免費電子書

學習

unity3d

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#unity3d

1: unity3d

Unity。C/JavaScriptUnityScript。。 https //unity3d.com/get-unity/download/archive 。

Unity 2017.1.0	2017710
5.6.2	2017621
5.6.1	2017511
5.6.0	2017331
5.5.3	2017331
5.5.2	2017224
5.5.1	2017124
5.5	
5.4.3	20161117
5.4.2	20161021
5.4.1	201698
5.4.0	2016728
5.3.6	2016720
5.3.5	
5.3.4	2016315
5.3.3	2016223
5.3.2	2016128
5.3.1	20151218
5.3.0	2015128
5.2.5	201661
5.2.4	
5.2.3	○

5.2.2	20151021
5.2.1	2015922
5.2.0	2015-09-08
5.1.5	201567
5.1.4	2015106
5.1.3	2015824
5.1.2	2015-07-17
5.1.1	2015618
5.1.0	2015-06-25
5.0.4	2015-07-06
5.0.3	2015-06-25
5.0.2	2015513
5.0.1	2015-04-01
5.0.0	201533
4.7.2	2016531
4.7.1	2016225
4.7.0	20151217
4.6.9	
4.6.8	2015826
4.6.7	201571
4.6.6	2015-06-08
4.6.5	2015430
4.6.4	2015326
4.6.3	2015219
4.6.2	2015129
4.6.1	2014129

4.6.0	
4.5.5	20141013
4.5.4	2014911
4.5.3	2014812
4.5.2	2014710
4.5.1	2014612
4.5.0	2014527
4.3.4	2014129
4.3.3	2014113
4.3.2	20131218
4.3.1	20131128
4.3.0	20131112
4.2.2	○
4.2.1	201395
4.2.0	2013722
4.1.5	201368
4.1.4	201366
4.1.3	2013523
4.1.2	2013326
4.1.0	2013313
4.0.1	2013112
4.0.0	20121113
3.5.7	○
3.5.6	2012-09-27
3.5.5	2012-08-08
3.5.4	2012-07-20

3.5.3	2012-06-30
3.5.2	2012-05-15
3.5.1	2012-04-12
3.5.0	2012-02-14
3.4.2	2011-10-26
3.4.1	2011-09-20
3.4.0	2011-07-26

Examples

UnityWindowsMac。 Linux alpha。

Unity4

1. -
2. - 35
3. **Pro** - 125 - 24Pro。
4. - Unity

*EULA100,000**Unity Plus** ;200,000**Unity Pro** 。*

1. Unity 。
2. UnityMonoDevelop IDE。

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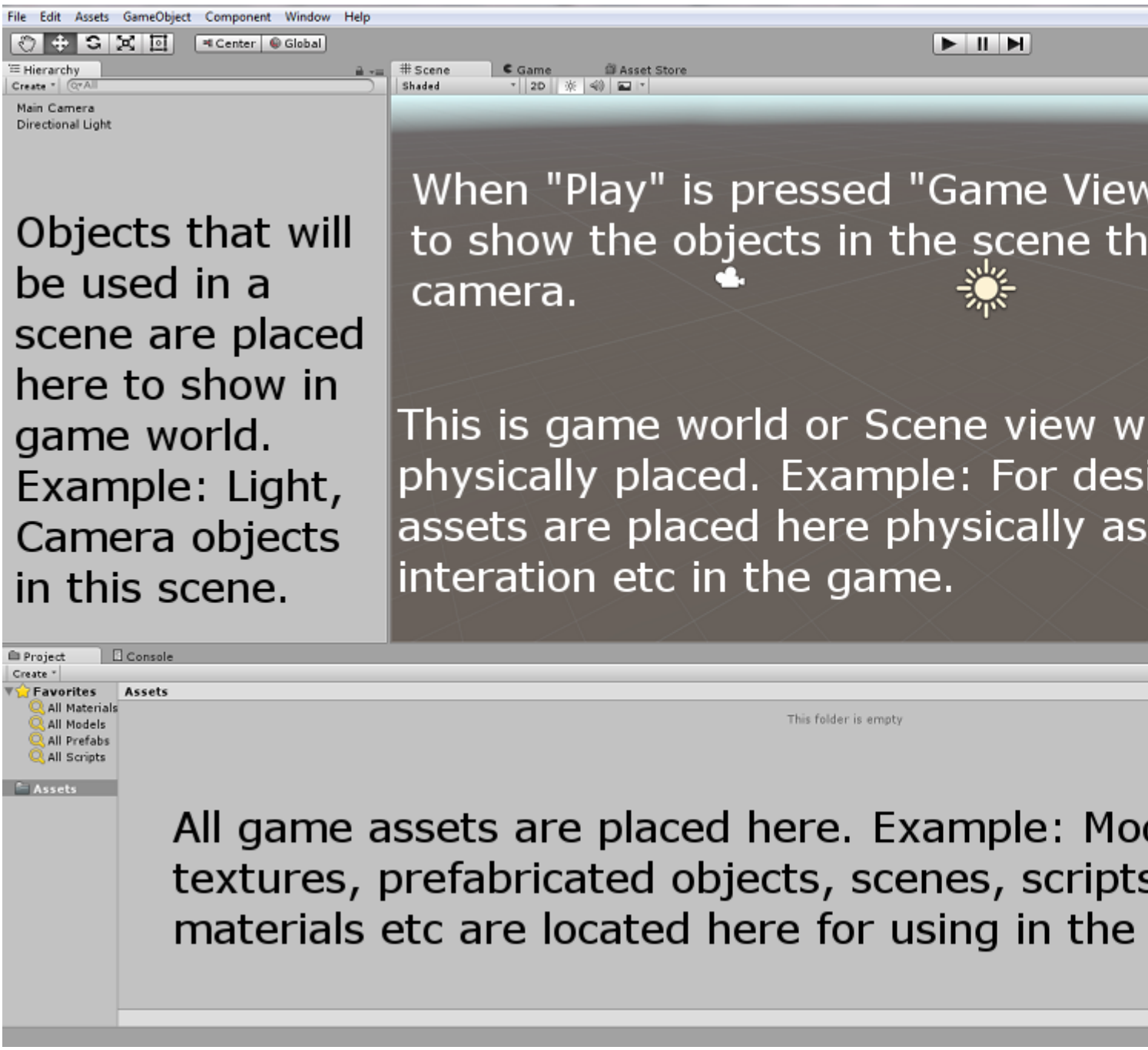
UnityUnityUnity 5.5.1 。

Unity

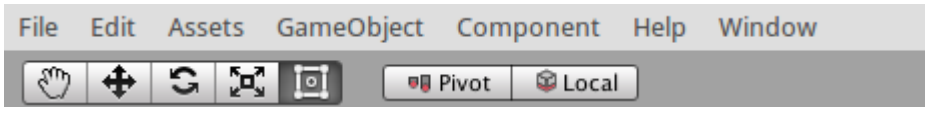
Unity。

- Windows`Unity 5.3.1f1` 。
- Mac`/Applications/Unity` 。 `/Applications/Unity5.3.1f1` 。
- Unity`Alt`。 。

Unity。/。



Linux

linux 

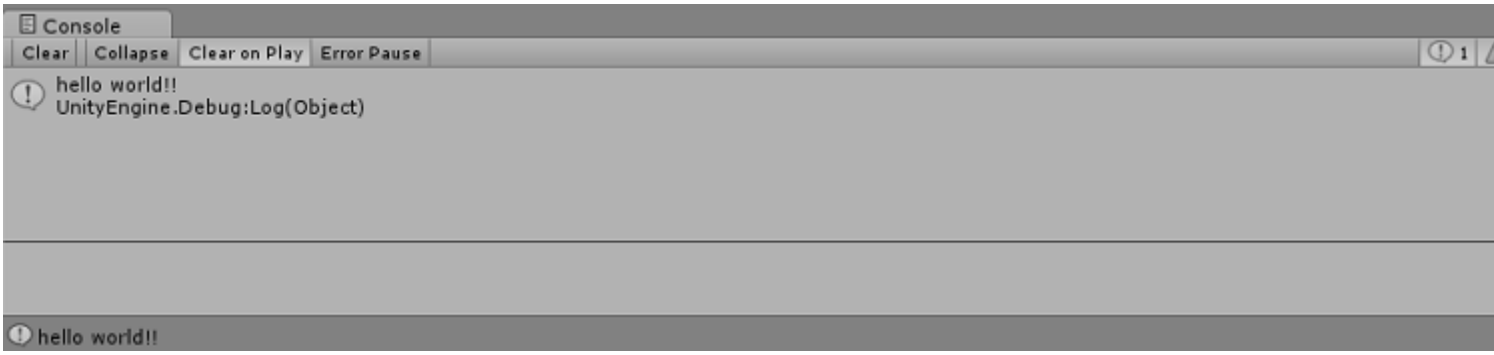
Hierarchy`Create EmptyGameObject`。 “”“ `Create` >“ `C# Script`。 。

“”`GameObject` “”。 “”。 MonoDevelop IDE。

`Debug.Log("hello world!!");Debug.Log("hello world!!");` 。

```
using UnityEngine;
using System.Collections;

public class BasicCode : MonoBehaviour {

    // Use this for initialization
    void Start () {
        Debug.Log("hello world!!");
    }

    // Update is called once per frame
    void Update () {

    }
}
```

Debug.Log("hello world!!");void Start()。 。 “ ”。



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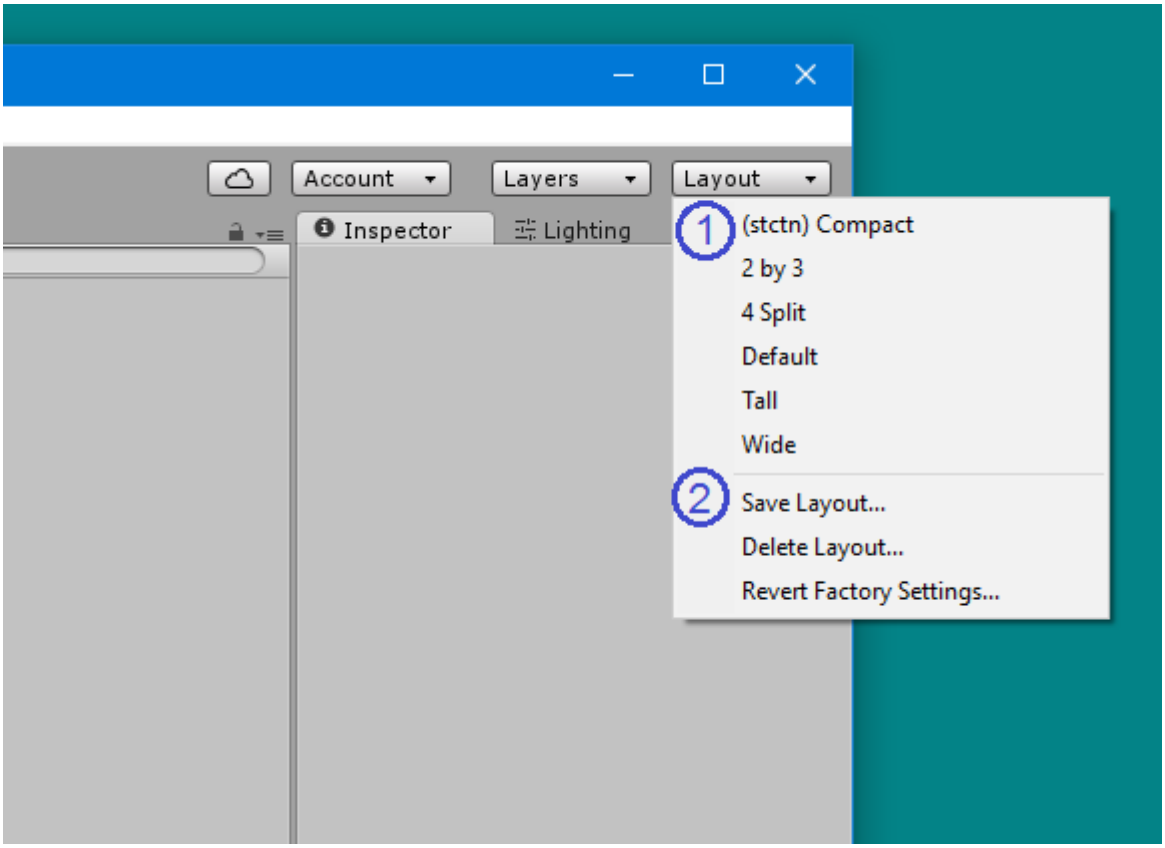
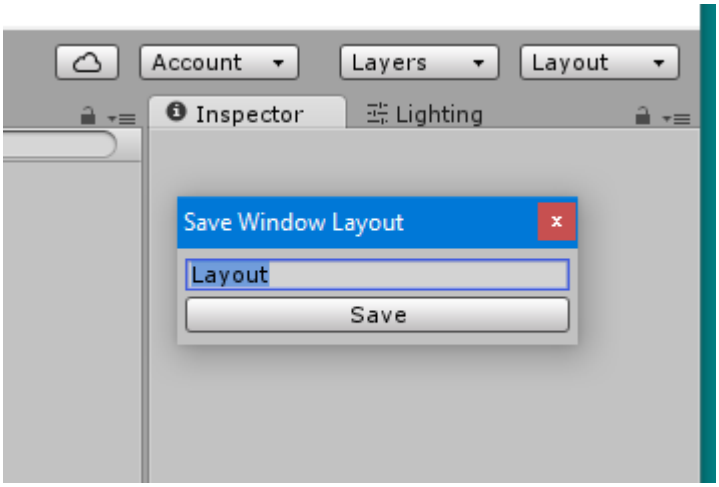
Unity Editor

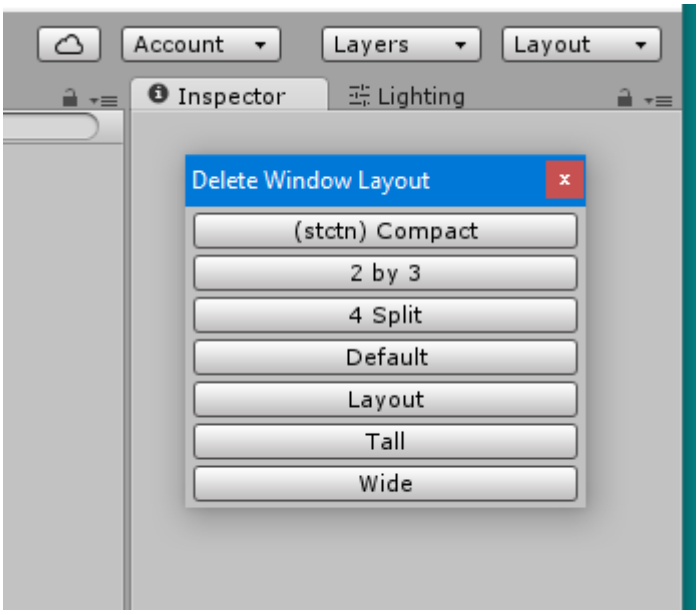


Unity523,4 *1* 。 。

“...”*2*

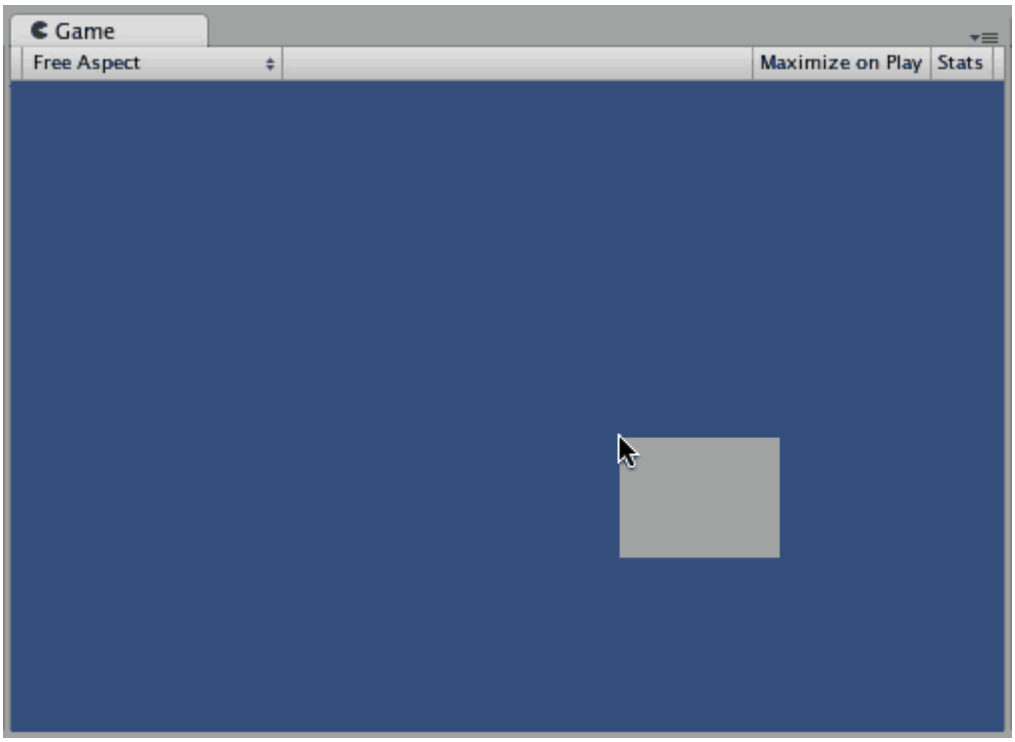


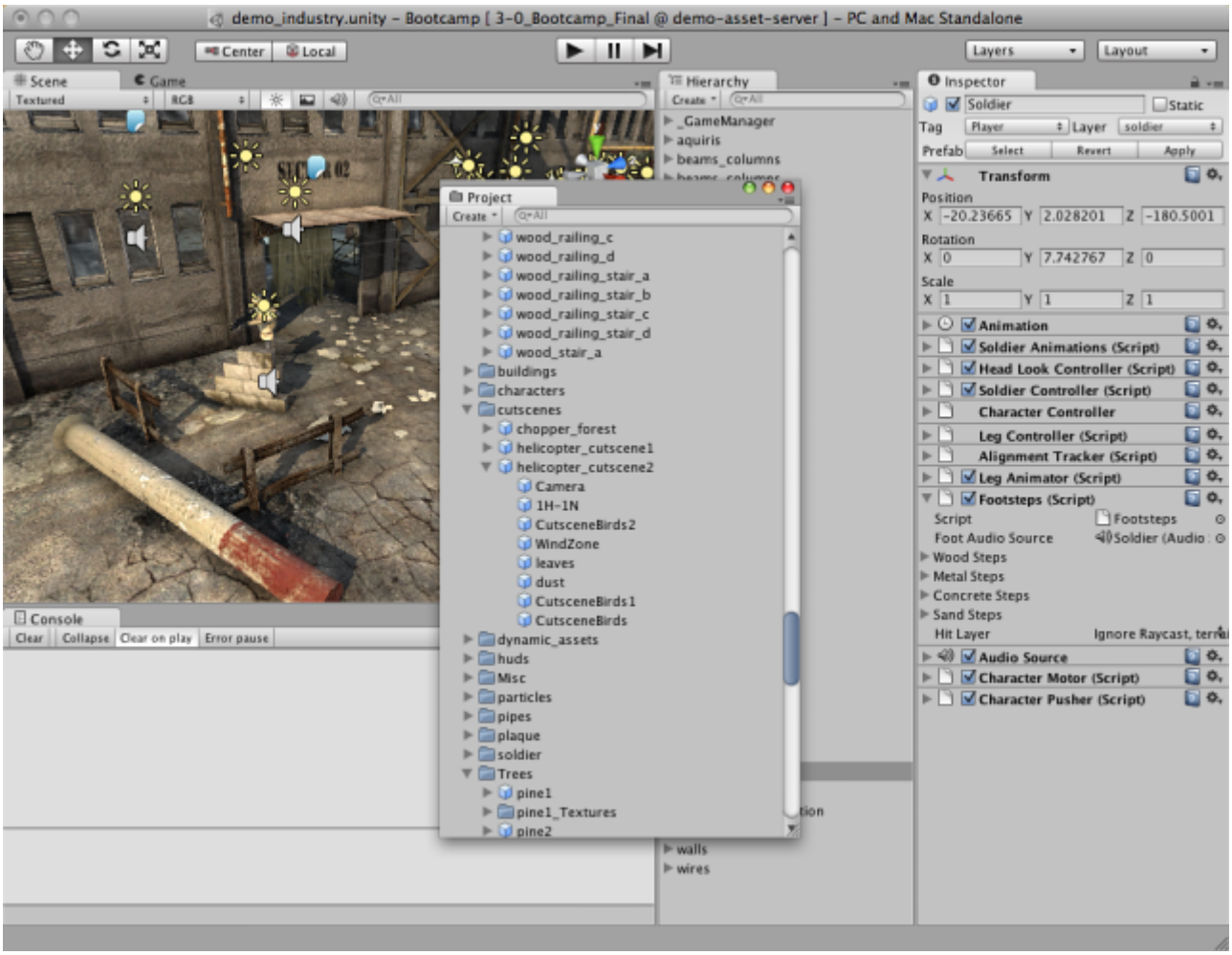
“...”*2*

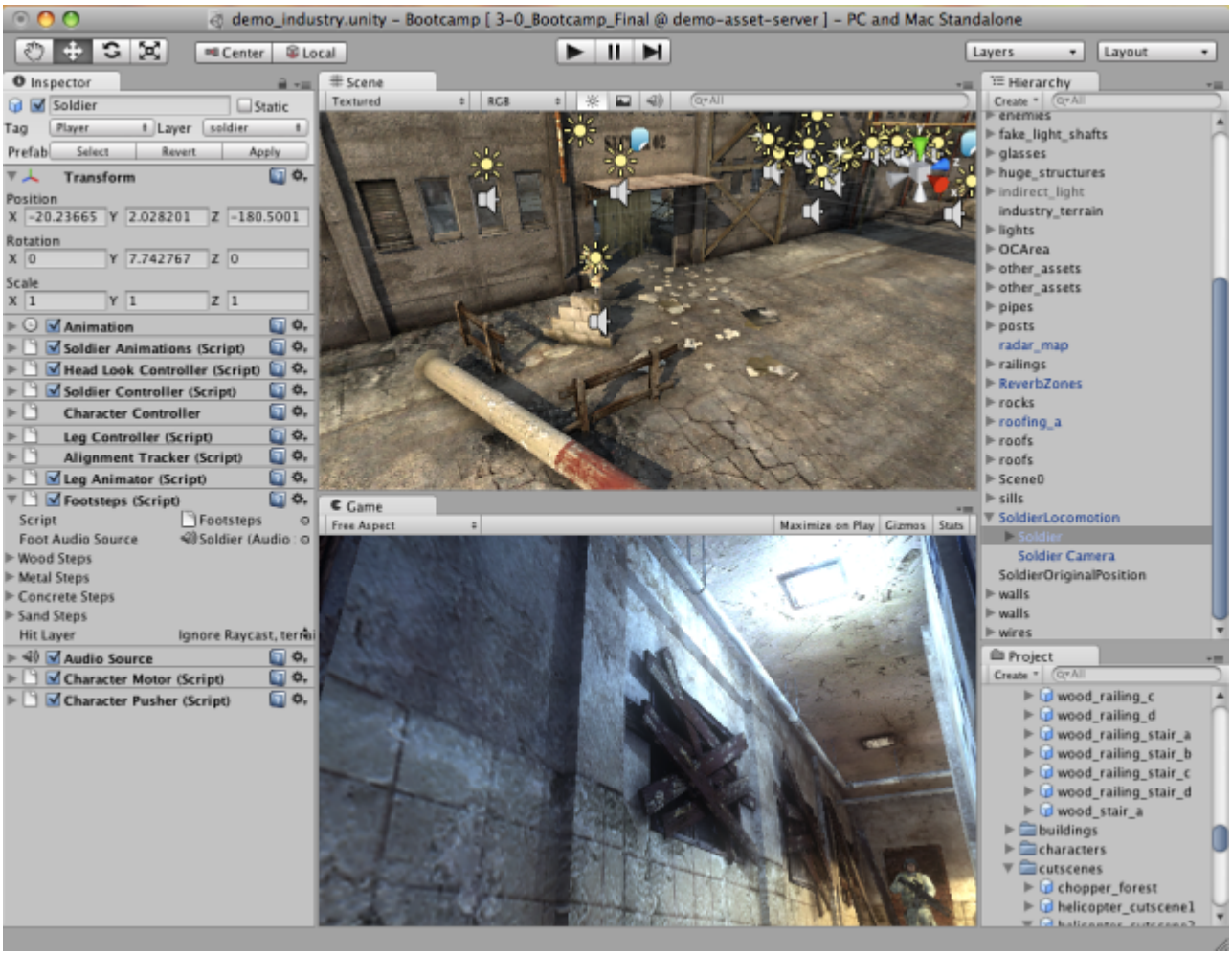


“...”*2* 。

。 。 DockTabView。


Game
Free Aspect
Maximize on Play
Stats


demo_industry.unity – Bootcamp [3-0_Bootcamp_Final @ demo-asset-server] – PC and Mac Standalone
Center
Local
Layers
Layout
Scene
Game
Hierarchy
Create
_GameManager
aquiris
beams_columns
Project
wood_railing_c
wood_railing_d
wood_railing_stair_a
wood_railing_stair_b
wood_railing_stair_c
wood_railing_stair_d
wood_stair_a
buildings
characters
cutscenes
chopper_forest
helicopter_cutscene1
helicopter_cutscene2
Camera
1H-1N
CutsceneBirds2
WindZone
leaves
dust
CutsceneBirds1
CutsceneBirds
dynamic_assets
huds
Misc
particles
pipes
plaque
soldier
Trees
pine1
pine1_Textures
pine2
walls
wires
Inspector
Soldier
Static
Tag
Player
Layer
soldier
Prefab
Select
Revert
Apply
Transform
Position
Rotation
Scale
Animation
Soldier Animations (Script)
Head Look Controller (Script)
Soldier Controller (Script)
Character Controller
Leg Controller (Script)
Alignment Tracker (Script)
Leg Animator (Script)
Footsteps (Script)
Script
Footsteps
Foot Audio Source
Soldier (Audio
Wood Steps
Metal Steps
Concrete Steps
Sand Steps
Hit Layer
Audio Source
Character Motor (Script)
Character Pusher (Script)
Console
Clear
Collapse
Clear on play
Error pause



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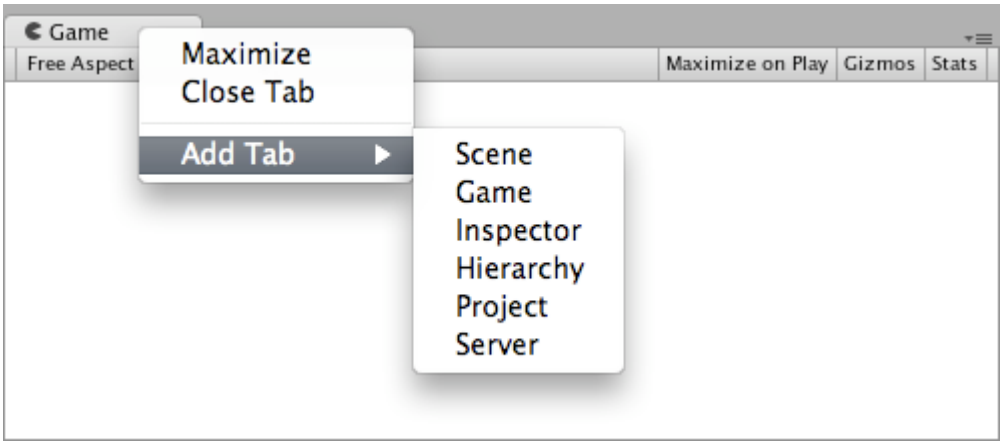


unity3d https://riptutorial.com/zh-TW/unity3d/topic/846/unity3d

2: Android101 -

UnityAndroid。 /Android。

。 。

Android

UnityAndroid。

1. JavaAndroidCJava
2. CAndroid OS

Unity。

- AndroidJavaObject - Unity。 AndroidJavaObject
- AndroidJavaClass - AndroidJavaObject。
- / GetStatic / SetStatic
- Call / CallStatic

---

1. Android StudioJava
2. JAR / AARJARAAR
3. JAR / AAR**Assets / Plugins / Android** Unity
4. UnityC

JAR / AAR C**C**

。 1。

1. - 1
2. Android - 2

“”12。

Examples

UnityAndroidPlugin.cs

UnityC

```
using UnityEngine;
using System.Collections;

public static class UnityAndroidPlugin {

}
```

UnityAndroidNative.java

Android StudioJava

```
package com.axs.unityandroidplugin;
import android.util.Log;
import android.widget.Toast;
import android.app.ActivityManager;
import android.content.Context;


public class UnityAndroidNative {


}
```

UnityAndroidPluginGUI.cs

UnityC

```
using UnityEngine;
using System.Collections;

public class UnityAndroidPluginGUI : MonoBehaviour {

    void OnGUI () {

    }

}
```

Android101 - https://riptutorial.com/zh-TW/unity3d/topic/10032/android101----

3: CullingGroup API

CullingGroups。

。

```
using UnityEngine;
using System;
public interface ICullingGroupManager
{
    int ReserveSphere();
    void ReleaseSphere(int sphereIndex);
    void SetPosition(int sphereIndex, Vector3 position);
    void SetRadius(int sphereIndex, float radius);
    void SetCullingEvent(int sphereIndex, Action<CullingGroupEvent> sphere);
}
```

。 。

Examples

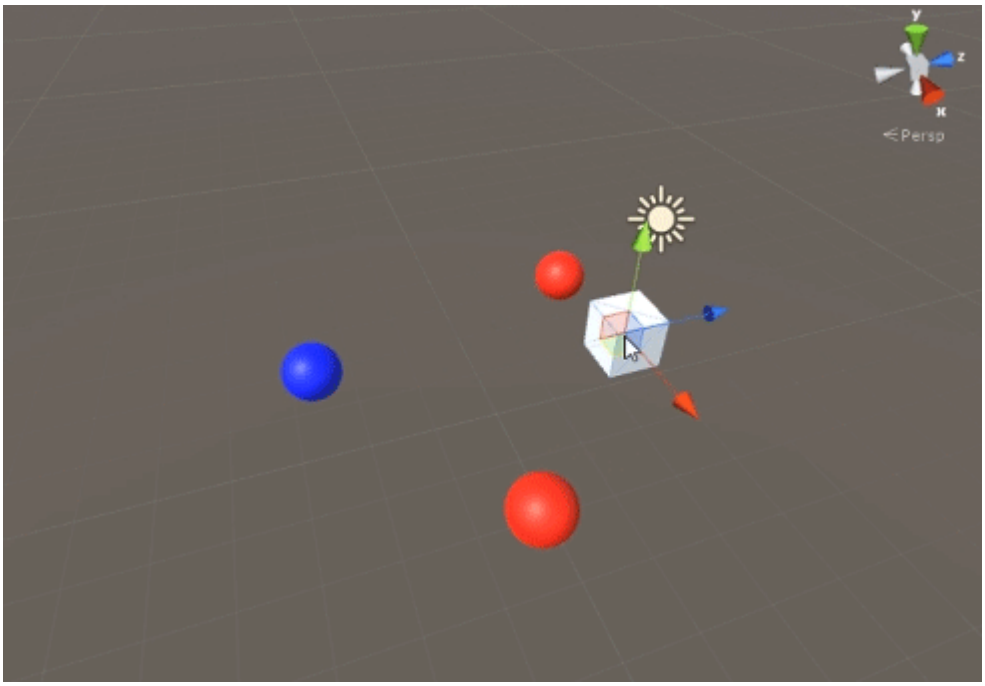
CullingGroups。

。

```
using UnityEngine;
using System.Linq;

public class CullingGroupBehaviour : MonoBehaviour
{
    CullingGroup localCullingGroup;

    MeshRenderer[] meshRenderers;
    Transform[] meshTransforms;
    BoundingSphere[] cullingPoints;

    void OnEnable()
    {
        localCullingGroup = new CullingGroup();

        meshRenderers = FindObjectsOfType<MeshRenderer>()
                .Where((MeshRenderer m) => m.gameObject != this.gameObject)
                .ToArray();

        cullingPoints = new BoundingSphere[meshRenderers.Length];
        meshTransforms = new Transform[meshRenderers.Length];

        for (var i = 0; i < meshRenderers.Length; i++)
        {
            meshTransforms[i] = meshRenderers[i].GetComponent<Transform>();
            cullingPoints[i].position = meshTransforms[i].position;
            cullingPoints[i].radius = 4f;
        }
```

```
        localCullingGroup.onStateChanged = CullingEvent;
        localCullingGroup.SetBoundingSpheres(cullingPoints);
        localCullingGroup.SetBoundingDistances(new float[] { 0f, 5f });
        localCullingGroup.SetDistanceReferencePoint(GetComponent<Transform>().position);
        localCullingGroup.targetCamera = Camera.main;
    }

    void FixedUpdate()
    {
        localCullingGroup.SetDistanceReferencePoint(GetComponent<Transform>().position);
        for (var i = 0; i < meshTransforms.Length; i++)
        {
            cullingPoints[i].position = meshTransforms[i].position;
        }
    }

    void CullingEvent(CullingGroupEvent sphere)
    {
        Color newColor = Color.red;
        if (sphere.currentDistance == 1) newColor = Color.blue;
        if (sphere.currentDistance == 2) newColor = Color.white;
        meshRenderers[sphere.index].material.color = newColor;
    }

    void OnDisable()
    {
        localCullingGroup.Dispose();
    }
}
```

GameObjectPlay。GameObject。



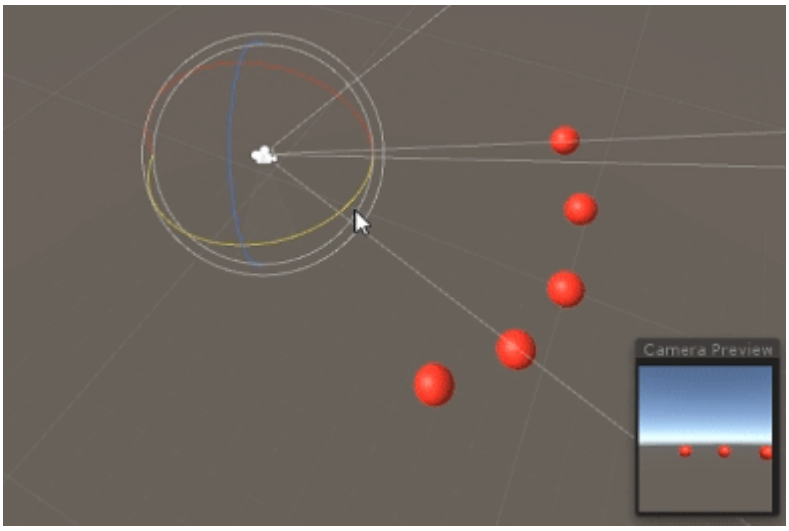
。

。

```
using UnityEngine;
```

```
using System.Linq;

public class CullingGroupCameraBehaviour : MonoBehaviour
{
    CullingGroup localCullingGroup;

    MeshRenderer[] meshRenderers;

    void OnEnable()
    {
        localCullingGroup = new CullingGroup();

        meshRenderers = FindObjectsOfType<MeshRenderer>()
            .Where((MeshRenderer m) => m.gameObject != this.gameObject)
            .ToArray();

        BoundingSphere[] cullingPoints = new BoundingSphere[meshRenderers.Length];
        Transform[] meshTransforms = new Transform[meshRenderers.Length];

        for (var i = 0; i < meshRenderers.Length; i++)
        {
            meshTransforms[i] = meshRenderers[i].GetComponent<Transform>();
            cullingPoints[i].position = meshTransforms[i].position;
            cullingPoints[i].radius = 4f;
        }

        localCullingGroup.onStateChanged = CullingEvent;
        localCullingGroup.SetBoundingSpheres(cullingPoints);
        localCullingGroup.targetCamera = Camera.main;
    }

    void CullingEvent(CullingGroupEvent sphere)
    {
        meshRenderers[sphere.index].material.color = sphere.isVisible ? Color.red :
Color.white;
    }

    void OnDisable()
    {
        localCullingGroup.Dispose();
    }
}
```

“”。 。



`MeshRendererMonoBehaviour.OnBecameVisible()`。 GameObjects `Vector3`CulingGroups。

。 “”“”“”。

```
cullingGroup.SetBoundingDistances(new float[] { 0f, 10f, 100f});
```

。 。

。

。 。 。

```
float cullingPointArea = Mathf.PI * (cullingPointRadius * cullingPointRadius);
float boundingArea = Mathf.PI * (boundingDistance * boundingDistance);
float combinedRadius = Mathf.Sqrt((cullingPointArea + boundingArea) / Mathf.PI);
```

CullingGroup API https://riptutorial.com/zh-TW/unity3d/topic/4574/cullinggroup-api

4: MonoBehaviour

Examples

Awake Start Update◦

◦ ◦ ◦

◦ Awake Start OnEnable OnDisable Update LateUpdateFixedUpdate ◦ C ++C◦

/◦ ◦ Unity◦

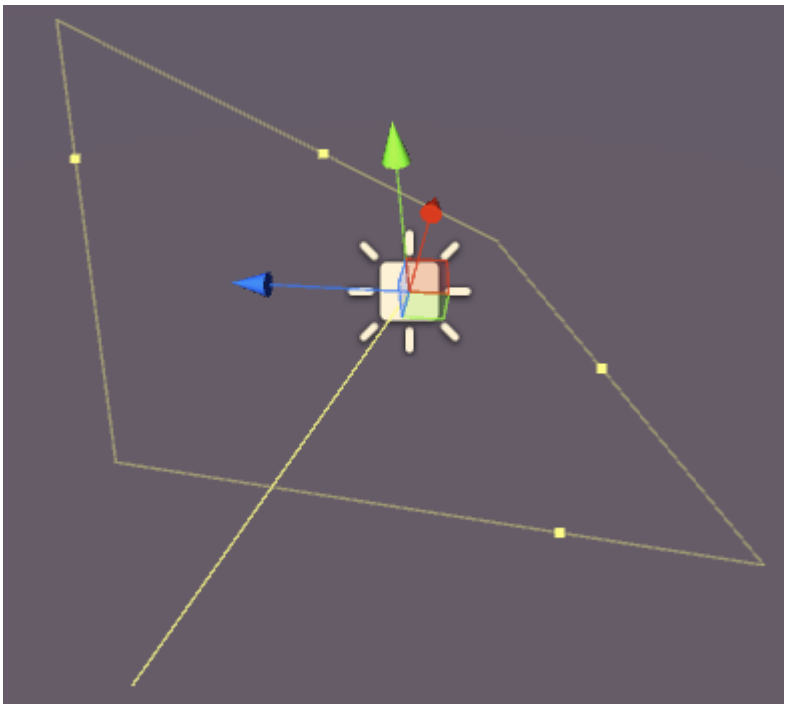
Unity 10000IL2CPP IL2CPP

MonoBehaviour https://riptutorial.com/zh-TW/unity3d/topic/2304/monobehaviour

5: Unity Lighting

Examples

◦ ◦



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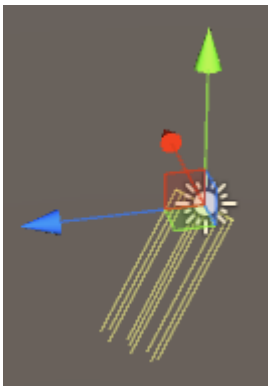
◦ GameObject“”◦ ◦



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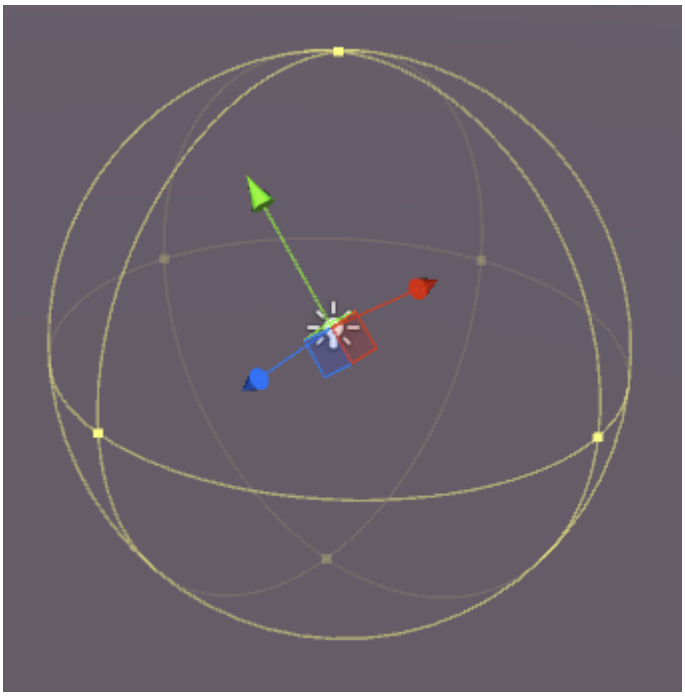

Point Lights

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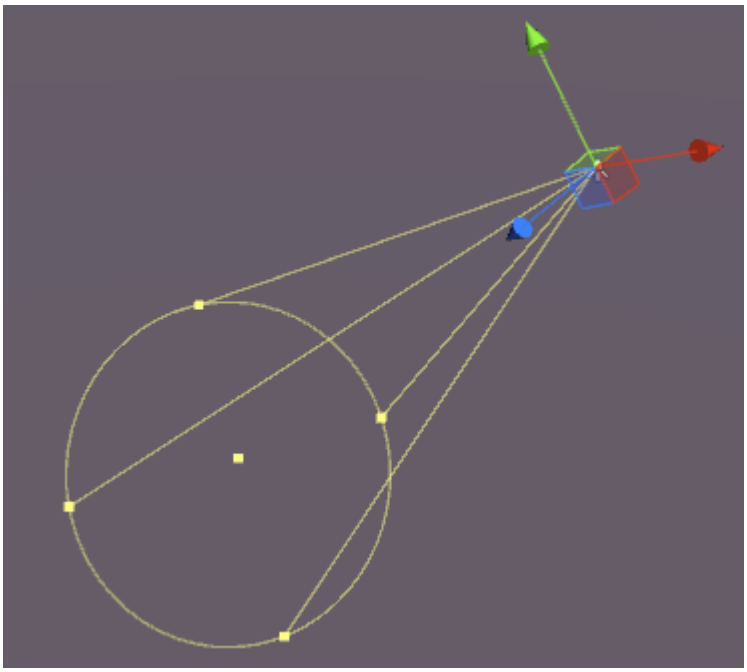

Spot Lights

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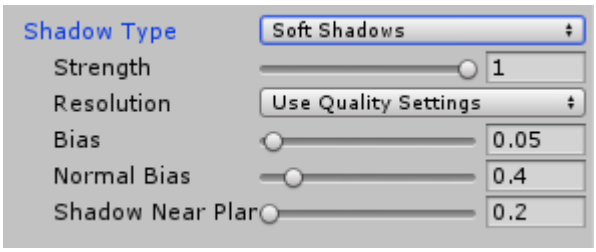

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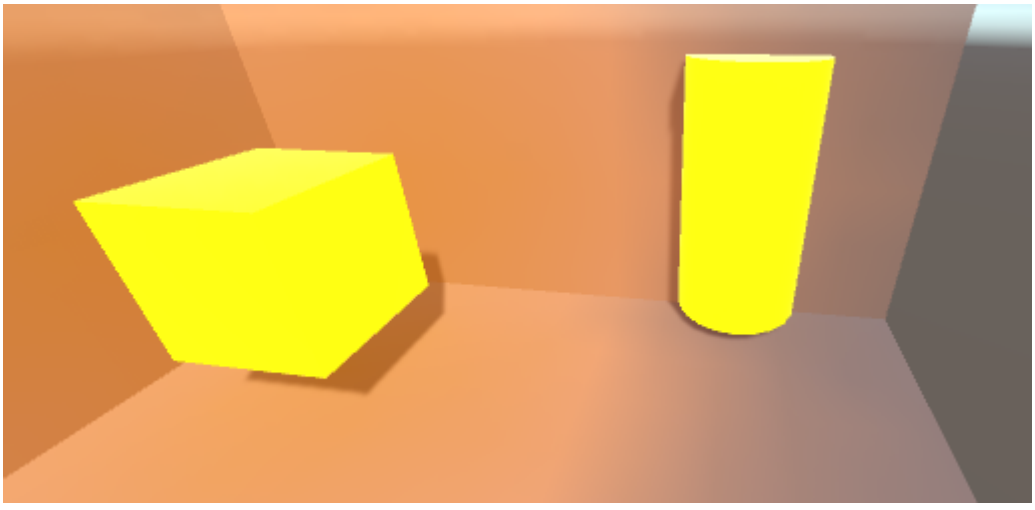


“”。

```
Renderer renderer = GetComponent<Renderer>();
Material mat = renderer.material;
mat.SetColor("_EmissionColor", Color.yellow);
```

。

Unity Lighting https://riptutorial.com/zh-TW/unity3d/topic/7884/unity-lighting

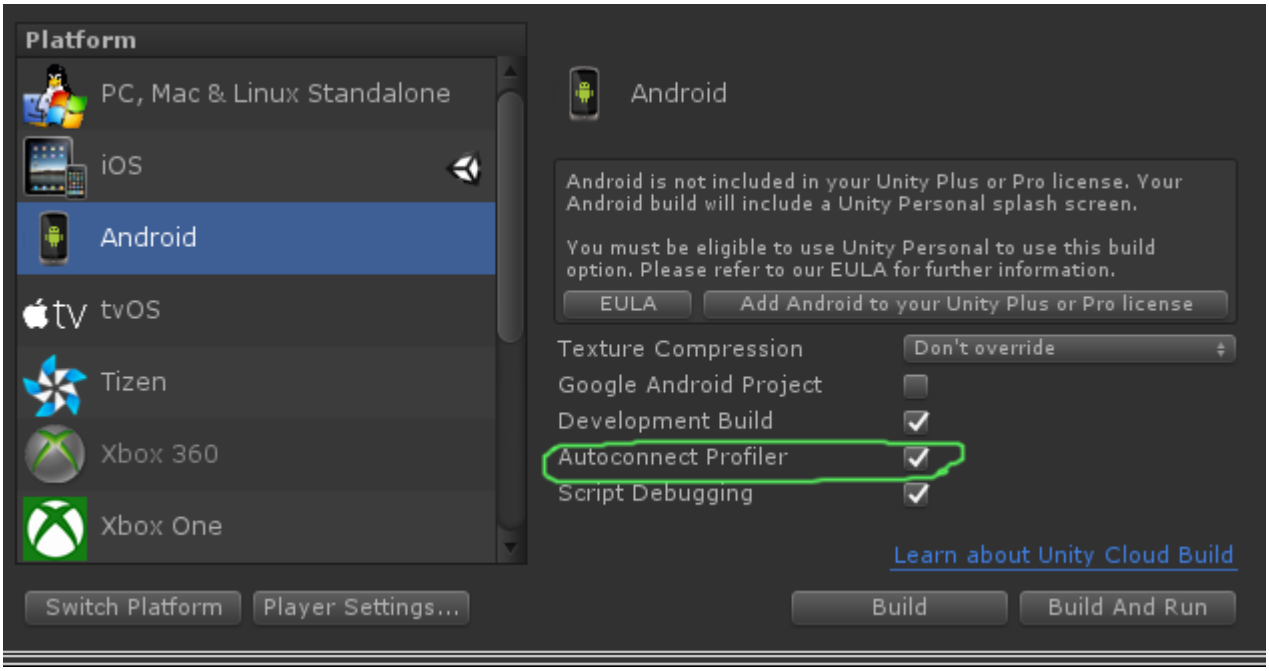
6: Unity Profiler

Profiler

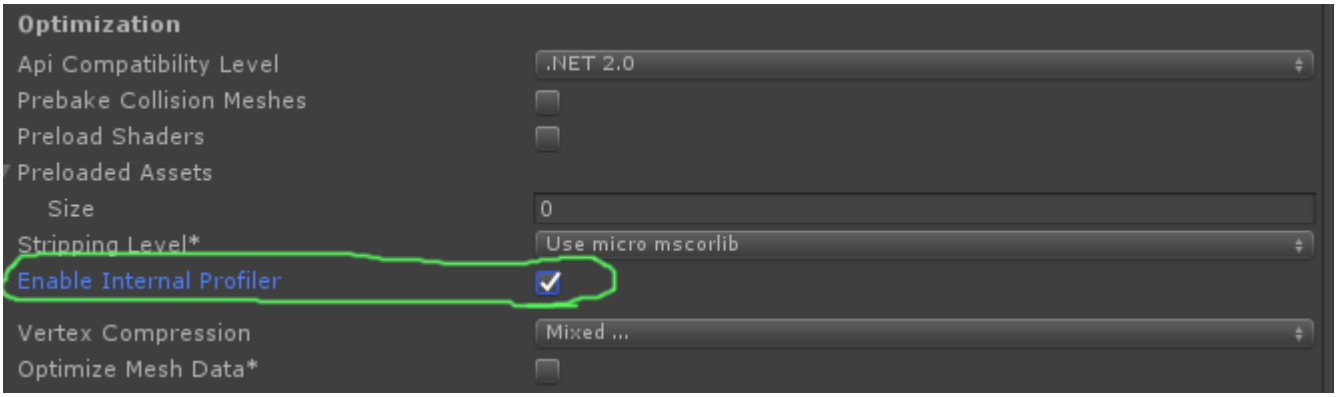
Profiler。

Android

Autoconnect Profiler Build Settings“Build and Run”。



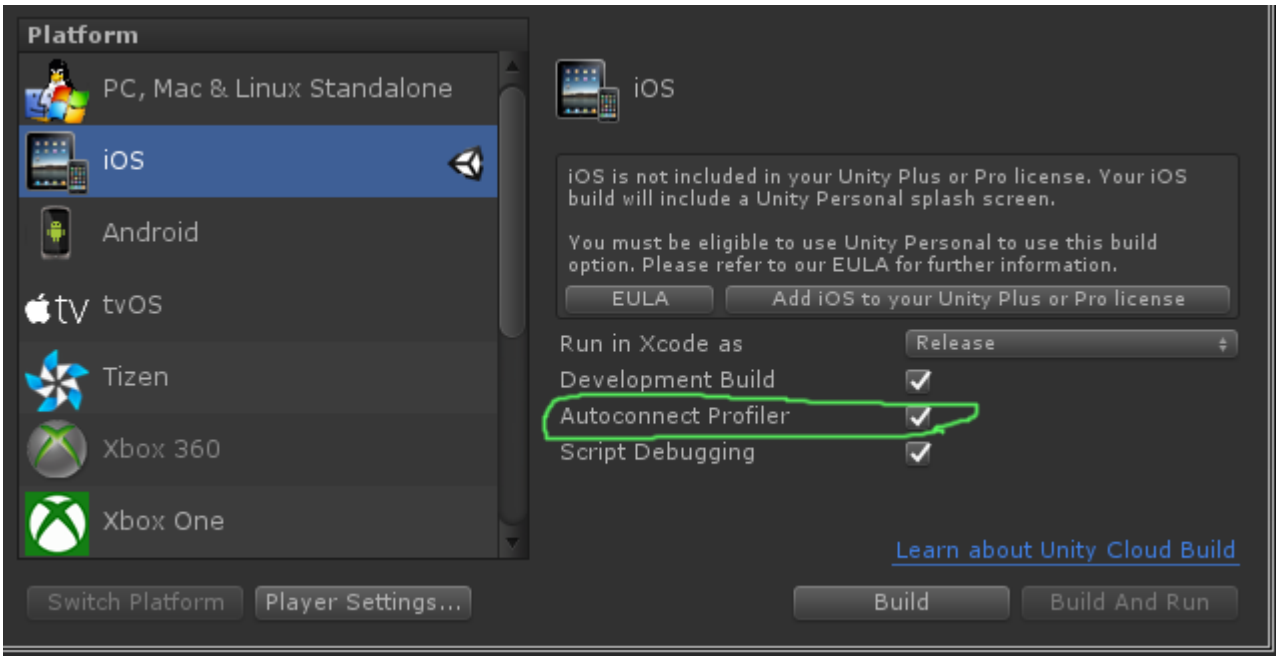
“”“Android”“ ” LogCat。



“Build”Android“Build and Run”LogCat。

iOS

“”“”“**Autoconnect Profiler** ”。



iOSProfiler。。

Examples

Profiler Markup

Profiler

Profiler.BeginSampleProfiler.EndSampleProfiler。

ConditionalAttribute。

```
public class SomeClass : MonoBehaviour
{
    void SomeFunction()
    {
        Profiler.BeginSample("SomeClass.SomeFunction");
        // Various call made here
        Profiler.EndSample();
    }
}
```

ProfilerEntry“SomeClass.SomeFunction”。

Unity Profiler https://riptutorial.com/zh-TW/unity3d/topic/6974/unity-profiler

7: Unity

Singletonsgameprogrammingpatterns.comSingleton UnityGameObject; Singleton。

GameObject。

ScriptableObject UnityDoc 。 Unity。 。

```
// MyAudioManager.cs
using UnityEngine;

[CreateAssetMenu] // Remember to create the instance in editor
public class MyAudioManager : ScriptableObject {
    public void PlaySound() {}
}
```

```
// MyGameObject.cs
using UnityEngine;

public class MyGameObject : MonoBehaviour
{
    [SerializeField]
    MyAudioManager audioManager; //Insert through Inspector

    void OnEnable()
    {
        audioManager.PlaySound();
    }
}
```

- C

Examples

RuntimeInitializeOnLoadMethodAttribute

Unity 5.2.5 RuntimeInitializeOnLoadMethodAttributeMonoBehaviour。

```
using UnityEngine;

sealed class GameDirector : MonoBehaviour
{
    // Because of using RuntimeInitializeOnLoadMethod attribute to find/create and
    // initialize the instance, this property is accessible and
    // usable even in Awake() methods.
    public static GameDirector Instance
    {
        get; private set;
    }
```

```
    // Thanks to the attribute, this method is executed before any other MonoBehaviour
    // logic in the game.
    [RuntimeInitializeOnLoadMethod(RuntimeInitializeLoadType.BeforeSceneLoad)]
    static void OnRuntimeMethodLoad()
    {
        var instance = FindObjectOfType<GameDirector>();

        if (instance == null)
            instance = new GameObject("Game Director").AddComponent<GameDirector>();

        DontDestroyOnLoad(instance);

        Instance = instance;
    }

    // This Awake() will be called immediately after AddComponent() execution
    // in the OnRuntimeMethodLoad(). In other words, before any other MonoBehaviour's
    // in the scene will begin to initialize.
    private void Awake()
    {
        // Initialize non-MonoBehaviour logic, etc.
        Debug.Log("GameDirector.Awake()", this);
    }
}
```

1. `GameDirector.OnRuntimeMethodLoad()`.....
2. `GameDirector.Awake()`
3. `GameDirector.OnRuntimeMethodLoad()`◦
4. `OtherMonoBehaviour1.Awake()`
5. `OtherMonoBehaviour2.Awake()`

Unity CSingleton MonoBehaviour

◦

`if`Singleton◦

```
using UnityEngine;

public class SingletonExample : MonoBehaviour {

    private static SingletonExample _instance;

    void Awake(){

        if (_instance == null){

            _instance = this;
            DontDestroyOnLoad(this.gameObject);

            //Rest of your Awake code

        } else {
            Destroy(this);
        }
    }
```

```
    //Rest of your class code

}
```

Unity Singleton

InternetMonoBehaviour。

Unity 5。 `public class MySingleton : Singleton<MySingleton> {}` 。 AwakeSingletonAwake 。 。

---

1. DisallowMultipleComponentGameObject。
2. 。 `AwakeSingleton Awake` 。
3. 。
4. 。 `instantiated`Unity==。
5. Unity。
6.

- `FindInactive FindInactive`。
- `Persist` 。
- `DestroyOthers` 。
- `Lazy` “”`Awake` “”getter。

```
using UnityEngine;

[DisallowMultipleComponent]
public abstract class Singleton<T> : MonoBehaviour where T : Singleton<T>
{
    private static volatile T instance;
    // thread safety
    private static object _lock = new object();
    public static bool FindInactive = true;
    // Whether or not this object should persist when loading new scenes. Should be set in
Init().
    public static bool Persist;
    // Whether or not destory other singleton instances if any. Should be set in Init().
    public static bool DestroyOthers = true;
    // instead of heavy comparision (instance != null)
    // http://blogs.unity3d.com/2014/05/16/custom-operator-should-we-keep-it/
    private static bool instantiated;

    private static bool applicationIsQuitting;

    public static bool Lazy;

    public static T Instance
    {
        get
        {
            if (applicationIsQuitting)
            {
                Debug.LogWarningFormat("[Singleton] Instance '{0}' already destroyed on
application quit. Won't create again - returning null.", typeof(T));
```

```
                return null;
            }
            lock (_lock)
            {
                if (!instantiated)
                {
                    Object[] objects;
                    if (FindInactive) { objects = Resources.FindObjectsOfTypeAll(typeof(T)); }
                    else { objects = FindObjectsOfType(typeof(T)); }
                    if (objects == null || objects.Length < 1)
                    {
                        GameObject singleton = new GameObject();
                        singleton.name = string.Format("{0} [Singleton]", typeof(T));
                        Instance = singleton.AddComponent<T>();
                        Debug.LogWarningFormat("[Singleton] An Instance of '{0}' is needed in
the scene, so '{1}' was created{2}", typeof(T), singleton.name, Persist ? " with
DontDestoryOnLoad." : ".");
                    }
                    else if (objects.Length >= 1)
                    {
                        Instance = objects[0] as T;
                        if (objects.Length > 1)
                        {
                            Debug.LogWarningFormat("[Singleton] {0} instances of '{1}'!",
objects.Length, typeof(T));
                            if (DestroyOthers)
                            {
                                for (int i = 1; i < objects.Length; i++)
                                {
                                    Debug.LogWarningFormat("[Singleton] Deleting extra '{0}'
instance attached to '{1}'", typeof(T), objects[i].name);
                                    Destroy(objects[i]);
                                }
                            }
                        }
                        return instance;
                    }
                }
                return instance;
            }
        }
        protected set
        {
            instance = value;
            instantiated = true;
            instance.AwakeSingleton();
            if (Persist) { DontDestroyOnLoad(instance.gameObject); }
        }
    }

    // if Lazy = false and gameObject is active this will set instance
    // unless instance was called by another Awake method
    private void Awake()
    {
        if (Lazy) { return; }
        lock (_lock)
        {
            if (!instantiated)
            {
                Instance = this as T;
            }
```

```
            else if (DestroyOthers && Instance.GetInstanceID() != GetInstanceID())
            {
                Debug.LogWarningFormat("[Singleton] Deleting extra '{0}' instance attached to
'{1}'", typeof(T), name);
                Destroy(this);
            }
        }
    }

    // this might be called for inactive singletons before Awake if FindInactive = true
    protected virtual void AwakeSingleton() {}

    protected virtual void OnDestroy()
    {
        applicationIsQuitting = true;
        instantiated = false;
    }
}
```

```
using UnityEngine;
using System.Collections.Generic;
using System;

public abstract class MonoBehaviourSingleton<T> : MonoBehaviour {

    private static Dictionary<Type, object> _singletons
        = new Dictionary<Type, object>();

    public static T Instance {
        get {
            return (T)_singletons[typeof(T)];
        }
    }

    void OnEnable() {
        if (_singletons.ContainsKey(GetType())) {
            Destroy(this);
        } else {
            _singletons.Add(GetType(), this);
            DontDestroyOnLoad(this);
        }
    }
}
```

MonoBehaviourMonoBehaviourSingleton。Singleton

```
using UnityEngine;
using System.Collections;

public class SingletonImplementation : MonoBehaviourSingleton<SingletonImplementation> {

    public string Text= "String Instance";

    // Use this for initialisation
    IEnumerator Start () {
        var demonstration = "SingletonImplementation.Start()\n" +
                            "Note that the this text logs only once and\n"
                            "only one class instance is allowed to exist.";
        Debug.Log(demonstration);
```

```
        yield return new WaitForSeconds(2f);
        var secondInstance = new GameObject();
        secondInstance.AddComponent<SingletonImplementation>();
    }

}
```

```
// Logs: String Instance
Debug.Log(SingletonImplementation.Instance.Text);
```

◦ DictionaryDRY◦

Unitys -

GameObjects

-
- Unity
-
-
- MonoBehaviours / Components
- Singletons GameObject
-
- Unity UnitySingleton

Test.cs

```
using UnityEngine;
using UnityEngine.Assertions;

public class Test : MonoBehaviour {
    void Start() {
        ExampleSingleton singleton = ExampleSingleton.instance;
        Assert.IsNotNull(singleton); // automatic initialization on first usage
        Assert.AreEqual("abc", singleton.myVar1);
        singleton.myVar1 = "123";
        // multiple calls to instance() return the same object:
        Assert.AreEqual(singleton, ExampleSingleton.instance);
        Assert.AreEqual("123", ExampleSingleton.instance.myVar1);
    }
}
```

ExampleSingleton.csSingleton

```
using UnityEngine;
using UnityEngine.Assertions;

public class ExampleSingleton : MonoBehaviour {
    public static ExampleSingleton instance { get { return Singleton.get<ExampleSingleton>();
} }
    public string myVar1 = "abc";
    public void Start() { Assert.AreEqual(this, instance, "Singleton more than once in
scene"); }
}
```

```
/// <summary> Helper that turns any MonBehaviour or other Component into a Singleton
</summary>
public static class Singleton {
    public static T get<T>() where T : Component {
        return GetOrAddGo("Singletons").GetOrAddChild("" + typeof(T)).GetOrAddComponent<T>();
    }
    private static GameObject GetOrAddGo(string goName) {
        var go = GameObject.Find(goName);
        if (go == null) { return new GameObject(goName); }
        return go;
    }
}

public static class GameObjectExtensionMethods {
    public static GameObject GetOrAddChild(this GameObject parentGo, string childName) {
        var childGo = parentGo.transform.FindChild(childName);
        if (childGo != null) { return childGo.gameObject; } // child found, return it
        var newChild = new GameObject(childName);        // no child found, create it
        newChild.transform.SetParent(parentGo.transform, false); // add it to parent
        return newChild;
    }

    public static T GetOrAddComponent<T>(this GameObject parentGo) where T : Component {
        var comp = parentGo.GetComponent<T>();
        if (comp == null) { return parentGo.AddComponent<T>(); }
        return comp;
    }
}
```

GameObjectSingleton。

MonoBehaviourScriptableObjectSingleton

SingletonMonoBehaviour。Singleton。

- 。
- Singleton。
- Unity UI。“”“GameManager.Instance.SomeGlobalMethod”。

ScriptableObjectsMonoBehavi。ScriptableObjectMonoBehavior

- Unity。
- Unity。
- 。
- UnitySingleton。
- “SingletonClassName.Instance”
- MonoBehaviourUpdateAwakeStartFixedUpdateStartCoroutine。

```
/****************************************************
 * Better Singleton by David Darias
 * Use as you like - credit where due would be appreciated :D
 * Licence: WTFPL V2, Dec 2014
 * Tested on Unity v5.6.0 (should work on earlier versions)
```

```
 * 03/02/2017 - v1.1
 * *********************************************************/

using System;
using UnityEngine;
using SingletonScriptableObjectNamespace;

public class SingletonScriptableObject<T> :
SingletonScriptableObjectNamespace.BehaviourScriptableObject where T :
SingletonScriptableObjectNamespace.BehaviourScriptableObject
{
    //Private reference to the scriptable object
    private static T _instance;
    private static bool _instantiated;
    public static T Instance
    {
        get
        {
            if (_instantiated) return _instance;
            var singletonName = typeof(T).Name;
            //Look for the singleton on the resources folder
            var assets = Resources.LoadAll<T>("");
            if (assets.Length > 1) Debug.LogError("Found multiple " + singletonName + "s on
the resources folder. It is a Singleton ScriptableObject, there should only be one.");
            if (assets.Length == 0)
            {
                _instance = CreateInstance<T>();
                Debug.LogError("Could not find a " + singletonName + " on the resources
folder. It was created at runtime, therefore it will not be visible on the assets folder and
it will not persist.");
            }
            else _instance = assets[0];
            _instantiated = true;
            //Create a new game object to use as proxy for all the MonoBehaviour methods
            var baseObject = new GameObject(singletonName);
            //Deactivate it before adding the proxy component. This avoids the execution of
the Awake method when the the proxy component is added.
            baseObject.SetActive(false);
            //Add the proxy, set the instance as the parent and move to DontDestroyOnLoad
scene
            SingletonScriptableObjectNamespace.BehaviourProxy proxy =
baseObject.AddComponent<SingletonScriptableObjectNamespace.BehaviourProxy>();
            proxy.Parent = _instance;
            Behaviour = proxy;
            DontDestroyOnLoad(Behaviour.gameObject);
            //Activate the proxy. This will trigger the MonoBehaviourAwake.
            proxy.gameObject.SetActive(true);
            return _instance;
        }
    }
    //Use this reference to call MonoBehaviour specific methods (for example StartCoroutine)
    protected static MonoBehaviour Behaviour;
    public static void BuildSingletonInstance() {
SingletonScriptableObjectNamespace.BehaviourScriptableObject i = Instance; }
    private void OnDestroy(){ _instantiated = false; }
}

// Helper classes for the SingletonScriptableObject
namespace SingletonScriptableObjectNamespace
{
    #if UNITY_EDITOR
```

```
    //Empty custom editor to have cleaner UI on the editor.
    using UnityEditor;
    [CustomEditor(typeof(BehaviourProxy))]
    public class BehaviourProxyEditor : Editor
    {
        public override void OnInspectorGUI(){}
    }

    #endif

    public class BehaviourProxy : MonoBehaviour
    {
        public IBehaviour Parent;

        public void Awake() { if (Parent != null) Parent.MonoBehaviourAwake(); }
        public void Start() { if (Parent != null) Parent.Start(); }
        public void Update() { if (Parent != null) Parent.Update(); }
        public void FixedUpdate() { if (Parent != null) Parent.FixedUpdate(); }
    }

    public interface IBehaviour
    {
        void MonoBehaviourAwake();
        void Start();
        void Update();
        void FixedUpdate();
    }

    public class BehaviourScriptableObject : ScriptableObject, IBehaviour
    {
        public void Awake() { ScriptableObjectAwake(); }
        public virtual void ScriptableObjectAwake() { }
        public virtual void MonoBehaviourAwake() { }
        public virtual void Start() { }
        public virtual void Update() { }
        public virtual void FixedUpdate() { }
    }
}
```

SingletonScriptableObjectGameManager

```
using System;
using System.Collections;
using System.Collections.Generic;
using UnityEngine;

//this attribute is optional but recommended. It will allow the creation of the singleton via
the asset menu.
//the singleton asset should be on the Resources folder.
[CreateAssetMenu(fileName = "GameManager", menuName = "Game Manager", order = 0)]
public class GameManager : SingletonScriptableObject<GameManager> {

    //any properties as usual
    public int Lives;
    public int Points;

    //optional (but recommended)
    //this method will run before the first scene is loaded. Initializing the singleton here
    //will allow it to be ready before any other GameObjects on every scene and will
    //will prevent the "initialization on first usage".
```

```
    [RuntimeInitializeOnLoadMethod(RuntimeInitializeLoadType.BeforeSceneLoad)]
    public static void BeforeSceneLoad() { BuildSingletonInstance(); }

    //optional,
    //will run when the Singleton Scriptable Object is first created on the assets.
    //Usually this happens on edit mode, not runtime. (the override keyword is mandatory for
this to work)
    public override void ScriptableObjectAwake(){
        Debug.Log(GetType().Name + " created." );
    }

    //optional,
    //will run when the associated MonoBehavioir awakes. (the override keyword is mandatory
for this to work)
    public override void MonoBehaviourAwake(){
        Debug.Log(GetType().Name + " behaviour awake." );

        //A coroutine example:
        //Singleton Objects do not have coroutines.
        //if you need to use coroutines use the atached MonoBehaviour
        Behaviour.StartCoroutine(SimpleCoroutine());
    }

    //any methods as usual
    private IEnumerator SimpleCoroutine(){
        while(true){
            Debug.Log(GetType().Name + " coroutine step." );
            yield return new WaitForSeconds(3);
        }
    }

    //optional,
    //Classic runtime Update method (the override keyword is mandatory for this to work).
    public override void Update(){

    }

    //optional,
    //Classic runtime FixedUpdate method (the override keyword is mandatory for this to work).
    public override void FixedUpdate(){

    }
}

/*
*  Notes:
*  - Remember that you have to create the singleton asset on edit mode before using it. You
have to put it on the Resources folder and of course it should be only one.
*  - Like other Unity Singleton this one is accessible anywhere in your code using the
"Instance" property i.e: GameManager.Instance
*/
```

Unity https://riptutorial.com/zh-TW/unity3d/topic/2137/unity

8: Unity

Examples

Unity。

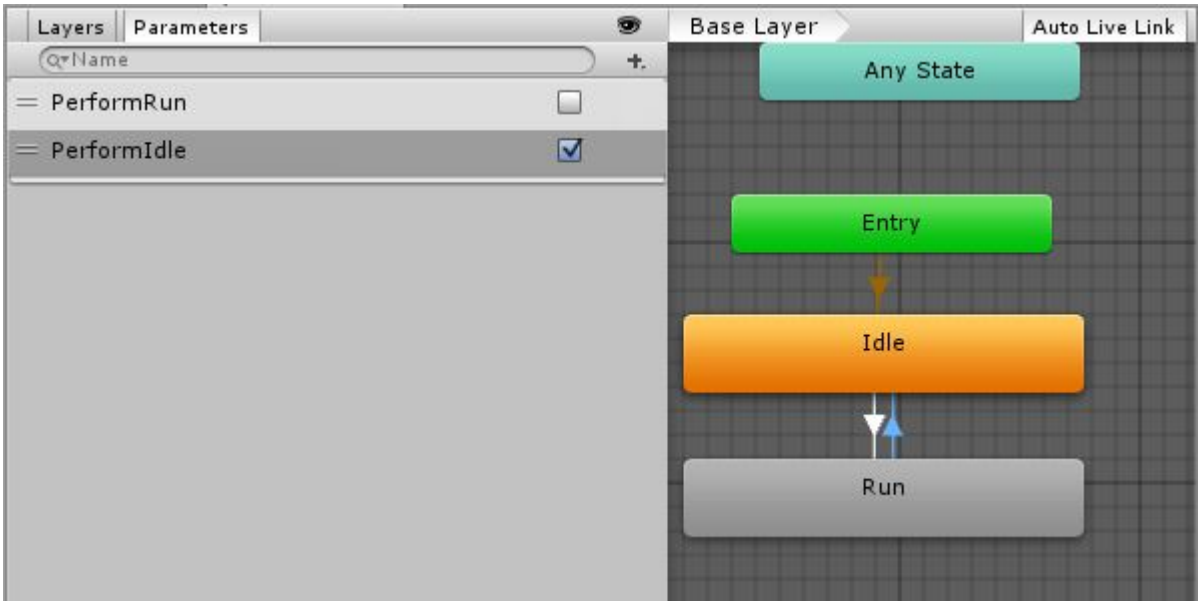
2;。Stand-In-Place。Animator Controller。Controller。

WindowsAnimator。2Animator2。2bool。“PerformRun”“PerformIdle”。“PerformIdle”true。

。Idle-> Run transitionInspectorHasExit。。 - >PerformIdle。Run-> IdlePerformRun。C。。

```
using UnityEngine;
using System.Collections;

public class RootMotion : MonoBehaviour {

//Public Variables
[Header("Transform Variables")]
public float RunSpeed = 0.1f;
public float TurnSpeed = 6.0f;


Animator animator;

void Start()
{
    /**
    * Initialize the animator that is attached on the current game object i.e. on which you
will attach this script.
    */
    animator = GetComponent<Animator>();
}

void Update()
{
    /**
    * The Update() function will get the bool parameters from the animator state machine and
set the values provided by the user.
    * Here, I have only added animation for Run and Idle. When the Up key is pressed, Run
animation is played. When we let go, Idle is played.
    */

    if (Input.GetKey (KeyCode.UpArrow)) {
            animator.SetBool ("PerformRun", true);
            animator.SetBool ("PerformIdle", false);
        } else {
            animator.SetBool ("PerformRun", false);
            animator.SetBool ("PerformIdle", true);
        }
}

void OnAnimatorMove()
    {
        /**
         * OnAnimatorMove() function will shadow the "Apply Root Motion" on the animator. Your
```

```
game objects psoition will now be determined
         * using this fucntion.
         */
        if (Input.GetKey (KeyCode.UpArrow)){
            transform.Translate (Vector3.forward * RunSpeed);
            if (Input.GetKey (KeyCode.RightArrow)) {
                transform.Rotate (Vector3.up * Time.deltaTime * TurnSpeed);
            }
            else if (Input.GetKey (KeyCode.LeftArrow)) {
                transform.Rotate (-Vector3.up * Time.deltaTime * TurnSpeed);
            }
        }

    }



}
```

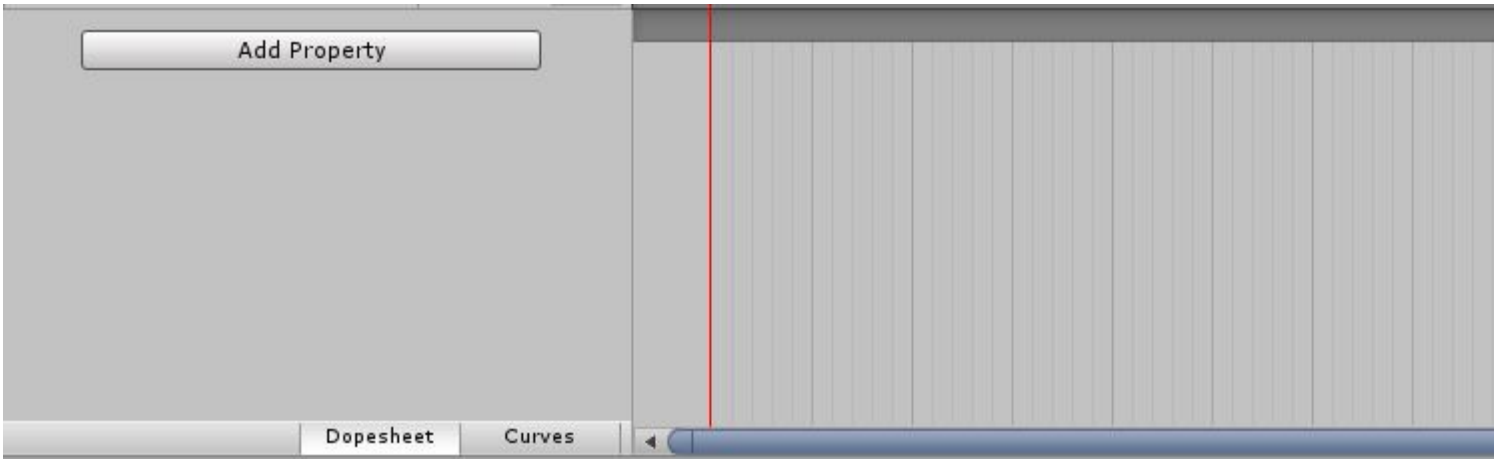


。

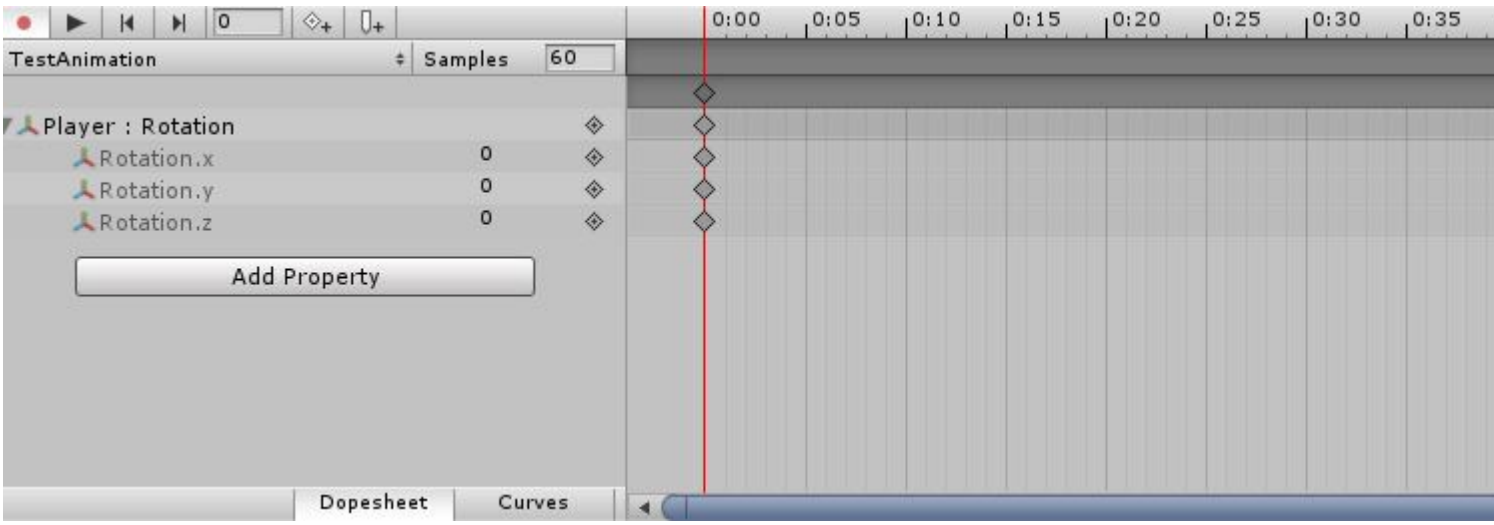
Unity Asset Store。 https //www.assetstore.unity3d.com/en/# / content21874 。

。 “”“”Ctrl + 6。 “”“”“”。

IdlePlayerSprintPlayerDyingPlayer。“”“”。。ColliderMesh Renderer。



3D。。。“”“”。



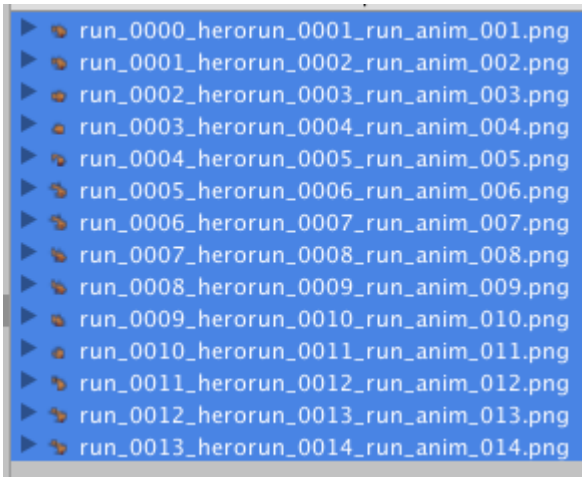
“”“”。XYZ。1。。“”。0.0s0.0。0.5sX20.0。1.0s0.0。1.0s。

。。

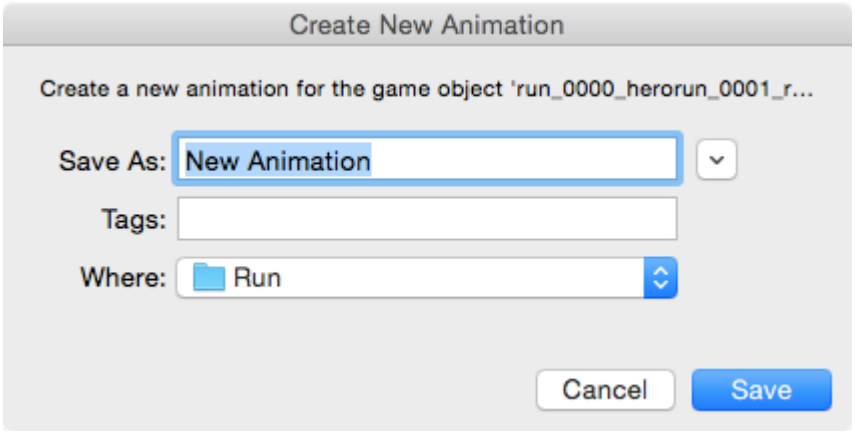
2D

。

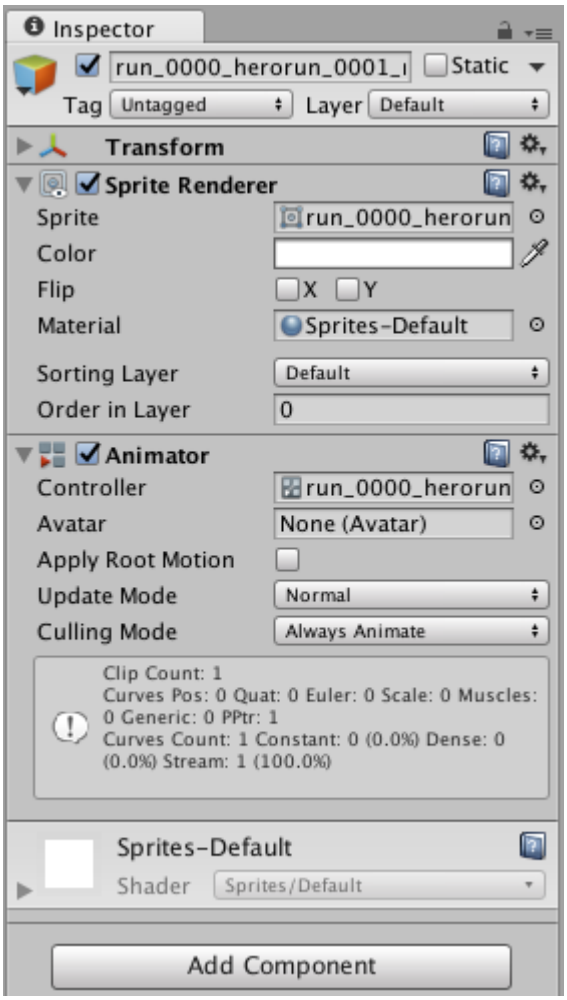
。 。 。



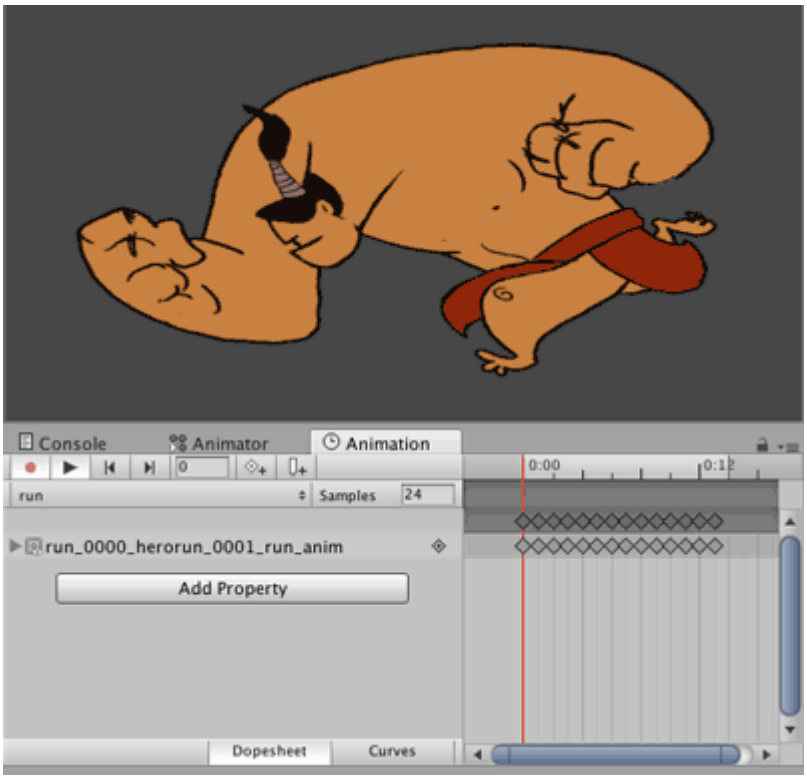
assets。 Unity。



-
- Sprite RendererAnimator
- Animator
-


Inspector
run_0000_herorun_0001_ı
Static
Tag
Untagged
Layer
Default
Transform
Sprite Renderer
Sprite
run_0000_herorun
Color
Flip
X
Y
Material
Sprites-Default
Sorting Layer
Default
Order in Layer
0
Animator
Controller
run_0000_herorun
Avatar
None (Avatar)
Apply Root Motion
Update Mode
Normal
Culling Mode
Always Animate
Clip Count: 1
Curves Pos: 0 Quat: 0 Euler: 0 Scale: 0 Muscles: 0 Generic: 0 PPtr: 1
Curves Count: 1 Constant: 0 (0.0%) Dense: 0 (0.0%) Stream: 1 (100.0%)
Sprites-Default
Shader
Sprites/Default
Add Component

“”


Console
Animator
Animation
0:00
0:12
run
Samples
24
run_0000_herorun_0001_run_anim
Add Property
Dopesheet
Curves

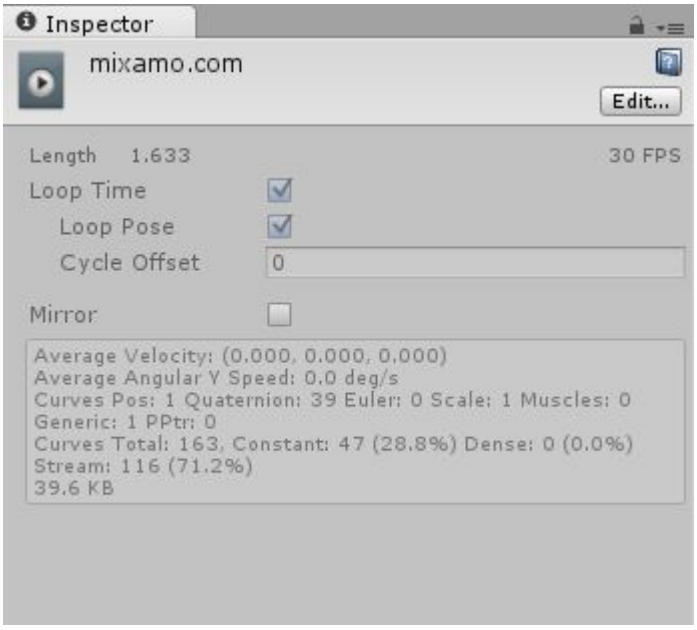
◦ 3D◦

◦ 60/X= 0.0s; X = 0.0= 30.0; X = 1.0= 60.0s; X = 0.0◦

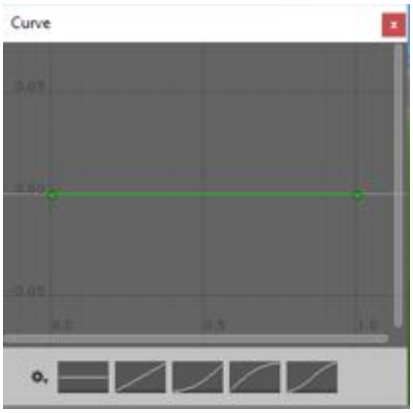
◦

◦ ◦ ◦

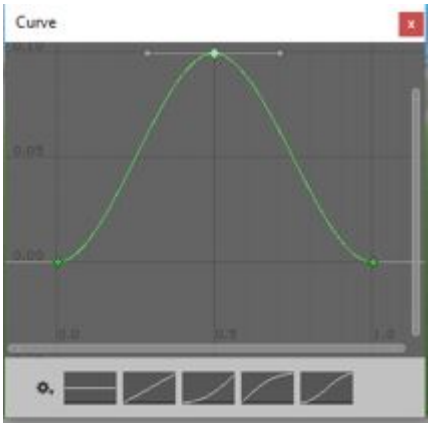
◦ “”◦



◦ +◦ ForwardRunCurve◦ ◦ ◦



◦ 2◦ ◦ ◦



Animator。floatForwardRunCurve。

。float

```
using UnityEngine;
using System.Collections;

public class RunAnimation : MonoBehaviour {

Animator animator;
float curveValue;

void Start()
{
    animator = GetComponent<Animator>();
}

void Update()
{
    curveValue = animator.GetFloat("ForwardRunCurve");

    transform.Translate (Vector3.forward * curveValue);
}

}
```

curveValueForwardRunCruve。。。

Unity https://riptutorial.com/zh-TW/unity3d/topic/5448/unity

9: UnityGit

Examples

UnityGitLFS

Git。 > 5 MB--Git。

2015GitHubGitGit LFS 。

Git。 Git。

GitGit-LFS

GitGit GUI。

1Git GUI

Git GUIGUI。 3

- Sourcetree
- Github
- SmartGit

Git-LFS。 。

2GitGit-LFS

- Git 。 。 Git LFS 。

Git Large File Storage

Git LFSGit LFS。 `.gitattributes`Unity

```
# Image formats:
*.tga filter=lfs diff=lfs merge=lfs -text
*.png filter=lfs diff=lfs merge=lfs -text
*.tif filter=lfs diff=lfs merge=lfs -text
*.jpg filter=lfs diff=lfs merge=lfs -text
*.gif filter=lfs diff=lfs merge=lfs -text
*.psd filter=lfs diff=lfs merge=lfs -text

# Audio formats:
```

```
*.mp3 filter=lfs diff=lfs merge=lfs -text
*.wav filter=lfs diff=lfs merge=lfs -text
*.aiff filter=lfs diff=lfs merge=lfs -text

# 3D model formats:
*.fbx filter=lfs diff=lfs merge=lfs -text
*.obj filter=lfs diff=lfs merge=lfs -text

# Unity formats:
*.sbsar filter=lfs diff=lfs merge=lfs -text
*.unity filter=lfs diff=lfs merge=lfs -text

# Other binary formats
*.dll filter=lfs diff=lfs merge=lfs -text
```

UnityGit

UnityGit。

Unity

。 .gitignore。 GitHubUnity .gitignore gitignore.io。

```
# Unity Generated
[Tt]emp/
[Ll]ibrary/
[Oo]bj/

# Unity3D Generated File On Crash Reports
sysinfo.txt

# Visual Studio / MonoDevelop Generated
ExportedObj/
obj/
*.csproj
*.unityproj
*.sln
*.suo
*.tmp
*.user
*.userprefs
*.pidb
*.booproj
*.svd

# OS Generated
desktop.ini
.DS_Store
.DS_Store?
.Spotlight-V100
.Trashes
ehthumbs.db
Thumbs.db
```

.gitignore 。

Unity

Unity。

1. v4.5`Unity → Preferences → Packages → RepositoryExternal`。
2. `Edit → Project Settings → Editor → Version Control ModeVisible Meta Files` 。
3. `Edit → Project Settings → Editor → Asset Serialization ModeForce Text` 。
4. “ `File`。

GitUnityGit。 Unity`*.meta`Git`*.meta` 。

Git`/.git/hooks/`Unity。 Git pull / merge。

Unity2Unity* .unity。 Git。 UnitySmartMerge。 `.git.gitconfig`:(Windows `%USERPROFILE%\.gitconfig` Linux / Mac OS X `~/.gitconfig`

```
[merge]
tool = unityyamlmerge

[mergetool "unityyamlmerge"]
trustExitCode = false
cmd = '<path to UnityYAMLMerge>' merge -p "$BASE" "$REMOTE" "$LOCAL" "$MERGED"
```

WindowsUnityYAMLMerge

```
C:\Program Files\Unity\Editor\Data\Tools\UnityYAMLMerge.exe
```

```
C:\Program Files (x86)\Unity\Editor\Data\Tools\UnityYAMLMerge.exe
```

MacOSX

```
/Applications/Unity/Unity.app/Contents/Tools/UnityYAMLMerge
```

/ rebasemergetool。 `git mergetool`UnityYAMLMerge。

UnityGit https://riptutorial.com/zh-TW/unity3d/topic/2195/unitygit

10: ScriptableObject

AssetBundlesScriptableObjects

AssetBundlesScriptableObjects。 ScriptableObjectsUnityAssetBundles。

AssetBundleGameObjectScriptableObject。

Examples

ScriptableObjectsMonoBehaviours。 。 ScriptableObjectMonoBehaviorsScriptableObjects。

。

ScriptableObject

ScriptableObject。

```
using UnityEngine;

[CreateAssetMenu(menuName = "StackOverflow/Examples/MyScriptableObject")]
public class MyScriptableObject : ScriptableObject
{
    [SerializeField]
    int mySerializedNumber;

    int helloWorldCount = 0;

    public void HelloWorld()
    {
        helloWorldCount++;
        Debug.LogFormat("Hello! My number is {0}.", mySerializedNumber);
        Debug.LogFormat("I have been called {0} times.", helloWorldCount);
    }
}
```

`CreateAssetMenu`Unity**Assets / Create**。 **Assets / Create / StackOverflow / Examples** 。

InspectorScriptableObjectScriptableObjects。

```
using UnityEngine;

public class SampleScript : MonoBehaviour {

    [SerializeField]
    MyScriptableObject myScriptableObject;

    void OnEnable()
```

```
    {
        myScriptableObject.HelloWorld();
    }
}
```

ScriptableObject

`ScriptableObject.CreateInstance<T>()`ScriptableObject

```
T obj = ScriptableObject.CreateInstance<T>();
```

`TScriptableObject`◦

ScriptableObjects◦ `new ScriptableObject()`◦

ScriptableObjects◦ ◦ ◦

PlayModeScriptableObjects

ScriptableObject◦

`SerializeFieldpublicSerializeField`◦ MonoBehaviours◦ ◦

◦

```
public class MyScriptableObject : ScriptableObject
{
    [SerializeField]
    int mySerializedValue;

    public int MySerializedValue
    {
        get { return mySerializedValue; }
    }
}
```

ScriptableObject◦

```
public class MyScriptableObject : ScriptableObject
{
    // Private fields are not serialized and will reset to default on reset
    private int mySerializedValue;

    public int MySerializedValue
    {
        get { return mySerializedValue; }
        set { mySerializedValue = value; }
    }
}
```

ScriptableObjects

ScriptableObjects`Resources.FindObjectsOfTypeAll()` ◦

```
T[] instances = Resources.FindObjectsOfTypeAll<T>();
```

`T`ScriptableObject◦ ◦

◦ ScriptableObjects◦

◦ `OnEnable()`ScriptableObjects◦

ScriptableObject https://riptutorial.com/zh-TW/unity3d/topic/3434/scriptableobject

11:

1. ◦ ◦

Examples

Update ◦

/

sqrMagnitudemagnitude ◦ sqrt◦ sqrMagnitude ◦

```
if ((target.position - transform.position).sqrMagnitude < minDistance * minDistance))
```

Collider / Renderer◦ BoundsIntersects◦

Bounds Bounds.SqrDistance Bounds.SqrDistance ◦

◦

Mesh.bounds◦ MeshRenderer.bounds ◦

Unity APICoroutines◦

n◦

◦

Coroutine◦

```
for (int y = 0; y < heightmap.Height; y++)
{
    for (int x = 0; x < heightmap.Width; x++)
    {
        // Generate pixel at (x, y)
        // Assign pixel at (x, y)

        // Process only 32768 pixels each frame
        if ((y * heightmap.Height + x) % 32 * 1024) == 0)
            yield return null; // Wait for next frame
    }
}
```

◦ yield return 2-3for◦

◦

```
private void ProximityCheck()
{
    for (int i = 0; i < enemies.Length; i++)
    {
        if (Vector3.Distance(transform.position, enemies[i].transform.position) <
dangerDistance)
                return true;
    }
    return false;
}

private IEnumerator ProximityCheckCoroutine()
{
    while(true)
    {
        ProximityCheck();
        yield return new WaitForSeconds(.1f);
    }
}
```

CullingGroup API◦

◦ yield returnCoroutines◦ / ◦

Unity◦

◦ CPU◦

◦

```
string[] StringKeys = new string[] {
    "Key0",
    "Key1",
    "Key2"
};

void Update()
{
    for (var i = 0; i < 3; i++)
    {
        // Cached, no garbage generated
        Debug.Log(StringKeys[i]);
    }

    for (var i = 0; i < 3; i++)
    {
        // Not cached, garbage every cycle
```

```
        Debug.Log("Key" + i);
    }

    // The most memory-efficient way is to not create a cache at all and use literals or
constants.
    // However, it is not necessarily the most readable or beautiful way.
    Debug.Log("Key0");
    Debug.Log("Key1");
    Debug.Log("Key2");
}
```

Shaders。 。

。 。

。 。

Debug

Debug。 `Debug.Log("Object Name: " + obj.name)`。 。

Conditional 。 。

```
using UnityEngine;
using System.Collections;

public class ConditionalDebugExample: MonoBehaviour
{
    IEnumerator Start()
    {
        while(true)
        {
            // This message will pop up in Editor but not in builds
            Log("Elapsed: " + Time.timeSinceLevelLoad);
            yield return new WaitForSeconds(1f);
        }
    }

    [System.Diagnostics.Conditional("UNITY_EDITOR")]
    void Log(string Message)
    {
        Debug.Log(Message);
    }
}
```

。 。

。 。 。 。

```
// Faster string comparison
if (strA.Equals(strB, System.StringComparison.Ordinal)) {...}
// Compared to
if (strA == strB) {...}
```

```
// Less overhead
if (!string.IsNullOrEmpty(strA)) {...}
// Compared to
if (strA == "") {...}

// Faster lookups
Dictionary<string, int> myDic = new Dictionary<string, int>(System.StringComparer.Ordinal);
// Compared to
Dictionary<string, int> myDictionary = new Dictionary<string, int>();
```

◦ null / bool flat◦

```
void Update()
{
    var renderer = GetComponent<Renderer>();
    renderer.material.SetColor("_Color", Color.green);
}
```

```
private Renderer myRenderer;
void Start()
{
    myRenderer = GetComponent<Renderer>();
}

void Update()
{
    myRenderer.material.SetColor("_Color", Color.green);
}
```

```
void Update()
{
    var enemy = GameObject.Find("enemy");
    enemy.transform.LookAt(new Vector3(0,0,0));
}
```

```
private Transform enemy;

void Start()
{
    this.enemy = GameObject.Find("enemy").transform;
}

void Update()
{
    enemy.LookAt(new Vector3(0, 0, 0));
}
```

Mathf◦

◦ ◦

```
    //Avoid StartCoroutine with method name
    this.StartCoroutine("SampleCoroutine");
```

```
    //Instead use the method directly
    this.StartCoroutine(this.SampleCoroutine());

    //Avoid send message
    var enemy = GameObject.Find("enemy");
    enemy.SendMessage("Die");

    //Instead make direct call
    var enemy = GameObject.Find("enemy") as Enemy;
    enemy.Die();
```

。 。 。

```
void Update
{
}

void FixedUpdate
{
}
```

https://riptutorial.com/zh-TW/unity3d/topic/3433/

12:

maxDistance	
layerMask	◦
queryTriggerInteraction	◦

Examples

Raycast

maxDistance directionorigin◦

origin direction maxDistanceGameObject◦

```
Physics.Raycast(origin, direction, maxDistance);
```

GameObject 10Hello World

```
using UnityEngine;

public class TestPhysicsRaycast: MonoBehaviour
{
    void FixedUpdate()
    {
        Vector3 fwd = transform.TransformDirection(Vector3.forward);

        if (Physics.Raycast(transform.position, fwd, 10))
            print("Hello World");
    }
}
```

Physics2D Raycast2D

ai◦

```
using UnityEngine;

public class Physics2dRaycast: MonoBehaviour
    {
        public LayerMask LineOfSightMask;
        void FixedUpdate()
        {
            RaycastHit2D hit = Physics2D.Raycast(raycastRightPart, Vector2.down, 0.6f *
heightCharacter, LineOfSightMask);
```

```
            if(hit.collider != null)
            {
                //code when the ai can walk
            }
            else
            {
                //code when the ai cannot walk
            }
    }
}
```

。raycastRightPart。0.6f。Layermaskground。

RaycastHit2Dnull;RaycastHit2D。

Raycast

RaycastLayerMask。 。

Raycast。

SoCLayerMasks。 。 。 。

LayerMaskScriptableObject。

```
// RaycastService.cs
using UnityEngine;

[CreateAssetMenu(menuName = "StackOverflow")]
public class RaycastService : ScriptableObject
{
    [SerializeField]
    LayerMask layerMask;

    public RaycastHit2D Raycast2D(Vector2 origin, Vector2 direction, float distance)
    {
        return Physics2D.Raycast(origin, direction, distance, layerMask.value);
    }

    // Add more methods as needed

}
```

```
// MyScript.cs
using UnityEngine;

public class MyScript : MonoBehaviour
{
    [SerializeField]
    RaycastService raycastService;

    void FixedUpdate()
    {
        RaycastHit2D hit = raycastService.Raycast2D(Vector2.zero, Vector2.down, 1f);
    }
}
```

LayerMask。。

LayerMaskRaycastService。

-
-

https://riptutorial.com/zh-TW/unity3d/topic/2826/

13:

- public Coroutine StartCoroutineIEnumerator;
- public Coroutine StartCoroutinestring methodNameobject value = null;
- public void StopCoroutinestring methodName;
- public void StopCoroutineIEnumerator;
- public void StopAllCoroutines;

。

- UpdateCPU。
- UnityUnity`MoveNext`。 5.4.0b13。

YieldInstructions

`YieldInstruction``YieldInstruction` 。

```
IEnumerator TickEverySecond()
{
    var wait = new WaitForSeconds(1f); // Cache
    while(true)
    {
        yield return wait; // Reuse
    }
}
```

`null`。

Examples

Unity“”。

。

Unity。

。 。 0.026320.0211670.029778。 “”1/50。 ;。

Unity

Update。 - 。

“” 。

。

“”。 。 。 。

```
// do something
yield return null;  // wait until next frame
// do something
```

```
// do something
yield return null;  // wait until three frames from now
yield return null;
yield return null;
// do something
```

```
// do something
yield return new WaitForSeconds (0.5f); // wait for a frame in about .5 seconds
// do something
```

```
while (true)
{
    // do something
    yield return null;  // wait until the next frame
}
```

Unity“”“”。

Ticker`GameObject`。 。 ;。

```
using UnityEngine;
using System.Collections;

public class Ticker:MonoBehaviour {

    void OnEnable()
    {
        StartCoroutine(TickEverySecond());
    }

    void OnDisable()
    {
        StopAllCoroutines();
    }

    IEnumerator TickEverySecond()
    {
        var wait = new WaitForSeconds(1f); // REMEMBER: IT IS ONLY APPROXIMATE
        while(true)
        {
            Debug.Log("Tick");
            yield return wait;  // wait for a frame, about 1 second from now
        }
    }
}
```

。

```
IEnumerator TickFiveSeconds()
{
    var wait = new WaitForSeconds(1f);
    int counter = 1;
    while(counter < 5)
    {
        Debug.Log("Tick");
        counter++;
        yield return wait;
    }
    Debug.Log("I am done ticking");
}
```

“”“”◦ `yield break` ◦

```
IEnumerator ShowExplosions()
{
    ... show basic explosions
    if(player.xp < 100) yield break;
    ... show fancy explosions
}
```

◦

```
void OnDisable()
{
    // Stops all running coroutines
    StopAllCoroutines();
}
```

◦

```
StartCoroutine("YourAnimation");
```

StopCoroutine

```
StopCoroutine("YourAnimation");
```

A`IEnumerator` `Coroutine``StartCoroutine` `StopCoroutine`

```
public class SomeComponent : MonoBehaviour
{
    Coroutine routine;

    void Start () {
        routine = StartCoroutine(YourAnimation());
    }

    void Update () {
        // later, in response to some input...
        StopCoroutine(routine);
    }

    IEnumerator YourAnimation () { /* ... */ }
```

```
}
```

MonoBehaviourCoroutines

MonoBehaviour。

1.
2. OnBecameVisible
3. OnLevelWasLoaded

。

```
using UnityEngine;
using System.Collections;

public class RotateObject : MonoBehaviour
{
    IEnumerator OnBecameVisible()
    {
        var tr = GetComponent<Transform>();
        while (true)
        {
            tr.Rotate(new Vector3(0, 180f * Time.deltaTime));
            yield return null;
        }
    }

    void OnBecameInvisible()
    {
        StopAllCoroutines();
    }
}
```

。

- “”。

Unity。

“”。“”。

```
IEnumerator BeginRace()
{
  yield return StartCoroutine(PrepareRace());
  yield return StartCoroutine(Countdown());
  yield return StartCoroutine(StartRace());
}
```

BeginRace.....

```
 StartCoroutine(BeginRace());
```

“”。 。“”UI。AI。

```
  yield return StartCoroutine(PrepareRace());
  yield return StartCoroutine(Countdown());
  yield return StartCoroutine(StartRace());
```

◦ IEnumerator◦ IEnumerator BeginRace ◦ “”StartCoroutine◦

```
 StartCoroutine(BeginRace());
```

◦ ◦ ◦

```
// run various routines, one after the other
IEnumerator OneAfterTheOther( params IEnumerator[] routines )
{
    foreach ( var item in routines )
    {
        while ( item.MoveNext() ) yield return item.Current;
    }

    yield break;
}
```

...◦ IEnumerator

```
IEnumerator PrepareRace()
{
    // codesay, crowd cheering and camera pan around the stadium
    yield break;
}

IEnumerator Countdown()
{
    // codesay, animate your countdown on UI
    yield break;
}

IEnumerator StartRace()
{
    // codesay, camera moves and light changes and launch the AIs
    yield break;
}
```

```
StartCoroutine( MultipleRoutines( PrepareRace(), Countdown(), StartRace() ) );
```

```
IEnumerator[] routines = new IEnumerator[] {
     PrepareRace(),
     Countdown(),
     StartRace() };
StartCoroutine( MultipleRoutines( routines ) );
```

◦ Unity

```
  yield return StartCoroutine(PrepareRace());
  yield return StartCoroutine(Countdown());
```

```
  yield return StartCoroutine(StartRace());
```

。

```
yield return null; // wait until sometime in the next frame
```

。

```
//wait for a few frames
yield return null;
yield return null;
```

n。 。

```
yield return new WaitForSeconds(n);
```

“WaitForSeconds”。

。 。

```
yield return StartCoroutine(coroutine);
```

。

```
StartCoroutine(Test());
```

“”。

```
Debug.Log("A");
StartCoroutine(LongProcess());
Debug.Log("B");
```

A**B.**。

```
Debug.Log("A");
yield return StartCoroutine(LongProcess());
Debug.Log("B");
```

A B.

。

```
Debug.Log("A");
StartCoroutine(LongProcess());
Debug.Log("B");
```

“”LongProcess。 。 。 Unity“”。

Web。

```
void Start() {
    string url = "http://google.com";
    WWW www = new WWW(url);
    StartCoroutine(WaitForRequest(www));
}

IEnumerator WaitForRequest(WWW www) {
    yield return www;

    if (www.error == null) {
        //use www.data);
    }
    else {
        //use www.error);
    }
}
```

Unity;`WaitForFixedUpdate()`。 Unity`WaitForEndOfFrame()` 。 Unity。

https://riptutorial.com/zh-TW/unity3d/topic/3415/

14:

- Quaternion.LookRotationVector3 forward [Vector3 up];
- Quaternion.AngleAxisVector3 axisOfRotation;
- float angleBetween = Quaternion.AngleQuaternion rotation1Quaternion rotation2;

Examples

QuaternionEuler

“”901804530。1。3D。3D。

Unity。

EulerQuaternion

```
// Create a quaternion that represents 30 degrees about X, 10 degrees about Y
Quaternion rotation = Quaternion.Euler(30, 10, 0);

// Using a Vector
Vector3 EulerRotation = new Vector3(30, 10, 0);
Quaternion rotation = Quaternion.Euler(EulerRotation);

// Convert a transfroms Quaternion angles to Euler angles
Quaternion quaternionAngles = transform.rotation;
Vector3 eulerAngles = quaternionAngles.eulerAngles;
```

。。 @ 2:09

`Quaternion.LookRotation(Vector3 forward [, Vector3 up])`“”Y“”。 Vector3.up。

```
// Find a game object in the scene named Target
public Transform target = GameObject.Find("Target").GetComponent<Transform>();

// We subtract our position from the target position to create a
// Vector that points from our position to the target position
// If we reverse the order, our rotation would be 180 degrees off.
Vector3 lookVector = target.position - transform.position;
Quaternion rotation = Quaternion.LookRotation(lookVector);
transform.rotation = rotation;
```

https://riptutorial.com/zh-TW/unity3d/topic/1782/

15:

Examples

UnityPhysics Unity -

```
using UnityEngine;
class LayerExample {

    public int layer;

    void Start()
    {
        Collider[] colliders = Physics.OverlapSphere(transform.position, 5f, layer);
    }
}
```

◦ ◦

LayerMask

LayerMask◦ ◦

```
using UnityEngine;
class LayerMaskExample{

    public LayerMask mask;
    public Vector3 direction;

    void Start()
    {
        if(Physics.Raycast(transform.position, direction, 35f, mask))
        {
            Debug.Log("Raycast hit");
        }
    {
}
```

◦

```
using UnityEngine;
class NameToLayerExample{

    void Start()
    {
        int layerindex = LayerMask.NameToLayer("Obstacle");
    {
}
```

◦

```
public static bool IsInLayerMask(this GameObject @object, LayerMask layerMask)
{
    bool result = (1 << @object.layer & layerMask) == 0;

    return result;
}
```

。

https://riptutorial.com/zh-TW/unity3d/topic/4762/

16:

Examples

◦ ◦

- AppleAndroidGoogle Play◦
- WindowsWindowsLinuxLinux◦
- ◦
- ...

```
void Update(){

#if UNITY_IPHONE
    //code here is only called when running on iPhone
#endif

#if UNITY_STANDALONE_WIN && !UNITY_EDITOR
    //code here is only ran in a unity game running on windows outside of the editor
#endif

//other code that will be ran regardless of platform

}
```

Unity

◦

partial◦ “”◦

```
// ExampleClass.cs
using UnityEngine;

public partial class ExampleClass : MonoBehaviour
{
    partial void PlatformSpecificMethod();

    void OnEnable()
    {
        PlatformSpecificMethod();
    }
}
```

◦ ref void ◦

```
// ExampleClass.Iphone.cs

#if UNITY_IPHONE
using UnityEngine;
```

```
public partial class ExampleClass
{
    partial void PlatformSpecificMethod()
    {
        Debug.Log("I am an iPhone");
    }
}
#endif
```

```
// ExampleClass.Android.cs

#if UNITY_ANDROID
using UnityEngine;

public partial class ExampleClass
{
    partial void PlatformSpecificMethod()
    {
        Debug.Log("I am an Android");
    }
}
#endif
```

。

。

https://riptutorial.com/zh-TW/unity3d/topic/4816/

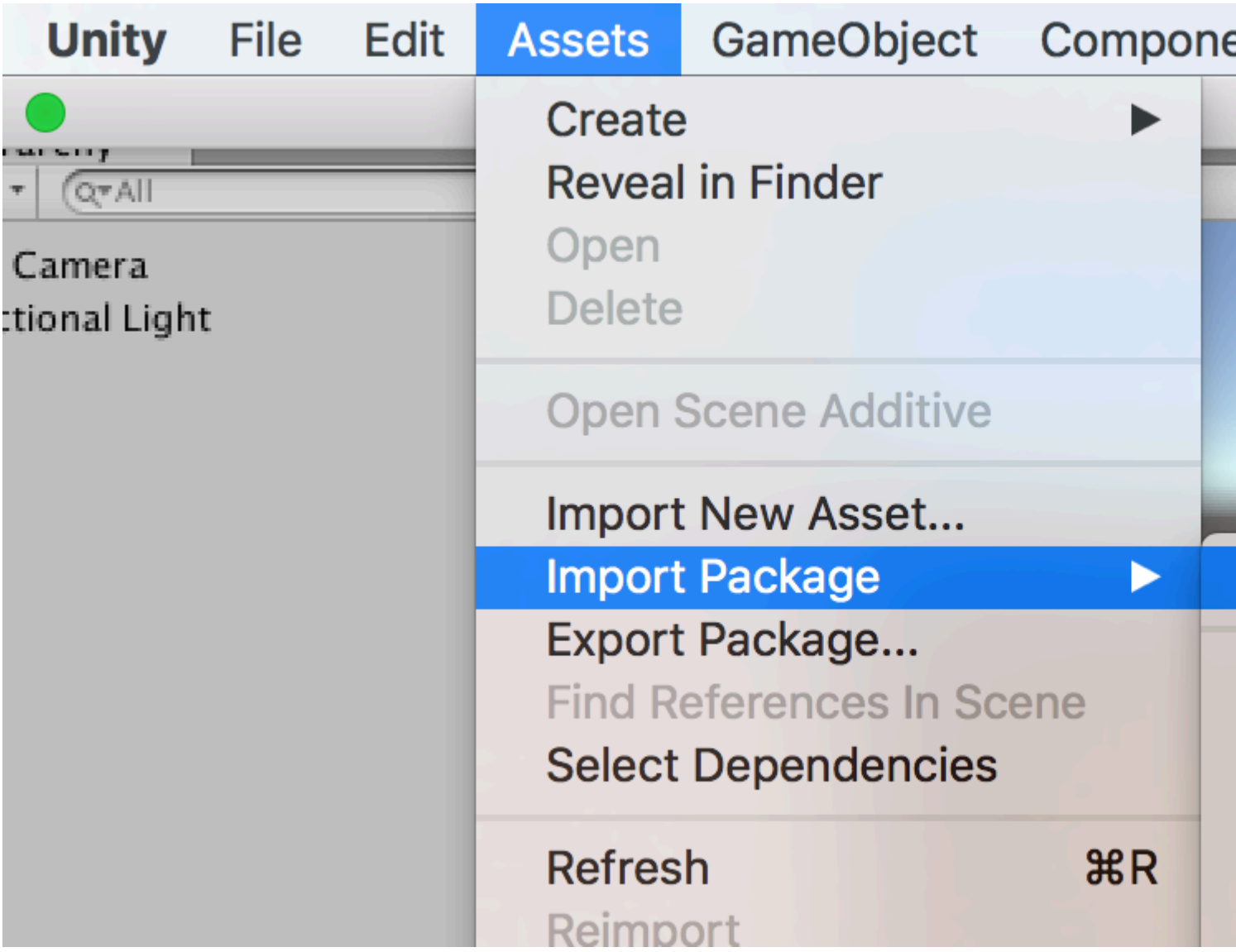
17:

Examples

`.unitypackage` Unity。 SDKOculus 。

.unitypackage

Unity`Assets > Import Package > Custom Package... .unitypackage`。



https://riptutorial.com/zh-TW/unity3d/topic/4491/

18:

Examples

。 /。

。 。

```
public class ObjectPool : MonoBehaviour
{
    public GameObject prefab;
    public int amount = 0;
    public bool populateOnStart = true;
    public bool growOverAmount = true;

    private List<GameObject> pool = new List<GameObject>();

    void Start()
    {
        if (populateOnStart && prefab != null && amount > 0)
        {
            for (int i = 0; i < amount; i++)
            {
                var instance = Instantiate(Prefab);
                instance.SetActive(false);
                pool.Add(instance);
            }
        }
    }

    public GameObject Instantiate (Vector3 position, Quaternion rotation)
    {
        foreach (var item in pool)
        {
            if (!item.activeInHierarchy)
            {
                item.transform.position = position;
                item.transform.rotation = rotation;
                item.SetActive( true );
                return item;
            }
        }

        if (growOverAmount)
        {
            var instance = (GameObject)Instantiate(prefab, position, rotation);
            pool.Add(instance);
            return instance;
        }

        return null;
    }
}
```

```
public GameObject prefab;
public int amount = 0;
```

```
public bool populateOnStart = true;
public bool growOverAmount = true;

private List<GameObject> pool = new List<GameObject>();
```

- GameObject prefab ◦
- int amount ◦ ◦
- bool populateOnStart ◦ Instantiate
- bool growOverAmount true◦ ◦
- List<GameObject> pool /◦

Start

```
void Start()
{
    if (populateOnStart && prefab != null && amount > 0)
    {
        for (int i = 0; i < amount; i++)
        {
            var instance = Instantiate(Prefab);
            instance.SetActive(false);
            pool.Add(instance);
        }
    }
}
```

prefab0◦

for◦ ◦ ◦

Instantiate

```
public GameObject Instantiate (Vector3 position, Quaternion rotation)
{
    foreach (var item in pool)
    {
        if (!item.activeInHierarchy)
        {
            item.transform.position = position;
            item.transform.rotation = rotation;
            item.SetActive(true);
            return item;
        }
    }

    if (growOverAmount)
    {
        var instance = (GameObject)Instantiate(prefab, position, rotation);
        pool.Add(instance);
        return instance;
    }

    return null;
}
```

InstantiateUnityInstantiateprefab◦

Instantiate。。。

。。。

“”。 null GameObjectNullReferenceExceptions。

。。

。createFuncAction。。

```
public class ResourcePool<T> where T : class
{
    private readonly List<T> objectPool = new List<T>();
    private readonly Action<T> cleanUpAction;
    private readonly Func<T> createAction;

    public ResourcePool(Action<T> cleanUpAction, Func<T> createAction)
    {
        this.cleanUpAction = cleanUpAction;
        this.createAction = createAction;
    }

    public void Return(T resource)
    {
        this.objectPool.Add(resource);
    }

    private void PurgeSingleResource()
    {
        var resource = this.Rent();
        this.cleanUpAction(resource);
    }

    public void TrimResourcesBy(int count)
    {
        count = Math.Min(count, this.objectPool.Count);
        for (int i = 0; i < count; i++)
        {
            this.PurgeSingleResource();
        }
    }

    public T Rent()
    {
        int count = this.objectPool.Count;
        if (count == 0)
        {
            Debug.Log("Creating new object.");
            return this.createAction();
        }
        else
        {
            Debug.Log("Retrieving existing object.");
            T resource = this.objectPool[count-1];
            this.objectPool.RemoveAt(count-1);
            return resource;
        }
    }
}
```

```
public class Test : MonoBehaviour
{
    private ResourcePool<GameObject> objectPool;

    [SerializeField]
    private GameObject enemyPrefab;

    void Start()
    {
        this.objectPool = new ResourcePool<GameObject>(Destroy,() =>
Instantiate(this.enemyPrefab) );
    }

    void Update()
    {
        // To get existing object or create new from pool
        var newEnemy = this.objectPool.Rent();
        // To return object to pool
        this.objectPool.Return(newEnemy);
        // In this example the message 'Creating new object' should only be seen on the frame
call
        // after that the same object in the pool will be returned.
    }
}
```

。

。

```
public class Weapon : MonoBehaviour {

    // The Bullet prefab that the Weapon will create
    public Bullet bulletPrefab;

    // This List is our object pool, which starts out empty
    private List<Bullet> availableBullets = new List<Bullet>();

    // The Transform that will act as the Bullet starting position
    public Transform bulletInstantiationPoint;

    // To spawn a new Bullet, this method either grabs an available Bullet from the pool,
    // otherwise Instantiates a new Bullet
    public Bullet CreateBullet () {
        Bullet newBullet = null;

        // If a Bullet is available in the pool, take the first one and make it active
        if (availableBullets.Count > 0) {
            newBullet = availableBullets[availableBullets.Count - 1];

            // Remove the Bullet from the pool
            availableBullets.RemoveAt(availableBullets.Count - 1);

            // Set the Bullet's position and make its GameObject active
            newBullet.transform.position = bulletInstantiationPoint.position;
            newBullet.gameObject.SetActive(true);
        }
        // If no Bullets are available in the pool, Instantiate a new Bullet
        else {
            newBullet newObject = Instantiate(bulletPrefab, bulletInstantiationPoint.position,
```

```
Quaternion.identity);

            // Set the Bullet's Weapon so we know which pool to return to later on
            newBullet.weapon = this;
        }

        return newBullet;
    }

}

public class Bullet : MonoBehaviour {

    public Weapon weapon;

    // When Bullet collides with something, rather than Destroying it, we return it to the
pool
    public void ReturnToPool () {
        // Add Bullet to the pool
        weapon.availableBullets.Add(this);

        // Disable the Bullet's GameObject so it's hidden from view
        gameObject.SetActive(false);
    }

}
```

https://riptutorial.com/zh-TW/unity3d/topic/2276/

19:

- [AddComponentMenustring menuName]
- [AddComponentMenustring menuNameint order]
- [CanEditMultipleObjects]
- [ContextMenuItem]
- [ContextMenu]
- [CustomEditorType inspectedType]
- [CustomEditorType inspectedTypebool editorForChildClasses]
- [CustomPropertyDrawerType type]
- [CustomPropertyDrawerType typebool useForChildren]
- [DisallowMultipleComponent]
- [DrawGizmoGizmoType Gizmo]
- [DrawGizmoGizmoType GizmoType drawnGizmoType]
- [ExecuteInEditMode]
- []
- [HideInInspector]
- [InitializeOnLoad]
- [InitializeOnLoadMethod]
- [MenuItemstring itemName]
- [MenuItemstring itemNamebool isValidateFunction]
- [MenuItemstring itemNamebool isValidateFunctionint priority]
- [int]
- [PreferenceItemstring name]
- [float minfloat max]
- [RequireComponentType type]
- [RuntimeInitializeOnLoadMethod]
- [RuntimeInitializeOnLoadMethodRuntimeInitializeLoadType loadType]
- [SerializeField]
- []
- [TextAreaint minLinesint maxLines]
- []

SerializeField

Unity

-
- [SerializeField]
-
-

SerializeFieldUnity

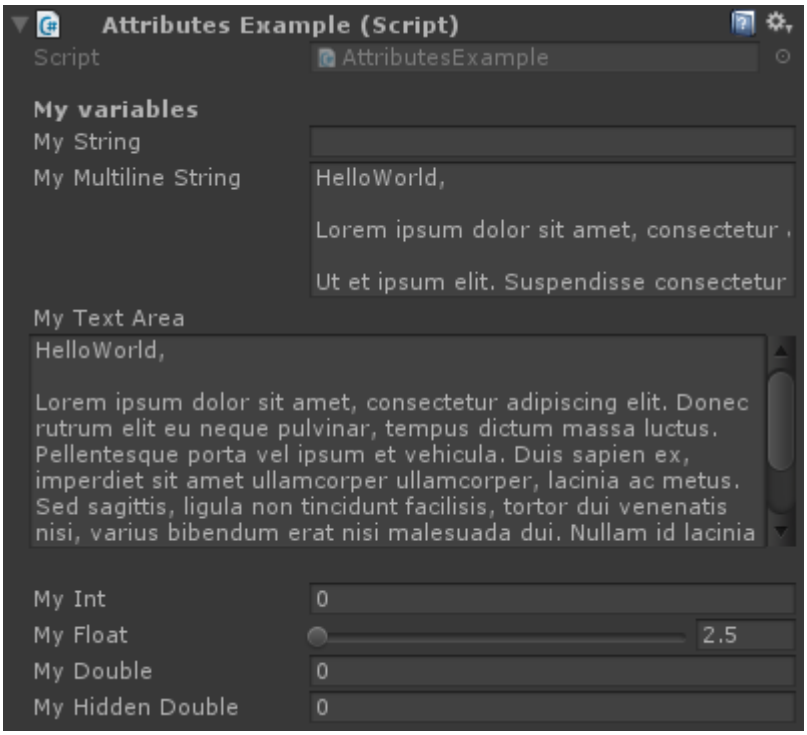
- UnityEngine.ObjectGameObjectComponentMonoBehaviourTexture2D
-

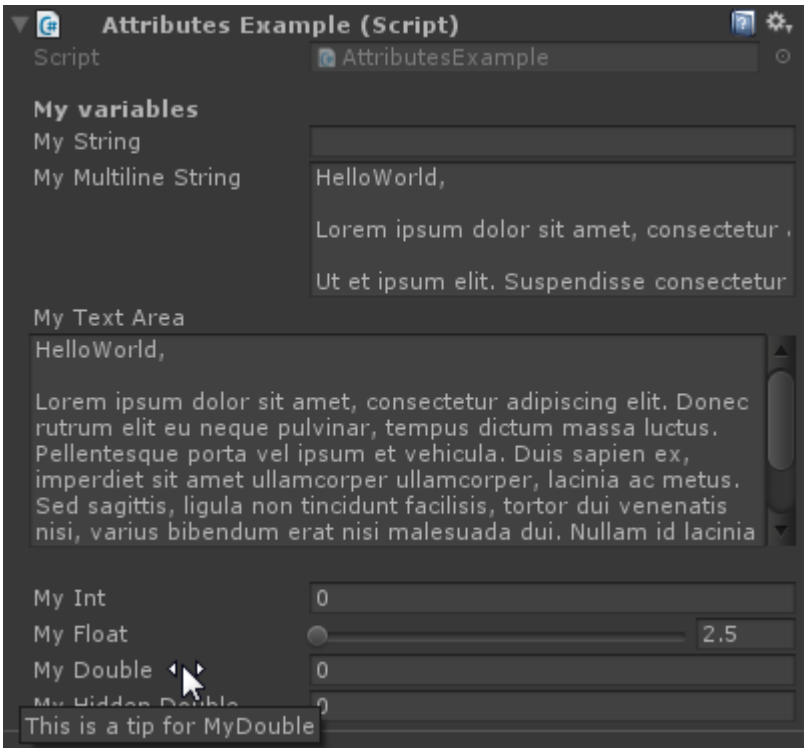
intstringfloatbool

- Vector2 / 3/4QuaternionMatrix4x4ColorRectLayerMask
-
-
-
-

Examples

```
[Header( "My variables" )]
public string MyString;

[HideInInspector]
public string MyHiddenString;

[Multiline( 5 )]
public string MyMultilineString;

[TextArea( 2, 8 )]
public string MyTextArea;

[Space( 15 )]
public int MyInt;

[Range( 2.5f, 12.5f )]
public float MyFloat;

[Tooltip( "This is a tip for MyDouble" )]
public double MyDouble;

[SerializeField]
private double myHiddenDouble;
```





```
[Header( "My variables" )]
public string MyString;
```

。 。

```
[HideInInspector]
public string MyHiddenString;
```

HideInInspector。 。

```
[Multiline( 5 )]
public string MyMultilineString;
```

。 。

```
[TextArea( 2, 8 )]
public string MyTextArea;
```

TextArea。

```
[Space( 15 )]
public int MyInt;
```

- 。

```
[Range( 2.5f, 12.5f )]
public float MyFloat;
```

。minmax。

```
[Tooltip( "This is a tip for MyDouble" )]
public double MyDouble;
```

。

```
[SerializeField]
private double myHiddenDouble;
```

SerializeFieldUnity - 。

```
[DisallowMultipleComponent]
[RequireComponent( typeof( Rigidbody ) )]
public class AttributesExample : MonoBehaviour
{
    [...]
}
```

```
[DisallowMultipleComponent]
```

DisallowMultipleComponentGameObject。

```
[RequireComponent( typeof( Rigidbody ) )]
```

RequireComponentGameObject。GameObject。

```
[ExecuteInEditMode]
public class AttributesExample : MonoBehaviour
{

    [RuntimeInitializeOnLoadMethod]
    private static void FooBar()
    {
        [...]
    }

    [RuntimeInitializeOnLoadMethod( RuntimeInitializeLoadType.BeforeSceneLoad )]
    private static void Foo()
    {
        [...]
    }

    [RuntimeInitializeOnLoadMethod( RuntimeInitializeLoadType.AfterSceneLoad )]
    private static void Bar()
    {
        [...]
    }

    void Update()
    {
        if ( Application.isEditor )
        {
```

```
            [...]
        }
        else
        {
            [...]
        }
    }
}
```

```
[ExecuteInEditMode]
public class AttributesExample : MonoBehaviour
```

ExecuteInEditModeUnity。

- 。
- OnGUI。
- OnRenderObject。

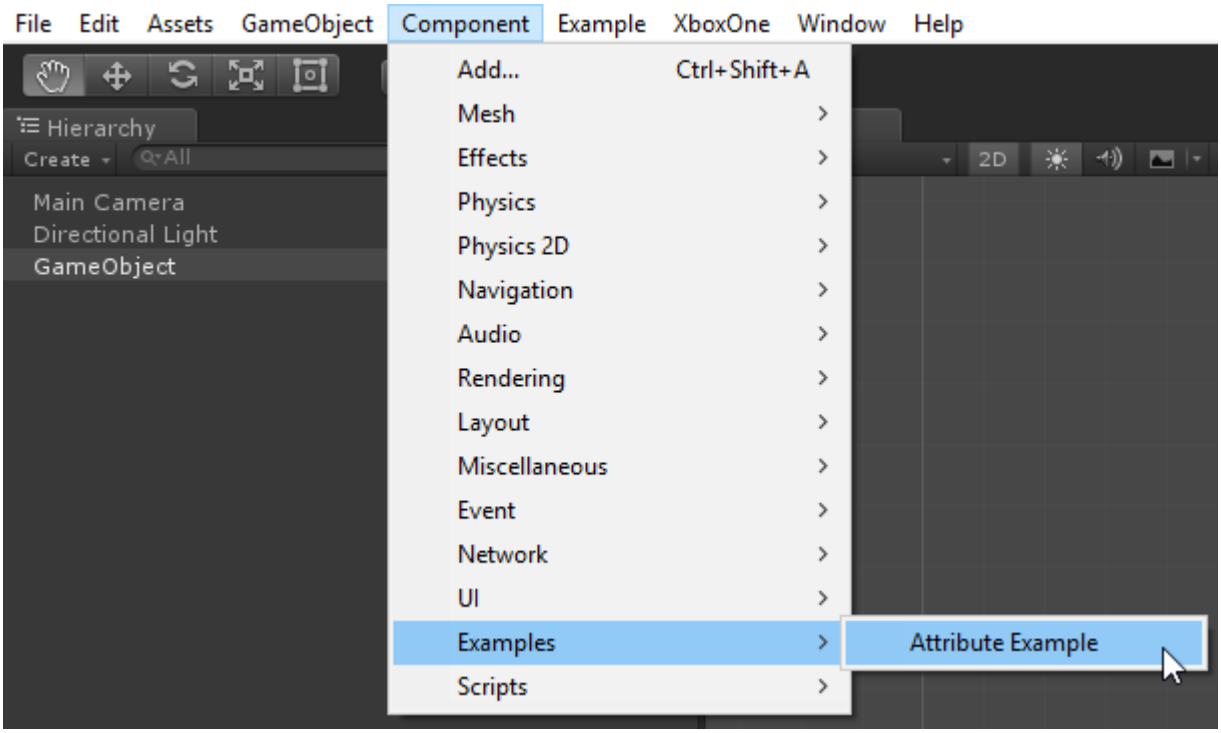
```
[RuntimeInitializeOnLoadMethod]
private static void FooBar()

[RuntimeInitializeOnLoadMethod( RuntimeInitializeLoadType.BeforeSceneLoad )]
private static void Foo()

[RuntimeInitializeOnLoadMethod( RuntimeInitializeLoadType.AfterSceneLoad )]
private static void Bar()
```

RuntimeInitializeOnLoadMethod。

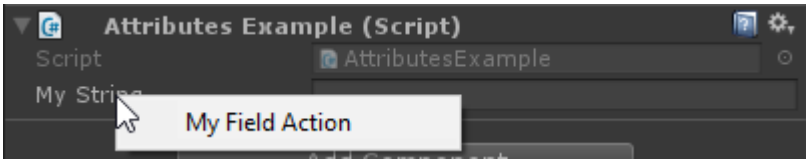
。 。

```
[AddComponentMenu( "Examples/Attribute Example" )]
public class AttributesExample : MonoBehaviour
{
    [ContextMenuItem( "My Field Action", "MyFieldContextAction" )]
    public string MyString;

    private void MyFieldContextAction()
    {
        [...]
    }

    [ContextMenu( "My Action" )]
    private void MyContextMenuAction()
    {
        [...]
    }
}
```

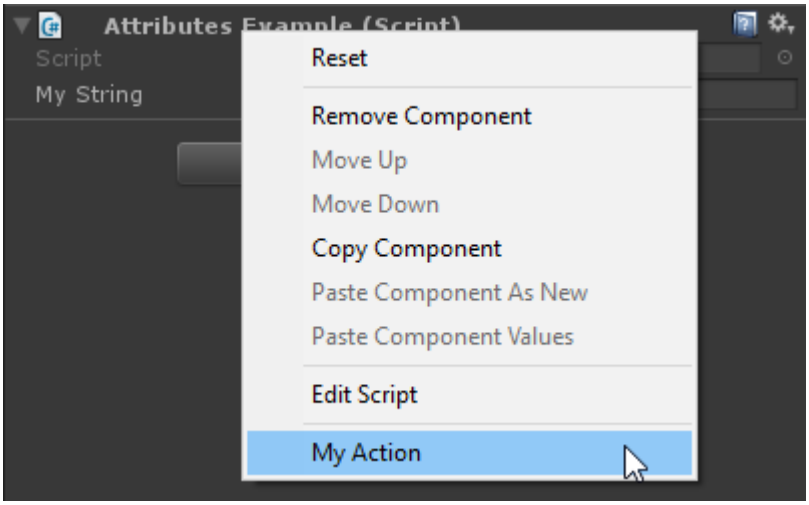
[AddComponentMenu]



[ContextMenuItem]



[ContextMenu]



```
[AddComponentMenu( "Examples/Attribute Example" )]
public class AttributesExample : MonoBehaviour
```

AddComponentMenu“”“” - >“”。

```
[ContextMenuItem( "My Field Action", "MyFieldContextAction" )]
public string MyString;
```

```
private void MyFieldContextAction()
{
    [...]
}
```

ContextMenuItem。。

```
[ContextMenu( "My Action" )]
private void MyContextMenuAction()
{
    [...]
}
```

ContextMenu。

```
[InitializeOnLoad]
public class AttributesExample : MonoBehaviour
{

    static AttributesExample()
    {
        [...]
    }

    [InitializeOnLoadMethod]
    private static void Foo()
    {
        [...]
    }
}
```

```
[InitializeOnLoad]
public class AttributesExample : MonoBehaviour
{

    static AttributesExample()
    {
        [...]
    }
```

InitializeOnLoad。。。

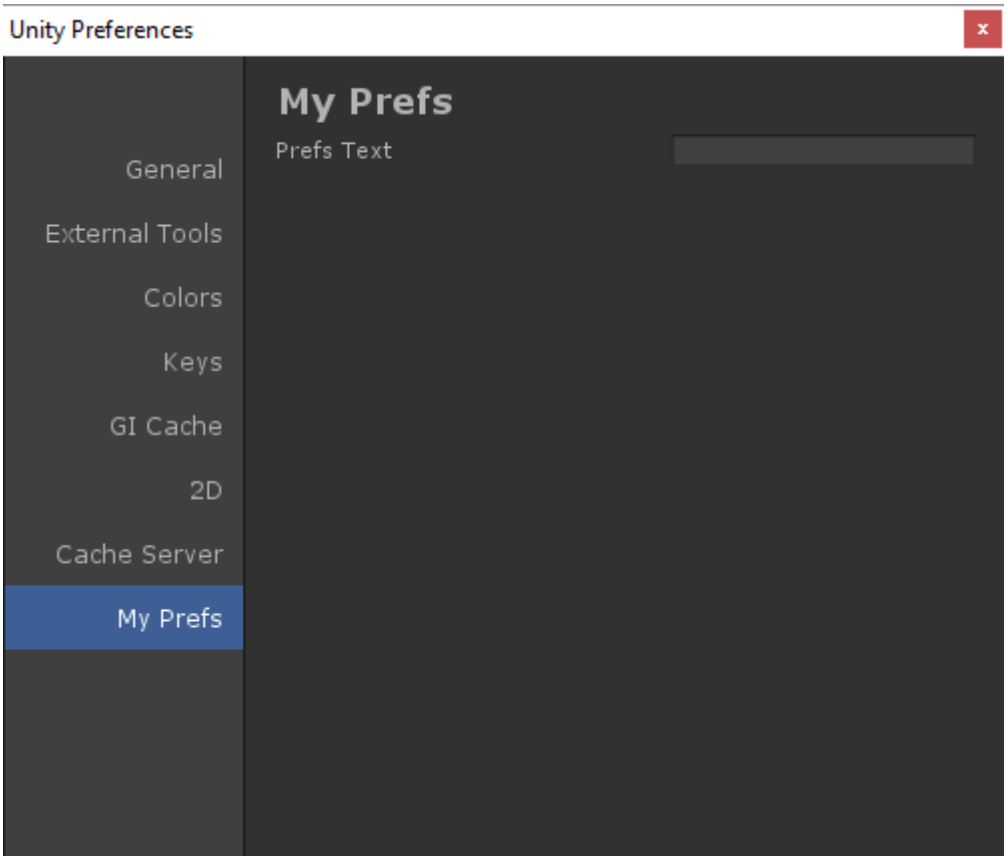
```
[InitializeOnLoadMethod]
private static void Foo()
{
    [...]
}
```

InitializeOnLoad。。。

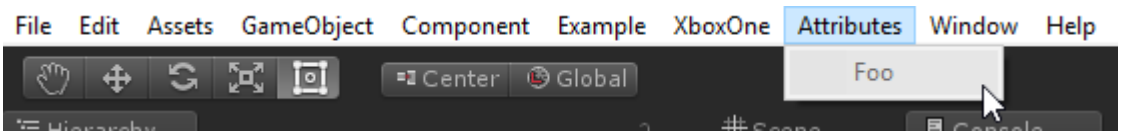
```
[CanEditMultipleObjects]
public class AttributesExample : MonoBehaviour
{
```

```
    public int MyInt;

    private static string prefsText = "";

    [PreferenceItem( "My Prefs" )]
    public static void PreferencesGUI()
    {
        prefsText = EditorGUILayout.TextField( "Prefs Text", prefsText );
    }

    [MenuItem( "Attributes/Foo" )]
    private static void Foo()
    {
        [...]
    }

    [MenuItem( "Attributes/Foo", true )]
    private static bool FooValidate()
    {
        return false;
    }
}
```

[PreferenceItem]



[MenuItem]



```
[CanEditMultipleObjects]
public class AttributesExample : MonoBehaviour
```

CanEditMultipleObjectsGameObjects。GameObject“”

。 。

```
[PreferenceItem( "My Prefs" )]
public static void PreferencesGUI()
```

PreferenceItemUnity。 。

```
[MenuItem( "Attributes/Foo" )]
private static void Foo()
{
    [...]
}

[MenuItem( "Attributes/Foo", true )]
private static bool FooValidate()
{
    return false;
}
```

MenuItem。false。

```
[CustomEditor( typeof( MyComponent ) )]
public class AttributesExample : Editor
{
    [...]
}
```

CustomEditor。Editor。

```
[CustomPropertyDrawer( typeof( MyClass ) )]
public class AttributesExample : PropertyDrawer
{
    [...]
}
```

CustomPropertyDrawer。 。

```
[DrawGizmo( GizmoType.Selected )]
private static void DoGizmo( AttributesExample obj, GizmoType type )
{
    [...]
}
```

DrawGizmo。 。DrawGizmoGizmoTypeGizmo。

GizmoGizmo。

https://riptutorial.com/zh-TW/unity3d/topic/5535/

20:

Unity AdsGoogle AdMobUnity。

Unity Ads 。

Unity Ads

。 **Unity Ads****Unity Ads**。

Unity Ads。

Examples

CUnity

```
using UnityEngine;
using UnityEngine.Advertisements;

public class Example : MonoBehaviour
{
    #if !UNITY_ADS // If the Ads service is not enabled
    public string gameId; // Set this value from the inspector
    public bool enableTestMode = true; // Enable this during development
    #endif

    void InitializeAds () // Example of how to initialize the Unity Ads service
    {
        #if !UNITY_ADS // If the Ads service is not enabled
        if (Advertisement.isSupported) { // If runtime platform is supported
            Advertisement.Initialize(gameId, enableTestMode); // Initialize
        }
        #endif
    }

    void ShowAd () // Example of how to show an ad
    {
        if (Advertisement.isInitialized || Advertisement.IsReady()) { // If the ads are ready
to be shown
            Advertisement.Show(); // Show the default ad placement
        }
    }
}
```

JavaScriptUnity Ads

```
#pragma strict
import UnityEngine.Advertisements;

#if !UNITY_ADS // If the Ads service is not enabled
public var gameId : String; // Set this value from the inspector
public var enableTestMode : boolean = true; // Enable this during development
```

```
#endif

function InitializeAds () // Example of how to initialize the Unity Ads service
{
    #if !UNITY_ADS // If the Ads service is not enabled
    if (Advertisement.isSupported) { // If runtime platform is supported
        Advertisement.Initialize(gameId, enableTestMode); // Initialize
    }
    #endif
}

function ShowAd () // Example of how to show an ad
{
    if (Advertisement.isInitialized && Advertisement.IsReady()) { // If the ads are ready to
be shown
        Advertisement.Show(); // Show the default ad placement
    }
}
```

https://riptutorial.com/zh-TW/unity3d/topic/9796/

21:

- [MenuItemstring itemName]
- [MenuItemstring itemNamebool isValidateFunction]
- [MenuItemstring itemNamebool isValidateFunctionint priority]
- [ContextMenu]
- [ContextMenuItem]
- [DrawGizmoGizmoType Gizmo]
- [DrawGizmoGizmoType GizmoType drawnGizmoType]

MenuCommand	MenuCommandMenuItem
MenuCommand.context	
MenuCommand.userData	int

Examples

Inspector。。

。

```
using UnityEngine;
#if UNITY_EDITOR
using UnityEditor;
#endif

public class InspectorExample : MonoBehaviour {

    public int Level;
    public float BaseDamage;

    public float DamageBonus {
        get {
            return Level / 100f * 50;
        }
    }

    public float ActualDamage {
        get {
            return BaseDamage + DamageBonus;
        }
    }
}

#if UNITY_EDITOR
[CustomEditor( typeof( InspectorExample ) )]
public class CustomInspector : Editor {

    public override void OnInspectorGUI() {
        base.OnInspectorGUI();
```

```
        var ie = (InspectorExample)target;

        EditorGUILayout.LabelField( "Damage Bonus", ie.DamageBonus.ToString() );
        EditorGUILayout.LabelField( "Actual Damage", ie.ActualDamage.ToString() );
    }
}
#endif
```

```
public class InspectorExample : MonoBehaviour {
    public int Level;
    public float BaseDamage;
}
```

“”。

```
public float DamageBonus {
    get {
        return Level / 100f * 50;
    }
}

public float ActualDamage {
    get {
        return BaseDamage + DamageBonus;
    }
}
```

Unity。Inspector。

```
[CustomEditor( typeof( InspectorExample ) )]
public class CustomInspector : Editor {
```

CustomEditor。。

OnInspectorGUI。。

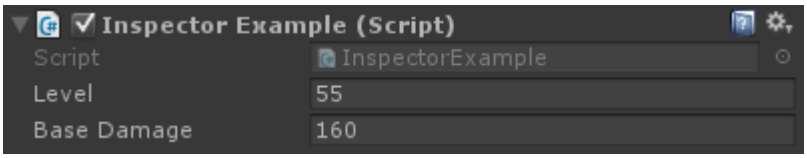
```
public override void OnInspectorGUI() {
    base.OnInspectorGUI();
}
```

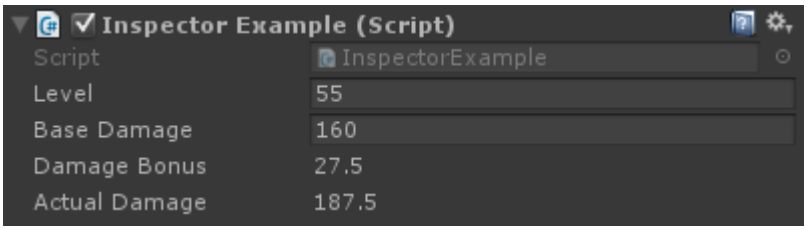
*base.OnInspectorGUI*Unity。。

```
var ie = (InspectorExample)target;

EditorGUILayout.LabelField( "Damage Bonus", ie.DamageBonus.ToString() );
EditorGUILayout.LabelField( "Actual Damage", ie.ActualDamage.ToString() );
```

。

labelfield。





MonoBehaviour。MonoBehaviour。

MonoBehaviour。

```
public enum Gender {
    Male,
    Female,
    Other
}

// Needs the Serializable attribute otherwise the CustomPropertyDrawer wont be used
[Serializable]
public class UserInfo {
    public string Name;
    public int Age;
    public Gender Gender;
}

// The class that you can attach to a GameObject
public class PropertyDrawerExample : MonoBehaviour {
    public UserInfo UInfo;
}

[CustomPropertyDrawer( typeof( UserInfo ) )]
public class UserInfoDrawer : PropertyDrawer {

    public override float GetPropertyHeight( SerializedProperty property, GUIContent label ) {
        // The 6 comes from extra spacing between the fields (2px each)
        return EditorGUIUtility.singleLineHeight * 4 + 6;
    }

    public override void OnGUI( Rect position, SerializedProperty property, GUIContent label )
{
        EditorGUI.BeginProperty( position, label, property );

        EditorGUI.LabelField( position, label );

        var nameRect = new Rect( position.x, position.y + 18, position.width, 16 );
        var ageRect = new Rect( position.x, position.y + 36, position.width, 16 );
        var genderRect = new Rect( position.x, position.y + 54, position.width, 16 );

        EditorGUI.indentLevel++;

        EditorGUI.PropertyField( nameRect, property.FindPropertyRelative( "Name" ) );
        EditorGUI.PropertyField( ageRect, property.FindPropertyRelative( "Age" ) );
        EditorGUI.PropertyField( genderRect, property.FindPropertyRelative( "Gender" ) );
```

```
        EditorGUI.indentLevel--;

        EditorGUI.EndProperty();
    }
}
```

。。GameObjectPropertyDrawerExample。

```
public enum Gender {
    Male,
    Female,
    Other
}

[Serializable]
public class UserInfo {
    public string Name;
    public int Age;
    public Gender Gender;
}

public class PropertyDrawerExample : MonoBehaviour {
    public UserInfo UInfo;
}
```

SerializableCustomPropertyDrawer

CustomPropertyDrawer

PropertyDrawer。CustomPropertyDrawer。。

```
[CustomPropertyDrawer( typeof( UserInfo ) )]
public class UserInfoDrawer : PropertyDrawer {
```

GetPropertyHeight。。。*EditorGUIUtility.singleLineHeight * 4* 6。

```
public override float GetPropertyHeight( SerializedProperty property, GUIContent label ) {
    return EditorGUIUtility.singleLineHeight * 4 + 6;
}
```

OnGUI。*EditorGUI.BeginProperty[...]EditorGUI.EndProperty*。。

```
public override void OnGUI( Rect position, SerializedProperty property, GUIContent label ) {
    EditorGUI.BeginProperty( position, label, property );
```

。

```
EditorGUI.LabelField( position, label );

var nameRect = new Rect( position.x, position.y + 18, position.width, 16 );
var ageRect = new Rect( position.x, position.y + 36, position.width, 16 );
var genderRect = new Rect( position.x, position.y + 54, position.width, 16 );
```

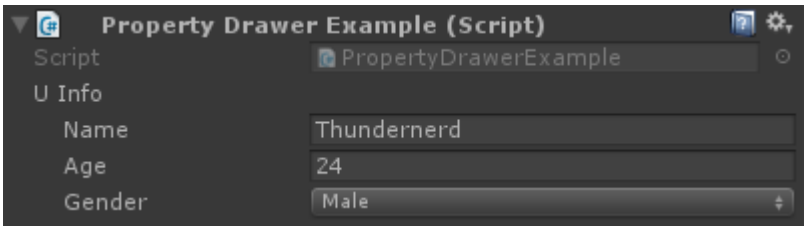
16 + 216EditorGUIUtility.singleLineHeight

UIGUI*EditorGUI.EndProperty*。

```
EditorGUI.indentLevel++;

EditorGUI.PropertyField( nameRect, property.FindPropertyRelative( "Name" ) );
EditorGUI.PropertyField( ageRect, property.FindPropertyRelative( "Age" ) );
EditorGUI.PropertyField( genderRect, property.FindPropertyRelative( "Gender" ) );

EditorGUI.indentLevel--;

EditorGUI.EndProperty();
```

*EditorGUI.PropertyField*SerializedProperty。*OnGUIFindPropertyRelative"..."*。

property.FindPropertyRelative"..."。

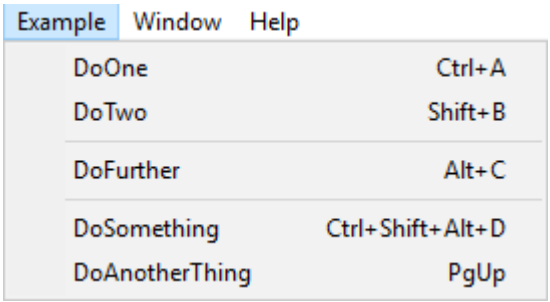


。。

。

```
public class MenuItemsExample : MonoBehaviour {

    [MenuItem( "Example/DoSomething %#&d" )]
    private static void DoSomething() {
        // Execute some code
    }

    [MenuItem( "Example/DoAnotherThing", true )]
    private static bool DoAnotherThingValidator() {
        return Selection.gameObjects.Length > 0;
    }

    [MenuItem( "Example/DoAnotherThing _PGUP", false )]
    private static void DoAnotherThing() {
        // Execute some code
    }

    [MenuItem( "Example/DoOne %a", false, 1 )]
    private static void DoOne() {
        // Execute some code
    }

    [MenuItem( "Example/DoTwo #b", false, 2 )]
    private static void DoTwo() {
```

```
        // Execute some code
    }

    [MenuItem( "Example/DoFurther &c", false, 13 )]
    private static void DoFurther() {
        // Execute some code
    }

    [MenuItem( "CONTEXT/Camera/DoCameraThing" )]
    private static void DoCameraThing( MenuCommand cmd ) {
        // Execute some code
    }

    [ContextMenu( "ContextSomething" )]
    private void ContentSomething() {
        // Execute some code
    }

    [ContextMenuItem( "Reset", "ResetDate" )]
    [ContextMenuItem( "Set to Now", "SetDateToNow" )]
    public string Date = "";

    public void ResetDate() {
        Date = "";
    }

    public void SetDateToNow() {
        Date = DateTime.Now.ToString();
    }
}
```



。*MenuItem*。/。

```
[MenuItem( "Example/DoSomething %#&d" )]
private static void DoSomething() {
    // Execute some code
}
```

。

MenuItem。

- - WindowsCtrlOS XCmd
- -
- - Alt

*d*Windowsctrl + shift + alt + DOS Xcmd + shift + alt + D.

“D”_。

- -
- F1..F12 -
- HOMEENDPGUPPGDN -

。 。 GameObjects。

```
[MenuItem( "Example/DoAnotherThing", true )]
private static bool DoAnotherThingValidator() {
    return Selection.gameObjects.Length > 0;
}

[MenuItem( "Example/DoAnotherThing _PGUP", false )]
private static void DoAnotherThing() {
    // Execute some code
}
```

MenuItem。 。

。 。 。 10。

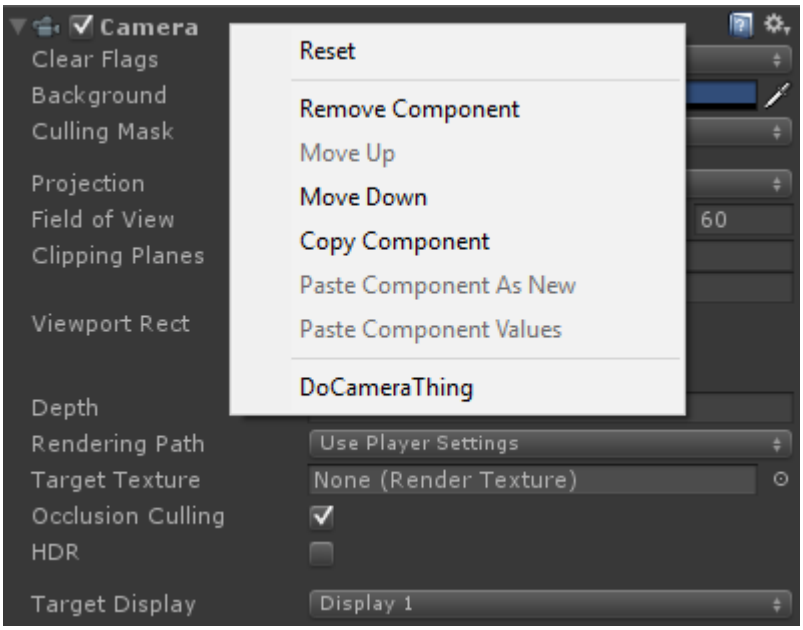
```
[MenuItem( "Example/DoOne %a", false, 1 )]
private static void DoOne() {
    // Execute some code
}

[MenuItem( "Example/DoTwo #b", false, 2 )]
private static void DoTwo() {
    // Execute some code
}

[MenuItem( "Example/DoFurther &c", false, 13 )]
private static void DoFurther() {
    // Execute some code
}
```

。

。 CONTEXTMenuItemMenuCommand。

Camera。

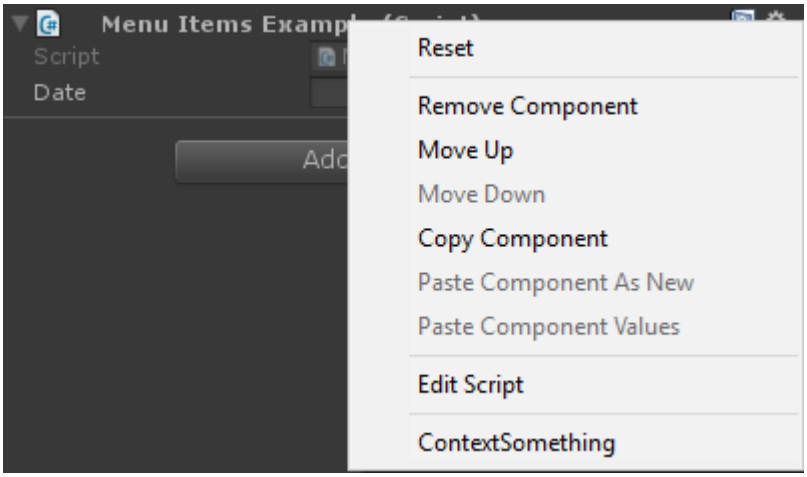
```
[MenuItem( "CONTEXT/Camera/DoCameraThing" )]
private static void DoCameraThing( MenuCommand cmd ) {
    // Execute some code
}
```



MenuCommand。

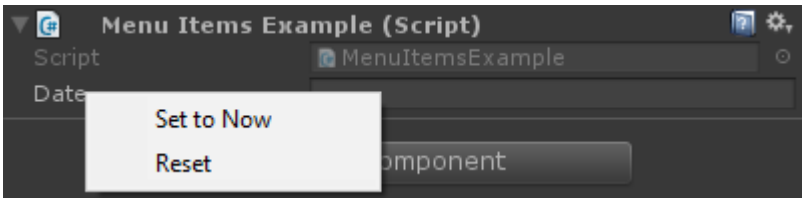
ContextMenu。。

```
[ContextMenu( "ContextSomething" )]
private void ContentSomething() {
    // Execute some code
}
```



。。。

```
[ContextMenuItem( "Reset", "ResetDate" )]
[ContextMenuItem( "Set to Now", "SetDateToNow" )]
public string Date = "";

public void ResetDate() {
    Date = "";
}

public void SetDateToNow() {
    Date = DateTime.Now.ToString();
}
```



Gizmos。GameObjects。

OnDrawGizmosOnDrawGizmosSelected magic。

```
public class GizmoExample : MonoBehaviour {

    public float GetDetectionRadius() {
        return 12.5f;
    }

    public float GetFOV() {
        return 25f;
    }

    public float GetMaxRange() {
        return 6.5f;
    }

    public float GetMinRange() {
        return 0;
    }

    public float GetAspect() {
        return 2.5f;
    }

    public void OnDrawGizmos() {
        var gizmoMatrix = Gizmos.matrix;
        var gizmoColor = Gizmos.color;

        Gizmos.matrix = Matrix4x4.TRS( transform.position, transform.rotation,
transform.lossyScale );
        Gizmos.color = Color.red;
        Gizmos.DrawFrustum( Vector3.zero, GetFOV(), GetMaxRange(), GetMinRange(), GetAspect()
);

        Gizmos.matrix = gizmoMatrix;
        Gizmos.color = gizmoColor;
    }

    public void OnDrawGizmosSelected() {
        Handles.DrawWireDisc( transform.position, Vector3.up, GetDetectionRadius() );
    }
}
```

OnDrawGizmosOnDrawGizmosSelected。

```
public void OnDrawGizmos() {
    var gizmoMatrix = Gizmos.matrix;
    var gizmoColor = Gizmos.color;
```

```
    Gizmos.matrix = Matrix4x4.TRS( transform.position, transform.rotation,
transform.lossyScale );
    Gizmos.color = Color.red;
    Gizmos.DrawFrustum( Vector3.zero, GetFOV(), GetMaxRange(), GetMinRange(), GetAspect() );

    Gizmos.matrix = gizmoMatrix;
    Gizmos.color = gizmoColor;
}
```

GizmoGizmo。

Gizmos。Gizmos。*Gizmos.DrawFrustum*。

Gizmos。

```
public void OnDrawGizmosSelected() {
    Handles.DrawWireDisc( transform.position, Vector3.up, GetDetectionRadius() );
}
```

GameObject。*HandlesGizmos*。

。

DrawGizmo。

```
public class GizmoDrawerExample {

    [DrawGizmo( GizmoType.Selected | GizmoType.NonSelected, typeof( GizmoExample ) )]
    public static void DrawGizmo( GizmoExample obj, GizmoType type ) {
        var gizmoMatrix = Gizmos.matrix;
        var gizmoColor = Gizmos.color;

        Gizmos.matrix = Matrix4x4.TRS( obj.transform.position, obj.transform.rotation,
obj.transform.lossyScale );
        Gizmos.color = Color.red;
        Gizmos.DrawFrustum( Vector3.zero, obj.GetFOV(), obj.GetMaxRange(), obj.GetMinRange(),
obj.GetAspect() );

        Gizmos.matrix = gizmoMatrix;
        Gizmos.color = gizmoColor;

        if ( ( type & GizmoType.Selected ) == GizmoType.Selected ) {
            Handles.DrawWireDisc( obj.transform.position, Vector3.up, obj.GetDetectionRadius()
);
        }
    }
}
```

Gizmo。。

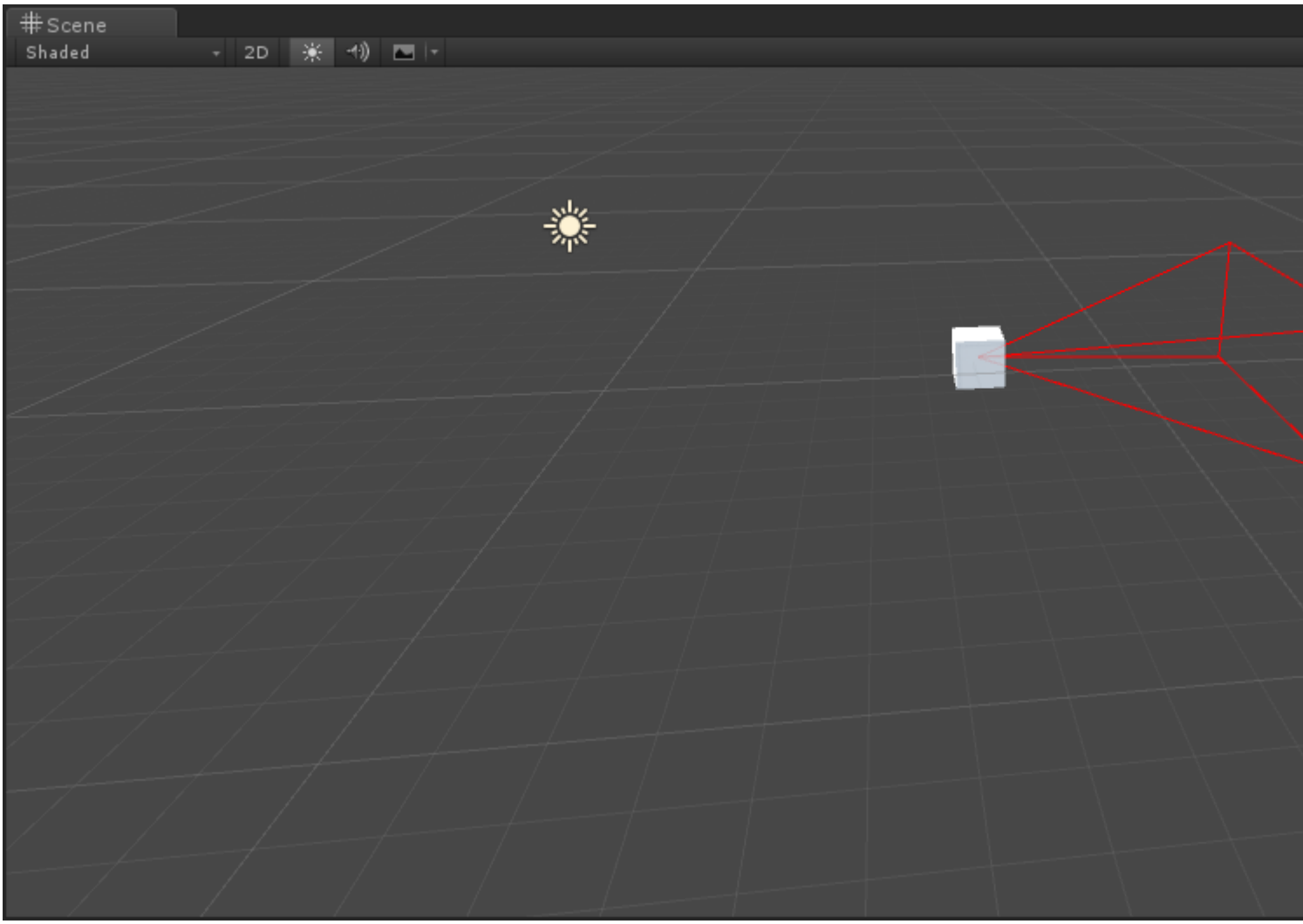
```
[DrawGizmo( GizmoType.Selected | GizmoType.NonSelected, typeof( GizmoExample ) )]
public static void DrawGizmo( GizmoExample obj, GizmoType type ) {
```

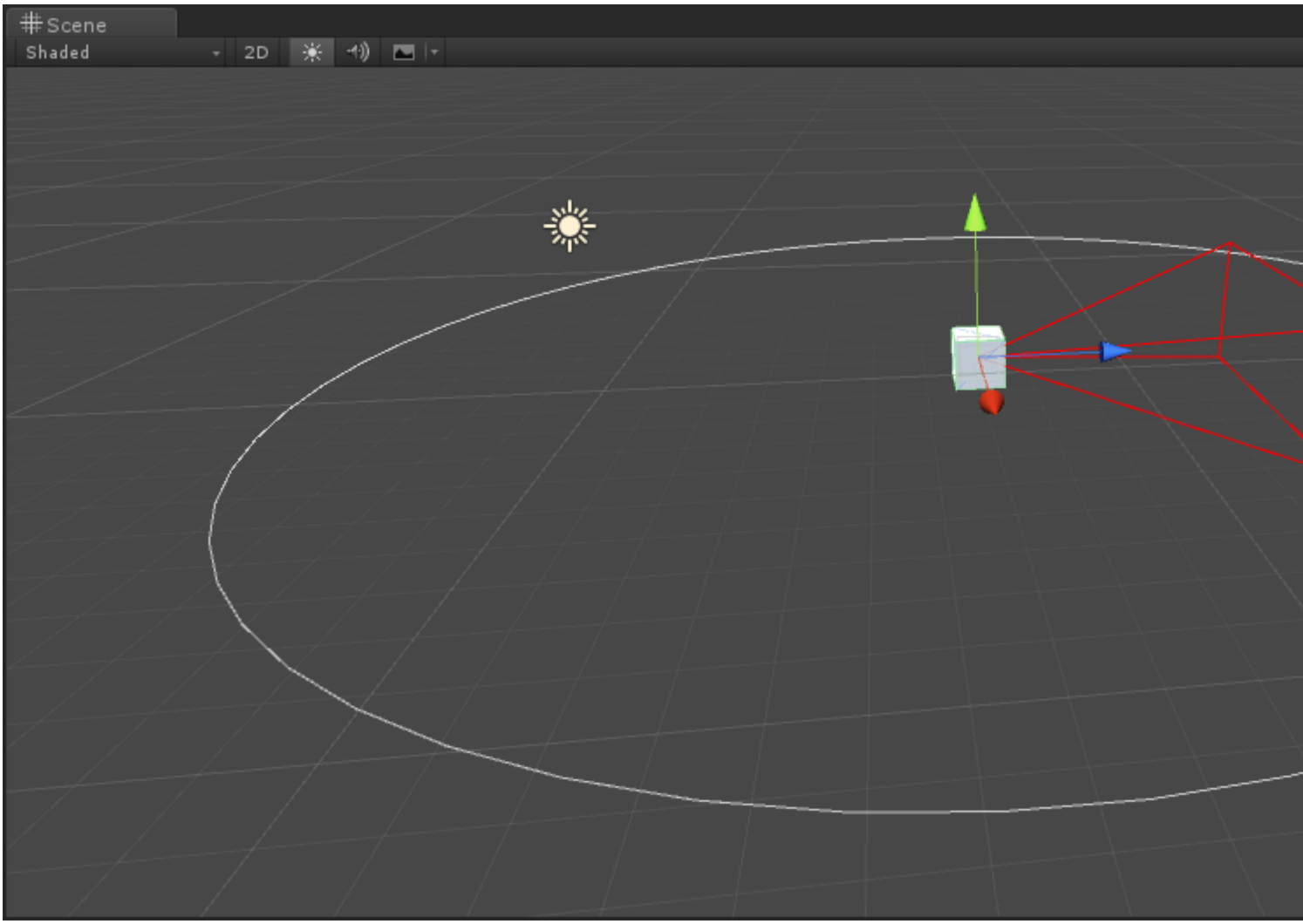
DrawGizmoGizmoTypeType。 TypeGizmo。

Gizmo。GizmoType。

```
if ( ( type & GizmoType.Selected ) == GizmoType.Selected ) {
    Handles.DrawWireDisc( obj.transform.position, Vector3.up, obj.GetDetectionRadius() );
}
```

GizmoTypeAND。





http //www.riptutorial.com/unity3d/topic/2506 / extend-the-editor 。 。 EditorWindow.Unity UIEditor Windows;

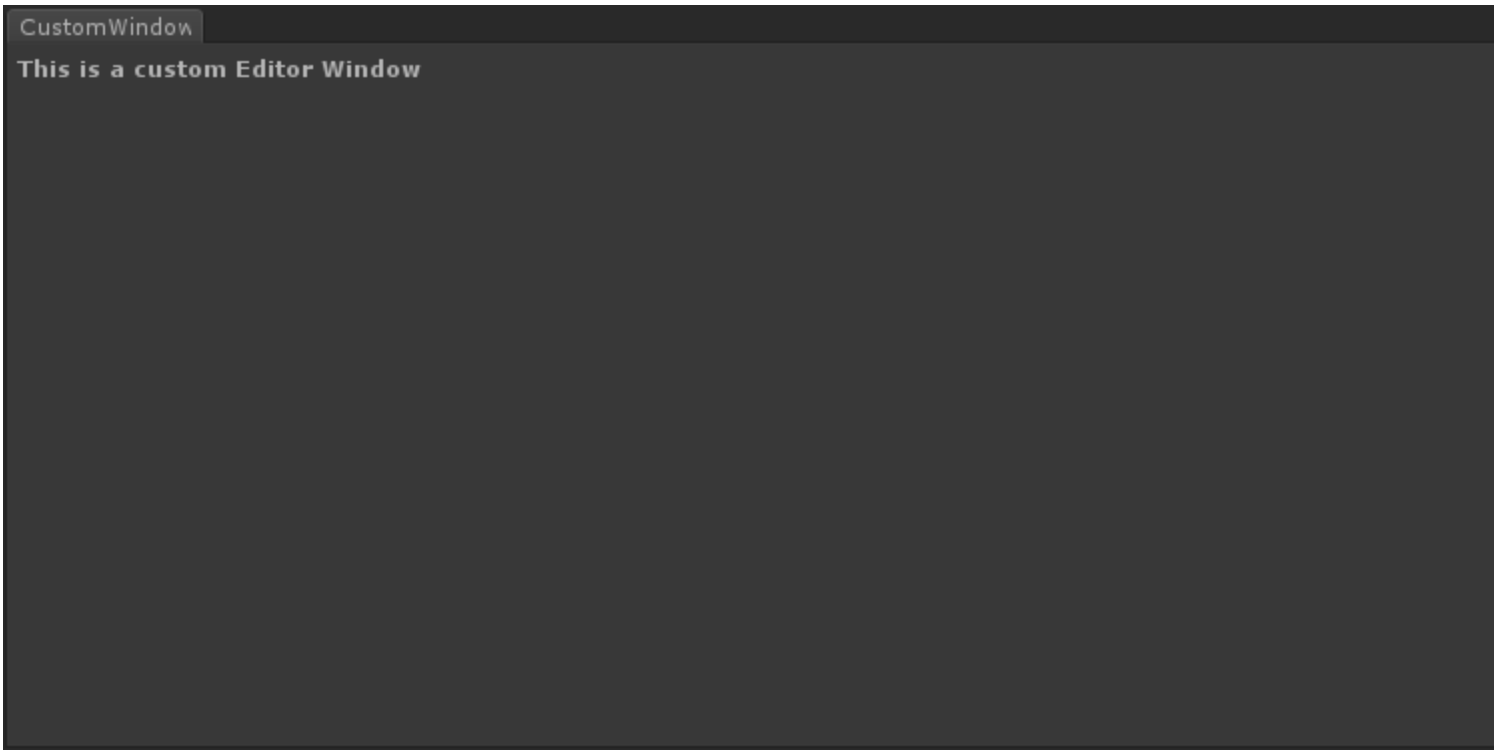
EditorWindow

。 EditorWindowInitOnGUI。

```
using UnityEngine;
using UnityEditor;

public class CustomWindow : EditorWindow
{
    // Add menu named "Custom Window" to the Window menu
    [MenuItem("Window/Custom Window")]
    static void Init()
    {
        // Get existing open window or if none, make a new one:
        CustomWindow window = (CustomWindow) EditorWindow.GetWindow(typeof(CustomWindow));
        window.Show();
    }

    void OnGUI()
    {
        GUILayout.Label("This is a custom Editor Window", EditorStyles.boldLabel);
```

```
    }
}
```

1. EditorWindow
2. Init。 EditorWindow.GetWindowCustomWindow。。
3. OnGUI

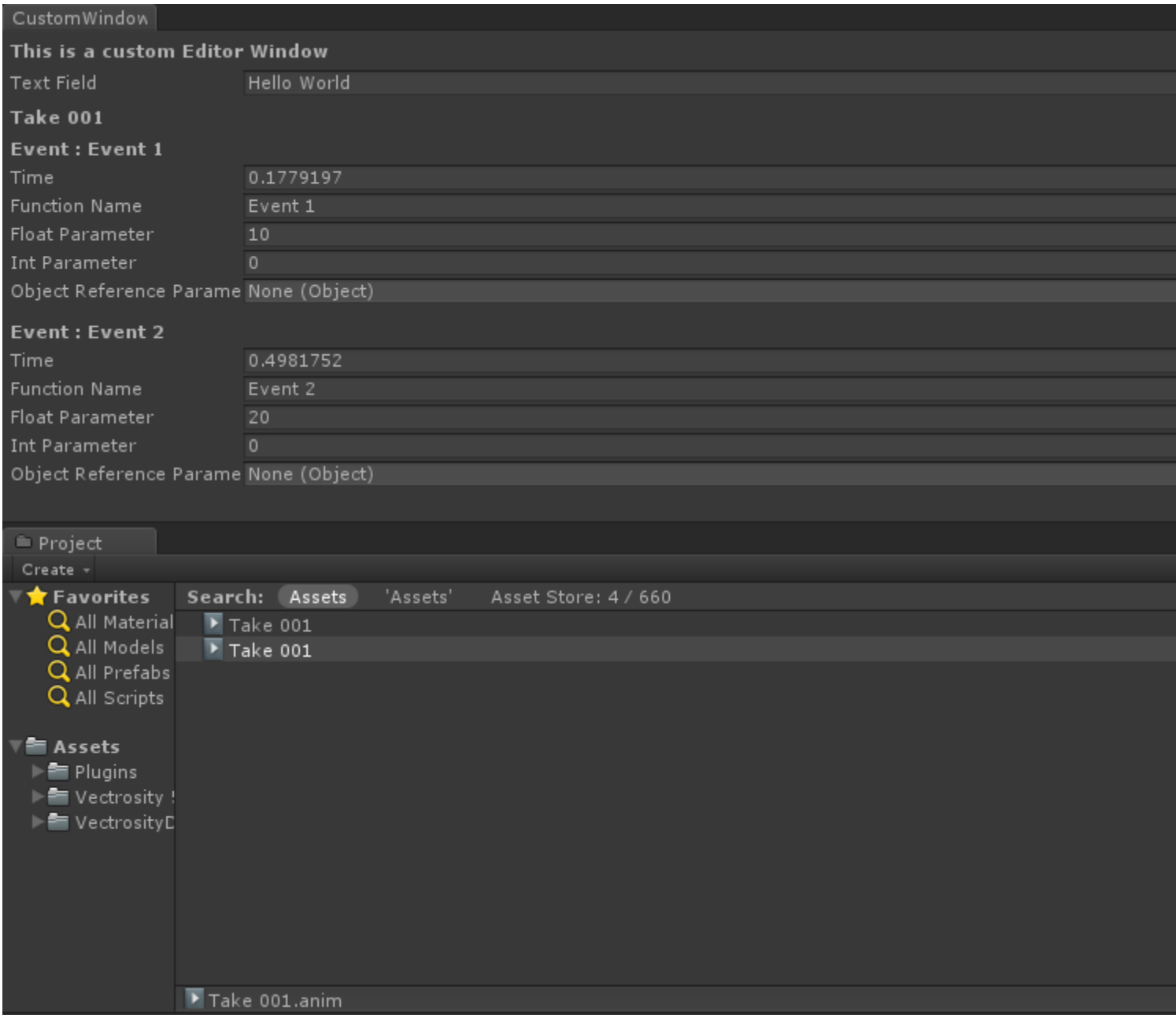


EditorWindow。 SelectionSelectionSerializedObjectSerializedProperty。

```
using System.Linq;
using UnityEngine;
using UnityEditor;

public class CustomWindow : EditorWindow
{
    private AnimationClip _animationClip;
    private SerializedObject _serializedClip;
    private SerializedProperty _events;

    private string _text = "Hello World";

    // Add menu named "Custom Window" to the Window menu
    [MenuItem("Window/Custom Window")]
    static void Init()
    {
        // Get existing open window or if none, make a new one:
        CustomWindow window = (CustomWindow) EditorWindow.GetWindow(typeof(CustomWindow));
        window.Show();
    }

    void OnGUI()
    {
        GUILayout.Label("This is a custom Editor Window", EditorStyles.boldLabel);
```

```
            // You can use EditorGUI, EditorGUILayout and GUILayout classes to display
anything you want
            // A TextField example
            _text = EditorGUILayout.TextField("Text Field", _text);

            // Note that you can modify an asset or a gameobject using an EditorWindow. Here
is a quick example with an AnimationClip asset
            // The _animationClip, _serializedClip and _events are set in OnSelectionChange()

            if (_animationClip == null || _serializedClip == null || _events == null) return;

            // We can modify our serializedClip like we would do in a Custom Inspector. For
example we can grab its events and display their information

            GUILayout.Label(_animationClip.name, EditorStyles.boldLabel);

            for (var i = 0; i < _events.arraySize; i++)
            {
                EditorGUILayout.BeginVertical();

                EditorGUILayout.LabelField(
                    "Event : " +
_events.GetArrayElementAtIndex(i).FindPropertyRelative("functionName").stringValue,
                    EditorStyles.boldLabel);

EditorGUILayout.PropertyField(_events.GetArrayElementAtIndex(i).FindPropertyRelative("time"),
true,
                    GUILayout.ExpandWidth(true));

EditorGUILayout.PropertyField(_events.GetArrayElementAtIndex(i).FindPropertyRelative("functionName"),

                    true, GUILayout.ExpandWidth(true));

EditorGUILayout.PropertyField(_events.GetArrayElementAtIndex(i).FindPropertyRelative("floatParameter"),

                    true, GUILayout.ExpandWidth(true));

EditorGUILayout.PropertyField(_events.GetArrayElementAtIndex(i).FindPropertyRelative("intParameter"),

                    true, GUILayout.ExpandWidth(true));
                EditorGUILayout.PropertyField(

_events.GetArrayElementAtIndex(i).FindPropertyRelative("objectReferenceParameter"), true,
                    GUILayout.ExpandWidth(true));

                EditorGUILayout.Separator();
                EditorGUILayout.EndVertical();
            }

            // Of course we need to Apply the modified properties. We don't our changes won't
be saved
            _serializedClip.ApplyModifiedProperties();
        }

        /// This Message is triggered when the user selection in the editor changes. That's
when we should tell our Window to Repaint() if the user selected another AnimationClip
        private void OnSelectionChange()
        {
            _animationClip =
                Selection.GetFiltered(typeof(AnimationClip),
SelectionMode.Assets).FirstOrDefault() as AnimationClip;
```

```
            if (_animationClip == null) return;

            _serializedClip = new SerializedObject(_animationClip);
            _events = _serializedClip.FindProperty("m_Events");
            Repaint();
        }
    }
```



EditorWindow。 UnityNodeCanvasPlayMakerEditorWindow。

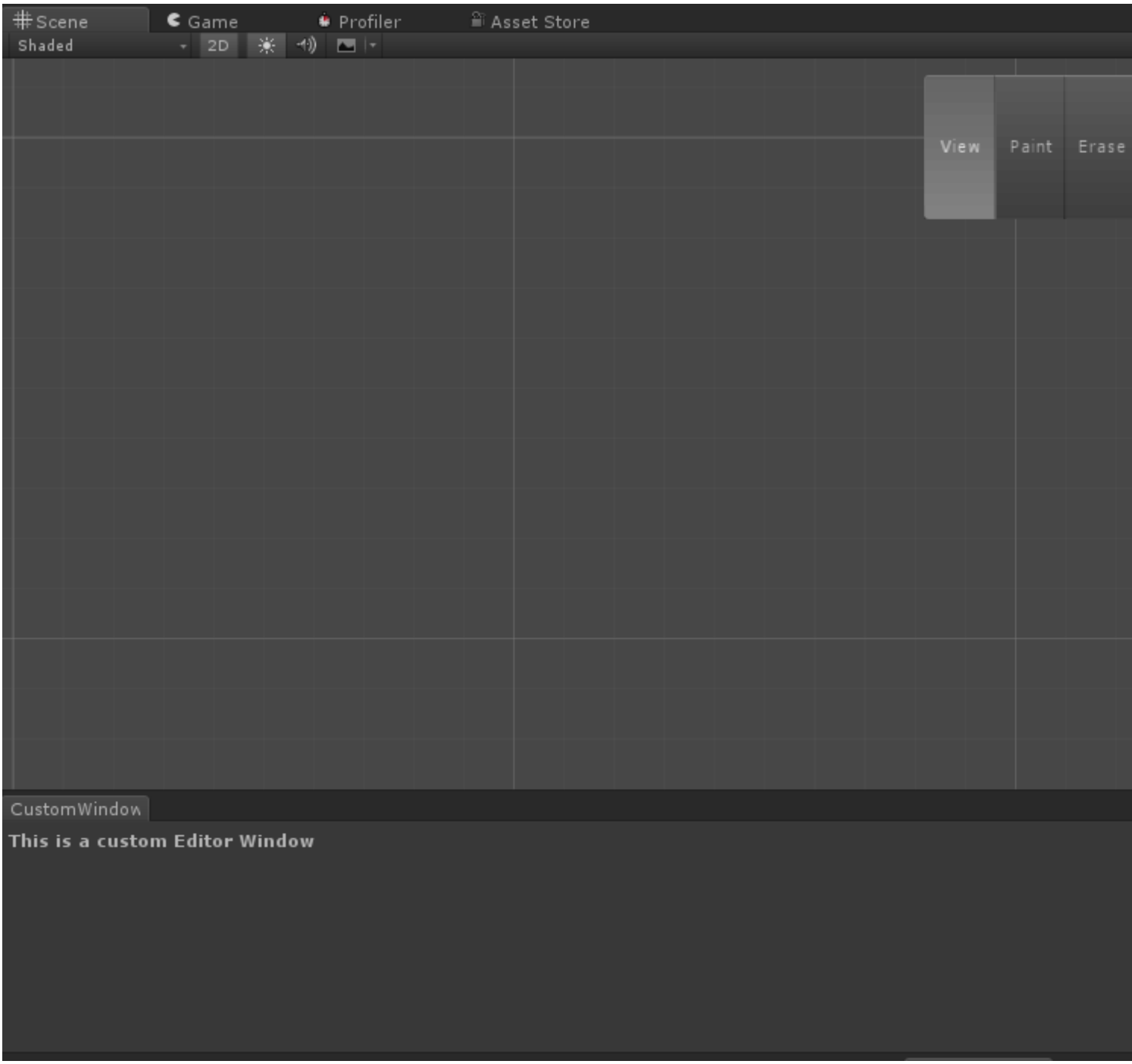
SceneView

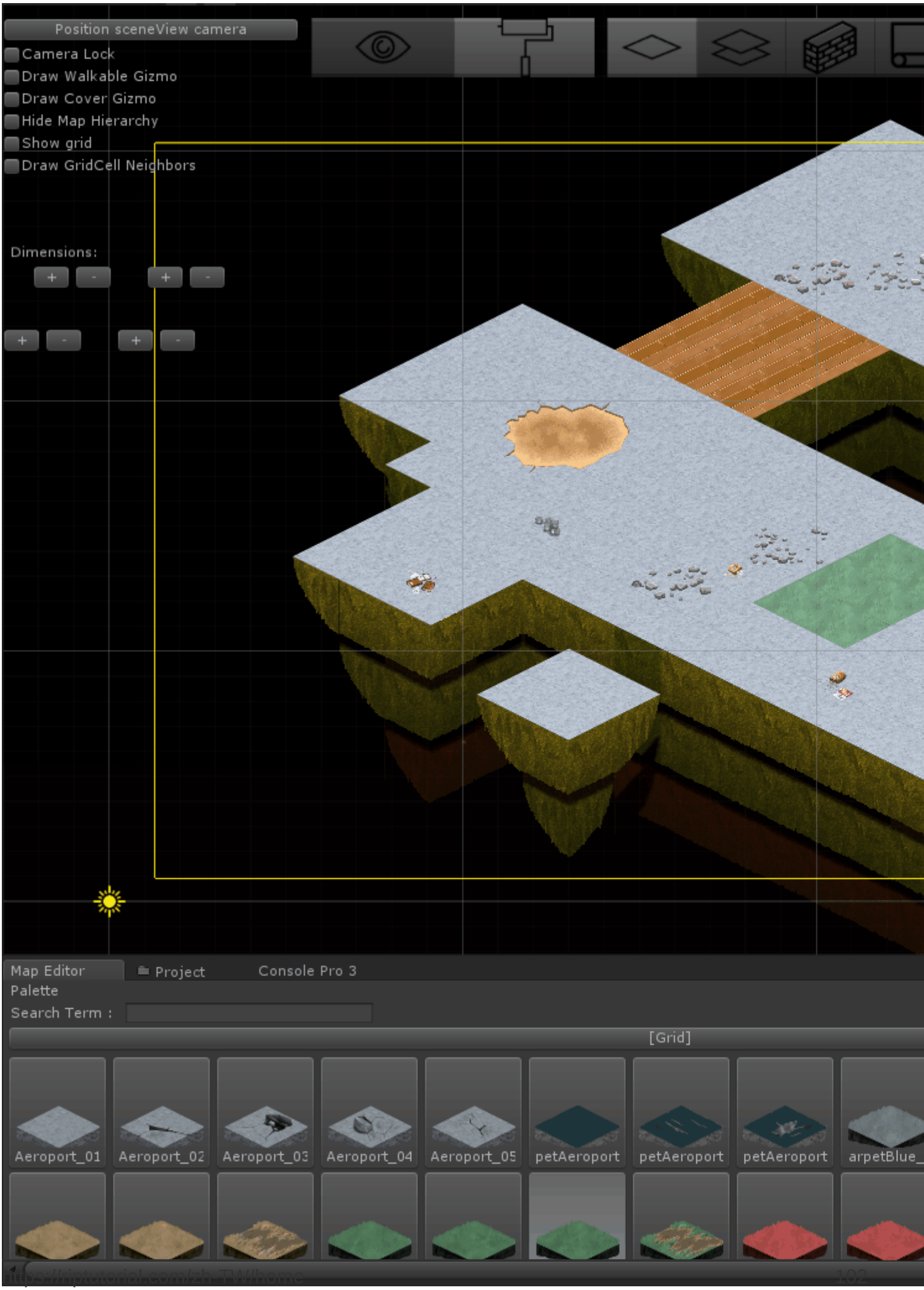
EditorWindowSceneView。/EditorWindowSceneView。

```
using UnityEngine;
using System;
```

```
using UnityEditor;

public class CustomWindow : EditorWindow {

    private enum Mode {
        View = 0,
        Paint = 1,
        Erase = 2
    }

    private Mode CurrentMode = Mode.View;

    [MenuItem ("Window/Custom Window")]
    static void Init () {
        // Get existing open window or if none, make a new one:
        CustomWindow window = (CustomWindow)EditorWindow.GetWindow (typeof (CustomWindow));
        window.Show();
    }

    void OnGUI () {
        GUILayout.Label ("This is a custom Editor Window", EditorStyles.boldLabel);
    }

    void OnEnable() {
        SceneView.onSceneGUIDelegate = SceneViewGUI;
        if (SceneView.lastActiveSceneView) SceneView.lastActiveSceneView.Repaint();
    }

    void SceneViewGUI(SceneView sceneView) {
        Handles.BeginGUI();
        // We define the toolbars' rects here
        var ToolBarRect = new Rect((SceneView.lastActiveSceneView.camera.pixelRect.width / 6),
10, (SceneView.lastActiveSceneView.camera.pixelRect.width * 4 / 6) ,
SceneView.lastActiveSceneView.camera.pixelRect.height / 5);
        GUILayout.BeginArea(ToolBarRect);
        GUILayout.BeginHorizontal();
        GUILayout.FlexibleSpace();
         CurrentMode = (Mode) GUILayout.Toolbar(
            (int) CurrentMode,
            Enum.GetNames(typeof(Mode)),
            GUILayout.Height(ToolBarRect.height));
        GUILayout.FlexibleSpace();
        GUILayout.EndHorizontal();
        GUILayout.EndArea();
        Handles.EndGUI();
    }
}
```

SceneView


Scene
Game
Profiler
Asset Store
Shaded
2D
View
Paint
Erase
CustomWindow
This is a custom Editor Window


Position sceneView camera
Camera Lock
Draw Walkable Gizmo
Draw Cover Gizmo
Hide Map Hierarchy
Show grid
Draw GridCell Neighbors
Dimensions:
Map Editor
Project
Console Pro 3
Palette
Search Term :
[Grid]
Aeroport_01
Aeroport_02
Aeroport_03
Aeroport_04
Aeroport_05
petAeroport
petAeroport
petAeroport
arpetBlue_

22: GameObjects

- public static GameObject Findstring name;
- public static GameObject FindGameObjectWithTagstring tag;
- public static GameObject [] FindGameObjectsWithTagstring tag;
- public static Object FindObjectOfTypeType type;
- public static Object [] FindObjectsOfTypeType type;

GameObjects。 FindObjectOfTypeFind in UpdateFixedUpdate。

- `FindObjectOfTypeFind`
- `FindGameObjectWithTag`。 Unity。
- “”GameObjectsUIGameObject
- ListObjectsListArrays
- GameObjectObject Pooling
- 。

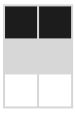
Unity。

- `FindObjectsOfType() static`。 。
- `Dictionary` 。

Examples

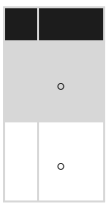
GameObject

```
var go = GameObject.Find("NameOfTheObject");
```



GameObject

```
var go = GameObject.FindGameObjectWithTag("Player");
```




```
[SerializeField]
GameObject[] gameObjects;
```

;	
	GameObjects

MonoBehaviourGameObjects

```
ExampleScript script = GameObject.FindObjectOfType<ExampleScript>();
GameObject go = script.gameObject;
```

FindObjectOfTypenull ◦

GameObjects

```
Transform tr = GetComponent<Transform>().Find("NameOfTheObject");
GameObject go = tr.gameObject;
```

Findnull

GameObjects https://riptutorial.com/zh-TW/unity3d/topic/3793/gameobjects

23:

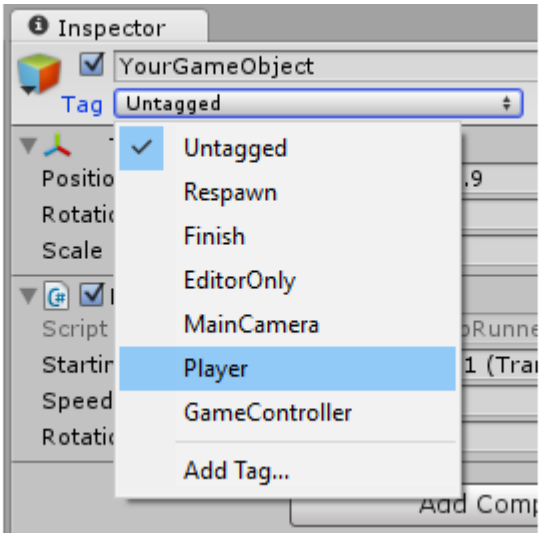
GameObject◦ GameObject◦

◦ *“Untagged”*GameObject ◦

Examples

;◦ “ ”◦

◦ ;“”◦ “…”“ ”;“ ”◦ ◦



◦ ;◦

static string◦

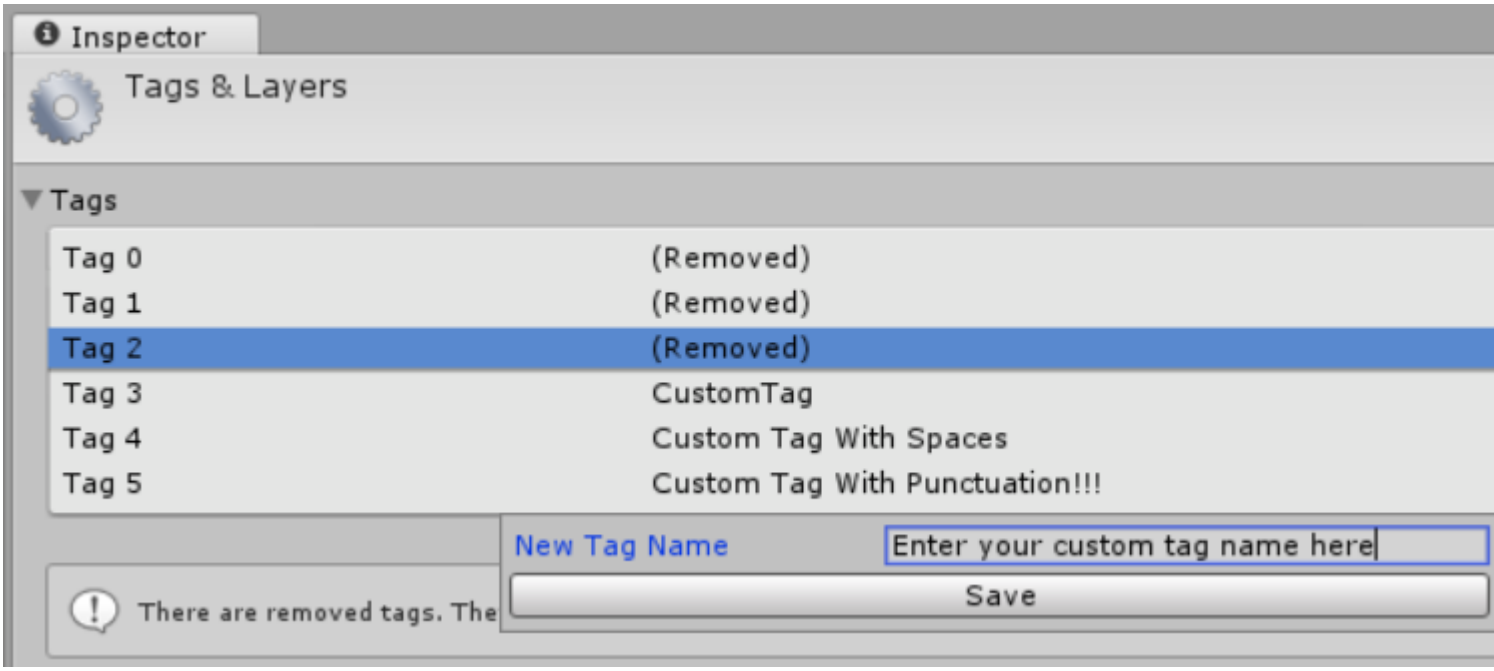
---

static string◦ static string“ ”◦

```
using UnityEngine;

public class Tagging : MonoBehaviour
{
    static string tagUntagged = "Untagged";
    static string tagPlayer = "Player";
    static string tagEnemy = "Enemy";

    /// <summary>Represents the player character. This game object should
    /// be linked up via the inspector.</summary>
    public GameObject player;
    /// <summary>Represents all the enemy characters. All enemies should
    /// be added to the array via the inspector.</summary>
    public GameObject[] enemy;
```

```
    void Start ()
    {
        // We ensure that the game object this script is attached to
        // is left untagged by using the default "Untagged" tag.
        gameObject.tag = tagUntagged;

        // We ensure the player has the player tag.
        player.tag = tagUntagged;

        // We loop through the enemy array to ensure they are all tagged.
        for(int i = 0; i < enemy.Length; i++)
        {
            enemy[i].tag = tagEnemy;
        }
    }
}
```

Inspector“ ”。“...”。“ **”>“”>“”**。



+□□。 −。 “”。

/。 “”“”。

GameObjects

。 。

GameObject

GameObject.FindGameObjectWithTag(string tag)。 。 。 GameObject。

```
///<summary>We create a static string to allow us consistency.</summary>
string playerTag = "Player"
```

```
///<summary>We can now use the tag to reference our player GameObject.</summary>
GameObject player = GameObject.FindGameObjectWithTag(playerTag);
```

GameObject

GameObject.FindGameObjectsWithTag(string tag)◦ ◦ ◦ GameObject.FindGameObjectWithTag(string tag)

GameObject.FindGameObjectsWithTag(string tag)GameObject◦ ◦

```
///<summary>We create a static string to allow us consistency.</summary>
string enemyTag = "Enemy";

///<summary>We can now use the tag to create an array of all enemy GameObjects.</summary>
GameObject[] enemies = GameObject.FindGameObjectsWithTag(enemyTag );

// We can now freely iterate through our array of enemies
foreach(GameObject enemy in enemies)
{
    // Do something to each enemy (link up a reference, check for damage, etc.)
}
```

GameObject

```
if (go.Tag == "myTag")
{
    //Stuff
}
```

UpdateUnity

```
if (go.CompareTag("myTag")
{
    //Stuff
}
```

◦

```
public static class Tags
{
    public const string Player = "Player";
    public const string MyCustomTag = "MyCustomTag";
}
```

```
if (go.CompareTag(Tags.MyCustomTag)
{
    //Stuff
}
```

◦

```
public enum Tags
{
    Player, Ennemies, MyCustomTag;
}
```

enum `toString()`

```
if (go.CompareTag(Tags.MyCustomTag.toString())
{
    //Stuff
}
```

https://riptutorial.com/zh-TW/unity3d/topic/5534/

24:

Examples

RigidbodyGameObject 。 GameObject。

Rigidbody

Component> Physics> RigidbodyRigidbody

Rigidbody

RigidbodyGameObject。 `AddForce()AddForce()AddTorque()`

```
// Add a force to the order of myForce in the forward direction of the Transform.
GetComponent<Rigidbody>().AddForce(transform.forward * myForce);

// Add torque about the Y axis to the order of myTurn.
GetComponent<Rigidbody>().AddTorque(transform.up * torque * myTurn);
```

Rigidbody GameObjectRigidbody。 GameObjectGameObjects。 。

```
GetComponent<Rigidbody>().mass = 1000;
```

。 。

```
GetComponent<Rigidbody>().drag = 10;
```

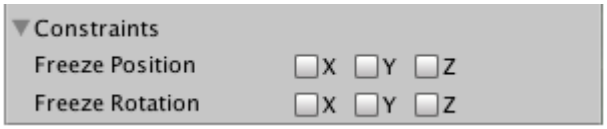
---

isKinematic

Rigidbody。

```
GetComponent<Rigidbody>().isKinematic = true;
```

Rigidbody。 `RigidbodyConstraints.None`




```
// Freeze rotation on all axes.
GetComponent<Rigidbody>().constraints = RigidbodyConstraints.FreezeRotation

// Freeze position on all axes.
GetComponent<Rigidbody>().constraints = RigidbodyConstraints.FreezePosition

// Freeze rotation and motion an all axes.
GetComponent<Rigidbody>().constraints = RigidbodyConstraints.FreezeAll
```

OR |

```
// Allow rotation on X and Y axes and motion on Y and Z axes.
GetComponent<Rigidbody>().constraints = RigidbodyConstraints.FreezePositionZ |
    RigidbodyConstraints.FreezeRotationX;
```

RigidbodyGameObject。

-
-
-
-
-

GameObject。

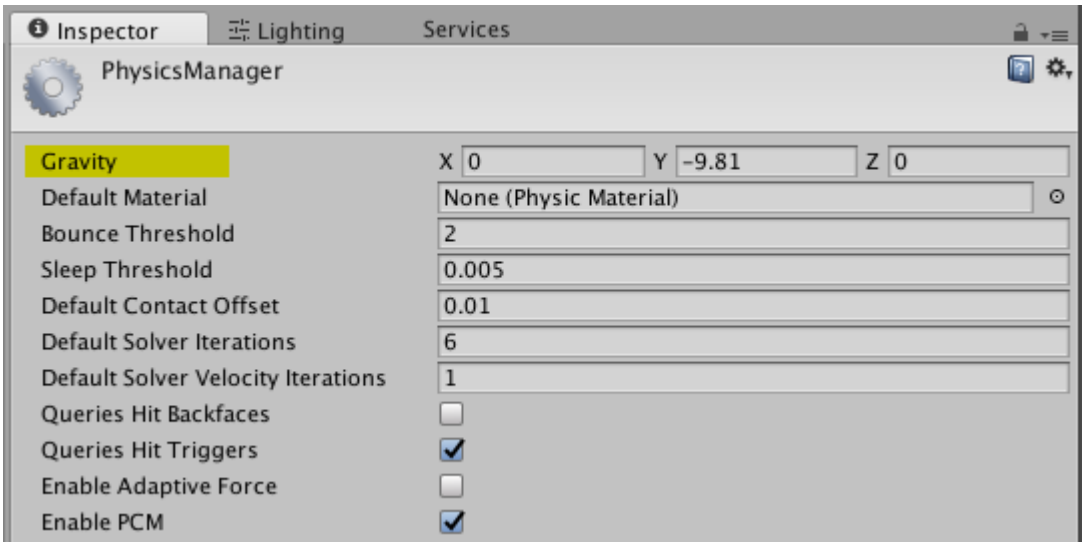
`OnTriggerEnter() OnTriggerEnter() OnTriggerStay()OnTriggerExit()。 。` GameObject。

`useGravityRigidBody。 falseRigidBody。`

```
GetComponent<RigidBody>().useGravity = false;
```

`RigidBody。`

`RigidBodyPhysics SettingsPhysics Settings`



`useGravity`TrueRigidBodies9.81UnityY。

https://riptutorial.com/zh-TW/unity3d/topic/3680/

25: UI

Examples

◦ click◦

```
using UnityEngine;
using UnityEngine.UI;

[RequireComponent(typeof(Button))]
public class AutomaticClickHandler : MonoBehaviour
{
    private void Awake()
    {
        var button = this.GetComponent<Button>();
        button.onClick.AddListener(HandleClick);
    }

    private void HandleClick()
    {
        Debug.Log("AutomaticClickHandler.HandleClick()", this);
    }
}
```

UI

- onClick
- onValueChanged
- InputField onEndEdit onValidateInput onValueChanged
- onValueChanged
- ScrollRect onValueChanged
- onValueChanged
- onValueChanged

◦ EventTriggerEventTrigger

```
using UnityEngine;
using UnityEngine.EventSystems;

[RequireComponent(typeof( EventTrigger ))]
public class CustomListenersExample : MonoBehaviour
{
    void Start( )
    {
        EventTrigger eventTrigger = GetComponent<EventTrigger>( );
        EventTrigger.Entry entry = new EventTrigger.Entry( );
        entry.eventID = EventTriggerType.PointerDown;
        entry.callback.AddListener( ( data ) => { OnPointerDownDelegate(
(PointerEventData)data ); } );
        eventTrigger.triggers.Add( entry );
    }

    public void OnPointerDownDelegate( PointerEventData data )
```

```
    {
        Debug.Log( "OnPointerDownDelegate called." );
    }
}
```

eventID

- PointerEnter
- PointerExit
- PointerDown
- PointerUp
- PointerClick
-
-
-
- UpdateSelected
-
-
-
- InitializePotentialDrag
- BeginDrag
- EndDrag
-
-

UI https://riptutorial.com/zh-TW/unity3d/topic/2296/-ui-

26: Vector3

Vector3 3D UnityEngine。 Vector3Transform 。 Vector3。 Unity API Vector3。

- public Vector3;
- public Vector3float xfloat y;
- public Vector3float xfloat yfloat z;
- Vector3.LerpVector3 startPositionVector3 targetPositionfloat movementFraction;
- Vector3.LerpUnclampedVector3 startPositionVector3 targetPositionfloat movementFraction;
- Vector3.MoveTowardsVector3 startPositionVector3 targetPositionfloat distance;

Examples

Vector3Vector3。 。

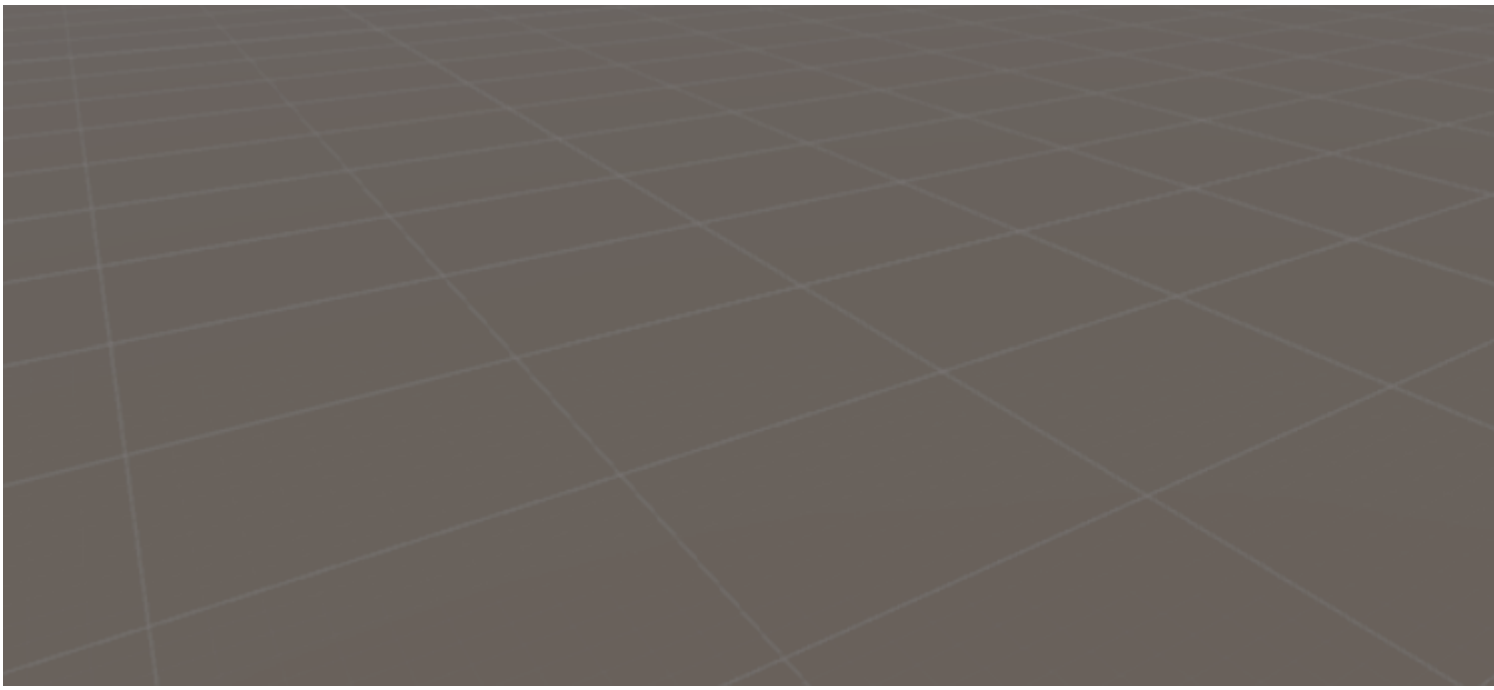
Vector3.zeroVector3.one

Vector3.zeroVector3.one Vector3 ; Vector3 x yz1. Vector3.zeroVector3.one。

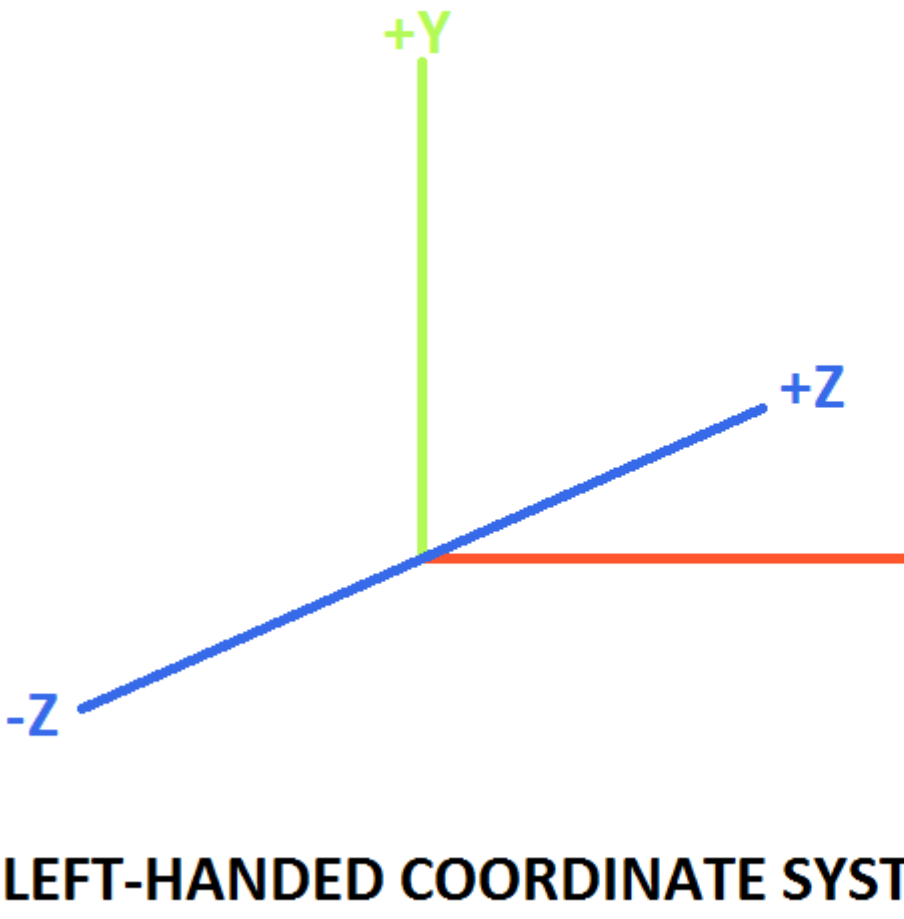
Vector3.zero。

Vector3.zeroVector3.one。

```
using UnityEngine;

public class Inflater : MonoBehaviour
{
    <summary>A sphere set up to inflate and deflate between two values.</summary>
    public ScaleBetween sphere;

    ///<summary>On start, set the sphere GameObject up to inflate
    /// and deflate to the corresponding values.</summary>
    void Start()
    {
        // Vector3.zero = Vector3(0, 0, 0); Vector3.one = Vector3(1, 1, 1);
        sphere.SetScale(Vector3.zero, Vector3.one);
    }
}
```

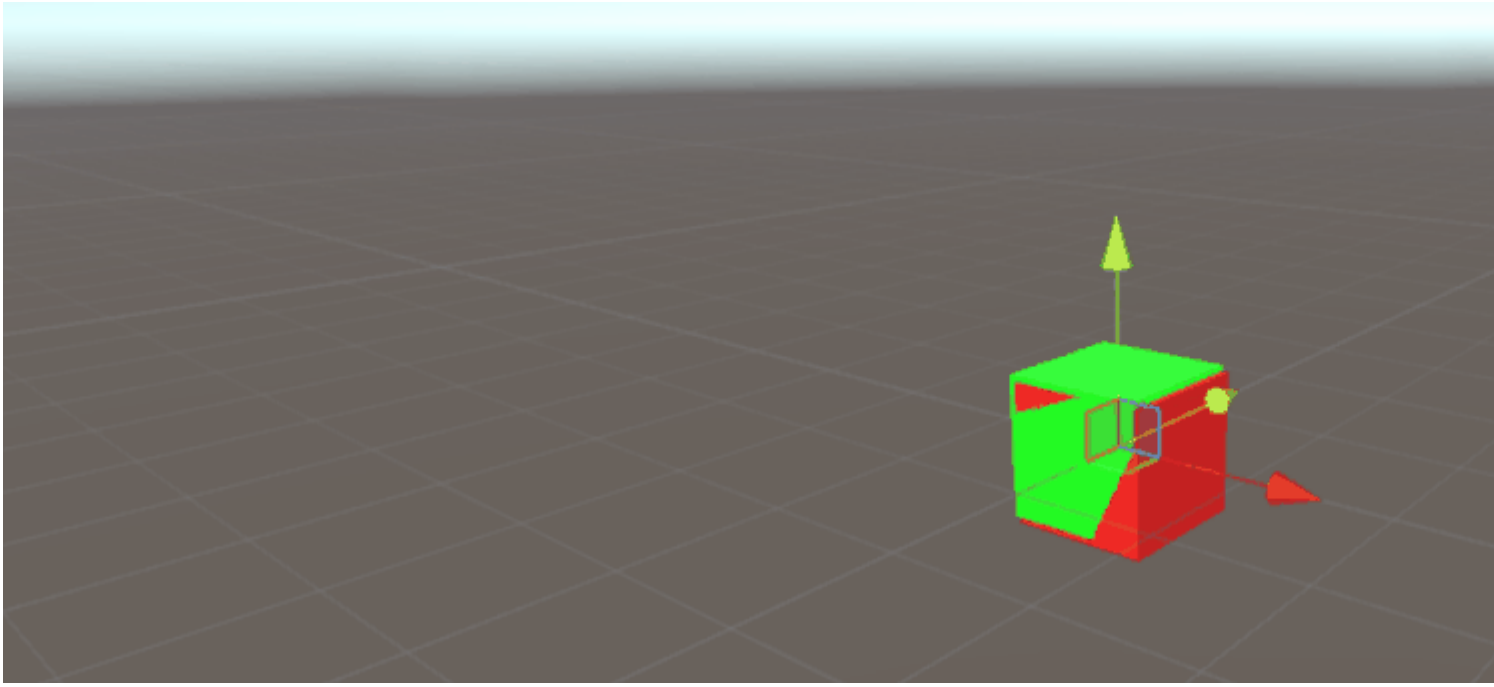


- Unity



Vector3◦

```
using UnityEngine;

public class StaticMover : MonoBehaviour
{
    <summary>GameObjects set up to move back and forth between two directions.</summary>
    public MoveBetween xMovement, yMovement, zMovement;

    ///<summary>On start, set each MoveBetween GameObject up to move
    /// in the corresponding direction(s).</summary>
    void Start()
    {
        // Vector3.left = Vector3(-1, 0, 0); Vector3.right = Vector3(1, 0, 0);
        xMovement.SetDirections(Vector3.left, Vector3.right);

        // Vector3.down = Vector3(0, -1, 0); Vector3.up = Vector3(0, 0, 1);
        yMovement.SetDirections(Vector3.down, Vector3.up);

        // Vector3.back = Vector3(0, 0, -1); Vector3.forward = Vector3(0, 0, 1);
        zMovement.SetDirections(Vector3.back, Vector3.forward);
    }
}
```



	X	ÿ	ž	new Vector3()
Vector3.zero	0	0	0	new Vector3(0, 0, 0)
Vector3.one	1	1	1	new Vector3(1, 1, 1)
Vector3.left	-1	0	0	new Vector3(-1, 0, 0)

	X	ÿ	ž	new Vector3()
Vector3.right	1	0	0	new Vector3(1, 0, 0)
Vector3.down	0	-1	0	new Vector3(0, -1, 0)
Vector3.up	0	1	0	new Vector3(0, 1, 0)
Vector3.back	0	0	-1	new Vector3(0, 0, -1)
Vector3.forward	0	0	1	new Vector3(0, 0, 1)

Vector3

Vector3◦ Vector3◦

Vector3 ◦

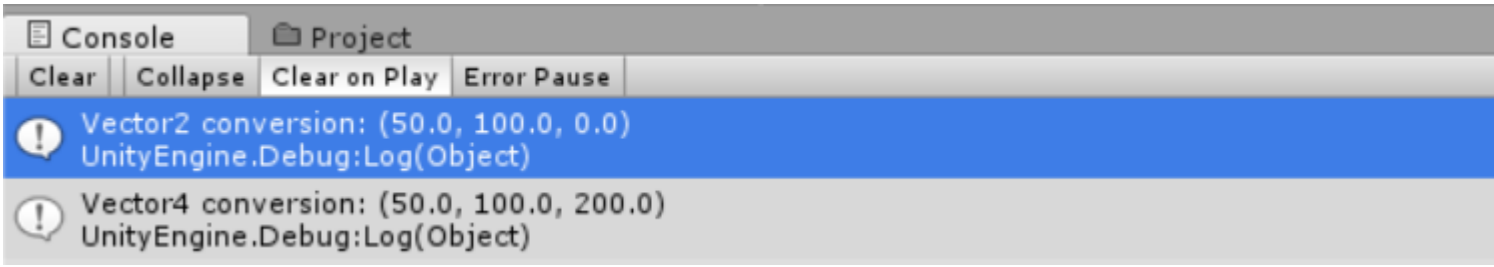
new Vector3()	0,0,0Vector3◦
new Vector3(float x, float y)	xyVector3◦ z0◦
new Vector3(float x, float y, float z)	x yzVector3◦

Vector2Vector4

Vector2Vector4Vector3 ◦ Vector2Vector4Vector3 ◦ Vector2xyVector4w ◦

◦

```
void VectorConversionTest()
{
    Vector2 vector2 = new Vector2(50, 100);
    Vector4 vector4 = new Vector4(50, 100, 200, 400);

    Vector3 fromVector2 = vector2;
    Vector3 fromVector4 = vector4;

    Debug.Log("Vector2 conversion: " + fromVector2);
    Debug.Log("Vector4 conversion: " + fromVector4);
}
```



Vector3Vector3◦

LerpLerpUnclamped

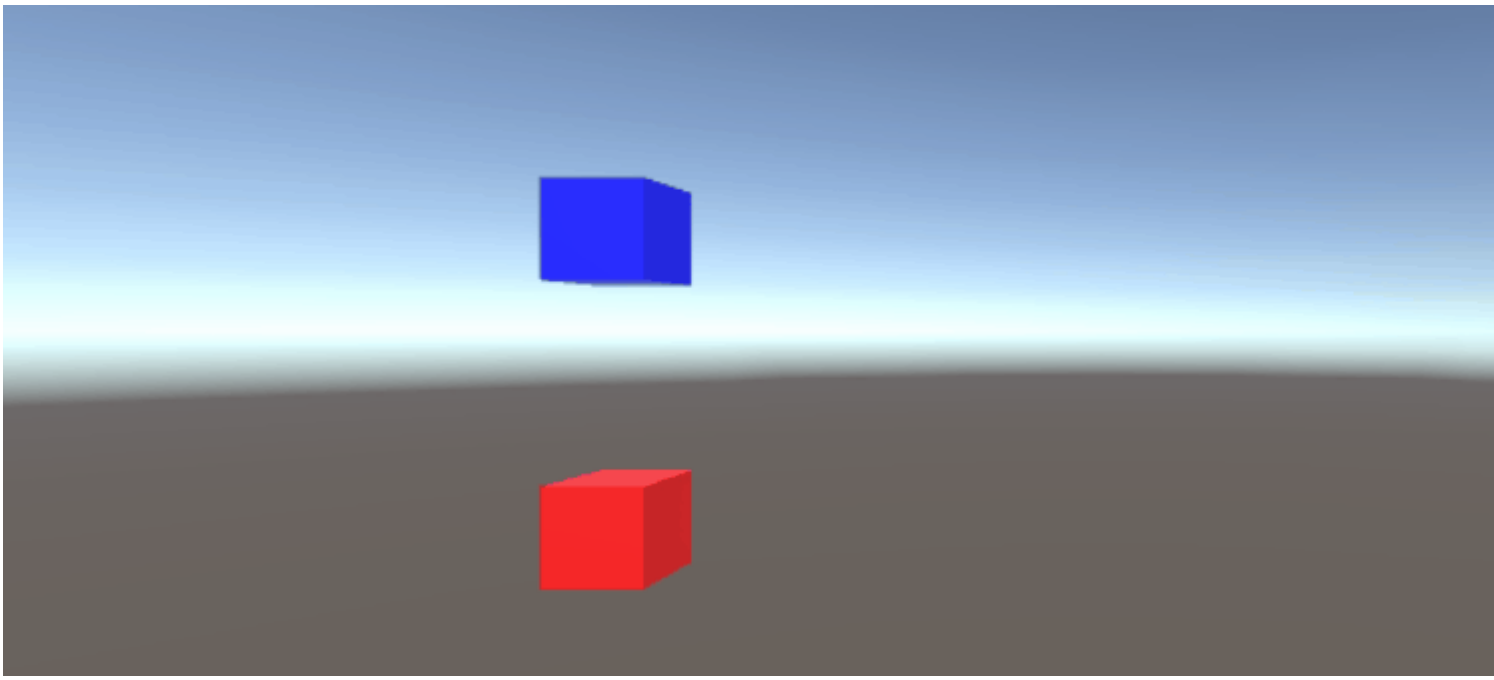
lerp◦ Lerp LerpUnclamped◦

float◦ 0.5 Vector3◦ 01Vector3 Vector3 Vector3 ◦ ◦ ◦

Lerp 01◦ ◦ LerpUnclamped◦

LerpLerpUnclamped◦

```
using UnityEngine;

public class Lerping : MonoBehaviour
{
    /// <summary>The red box will use Lerp to move. We will link
    /// this object in via the inspector.</summary>
    public GameObject lerpObject;
    /// <summary>The starting position for our red box.</summary>
    public Vector3 lerpStart = new Vector3(0, 0, 0);
    /// <summary>The end position for our red box.</summary>
    public Vector3 lerpTarget = new Vector3(5, 0, 0);

    /// <summary>The blue box will use LerpUnclamped to move. We will
    /// link this object in via the inspector.</summary>
    public GameObject lerpUnclampedObject;
    /// <summary>The starting position for our blue box.</summary>
    public Vector3 lerpUnclampedStart = new Vector3(0, 3, 0);
    /// <summary>The end position for our blue box.</summary>
    public Vector3 lerpUnclampedTarget = new Vector3(5, 3, 0);

    /// <summary>The current fraction to increment our lerp functions by.</summary>
    public float lerpFraction = 0;

    private void Update()
    {
        // First, I increment the lerp fraction.
        // delaTime * 0.25 should give me a value of +1 every second.
        lerpFraction += (Time.deltaTime * 0.25f);

        // Next, we apply the new lerp values to the target transform position.
        lerpObject.transform.position
            = Vector3.Lerp(lerpStart, lerpTarget, lerpFraction);
        lerpUnclampedObject.transform.position
            = Vector3.LerpUnclamped(lerpUnclampedStart, lerpUnclampedTarget, lerpFraction);
    }
}
```



MoveTowards

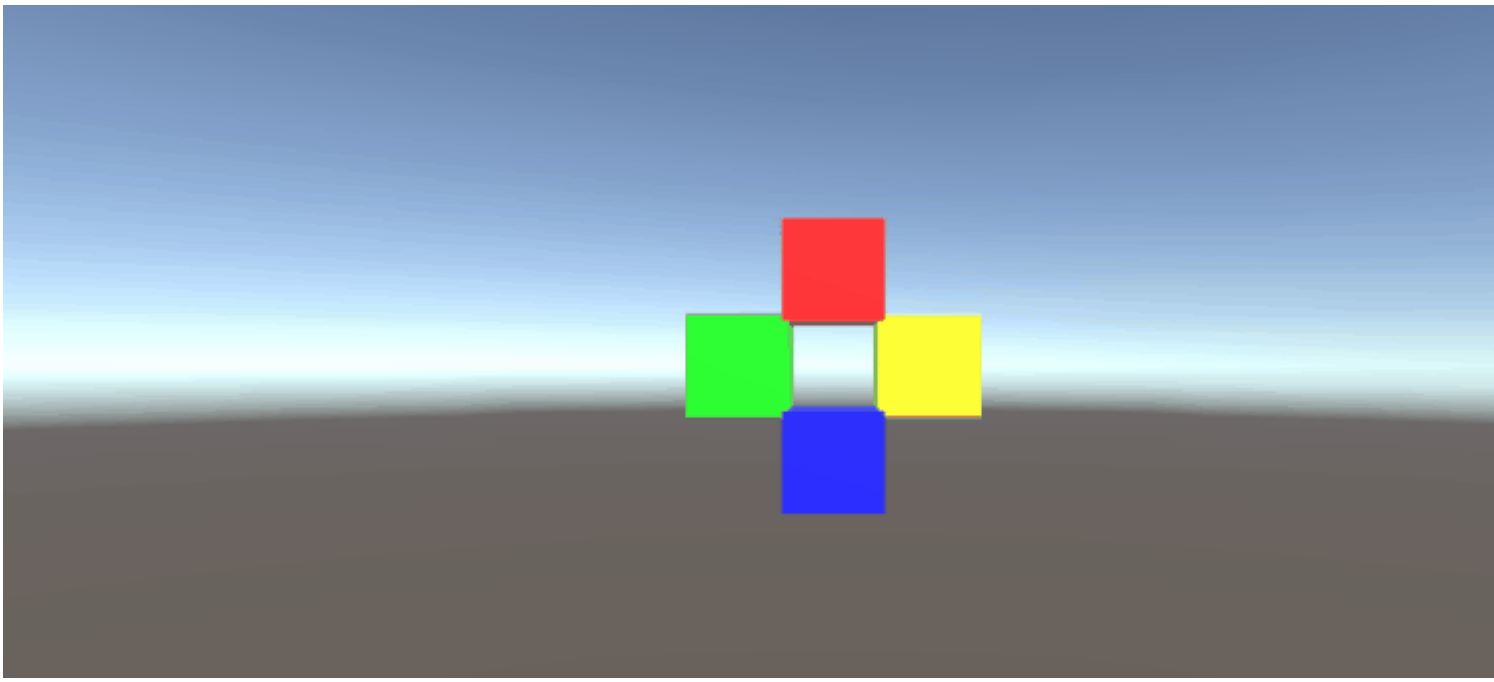
MoveTowards Lerp ；◦ MoveTowardsVector3 ◦

LerpUnclampedVector3 ◦ Vector3 ◦ Vector3“”;Vector3Vector3 ◦

MoveTowards◦

```
using UnityEngine;

public class MoveTowardsExample : MonoBehaviour
{
    /// <summary>The red cube will move up, the blue cube will move down,
    /// the green cube will move left and the yellow cube will move right.
    /// These objects will be linked via the inspector.</summary>
    public GameObject upCube, downCube, leftCube, rightCube;
    /// <summary>The cubes should move at 1 unit per second.</summary>
    float speed = 1f;

    void Update()
    {
        // We determine our distance by applying a deltaTime scale to our speed.
        float distance = speed * Time.deltaTime;

        // The up cube will move upwards, until it reaches the
        //position of (Vector3.up * 2), or (0, 2, 0).
        upCube.transform.position
            = Vector3.MoveTowards(upCube.transform.position, (Vector3.up * 2f), distance);

        // The down cube will move downwards, as it enforces a negative distance..
        downCube.transform.position
            = Vector3.MoveTowards(downCube.transform.position, Vector3.up * 2f, -distance);

        // The right cube will move to the right, indefinetly, as it is constantly updating
```

```
        // its target position with a direction based off the current position.
        rightCube.transform.position = Vector3.MoveTowards(rightCube.transform.position,
            rightCube.transform.position + Vector3.right, distance);

        // The left cube does not need to account for updating its target position,
        // as it is moving away from the target position, and will never reach it.
        leftCube.transform.position
            = Vector3.MoveTowards(leftCube.transform.position, Vector3.right, -distance);
    }
}
```



SmoothDamp

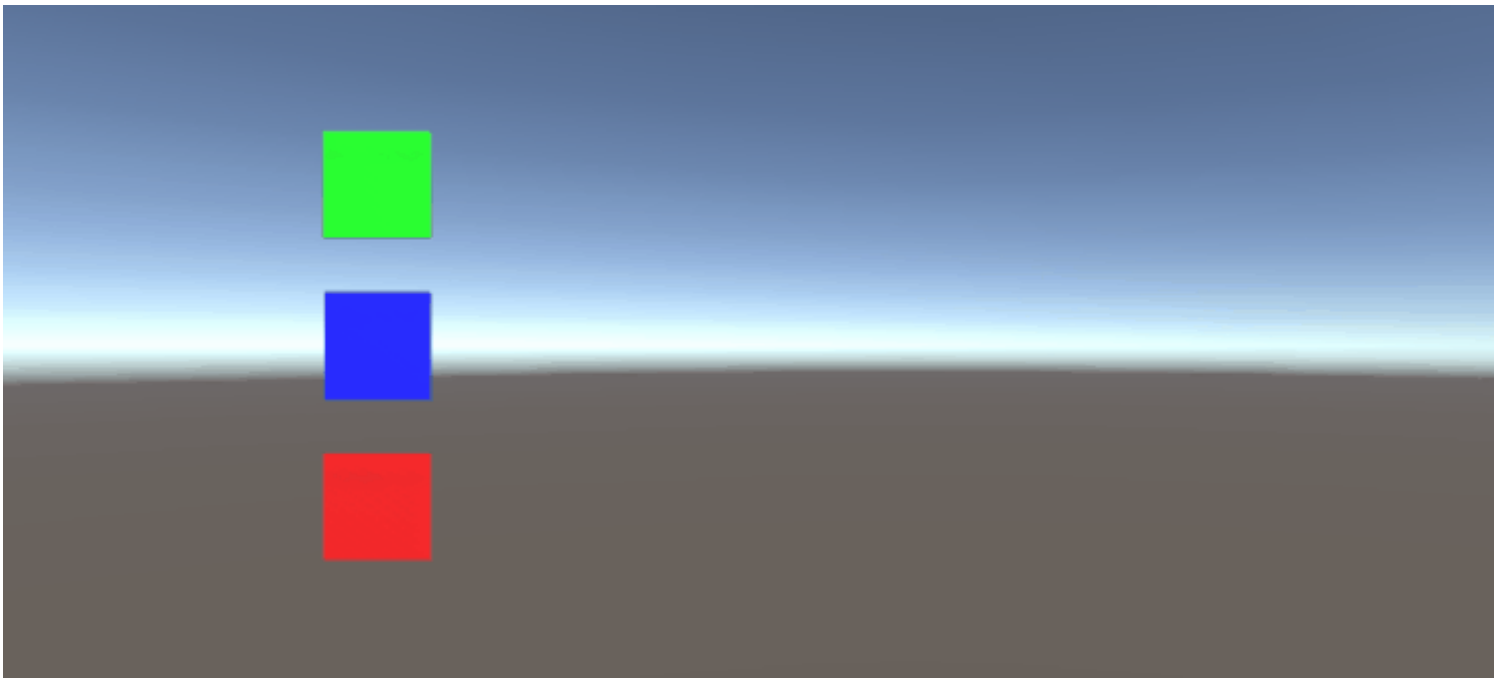
SmoothDampMoveTowards◦ ◦

Vector3Vector3 float◦ ◦ ◦

float floatSmoothDamp◦ ;Time.deltaTime ◦ MonoBehaviour.Update()◦

```
using UnityEngine;

public class SmoothDampMovement : MonoBehaviour
{
    /// <summary>The red cube will imitate the default SmoothDamp function.
    /// The blue cube will move faster by manipulating the "time gap", while
    /// the green cube will have an enforced maximum speed. Note that these
    /// objects have been linked via the inspector.</summary>
    public GameObject smoothObject, fastSmoothObject, cappedSmoothObject;

    /// <summary>We must instantiate the velocities, externally, so they may
    /// be manipulated from within the function. Note that by making these
    /// vectors public, they will be automatically instantiated as Vector3.Zero
    /// through the inspector. This also allows us to view the velocities,
```

```
    /// from the inspector, to observe how they change.</summary>
    public Vector3 regularVelocity, fastVelocity, cappedVelocity;

    /// <summary>Each object should move 10 units along the X-axis.</summary>
    Vector3 regularTarget = new Vector3(10f, 0f);
    Vector3 fastTarget = new Vector3(10f, 1.5f);
    Vector3 cappedTarget = new Vector3(10f, 3f);

    /// <summary>We will give a target time of 5 seconds.</summary>
    float targetTime = 5f;

    void Update()
    {
        // The default SmoothDamp function will give us a general smooth movement.
        smoothObject.transform.position = Vector3.SmoothDamp(smoothObject.transform.position,
            regularTarget, ref regularVelocity, targetTime);

        // Note that a "maxSpeed" outside of reasonable limitations should not have any
        // effect, while providing a "deltaTime" of 0 tells the function that no time has
        // passed since the last SmoothDamp call, resulting in no movement, the second time.
        smoothObject.transform.position = Vector3.SmoothDamp(smoothObject.transform.position,
            regularTarget, ref regularVelocity, targetTime, 10f, 0f);

        // Note that "deltaTime" defaults to Time.deltaTime due to an assumption that this
        // function will be called once per update function. We can call the function
        // multiple times during an update function, but the function will assume that enough
        // time has passed to continue the same approximate movement. As a result,
        // this object should reach the target, quicker.
        fastSmoothObject.transform.position = Vector3.SmoothDamp(
            fastSmoothObject.transform.position, fastTarget, ref fastVelocity, targetTime);
        fastSmoothObject.transform.position = Vector3.SmoothDamp(
            fastSmoothObject.transform.position, fastTarget, ref fastVelocity, targetTime);

        // Lastly, note that a "maxSpeed" becomes irrelevant, if the object does not
        // realistically reach such speeds. Linear speed can be determined as
        // (Distance / Time), but given the simple fact that we start and end slow, we can
        // infer that speed will actually be higher, during the middle. As such, we can
        // infer that a value of (Distance / Time) or (10/5) will affect the
        // function. We will half the "maxSpeed", again, to make it more noticeable.
        cappedSmoothObject.transform.position = Vector3.SmoothDamp(
            cappedSmoothObject.transform.position,
            cappedTarget, ref cappedVelocity, targetTime, 1f);
    }
}
```



Vector3 https://riptutorial.com/zh-TW/unity3d/topic/7827/vector3

27:

Examples

Box Collider

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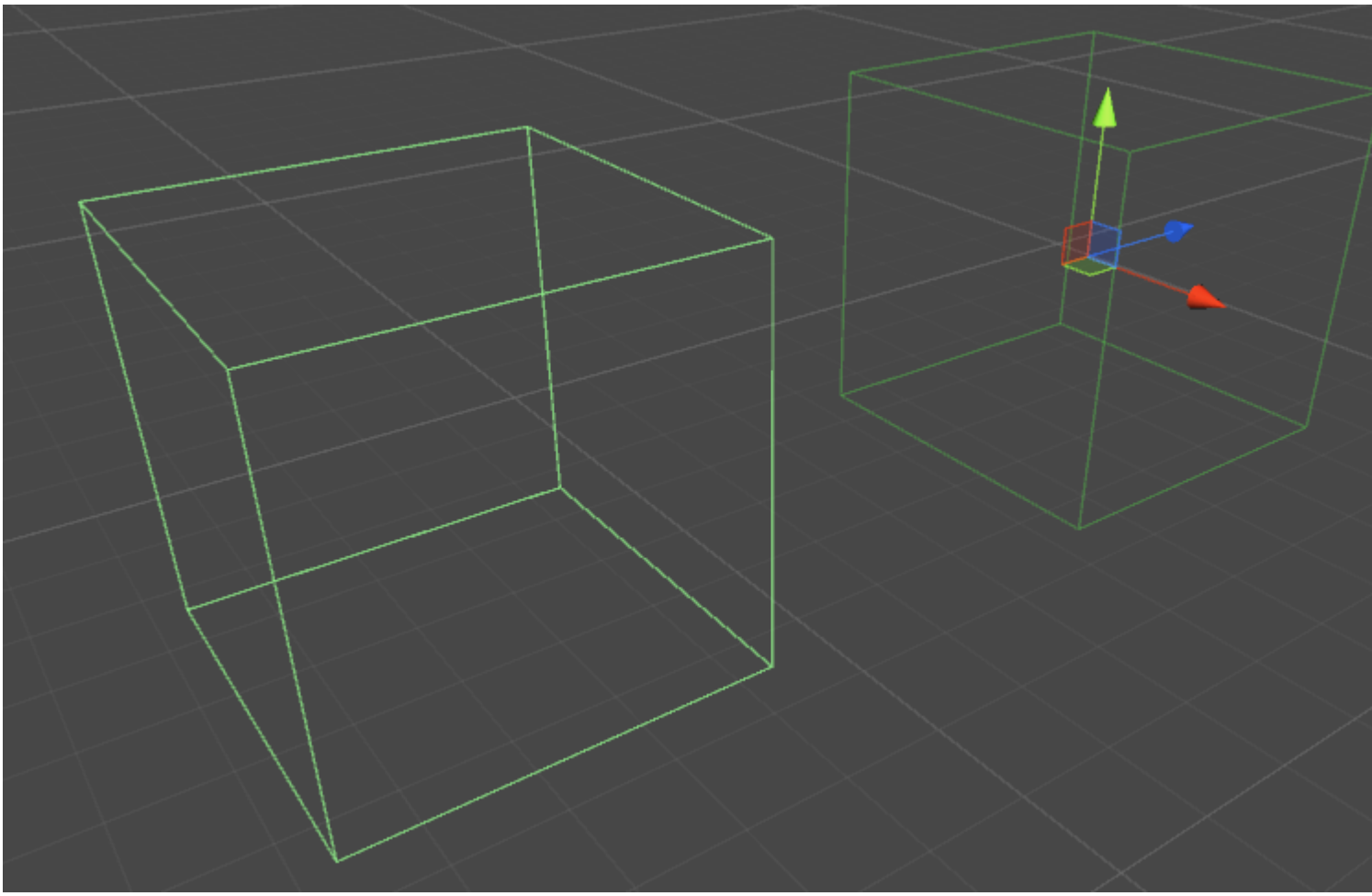


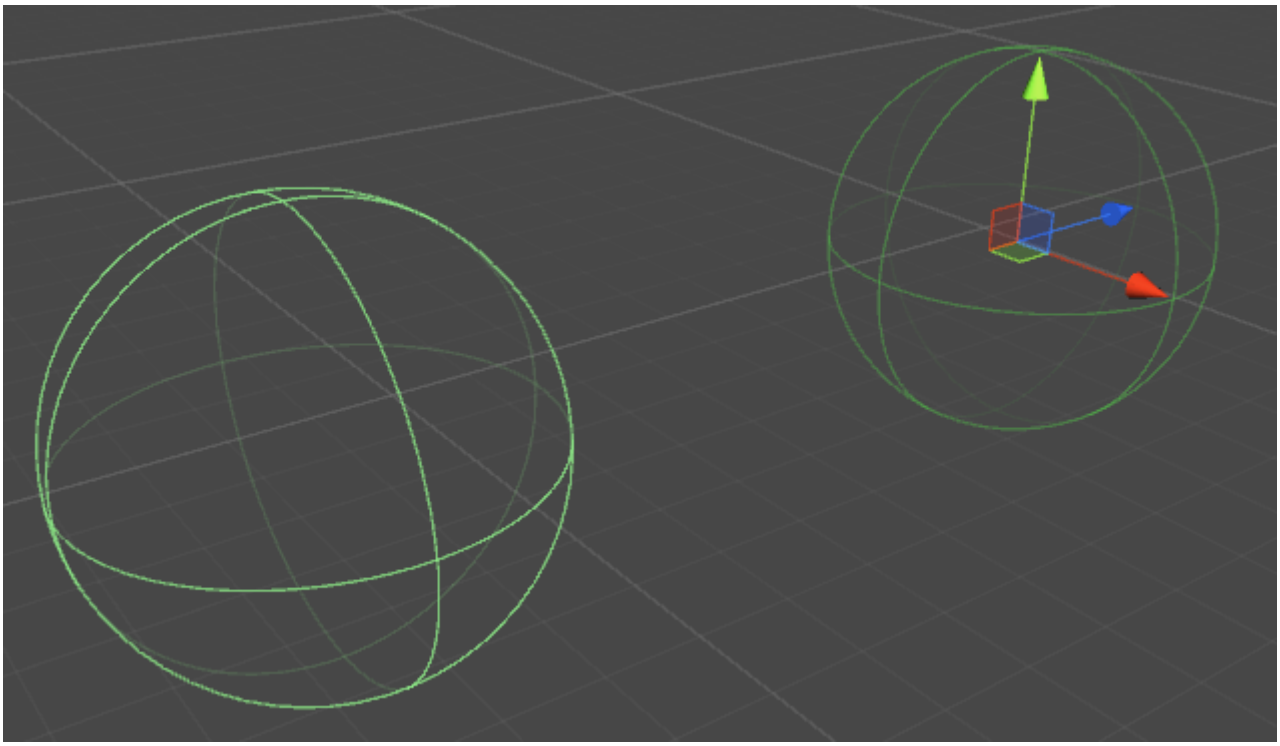
- - Box Collider
- - Box Collider
- - Box Collider
- - Box Collider

```
// Add a Box Collider to the current GameObject.
BoxCollider myBC = BoxCollider)myGameObject.gameObject.AddComponent(typeof(BoxCollider));

// Make the Box Collider into a Trigger Collider.
myBC.isTrigger= true;
```

```
// Set the center of the Box Collider to the center of the GameObject.
myBC.center = Vector3.zero;

// Make the Box Collider twice as large.
myBC.size = 2;
```

- 

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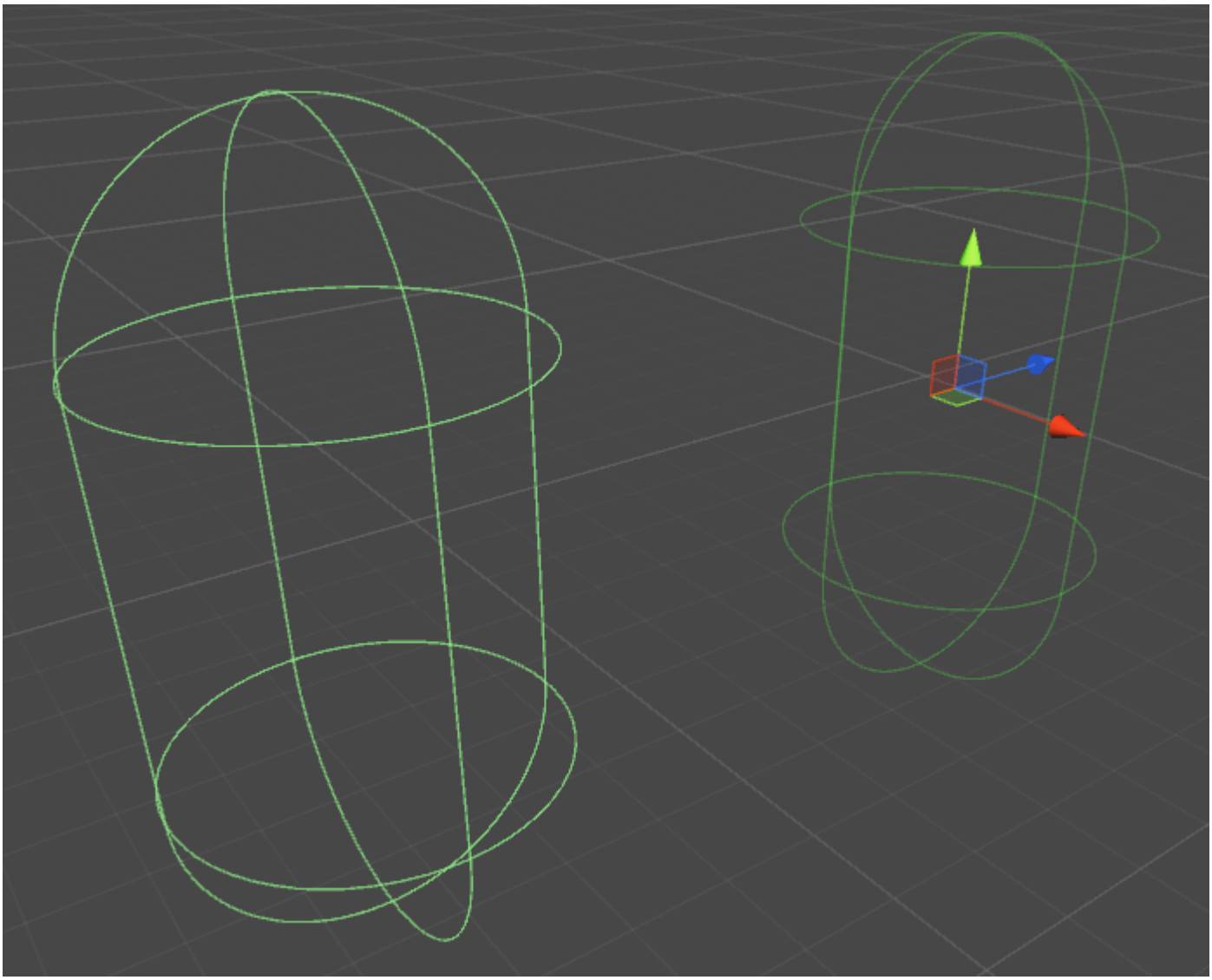
```
// Add a Sphere Collider to the current GameObject.
SphereCollider mySC =
SphereCollider)myGameObject.gameObject.AddComponent(typeof(SphereCollider));

// Make the Sphere Collider into a Trigger Collider.
mySC.isTrigger= true;

// Set the center of the Sphere Collider to the center of the GameObject.
mySC.center = Vector3.zero;

// Make the Sphere Collider twice as large.
mySC.radius = 2;
```

-



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```
// Add a Capsule Collider to the current GameObject.
CapsuleCollider myCC =
CapsuleCollider)myGameObject.gameObject.AddComponent(typeof(CapsuleCollider));

// Make the Capsule Collider into a Trigger Collider.
myCC.isTrigger= true;

// Set the center of the Capsule Collider to the center of the GameObject.
myCC.center = Vector3.zero;

// Make the Sphere Collider twice as tall.
```

```
myCC.height= 2;

// Make the Sphere Collider twice as wide.
myCC.radius= 2;

// Set the axis of lengthwise orientation to the X axis.
myCC.direction = 0;

// Set the axis of lengthwise orientation to the Y axis.
myCC.direction = 1;

// Set the axis of lengthwise orientation to the Y axis.
myCC.direction = 2;
```

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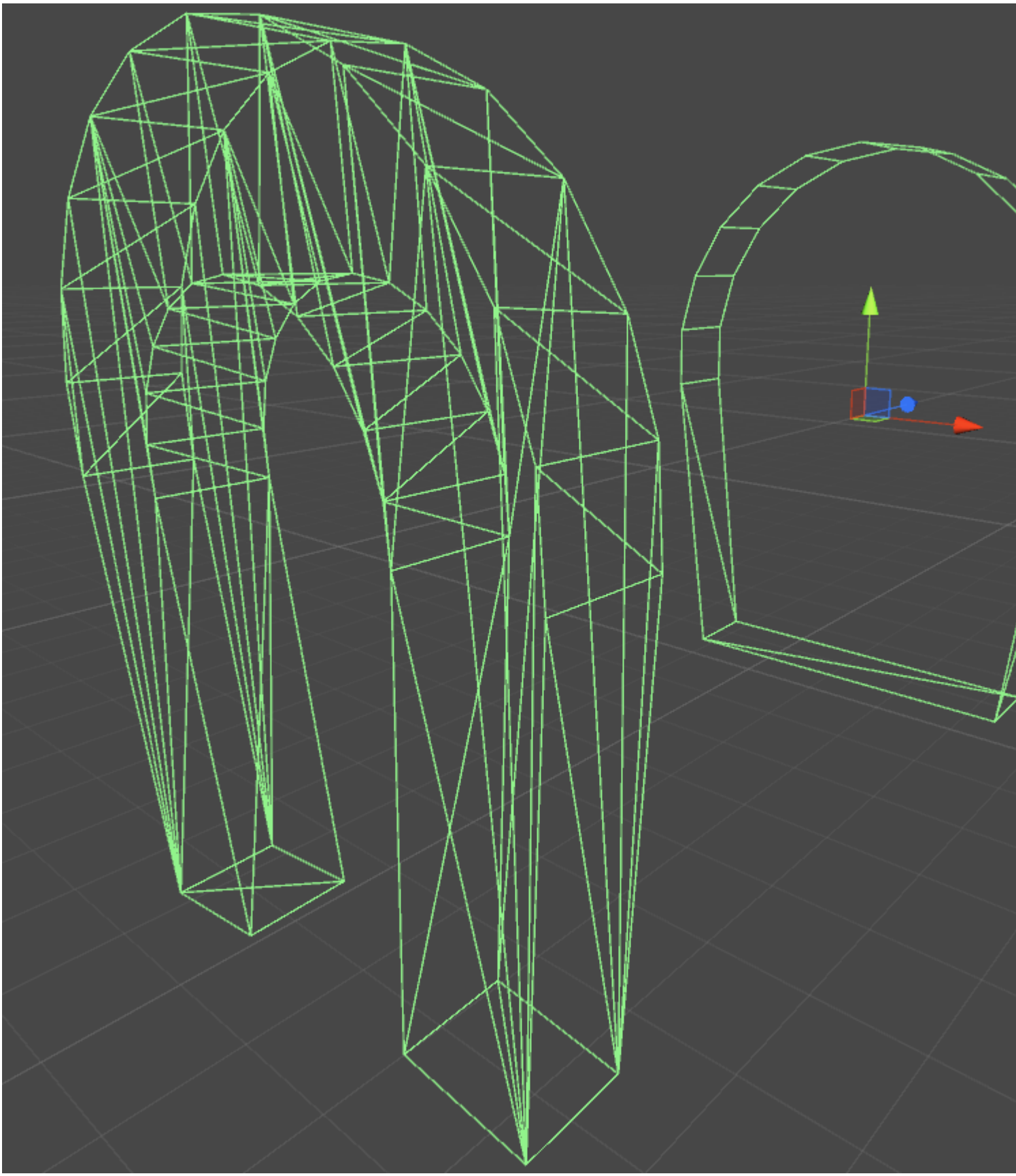

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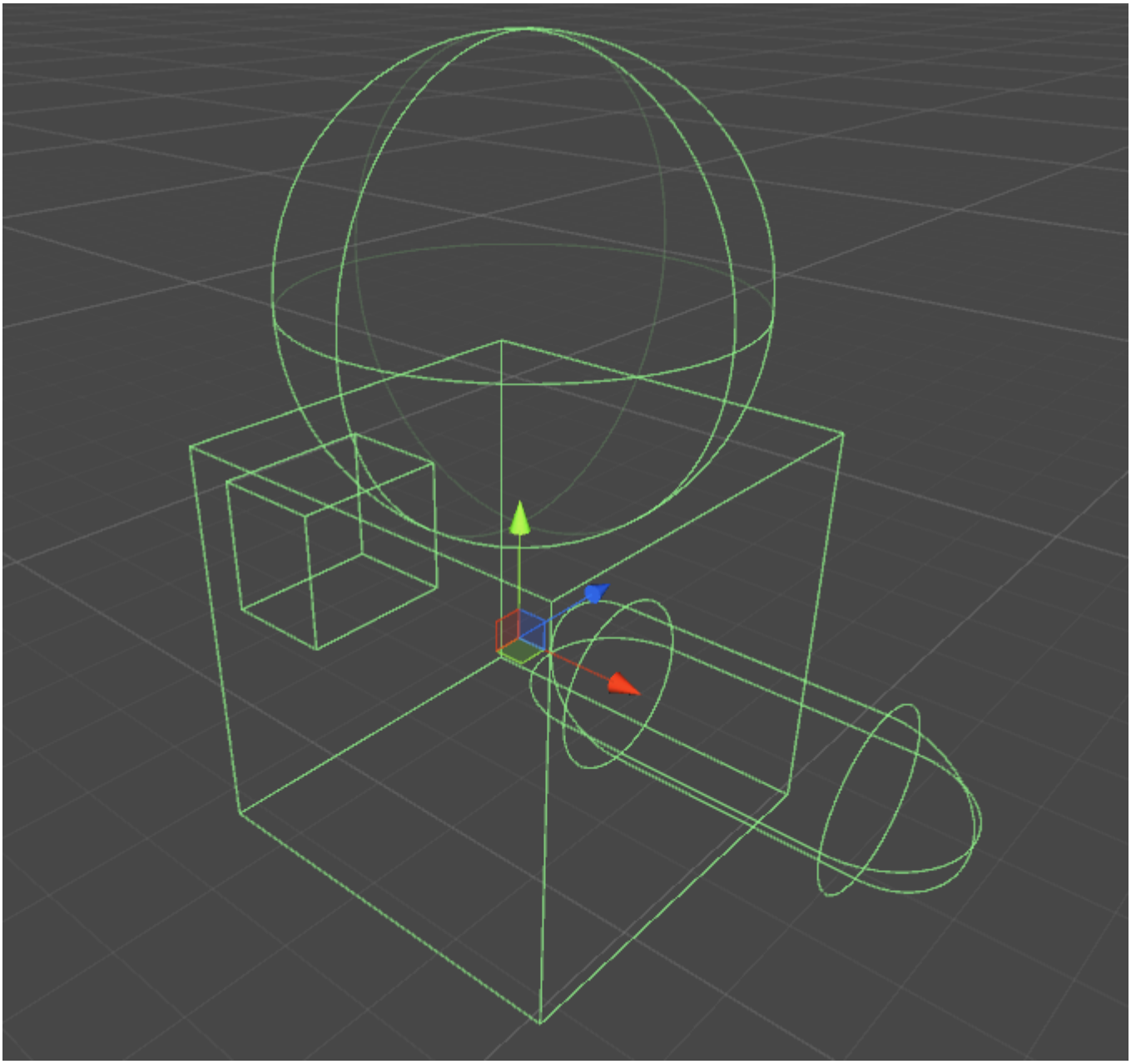

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Nvidia http
//docs.nvidia.com/gameworks/content/gameworkslibrary/physx/guide/Manual/Vehicles.html

- `OnTriggerEnter()`
- `OnTriggerStay()`
- `OnTriggerExit()`

Collider**Trigger** `OnTriggerEnter()` `OnTriggerStay()`OnTriggerExit()。。GameObject。

GameObject。GameObject。

```
void OnTriggerEnter(Collider other)
{
    //Check collider for specific properties (Such as tag=item or has component=item)
}
```

https://riptutorial.com/zh-TW/unity3d/topic/4405/

28:

- public static int Input.touchCount
- public static Touch Input.GetTouchint index

Examples

Unity`Input.GetTouch()`。

```
using UnityEngine;
using System.Collections;

public class TouchExample : MonoBehaviour {
    void Update() {
        if (Input.touchCount > 0 && Input.GetTouch(0).phase == TouchPhase.Began)
        {
            //Do Stuff
        }
    }
}
```

```
using UnityEngine;
using System.Collections;

public class TouchExample : MonoBehaviour {
    void Update() {
        for(int i = 0; i < Input.touchCount; i++)
        {
            if (Input.GetTouch(i).phase == TouchPhase.Began)
            {
                //Do Stuff
            }
        }
    }
}
```

。

TouchPhase

TouchPhase5TouchPhase

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```
public class TouchMoveExample : MonoBehaviour
{
    public float speed = 0.1f;

    void Update () {
        if(Input.touchCount > 0 && Input.GetTouch(0).phase == TouchPhase.Moved)
        {
            Vector2 touchDeltaPosition = Input.GetTouch(0).deltaPosition;
            transform.Translate(-touchDeltaPosition.x * speed, -touchDeltaPosition.y * speed,
0);
        }
    }
}
```

https://riptutorial.com/zh-TW/unity3d/topic/6285/

29: IMGUI

- public static void GUILayout.Labelstring textparams GUILayoutOption [] options
- public static bool GUILayout.Buttonstring textparams GUILayoutOption [] options
- public static string GUILayout.TextAreastring textparams GUILayoutOption [] options

Examples

GUILayout

UI。

```
void OnGUI ()
{
    GUILayout.Label ("I'm a simple label text displayed in game.");

    if ( GUILayout.Button("CLICK ME") )
    {
        GUILayout.TextArea ("This is a \n
                             multiline comment.")
    }
}
```

GUILayoutOnGUI。

IMGUI https://riptutorial.com/zh-TW/unity3d/topic/6947/-imgui-

30:

- public static Object PrefabUtility.InstantiatePrefabObject target;
- public static Object AssetDatabase.LoadAssetAtPathstring assetPathType type;
- public static Object Object.InstantiateObject original;
- public static Object Resources.Loadstring path;

Examples

GameObject。

-
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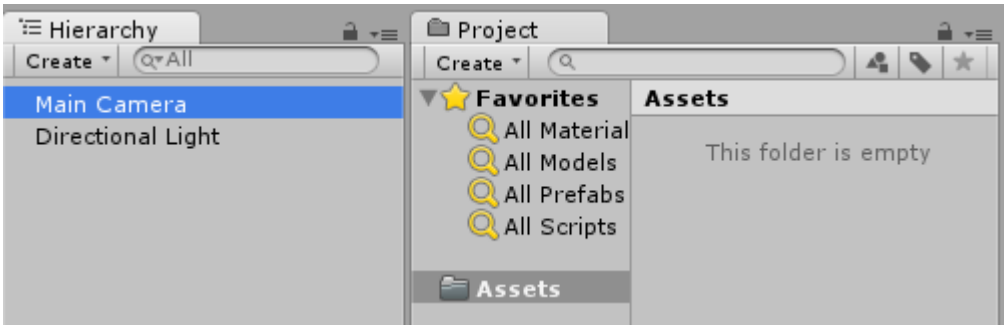
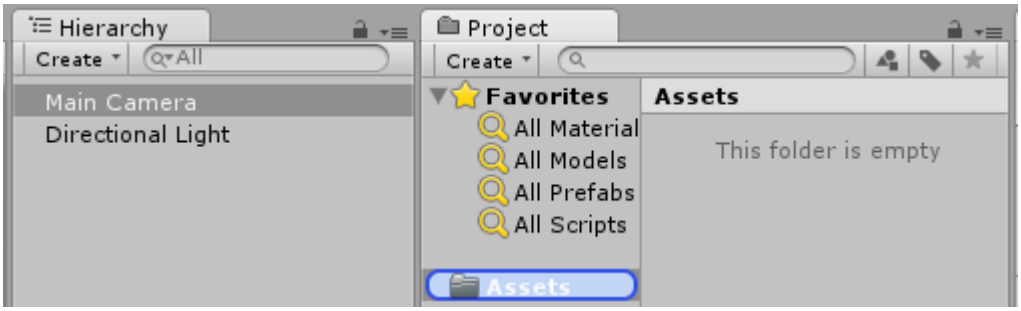
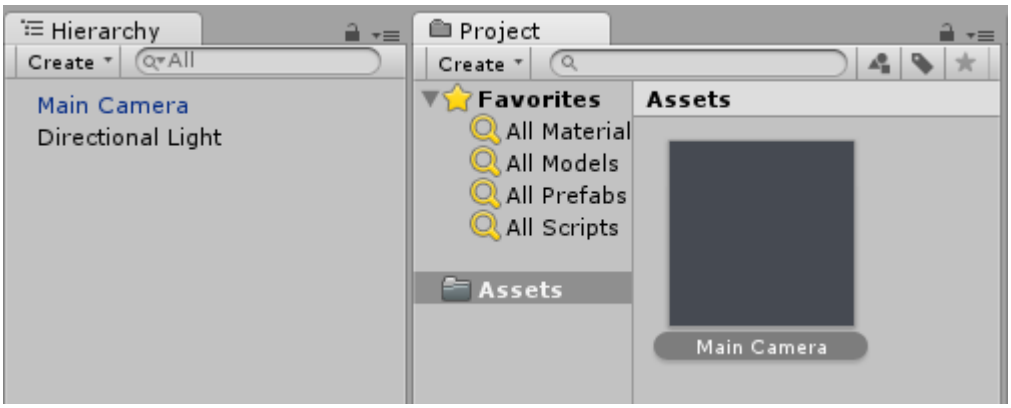
- /
-
- GameObjects

Unity“”。GameObjects。

Assets






Hierarchy
Create
All
Main Camera
Directional Light
Project
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Favorites
All Material
All Models
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All Scripts
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Assets
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Hierarchy
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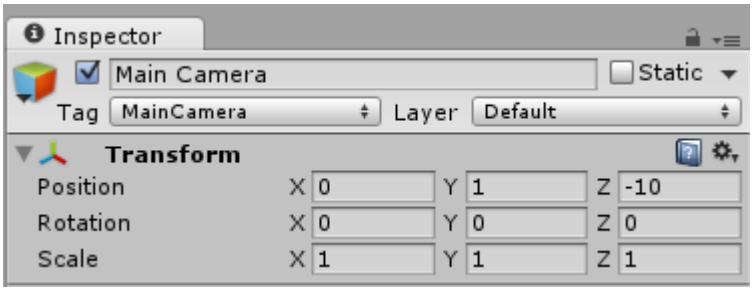
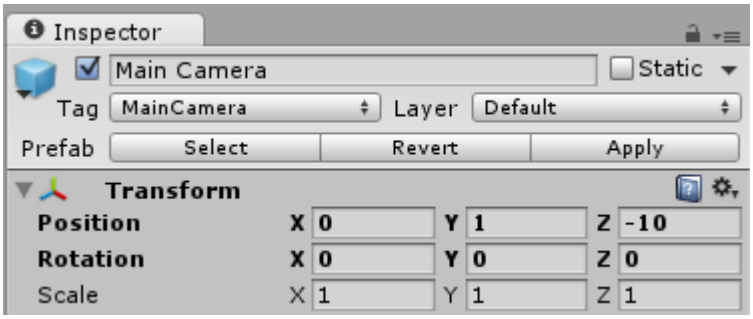

Inspector
Main Camera
Static
Tag
MainCamera
Layer
Default
Transform
Position
X 0
Y 1
Z -10
Rotation
X 0
Y 0
Z 0
Scale
X 1
Y 1
Z 1

VS


Inspector
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Y 1
Z -10
Rotation
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Y 0
Z 0
Scale
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Y 1
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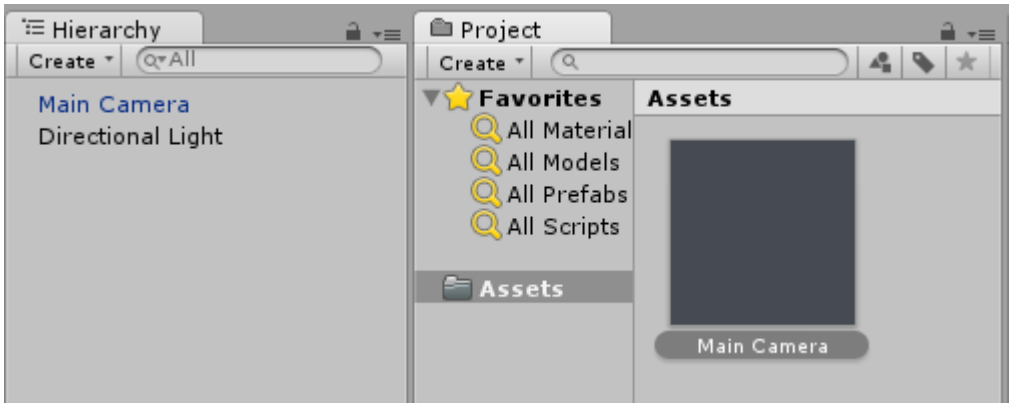

- `PrefabUtility.InstantiatePrefab()`

```
GameObject gameObject =
(GameObject)PrefabUtility.InstantiatePrefab(AssetDatabase.LoadAssetAtPath("Assets/MainCamera.pref
typeof(GameObject)));
```

---

5 。

。 `MonoBehaviourpublic GameObject`Unity

```
public class SomeScript : MonoBehaviour {
   public GameObject prefab;
}
```

Resource`Resources.Load`

```
GameObject prefab = Resources.Load("Assets/Resources/MainCamera");
```

prefab`Instantiate`

```
GameObject gameObject = Instantiate<GameObject>(prefab, new Vector3(0,0,0),
Quaternion.identity);
```

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Unity。 。

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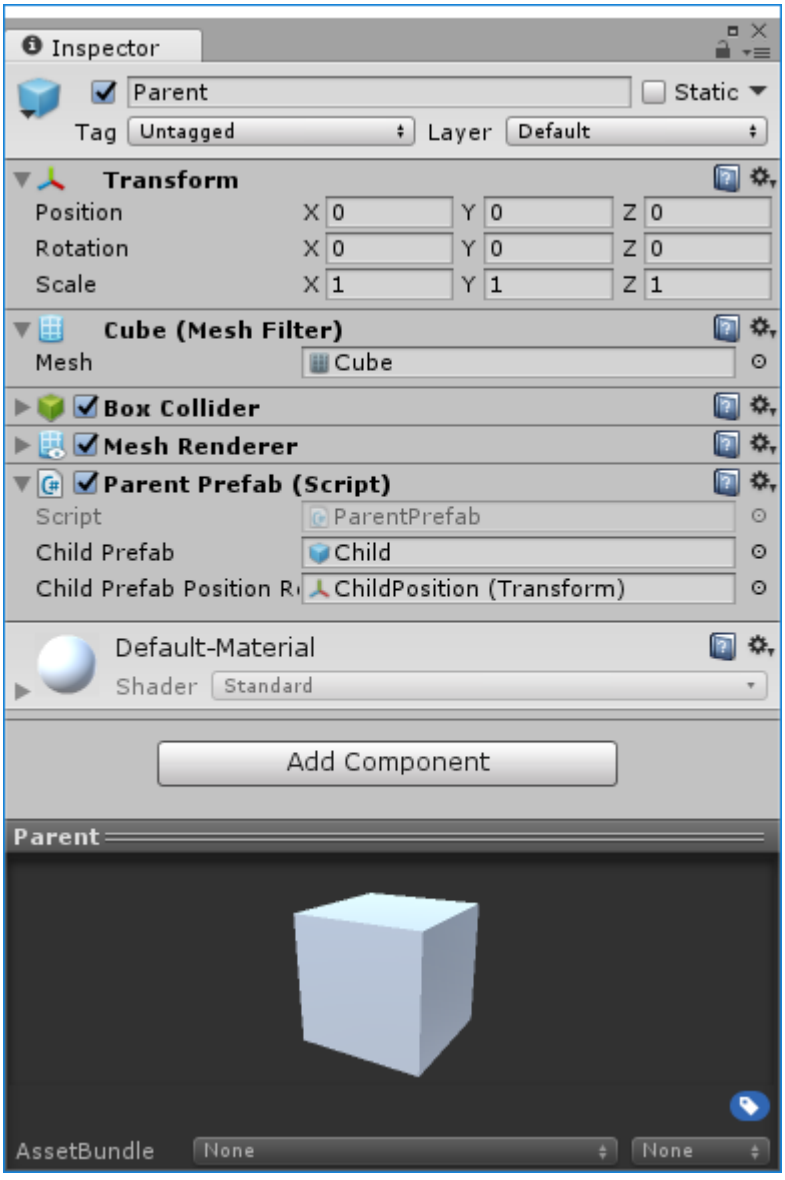
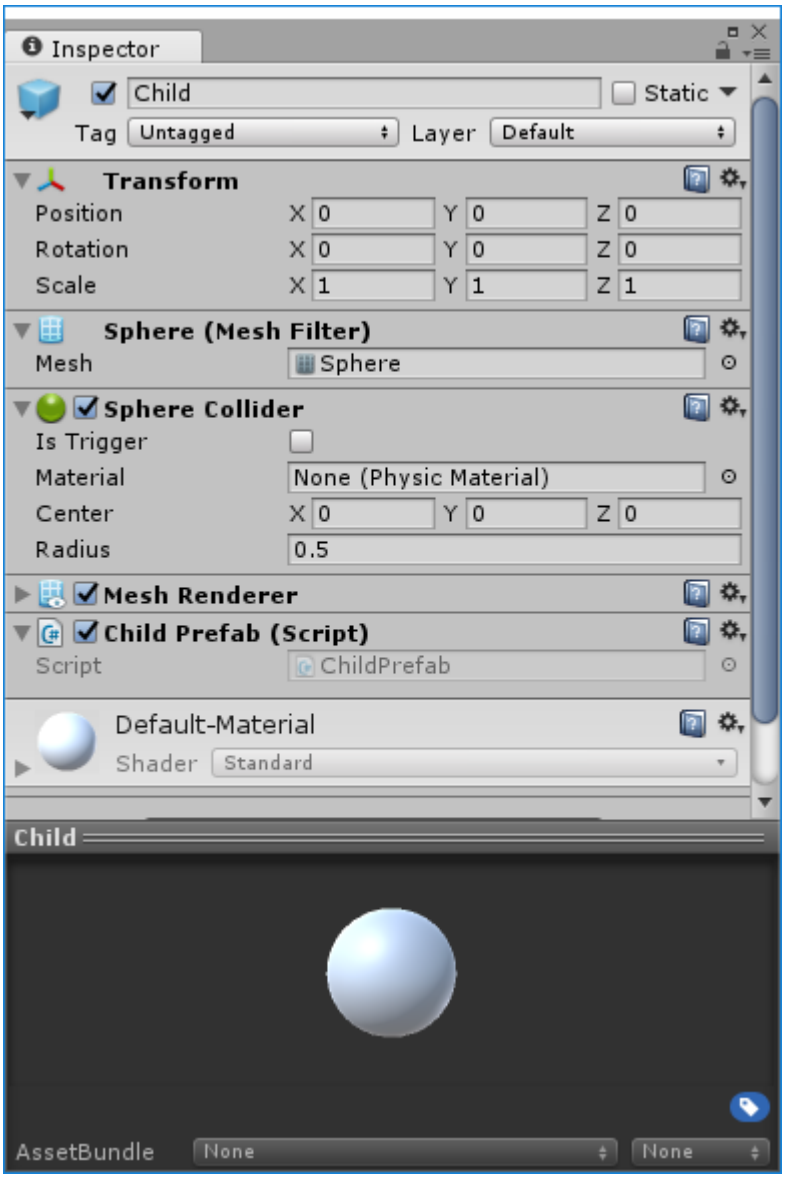
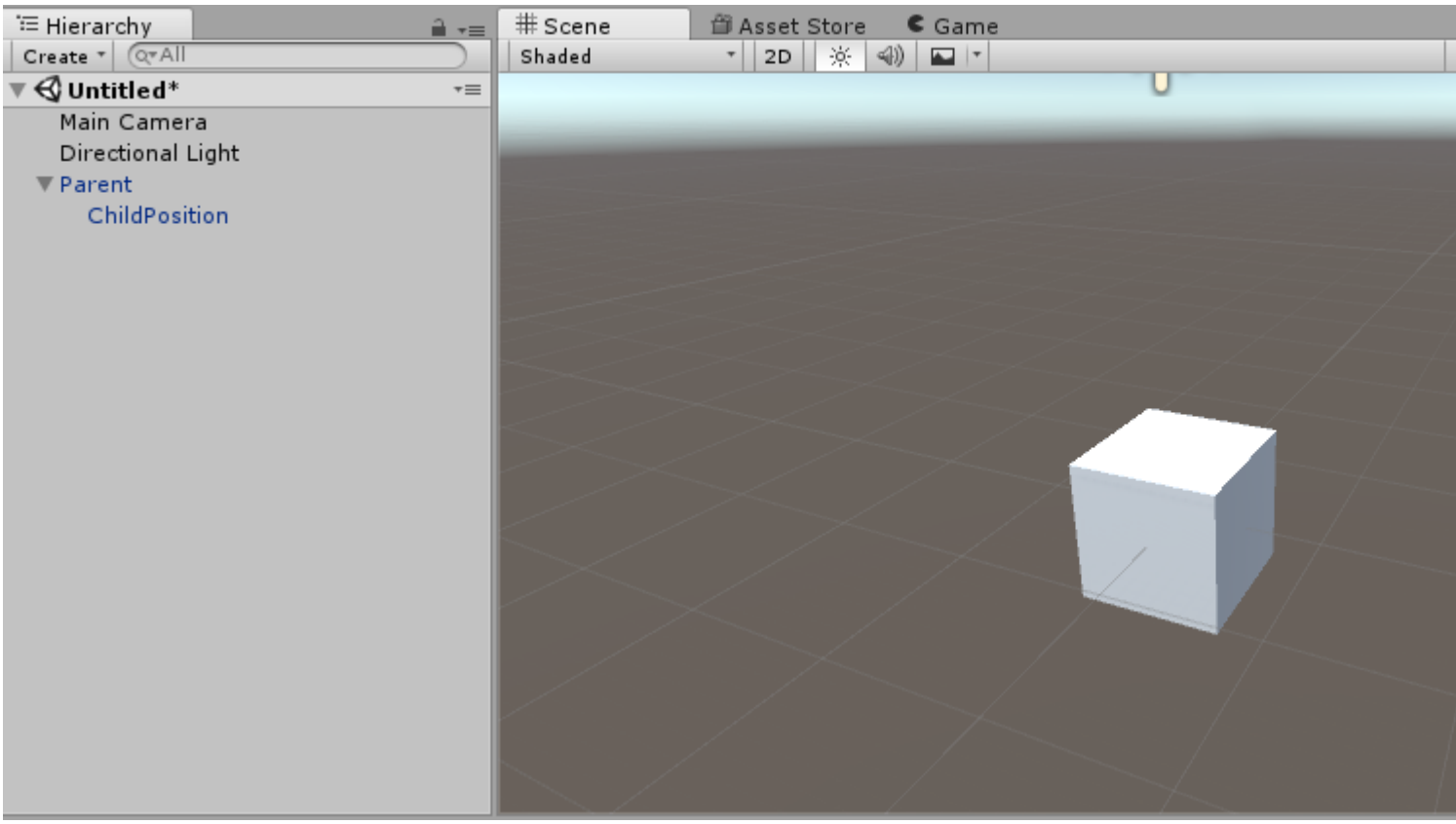
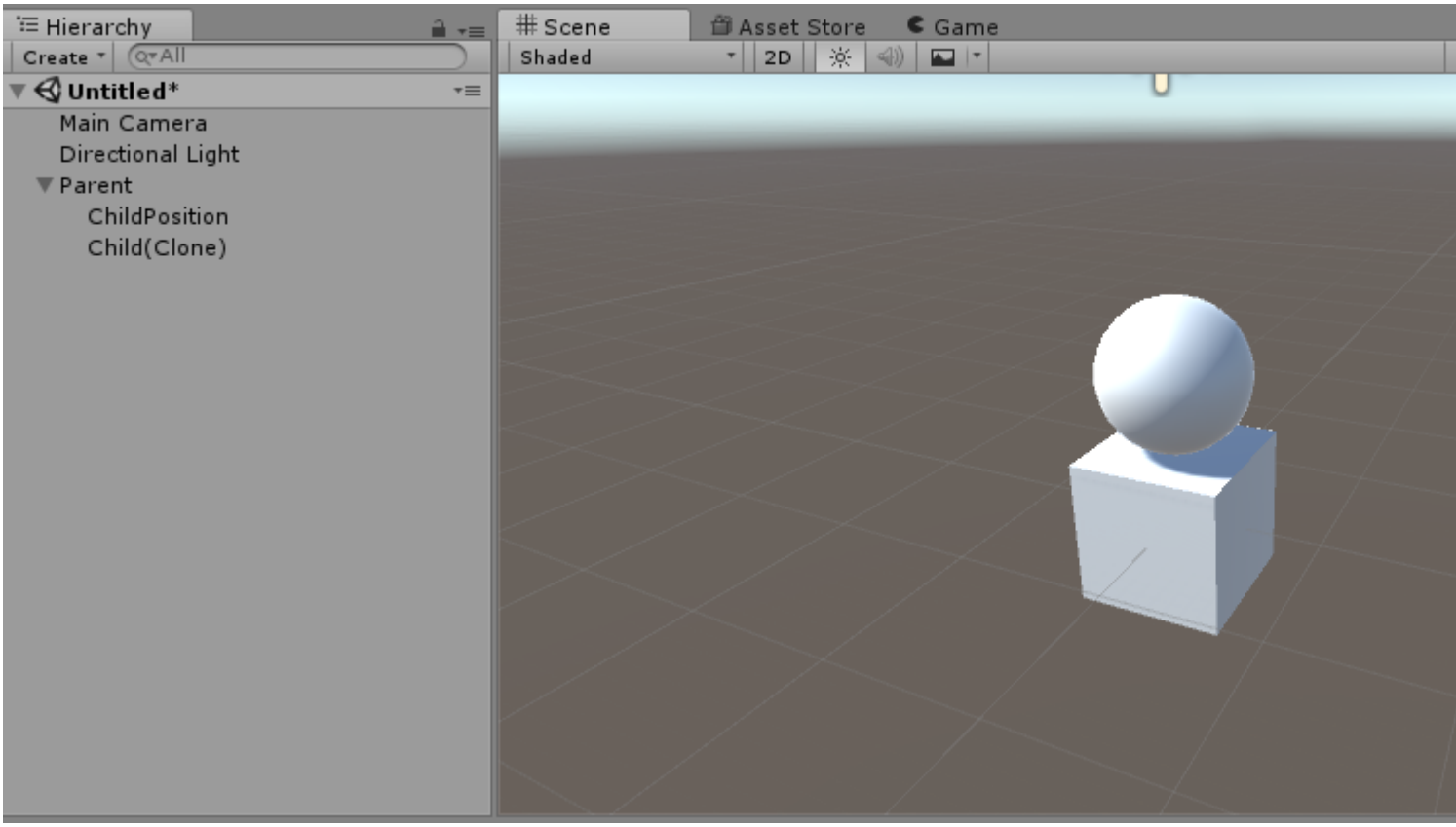
```
using UnityEngine;

public class ParentPrefab : MonoBehaviour {

    [SerializeField] GameObject childPrefab;
    [SerializeField] Transform childPrefabPositionReference;

    // Use this for initialization
    void Start () {
        print("Hello, I'm a parent prefab!");
        Instantiate(
            childPrefab,
            childPrefabPositionReference.position,
            childPrefabPositionReference.rotation,
            gameObject.transform
        );
    }
}
```




Inspector
Child
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
Sphere (Mesh Filter)
Mesh
Sphere
Sphere Collider
Is Trigger
Material
None (Physic Material)
Center
X 0
Y 0
Z 0
Radius
0.5
Mesh Renderer
Child Prefab (Script)
Script
ChildPrefab
Default-Material
Shader
Standard
Child
AssetBundle
None
None





https://riptutorial.com/zh-TW/unity3d/topic/2133/

31:

Unity

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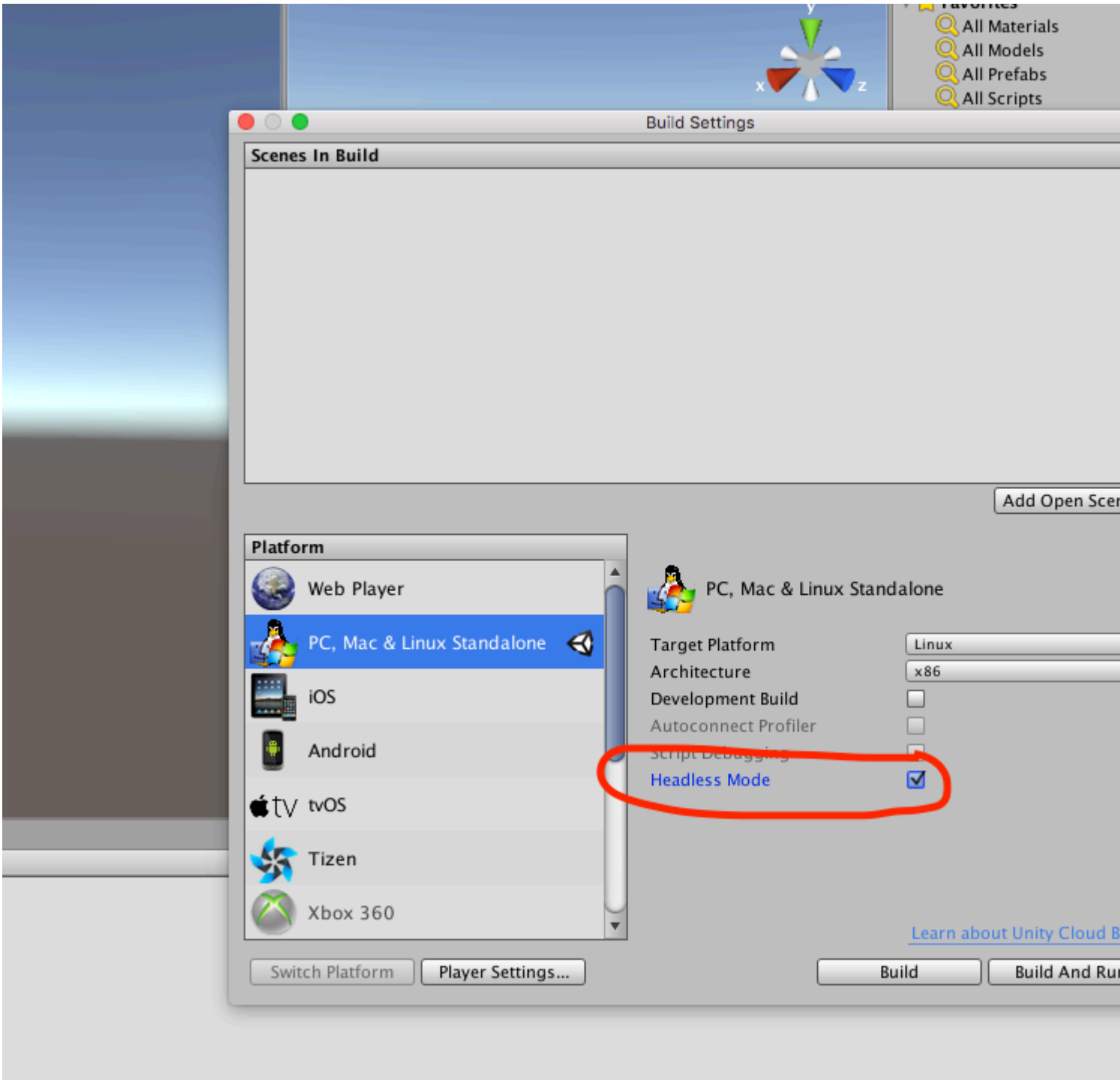

Examples

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UnityAPIHLA。

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HLA。

MessageBase。

```
using System;
using UnityEngine.Networking;

public class MyNetworkMessage : MessageBase
{
    public string message;
}
```

999910。

HLAid。 Unity NetworkingMsgType。id 32。。

ID。

```
using UnityEngine;
using System.Collections;
using UnityEngine.Networking;

public class Server : MonoBehaviour {

    int port = 9999;
    int maxConnections = 10;

    // The id we use to identify our messages and register the handler
    short messageID = 1000;

    // Use this for initialization
    void Start () {
        // Usually the server doesn't need to draw anything on the screen
        Application.runInBackground = true;
        CreateServer();
    }

    void CreateServer() {
        // Register handlers for the types of messages we can receive
        RegisterHandlers ();

        var config = new ConnectionConfig ();
        // There are different types of channels you can use, check the official documentation
        config.AddChannel (QosType.ReliableFragmented);
        config.AddChannel (QosType.UnreliableFragmented);

        var ht = new HostTopology (config, maxConnections);

        if (!NetworkServer.Configure (ht)) {
            Debug.Log ("No server created, error on the configuration definition");
```

```
            return;
        } else {
            // Start listening on the defined port
            if(NetworkServer.Listen (port))
                Debug.Log ("Server created, listening on port: " + port);
            else
                Debug.Log ("No server created, could not listen to the port: " + port);
        }
    }

    void OnApplicationQuit() {
        NetworkServer.Shutdown ();
    }

    private void RegisterHandlers () {
        // Unity have different Messages types defined in MsgType
        NetworkServer.RegisterHandler (MsgType.Connect, OnClientConnected);
        NetworkServer.RegisterHandler (MsgType.Disconnect, OnClientDisconnected);

        // Our message use his own message type.
        NetworkServer.RegisterHandler (messageID, OnMessageReceived);
    }

    private void RegisterHandler(short t, NetworkMessageDelegate handler) {
        NetworkServer.RegisterHandler (t, handler);
    }

    void OnClientConnected(NetworkMessage netMessage)
    {
        // Do stuff when a client connects to this server

        // Send a thank you message to the client that just connected
        MyNetworkMessage messageContainer = new MyNetworkMessage();
        messageContainer.message = "Thanks for joining!";

        // This sends a message to a specific client, using the connectionId
        NetworkServer.SendToClient(netMessage.conn.connectionId,messageID,messageContainer);

        // Send a message to all the clients connected
        messageContainer = new MyNetworkMessage();
        messageContainer.message = "A new player has conencted to the server";

        // Broadcast a message a to everyone connected
        NetworkServer.SendToAll(messageID,messageContainer);
    }

    void OnClientDisconnected(NetworkMessage netMessage)
    {
        // Do stuff when a client dissconnects
    }

    void OnMessageReceived(NetworkMessage netMessage)
    {
        // You can send any object that inherence from MessageBase
        // The client and server can be on different projects, as long as the MyNetworkMessage
or the class you are using have the same implementation on both projects
        // The first thing we do is deserialize the message to our custom type
        var objectMessage = netMessage.ReadMessage<MyNetworkMessage>();
        Debug.Log("Message received: " + objectMessage.message);

    }
```

```
}
```

```
using System;
using UnityEngine;
using UnityEngine.Networking;


public class Client : MonoBehaviour
{
    int port = 9999;
    string ip = "localhost";

    // The id we use to identify our messages and register the handler
    short messageID = 1000;

    // The network client
    NetworkClient client;

    public Client ()
    {
        CreateClient();
    }

    void CreateClient()
    {
        var config = new ConnectionConfig ();

        // Config the Channels we will use
        config.AddChannel (QosType.ReliableFragmented);
        config.AddChannel (QosType.UnreliableFragmented);

        // Create the client ant attach the configuration
        client = new NetworkClient ();
        client.Configure (config,1);

        // Register the handlers for the different network messages
        RegisterHandlers();

        // Connect to the server
        client.Connect (ip, port);
    }

    // Register the handlers for the different message types
    void RegisterHandlers () {

        // Unity have different Messages types defined in MsgType
        client.RegisterHandler (messageID, OnMessageReceived);
        client.RegisterHandler(MsgType.Connect, OnConnected);
        client.RegisterHandler(MsgType.Disconnect, OnDisconnected);
    }

    void OnConnected(NetworkMessage message) {
        // Do stuff when connected to the server

        MyNetworkMessage messageContainer = new MyNetworkMessage();
        messageContainer.message = "Hello server!";

        // Say hi to the server when connected
        client.Send(messageID,messageContainer);
```

```
    }

    void OnDisconnected(NetworkMessage message) {
        // Do stuff when disconnected to the server
    }

    // Message received from the server
    void OnMessageReceived(NetworkMessage netMessage)
    {
        // You can send any object that inherence from MessageBase
        // The client and server can be on different projects, as long as the MyNetworkMessage
or the class you are using have the same implementation on both projects
        // The first thing we do is deserialize the message to our custom type
        var objectMessage = netMessage.ReadMessage<MyNetworkMessage>();

        Debug.Log("Message received: " + objectMessage.message);
    }
}
```

https://riptutorial.com/zh-TW/unity3d/topic/5671/

32:

Examples

GetWeb。`new WWW("https://urlexample.com");`**Get**。

```
using UnityEngine;
using System.Collections;

public class ExampleClass : MonoBehaviour
{
    public string url = "http://google.com";

    IEnumerator Start()
    {
        WWW www = new WWW(url); // One get.
        yield return www;
        Debug.Log(www.text); // The data of the url.
    }
}
```

www。

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```
void Login(string id, string pwd)
{
    WWWForm dataParameters = new WWWForm();    // Create a new form.
    dataParameters.AddField("username", id);
    dataParameters.AddField("password", pwd);   // Add fields.
    WWW www = new WWW(url+"/account/login",dataParameters);
    StartCoroutine("PostdataEnumerator", www);
}

IEnumerator PostdataEnumerator(WWW www)
{
    yield return www;
    if (!string.IsNullOrEmpty(www.error))
    {
        Debug.Log(www.error);
    }
    else
    {
        Debug.Log("Data Submitted");
    }
}
```

。**www**

Zip

```
string mainUrl = "http://server/upload/";
```

```
string saveLocation;

void Start()
{
    saveLocation = "ftp:///home/xxx/x.zip"; // The file path.
    StartCoroutine(PrepareFile());
}

// Prepare The File.
IEnumerator PrepareFile()
{
    Debug.Log("saveLoacation = " + saveLocation);

    // Read the zip file.
    WWW loadTheZip = new WWW(saveLocation);

    yield return loadTheZip;

    PrepareStepTwo(loadTheZip);
}

void PrepareStepTwo(WWW post)
{
    StartCoroutine(UploadTheZip(post));
}

// Upload.
IEnumerator UploadTheZip(WWW post)
{
    // Create a form.
    WWWForm form = new WWWForm();

    // Add the file.
    form.AddBinaryData("myTestFile.zip",post.bytes,"myFile.zip","application/zip");

    // Send POST request.
    string url = mainUrl;
    WWW POSTZIP = new WWW(url,form);

    Debug.Log("Sending zip...");
    yield return POSTZIP;
    Debug.Log("Zip sent!");
}
```

UnityCoroutines 。

Unity。 。 。

- 。

C

```
using System.Net;
using System.Text;

public class TestCommunicationWithServer
{
    public string SendDataToServer(string url, string username, string password)
```

```
    {
        WebClient client = new WebClient();

        // This specialized key-value pair will store the form data we're sending to the
server
        var loginData = new System.Collections.Specialized.NameValueCollection();
        loginData.Add("Username", username);
        loginData.Add("Password", password);

        // Upload client data and receive a response
        byte[] opBytes = client.UploadValues(ServerIpAddress, "POST", loginData);

        // Encode the response bytes into a proper string
        string opResponse = Encoding.UTF8.GetString(opBytes);

        return opResponse;
    }
```

WebClientNameValueCollectionusing。

SendDataToServer3

1. URL
2.
3.

。 。

WebClient。 NameValueCollection。

UploadValues3

1. IP
2. HTTP
3.

。 。

```
if(opResponse.Equals(ReturnMessage.Success))
{
    Debug.Log("Unity client has successfully sent and validated data on server.");
}
```

。

PHP。 PHP。 PHPUnity。

PHP

```
// Check to see if the unity client send the form data
if(!isset($_REQUEST['Username']) || !isset($_REQUEST['Password']))
{
    echo "Empty";
}
```

```
else
{
    // Unity sent us the data - its here so do whatever you want

    echo "Success";

}
```

- "。 。 。 。

Unity/ - 。

https://riptutorial.com/zh-TW/unity3d/topic/5578/

33: VR

Examples

VR

VR**Google Cardboard** **GearVR** PC**HTC ViveOculusPS VR** .....

Unity**Oculus Rift** **Google Carboard** **Steam VR** **Playstation VR** **Gear VRMicrosoft Hololens**
。

sdk。 sdk。

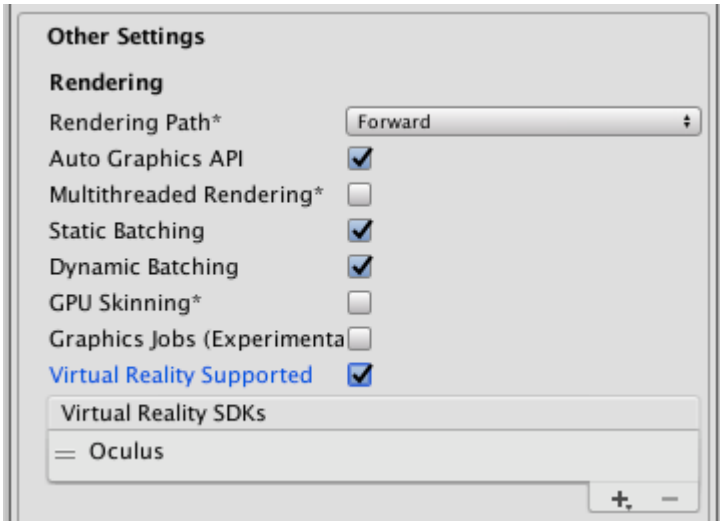
-
-
- GearVR Unity 5.3
- Oculus Rift
- HTC Vive / Open VR
- Hololens

- Google Cardboard / Daydream
- GearVR
- Oculus Rift
- HTC Vive
- Hololens

VR

Unity Editor >>。

“ ” “ ” 。



*Virtual Reality SDKs*VR。

VR。

1. 3 DOF
2. 6 DOF

3 DOFHMD33HMD - 。 HMDXYZ。

6 DOFXYZ6。

6 DOFVRRAM6×63200。

- Oculus Rift 6
- HTC Vive 6
- 3
- Oculus 3 VR
- 3

VR https://riptutorial.com/zh-TW/unity3d/topic/5787/-vr-

34:

Examples

MVC

◦ ◦ Unity◦

MVC◦

◦ ◦ Unity◦

- Monobehaviour
- Unity
- Unity APIModel

Player.cs

```
using System;

public class Player
{
    public delegate void PositionEvent(Vector3 position);
    public event PositionEvent OnPositionChanged;

    public Vector3 position
    {
        get
        {
            return _position;
        }
        set
        {
            if (_position != value) {
                _position = value;
                if (OnPositionChanged != null) {
                    OnPositionChanged(value);
                }
            }
        }
    }
    private Vector3 _position;
}
```

Vector3.cs

Vector3◦

```
using System;

public class Vector3
```

```
{
    public float x;
    public float y;
    public float z;

    public Vector3(float x, float y, float z)
    {
        this.x = x;
        this.y = y;
        this.z = z;
    }
}
```

◦ Monobehaviour◦ UnityAPI`OnCollisinEnter Start Update`...

- Monobehaviour
- Unity

PlayerView.cs

```
using UnityEngine;

public class PlayerView : Monobehaviour
{
    public void SetPosition(Vector3 position)
    {
        transform.position = position;
    }
}
```

◦ ◦ ◦

-
-
- Unity
- Monobehaviour

PlayerController.cs

```
using System;

public class PlayerController
{
    public Player model { get; private set; }
    public PlayerView view { get; private set; }

    public PlayerController(Player model, PlayerView view)
    {
        this.model = model;
        this.view = view;

        this.model.OnPositionChanged += OnPositionChanged;
    }

    private void OnPositionChanged(Vector3 position)
```

```
    {
        // Sync
        Vector3 pos = this.model.position;

        // Unity call required here! (we lost portability)
        this.view.SetPosition(new UnityEngine.Vector3(pos.x, pos.y, pos.z));
    }

    // Calling this will fire the OnPositionChanged event
    private void SetPosition(Vector3 position)
    {
        this.model.position = position;
    }
}
```

。

PlayerFactory.cs

```
using System;

public class PlayerFactory
{
    public PlayerController controller { get; private set; }
    public Player model { get; private set; }
    public PlayerView view { get; private set; }

    public void Load()
    {
        // Put the Player prefab inside the 'Resources' folder
        // Make sure it has the 'PlayerView' Component attached
        GameObject prefab = Resources.Load<GameObject>("Player");
        GameObject instance = GameObject.Instantiate<GameObject>(prefab);
        this.model = new Player();
        this.view = instance.GetComponent<PlayerView>();
        this.controller = new PlayerController(model, view);
    }
}
```

.....

Manager.cs

```
using UnityEngine;

public class Manager : Monobehaviour
{
    [ContextMenu("Load Player")]
    private void LoadPlayer()
    {
        new PlayerFactory().Load();
    }
}
```

ManagerGameObject“Load Player”。

。

https://riptutorial.com/zh-TW/unity3d/topic/10842/

35:

- void Transform.TranslateVector3 translationSpace relativeTo = Space.Self
- void Transform.Translatefloat xfloat yfloat zSpace relativeTo = Space.Self
- void Transform.RotateVector3 eulerAnglesSpace relativeTo = Space.Self
- void Transform.Rotatefloat xAnglefloat yAnglefloat zAngleSpace relativeTo = Space.Self
- void Transform.RotateVector3float angleSpace relativeTo = Space.Self
- void Transform.RotateAroundVector3 pointVector3 axisfloat angle
- void Transform.LookAtTransform targetVector3 worldUp = Vector3.up
- void Transform.LookAtVector3 worldPositionVector3 worldUp = Vector3.up

Examples

。 。 GameObjectTransform。

```
// Move an object 10 units in the positive x direction
transform.Translate(10, 0, 0);

// translating with a vector3
vector3 distanceToMove = new Vector3(5, 2, 0);
transform.Translate(distanceToMove);
```

```
// Rotate an object 45 degrees about the Y axis
transform.Rotate(0, 45, 0);

// Rotates an object about the axis passing through point (in world coordinates) by angle in
degrees
transform.RotateAround(point, axis, angle);
// Rotates on it's place, on the Y axis, with 90 degrees per second
transform.RotateAround(Vector3.zero, Vector3.up, 90 * Time.deltaTime);

// Rotates an object to make it's forward vector point towards the other object
transform.LookAt(otherTransform);
// Rotates an object to make it's forward vector point towards the given position (in world
coordinates)
transform.LookAt(new Vector3(10, 5, 0));
```

Unity。

`isKinematic == true` 。 AddForce。

Unity。 。

```
var other = GetOtherGameObject();
other.transform.SetParent( transform );
other.transform.SetParent( transform, worldPositionStays );
```

。 *worldPositionStays*false。

```
other.transform.IsChildOf( transform );
```

。

```
transform.Find( "other" );
transform.FindChild( "other" );
```

FindChild

。“/”。

```
transform.Find( "other/another" );
transform.FindChild( "other/another" );
```

GetChild

```
transform.GetChild( index );
```

GetChild

```
int count = transform.childCount;
```

GameObject。Z。

```
other.transform.SetSiblingIndex( index );
```

```
other.transform.SetAsFirstSibling();
other.transform.SetAsLastSibling();
```

```
foreach(Transform child in transform)
{
    child.parent = null;
}
```

Unity

```
transform.DetachChildren();
```

`DetachChildren()DetachChildren()DetachChildren()`null - `DetachChildren()` 。

https://riptutorial.com/zh-TW/unity3d/topic/2190/

36:

Examples

Resources。 。

Resources。 Resources。 `Resources`Resources。

。 Resources。

```
//Example of how to load language specific audio from Resources

[RequireComponent(typeof(AudioSource))]
public class loadIntroAudio : MonoBehaviour {
    void Start () {
        string language = Application.systemLanguage.ToString();
        AudioClip ac = Resources.Load(language + "/intro") as AudioClip; //loading intro.mp3
specific for user's language (note the file file extension should not be used)
        if (ac==null)
        {
            ac = Resources.Load("English/intro") as AudioClip; //fallback to the english
version for any unsupported language
        }
        transform.GetComponent<AudioSource>().clip = ac;
        transform.GetComponent<AudioSource>().Play();
    }
}
```

101

Unity“”。 “”

'Resources'UnityAssetBundlesUnity Docs

“Resources”AssetsResources。 'Resources'。

ResourcesResources.Load。 Resources。

```
public class ResourcesSample : MonoBehaviour {

    void Start () {
        //The following line will load a TextAsset named 'foobar' which was previously place
under 'Assets/Resources/Stackoverflow/foobar.txt'
        //Note the absence of the '.txt' extension! This is important!

        var text = Resources.Load<TextAsset>("Stackoverflow/foobar").text;
        Debug.Log(string.Format("The text file had this in it :: {0}", text));
    }
}
```

Resources。3D。

```
//This example will load a multiple sprite texture from Resources named "A_Multiple_Sprite"
var sprites = Resources.LoadAll("A_Multiple_Sprite") as Sprite[];
```

。GameObject“Resources / Sounds”

```
public class SoundManager : MonoBehaviour {

    void Start () {

        //An array of all sounds you want to load
        var filesToLoad = new string[] { "Foo", "Bar" };

        //Loop over the array, attach an Audio source for each sound clip and assign the
        //clip property.
        foreach(var file in filesToLoad) {
            var soundClip = Resources.Load<AudioClip>("Sounds/" + file);
            var audioSource = gameObject.AddComponent<AudioSource>();
            audioSource.clip = soundClip;
        }
    }
}
```

---

1. Unity。。Resources。

2. Resources.LoadResources.LoadAllResources.UnloadUnusedAssetsResources.UnloadAsset

https://riptutorial.com/zh-TW/unity3d/topic/4070/

37:

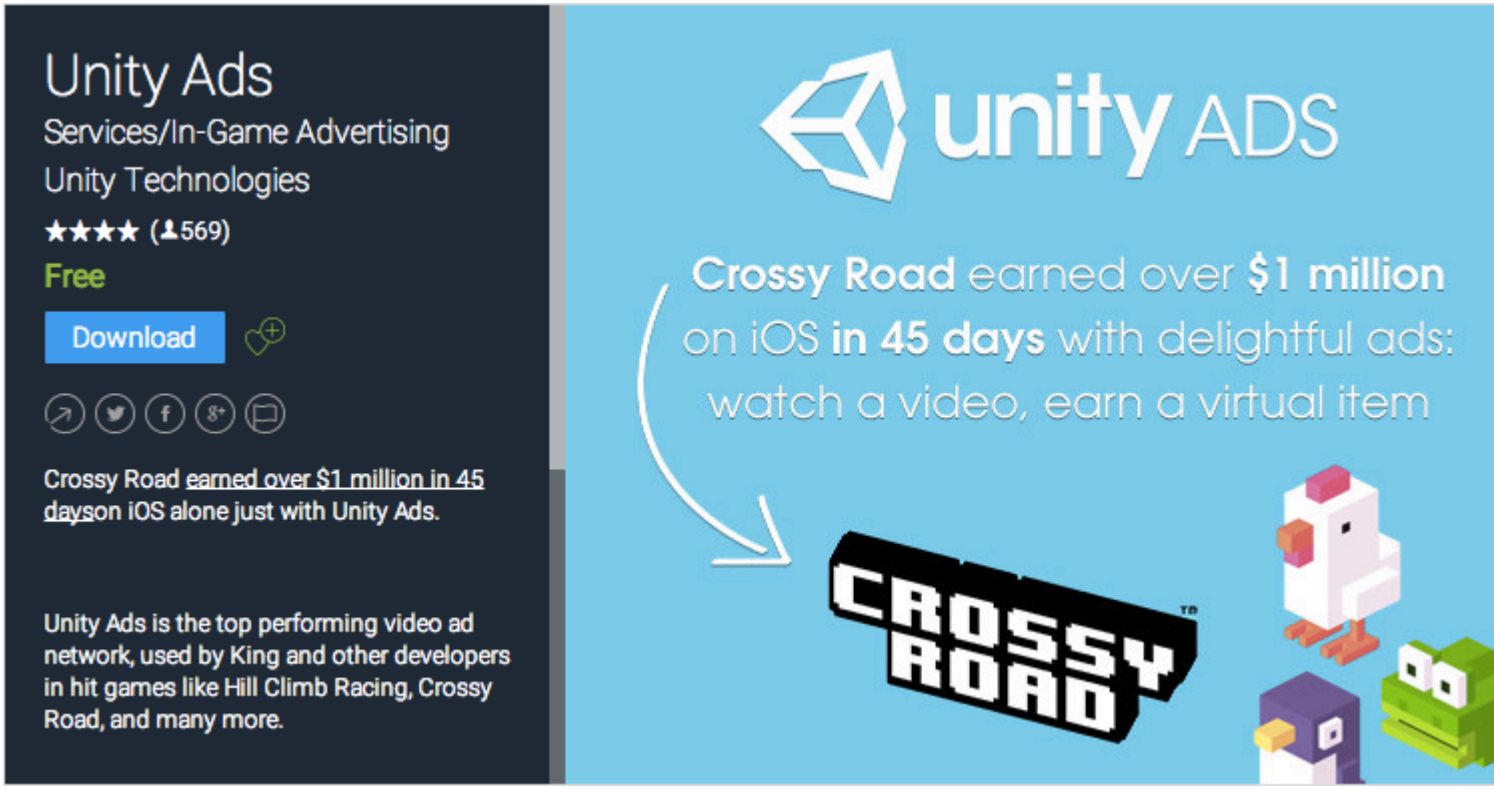
Examples

Unity

- UnityWindow→Asset StoreAsset Store。
- WindowsCtrl + 9 / Mac OS9
- Web https //www.assetstore.unity3d.com/

Unity。

“ ”。 “ ” 。



WebUnity“ **”Unity**“ ” 。 Unity“ ”。

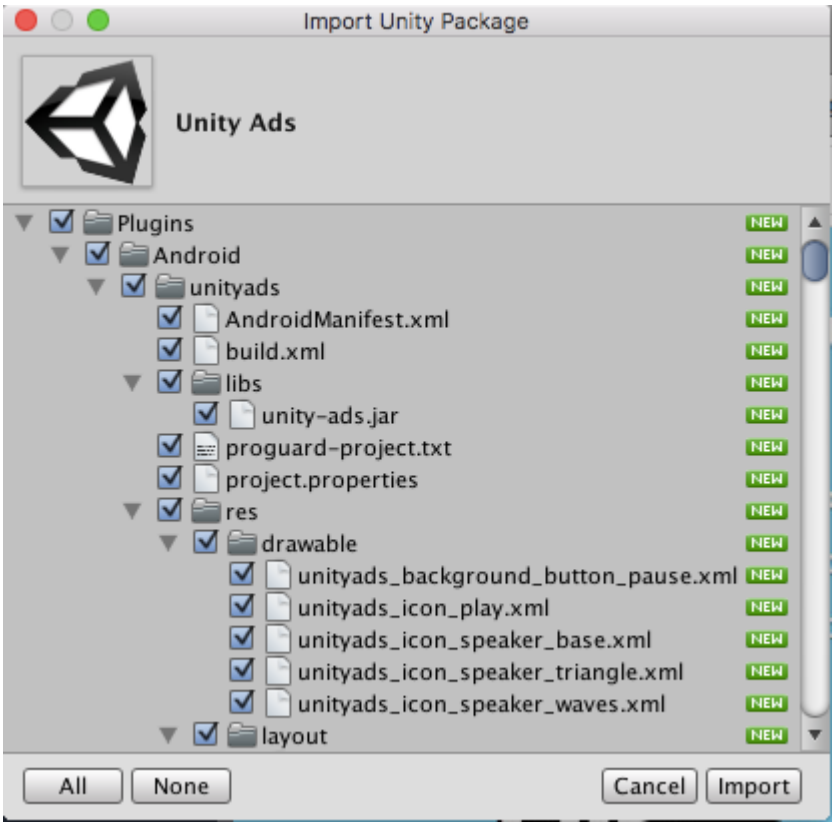
Unity。

Unity。

Unity“ ”“ ”“ ” 。

Import Unity Package。

“ ”“ ”“”。



1.
2.
3.
4. “”>“”
5.
6.
7.

TODO -

。 。 。

1. “Unity.....”。 PDF。

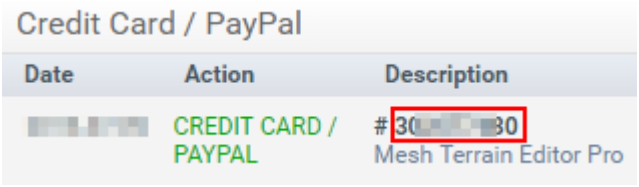
UNITY3D.COM

Unity Technologies ApS
Vendersgade 28
1363 København K
Danmark

INVOICE

Invoice No.	[redacted]
Date	[redacted]
Due Date	[redacted]
Order No.	[redacted]

2. https://www.assetstore.unity3d.com/#!/account/transactions “ ”。



Credit Card / PayPal

Date	Action	Description
[redacted]	CREDIT CARD / PAYPAL	#30[redacted]30 Mesh Terrain Editor Pro

https://riptutorial.com/zh-TW/unity3d/topic/5705/

38:

Examples

GetKeyGetKeyDownGetKeyUp

Update。

Keycode。

1.`Input.GetKey`

`Input.GetKeytrue` 。 。 Space。 。

```
public GameObject bulletPrefab;
public float shootForce = 50f;

void Update()
{
    if (Input.GetKey(KeyCode.Space))
    {
        Debug.Log("Shooting a bullet while SpaceBar is held down");

        //Instantiate bullet
        GameObject bullet = Instantiate(bulletPrefab, transform.position, transform.rotation)
as GameObject;

        //Get the Rigidbody from the bullet then add a force to the bullet
        bullet.GetComponent<Rigidbody>().AddForce(bullet.transform.forward * shootForce);
    }
}
```

2 .Reading`Input.GetKeyDown`

`Input.GetKeyDown` 。 `Input.GetKeyInput.GetKeyDown`。 /UI。

```
public Light flashLight;
bool enableFlashLight = false;

void Update()
{
    if (Input.GetKeyDown(KeyCode.Space))
    {
        //Toggle Light
        enableFlashLight = !enableFlashLight;
        if (enableFlashLight)
        {
            flashLight.enabled = true;
            Debug.Log("Light Enabled!");
        }
        else
        {
            flashLight.enabled = false;
```

```
            Debug.Log("Light Disabled!");
        }
    }
}
```

3 .Reading`Input.GetKeyUp`

`Input.GetKeyDown`◦ /◦ `Input.GetKeyDown` `true` ◦ `Input.GetKeyDown`nenable`Input.GetKeyUp`◦

```
public Light flashLight;
void Update()
{
    //Disable Light when Space Key is pressed
    if (Input.GetKeyDown(KeyCode.Space))
    {
        flashLight.enabled = true;
        Debug.Log("Light Enabled!");
    }

    //Disable Light when Space Key is released
    if (Input.GetKeyUp(KeyCode.Space))
    {
        flashLight.enabled = false;
        Debug.Log("Light Disabled!");
    }
}
```

`Input.acceleration`◦ `Vector3`3D`x yz`◦

```
void Update()
{
    Vector3 acclerometerValue = rawAccelValue();
    Debug.Log("X: " + acclerometerValue.x + "  Y: " + acclerometerValue.y + "  Z: " +
acclerometerValue.z);
}

Vector3 rawAccelValue()
{
    return Input.acceleration;
}
```

GameObject◦ ◦ ◦ `Vector3.Lerp`◦

```
//The lower this value, the less smooth the value is and faster Accel is updated. 30 seems
fine for this
const float updateSpeed = 30.0f;

float AccelerometerUpdateInterval = 1.0f / updateSpeed;
float LowPassKernelWidthInSeconds = 1.0f;
float LowPassFilterFactor = 0;
Vector3 lowPassValue = Vector3.zero;

void Start()
{
    //Filter Accelerometer
    LowPassFilterFactor = AccelerometerUpdateInterval / LowPassKernelWidthInSeconds;
```

```
    lowPassValue = Input.acceleration;
}

void Update()
{

    //Get Raw Accelerometer values (pass in false to get raw Accelerometer values)
    Vector3 rawAccelValue = filterAccelValue(false);
    Debug.Log("RAW X: " + rawAccelValue.x + "  Y: " + rawAccelValue.y + "  Z: " +
rawAccelValue.z);

    //Get smoothed Accelerometer values (pass in true to get Filtered Accelerometer values)
    Vector3 filteredAccelValue = filterAccelValue(true);
    Debug.Log("FILTERED X: " + filteredAccelValue.x + "  Y: " + filteredAccelValue.y + "  Z: "
+ filteredAccelValue.z);
}

//Filter Accelerometer
Vector3 filterAccelValue(bool smooth)
{
    if (smooth)
        lowPassValue = Vector3.Lerp(lowPassValue, Input.acceleration, LowPassFilterFactor);
    else
        lowPassValue = Input.acceleration;

    return lowPassValue;
}
```

。

```
void Update()
{
    //Get Precise Accelerometer values
    Vector3 accelValue = preciseAccelValue();
    Debug.Log("PRECISE X: " + accelValue.x + "  Y: " + accelValue.y + "  Z: " + accelValue.z);

}

Vector3 preciseAccelValue()
{
    Vector3 accelResult = Vector3.zero;
    foreach (AccelerationEvent tempAccelEvent in Input.accelerationEvents)
    {
        accelResult = accelResult + (tempAccelEvent.acceleration * tempAccelEvent.deltaTime);
    }
    return accelResult;
}
```

```
void Update()
{
    //Get Precise Accelerometer values
    Vector3 accelValue = preciseAccelValue();
    Debug.Log("PRECISE X: " + accelValue.x + "  Y: " + accelValue.y + "  Z: " + accelValue.z);

}

Vector3 preciseAccelValue()
{
    Vector3 accelResult = Vector3.zero;
```

```
    for (int i = 0; i < Input.accelerationEventCount; ++i)
    {
        AccelerationEvent tempAccelEvent = Input.GetAccelerationEvent(i);
        accelResult = accelResult + (tempAccelEvent.acceleration * tempAccelEvent.deltaTime);
    }
    return accelResult;
}
```

。 。

。

- Input.GetMouseButton(int button);
- Input.GetMouseButtonDown(int button);
- Input.GetMouseButtonUp(int button);

。

- 0 =。
- 1 =。
- 2 =。

GetMouseButton。 true 。

```
void Update()
{
    if (Input.GetMouseButton(0))
    {
        Debug.Log("Left Mouse Button Down");
    }

    if (Input.GetMouseButton(1))
    {
        Debug.Log("Right Mouse Button Down");
    }

    if (Input.GetMouseButton(2))
    {
        Debug.Log("Middle Mouse Button Down");
    }
}
```

GetMouseButtonDown。 true 。 true 。

```
void Update()
{
    if (Input.GetMouseButtonDown(0))
    {
        Debug.Log("Left Mouse Button Clicked");
    }

    if (Input.GetMouseButtonDown(1))
    {
        Debug.Log("Right Mouse Button Clicked");
    }
```

```
    if (Input.GetMouseButtonDown(2))
    {
        Debug.Log("Middle Mouse Button Clicked");
    }
}
```

GetMouseButtonUp。 true 。 true。

```
void Update()
{
    if (Input.GetMouseButtonUp(0))
    {
        Debug.Log("Left Mouse Button Released");
    }

    if (Input.GetMouseButtonUp(1))
    {
        Debug.Log("Right Mouse Button Released");
    }

    if (Input.GetMouseButtonUp(2))
    {
        Debug.Log("Middle Mouse Button Released");
    }
}
```

https://riptutorial.com/zh-TW/unity3d/topic/3413/

39:

- AssetPostprocessor.OnPreprocessTexture

`String.Contains()`◦

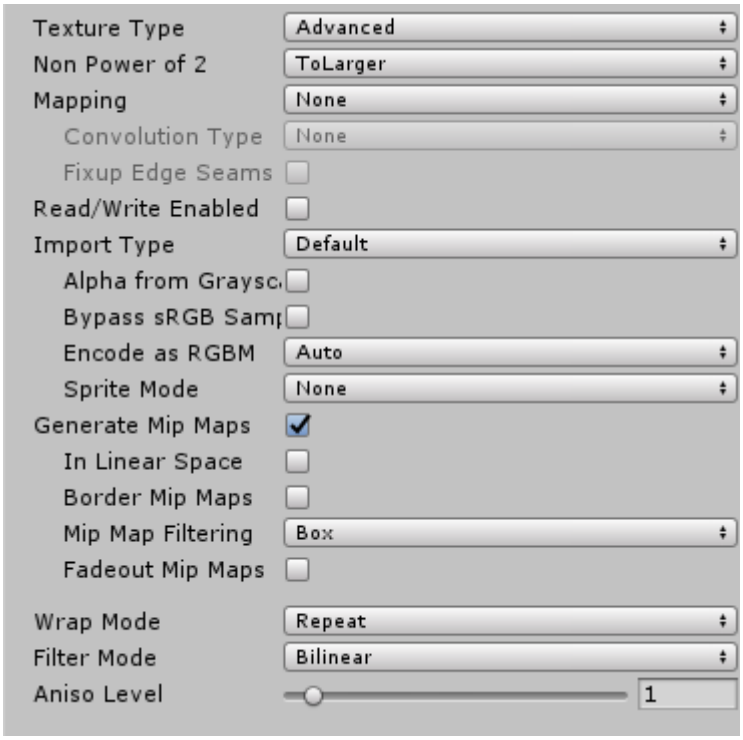
```
if (assetPath.Contains("ProcessThisFolder"))
{
    // Process asset
}
```

Examples

Assets`TexturePostProcessor.cs`

```
using UnityEngine;
using UnityEditor;

public class TexturePostProcessor : AssetPostprocessor
{
    void OnPostprocessTexture(Texture2D texture)
    {
        TextureImporter importer = assetImporter as TextureImporter;
        importer.anisoLevel = 1;
        importer.filterMode = FilterMode.Bilinear;
        importer.mipmapEnabled = true;
        importer.npotScale = TextureImporterNPOTScale.ToLarger;
        importer.textureType = TextureImporterType.Advanced;
    }
}
```



Unity

“ ”。

“ ”。

。 .xls。 JSON

JSON

```
{
  "someValue": 123,
  "someOtherValue": 456.297,
  "someBoolValue": true,
  "someStringValue": "this is a string",
}
```

`Example.test`。

`MonoBehaviour` 。 JSON。 。 `TestData.cs`

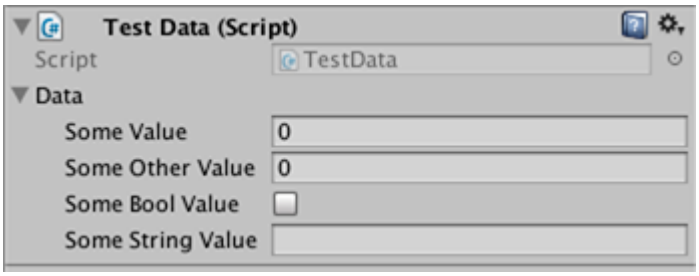
```
using UnityEngine;
using System.Collections;

public class TestData : MonoBehaviour {

    [System.Serializable]
    public class Data {
        public int someValue = 0;
        public float someOtherValue = 0.0f;
        public bool someBoolValue = false;
        public string someStringValue = "";
    }

    public Data data = new Data();
}
```

GameObject



`Assets` `Editor`。 。 Editor`TestDataAssetPostprocessor.cs`。

```
using UnityEditor;
using UnityEngine;
using System.Collections;

public class TestDataAssetPostprocessor : AssetPostprocessor
{
    const string s_extension = ".test";
```

```
    // NOTE: Paths start with "Assets/"
    static bool IsFileWeCareAbout(string path)
    {
        return System.IO.Path.GetExtension(path).Equals(
           s_extension,
           System.StringComparison.Ordinal);
    }

    static void HandleAddedOrChangedFile(string path)
    {
        string text = System.IO.File.ReadAllText(path);
        // should we check for error if the file can't be parsed?
        TestData.Data newData = JsonUtility.FromJson<TestData.Data>(text);

        string prefabPath = path + ".prefab";
        // Get the existing prefab
        GameObject existingPrefab =
            AssetDatabase.LoadAssetAtPath(prefabPath, typeof(Object)) as GameObject;
        if (!existingPrefab)
        {
            // If no prefab exists make one
            GameObject newGameObject = new GameObject();
            newGameObject.AddComponent<TestData>();
            PrefabUtility.CreatePrefab(prefabPath,
                                       newGameObject,
                                       ReplacePrefabOptions.Default);
            GameObject.DestroyImmediate(newGameObject);
            existingPrefab =
                AssetDatabase.LoadAssetAtPath(prefabPath, typeof(Object)) as GameObject;
        }

        TestData testData = existingPrefab.GetComponent<TestData>();
        if (testData != null)
        {
            testData.data = newData;
            EditorUtility.SetDirty(existingPrefab);
        }
    }

    static void HandleRemovedFile(string path)
    {
        // Decide what you want to do here. If the source file is removed
        // do you want to delete the prefab? Maybe ask if you'd like to
        // remove the prefab?
        // NOTE: Because you might get many calls (like you deleted a
        // subfolder full of .test files you might want to get all the
        // filenames and ask all at once ("delete all these prefabs?").
    }

    static void OnPostprocessAllAssets (string[] importedAssets, string[] deletedAssets,
string[] movedAssets, string[] movedFromAssetPaths)
    {
        foreach (var path in importedAssets)
        {
            if (IsFileWeCareAbout(path))
            {
                HandleAddedOrChangedFile(path);
            }
        }

        foreach (var path in deletedAssets)
```

```
        {
            if (IsFileWeCareAbout(path))
            {
                HandleRemovedFile(path);
            }
        }

        for (var ii = 0; ii < movedAssets.Length; ++ii)
        {
            string srcStr = movedFromAssetPaths[ii];
            string dstStr = movedAssets[ii];

            // the source was moved, let's move the corresponding prefab
            // NOTE: We don't handle the case if there already being
            // a prefab of the same name at the destination
            string srcPrefabPath = srcStr + ".prefab";
            string dstPrefabPath = dstStr + ".prefab";

            AssetDatabase.MoveAsset(srcPrefabPath, dstPrefabPath);
        }
    }
}
```

Example.testUnity Assets。 Example.test。 Example.test。 Example.test。 Example.testExample.test。

Example.testAssetsExample.testExample.test.prefab 。 Example.testAssetBundle。

https://riptutorial.com/zh-TW/unity3d/topic/5279/--

40:

Unity3D。

Examples

-

```
using UnityEngine;

public class Audio : MonoBehaviour {
    AudioSource audioSource;
    AudioClip audioClip;

    void Start() {
        audioClip = (AudioClip)Resources.Load("Audio/Soundtrack");
        audioSource.clip = audioClip;
        if (!audioSource.isPlaying) audioSource.Play();
    }
```

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