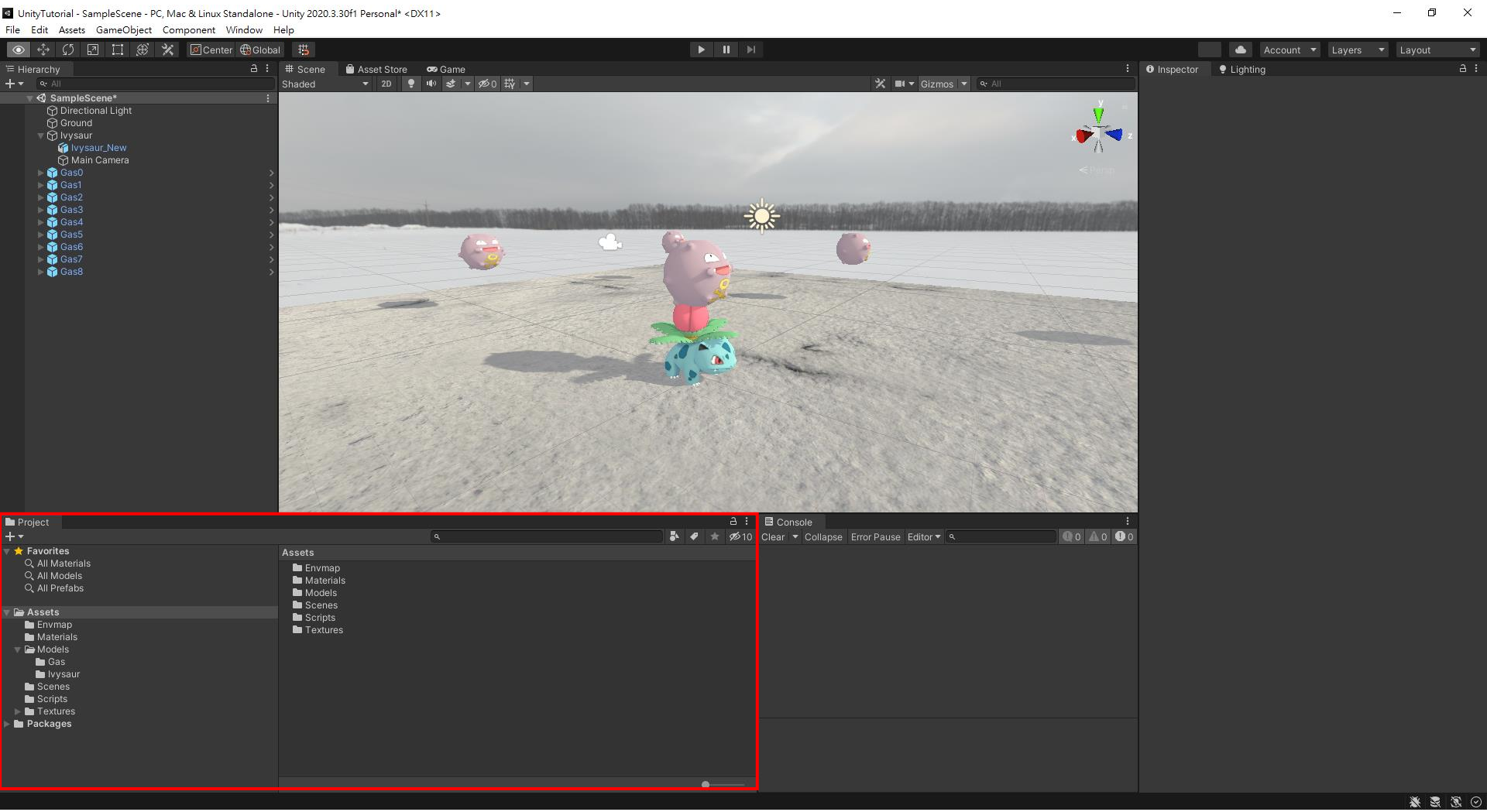
Hierarchy
SampleScene
Directional Light
Ground
Ivysaur
Ivysaur_New
Main Camera
Gas0
Gas1
Gas2
Gas3
Gas4
Gas5
Gas6
Gas7
Gas8
Scene
Asset Store
Game
Shaded
2D
Gizmos
geometry
renderer
rigidbody
collider
Project
Favorites
All Materials
All Models
All Prefabs
Assets
Envmap
Materials
Models
Gas
Ivysaur
Scenes
Scripts
Textures
Packages
Assets > Scenes
NewScene
SampleScene
Console
Clear
Collapse
Error Pause
Editor
Inspector
Lighting
Ivysaur_New
Static
Tag Untagged
Layer Default
Model Open Select Overrides
Transform
Position X 0 Y 0 Z 0
Rotation X -90 Y 0 Z 0
Scale X 2 Y 2 Z 2
Ivysaur (Mesh Filter)
Mesh Ivysaur
Mesh Renderer
Materials 4
Lighting
Probes
Additional Settings
Rigidbody
Mass 1
Drag 0
Angular Drag 0.05
Use Gravity
Is Kinematic
Interpolate None
Collision Detection Discrete
Constraints
Freeze Position X Y Z
Freeze Rotation X Y Z
Info
Box Collider
Edit Collider
Is Trigger
Material None (Physic Material)
Center X 5.960464e Y 0.1085825 Z 0.6347752
Size X 1.65471 Y 1.651985 Z 1.26955
Material #46 (Material)
Shader Standard
Material #47 (Material)
Shader Standard
Material #48 (Material)
Shader Standard

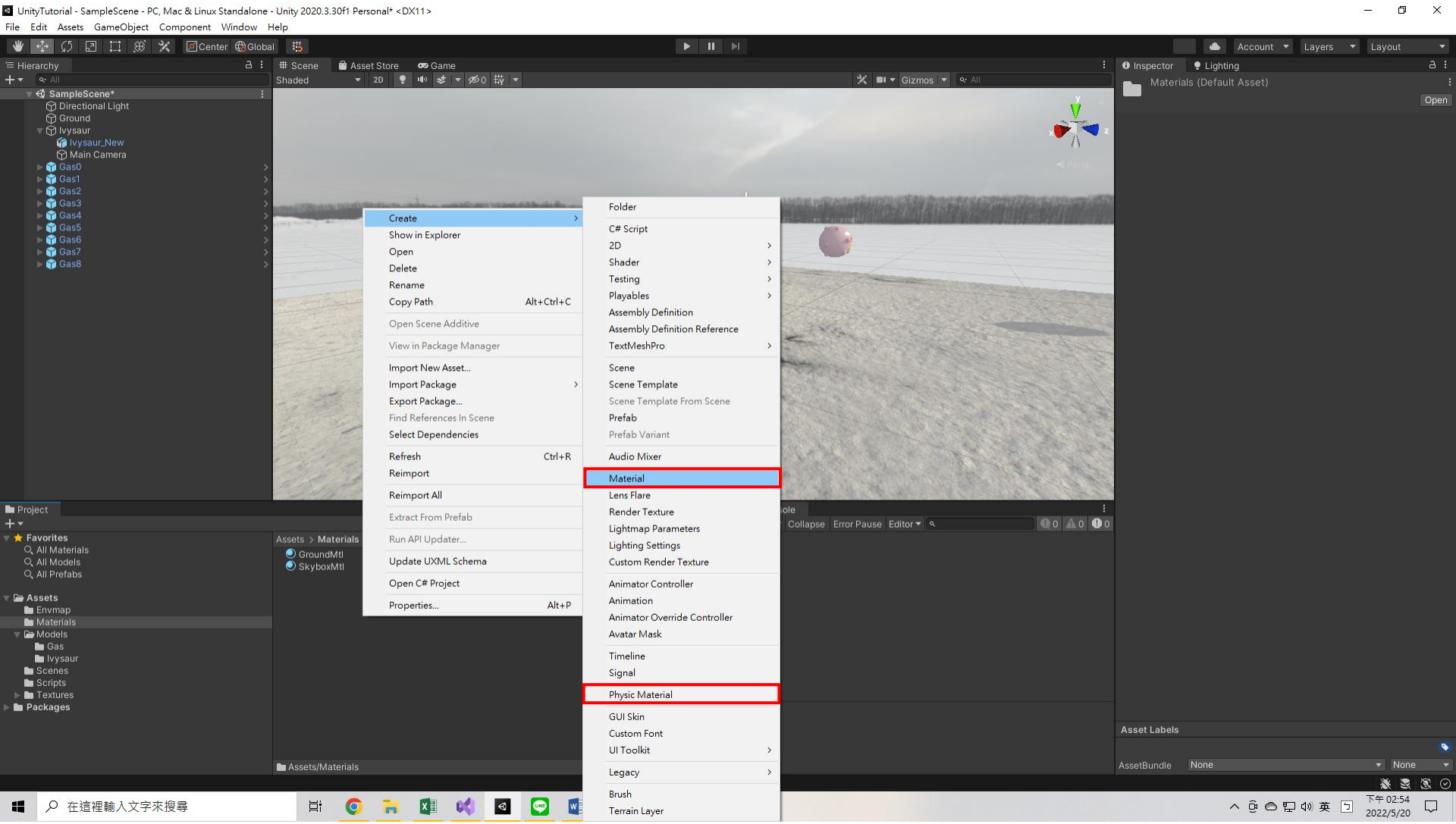
Add new components



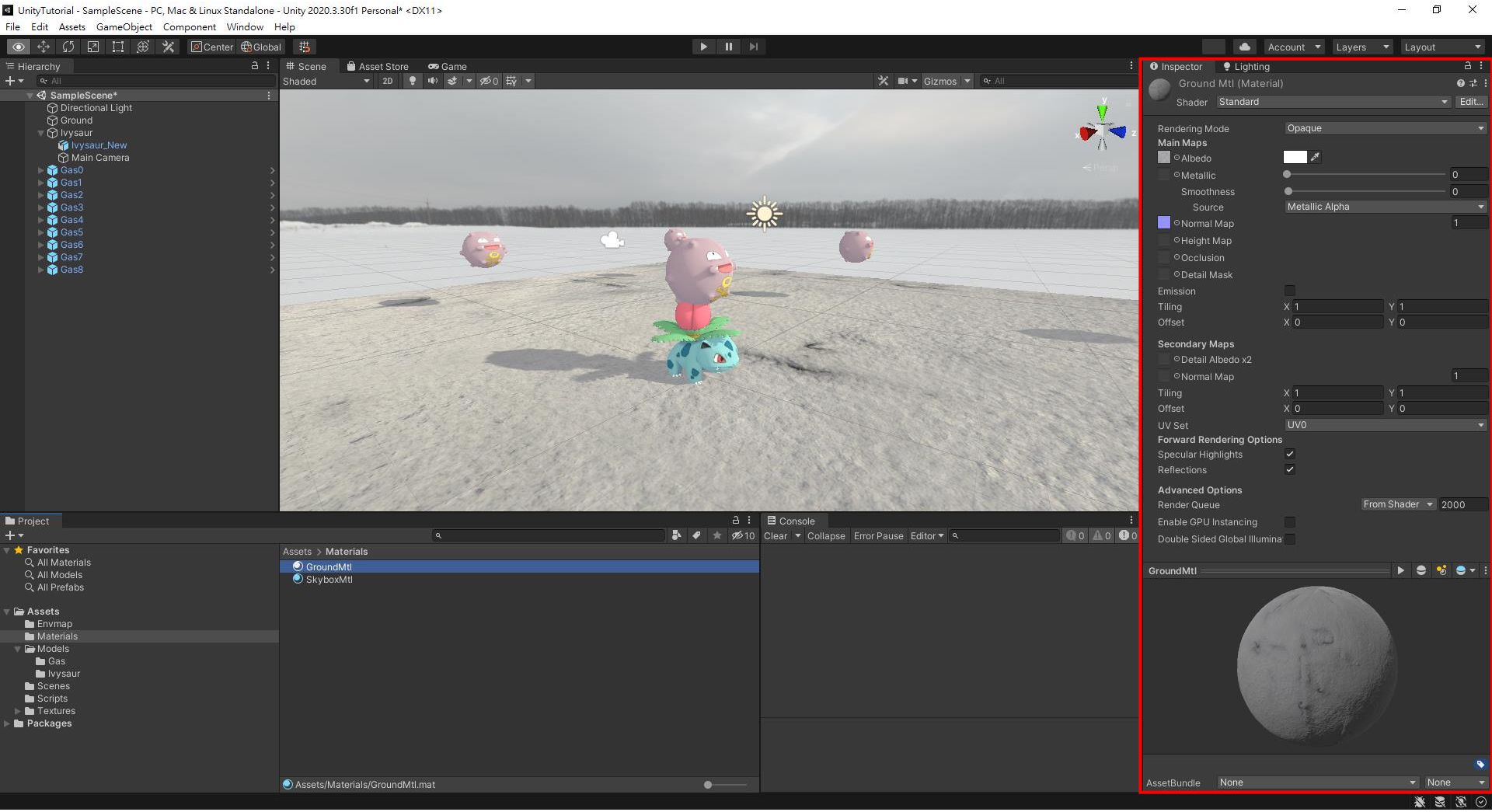
Assets Management



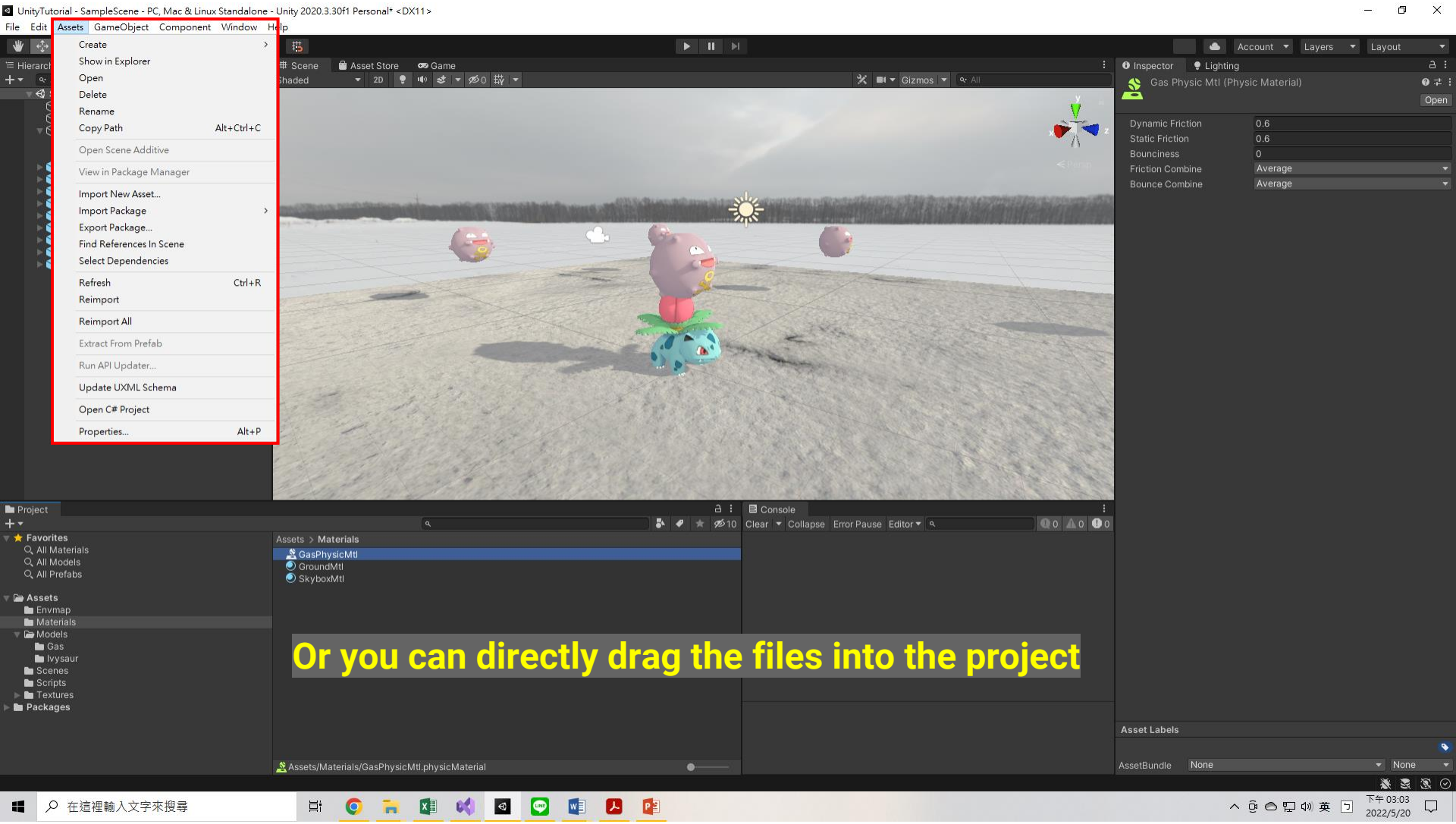
Material (for rendering / physics)



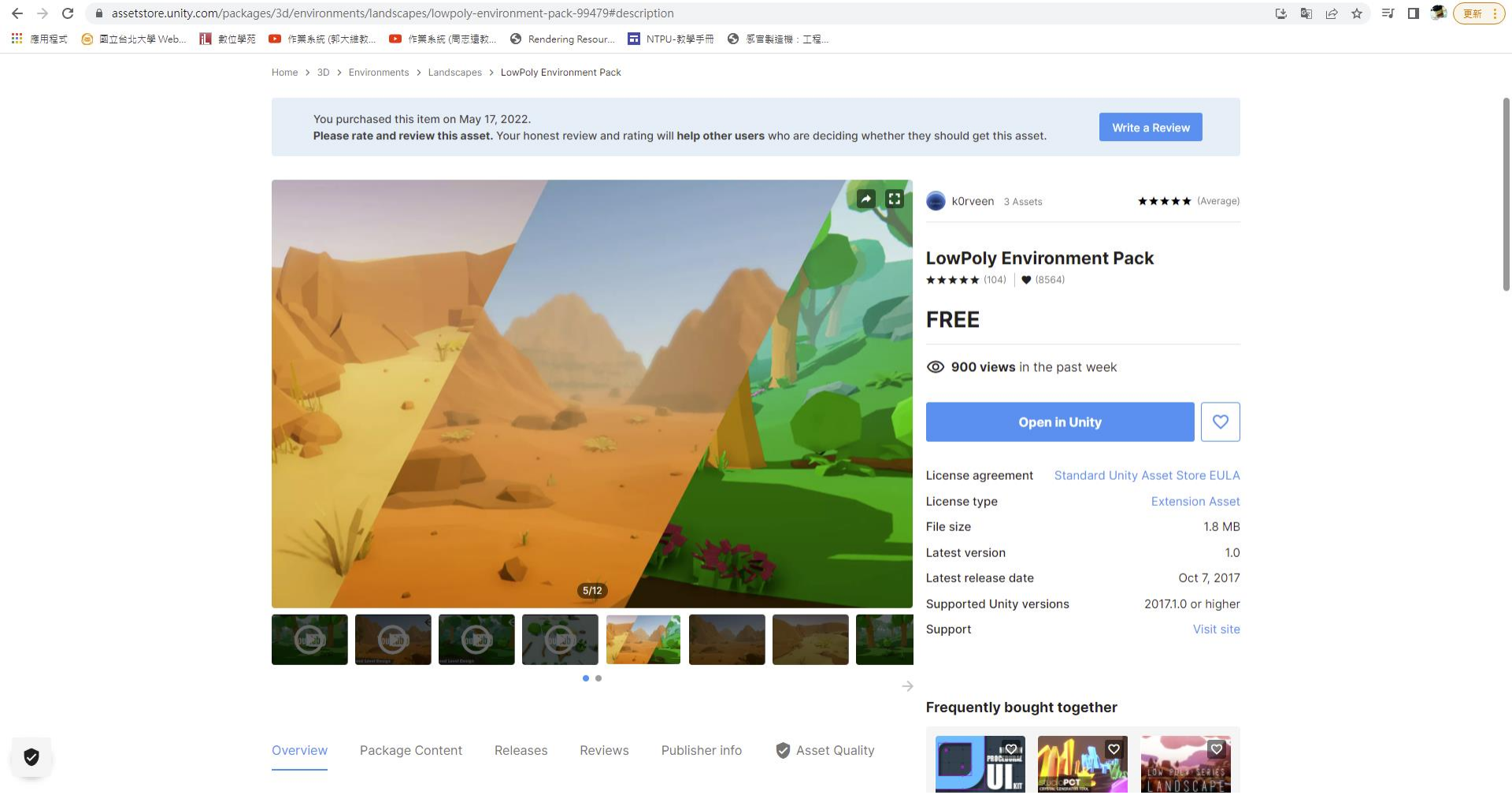
Material (for rendering)



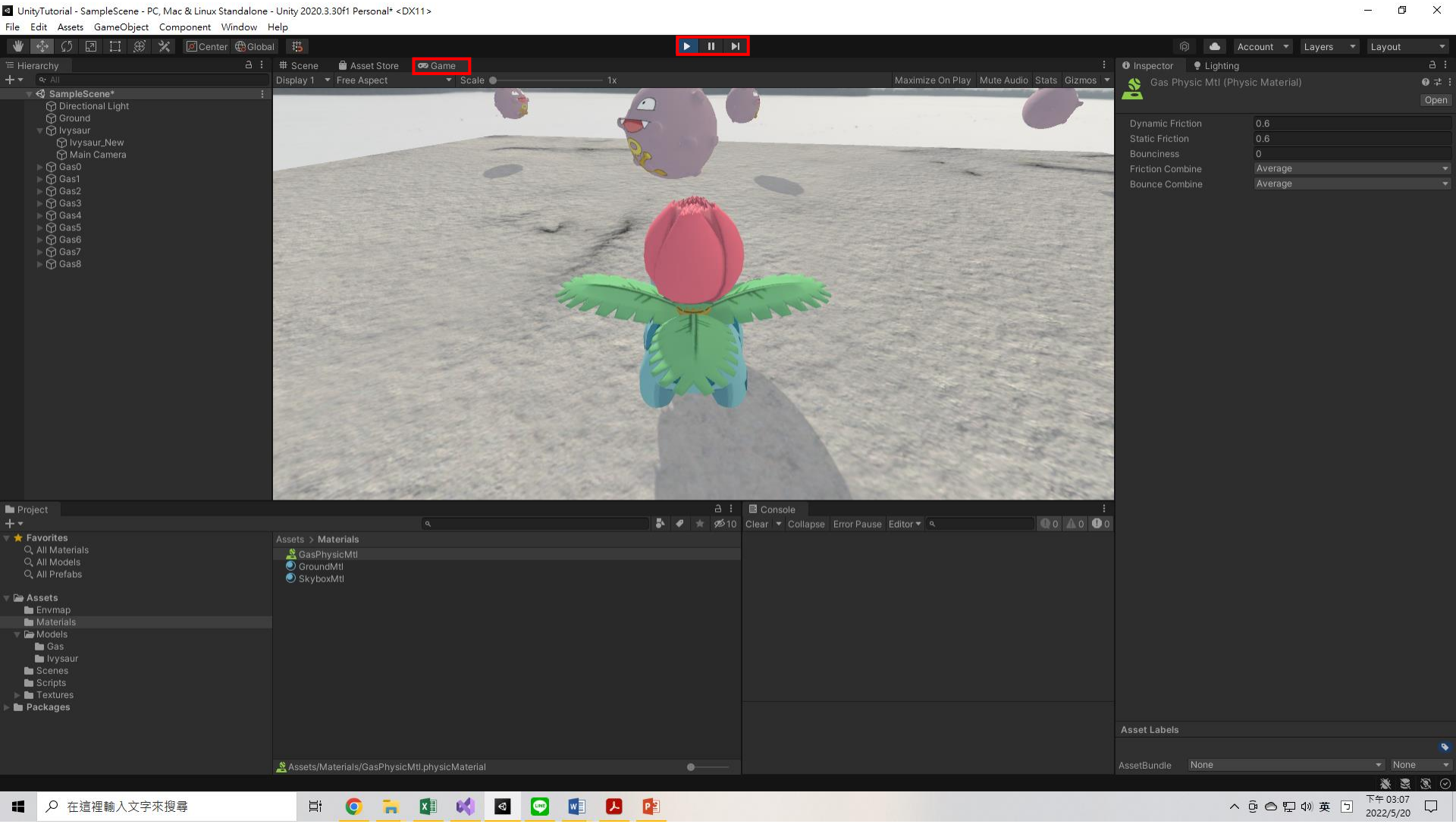
Import new assets



UnityAssetStore



Mode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Center Global
Account Layers Layout
Hierarchy
SampleScene*
Directional Light
Ground
Ivysaur
Ivysaur_New
Main Camera
Gas0
Gas1
Gas2
Gas3
Gas4
Gas5
Gas6
Gas7
Gas8
Scene Asset Store Game
Display 1 Free Aspect Scale 1x
Maximize On Play Mute Audio Stats Gizmos
Inspector Lighting
Gas Physic Mtl (Physic Material)
Open
Dynamic Friction 0.6
Static Friction 0.6
Bounciness 0
Friction Combine Average
Bounce Combine Average
Project
Favorites
All Materials
All Models
All Prefabs
Assets
Envmap
Materials
Models
Gas
Ivysaur
Scenes
Scripts
Textures
Packages
Assets > Materials
GasPhysicMtl
GroundMtl
SkyboxMtl
Assets/Materials/GasPhysicMtl.physicMaterial
Console
Clear Collapse Error Pause Editor
Asset Labels
AssetBundle None None
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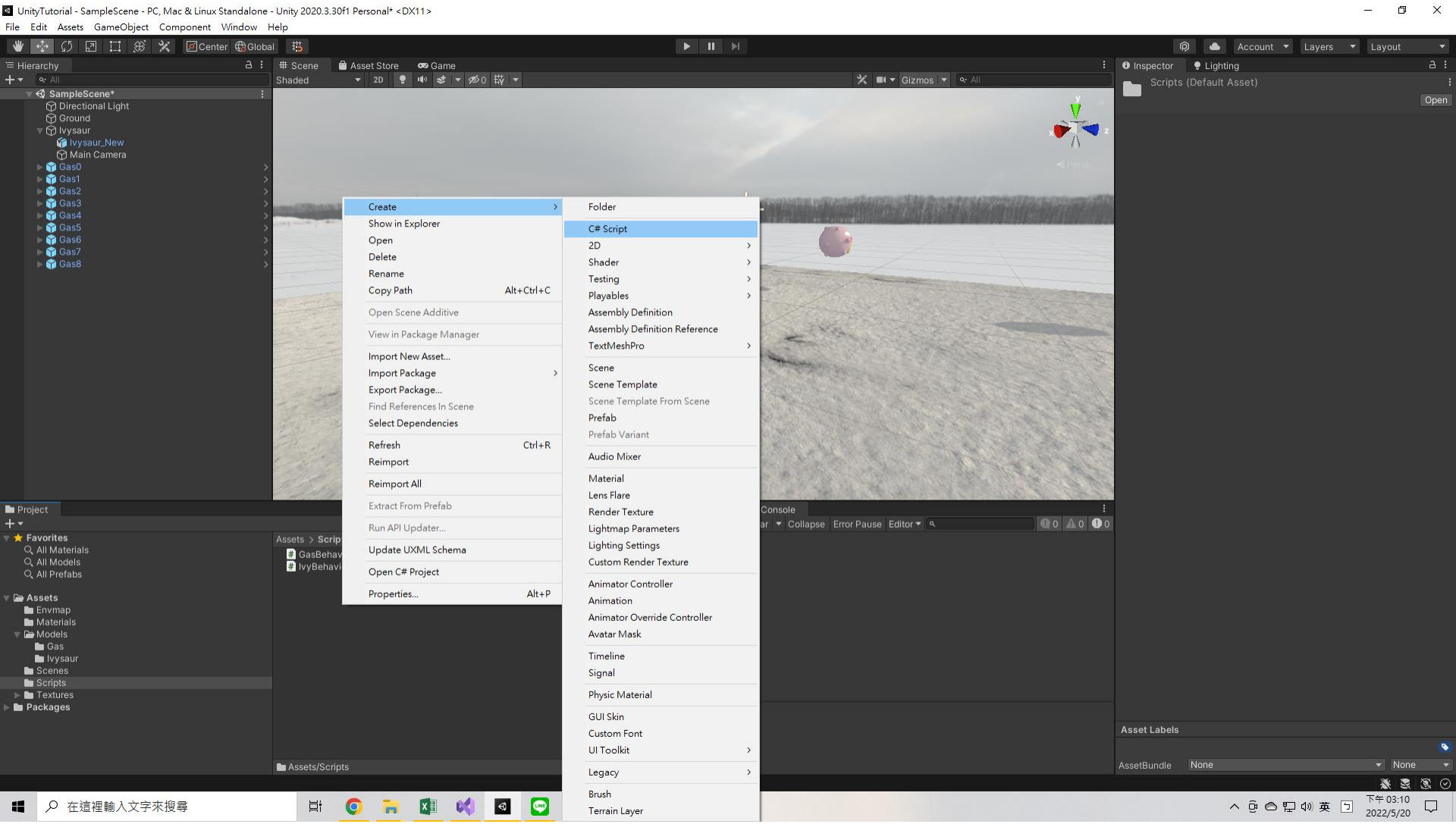
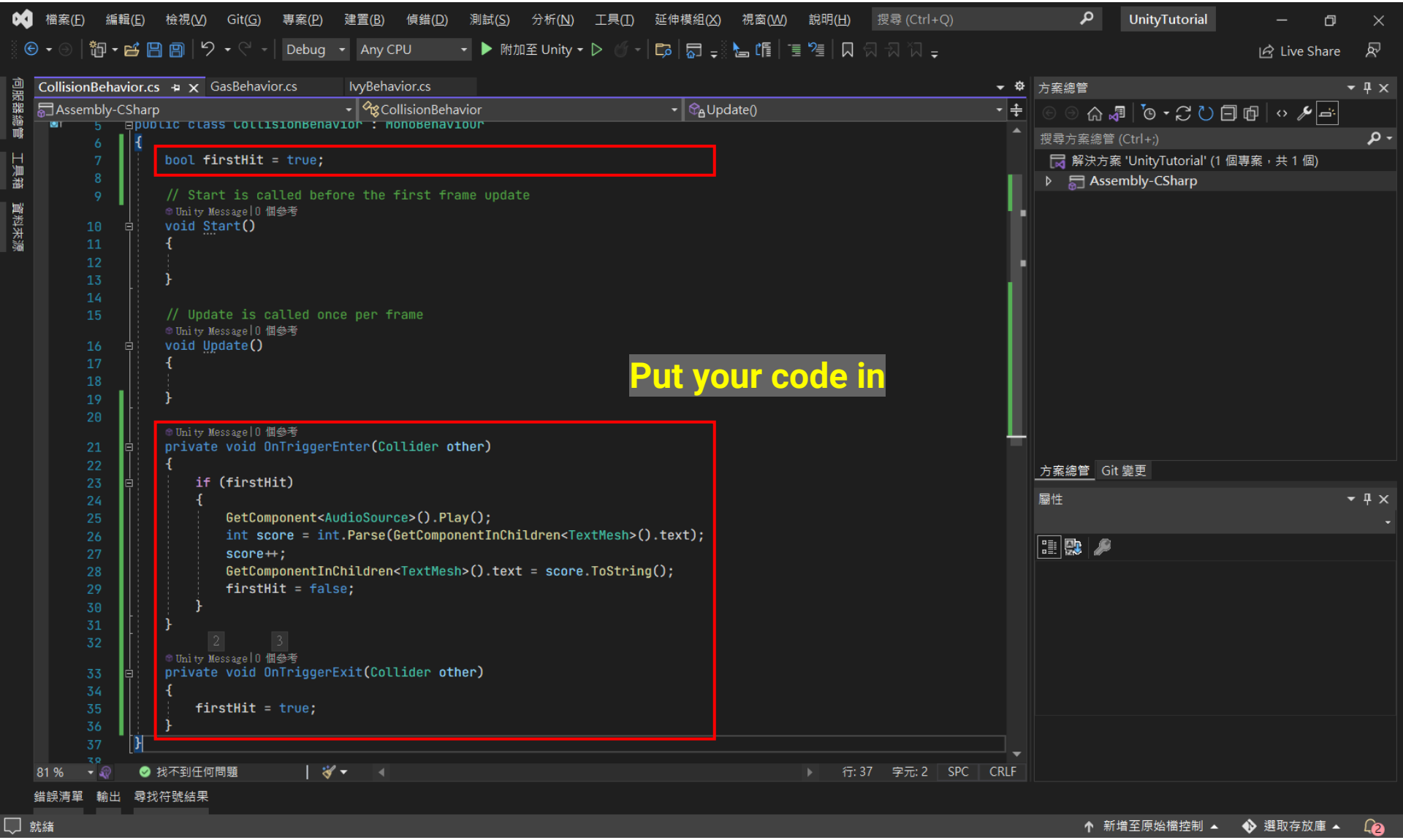
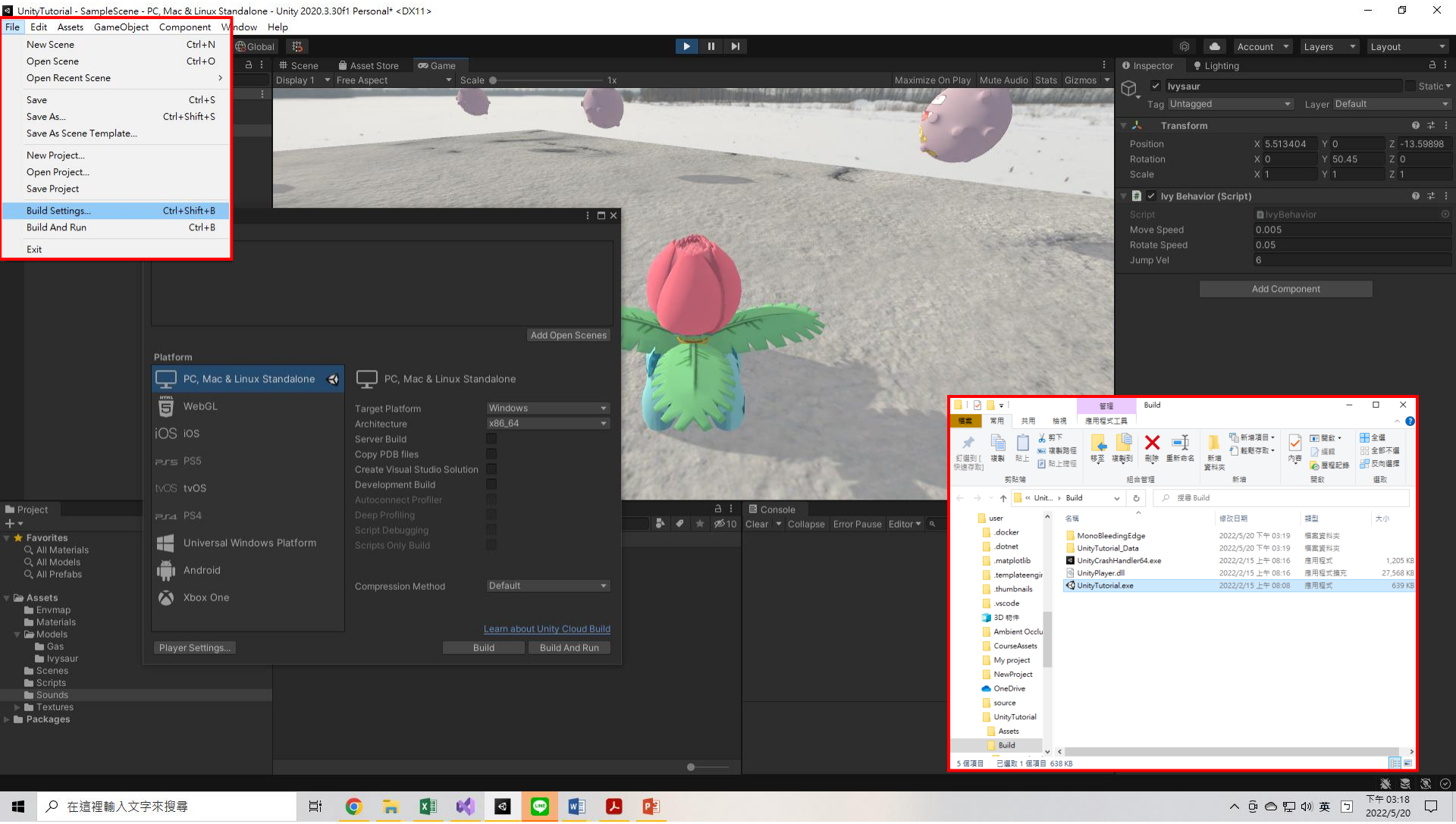
Behavior and Game Control

Add new behavior



Add new behavior



Deploy

Output executable file