URP通用渲染管线介绍与最新功能演示

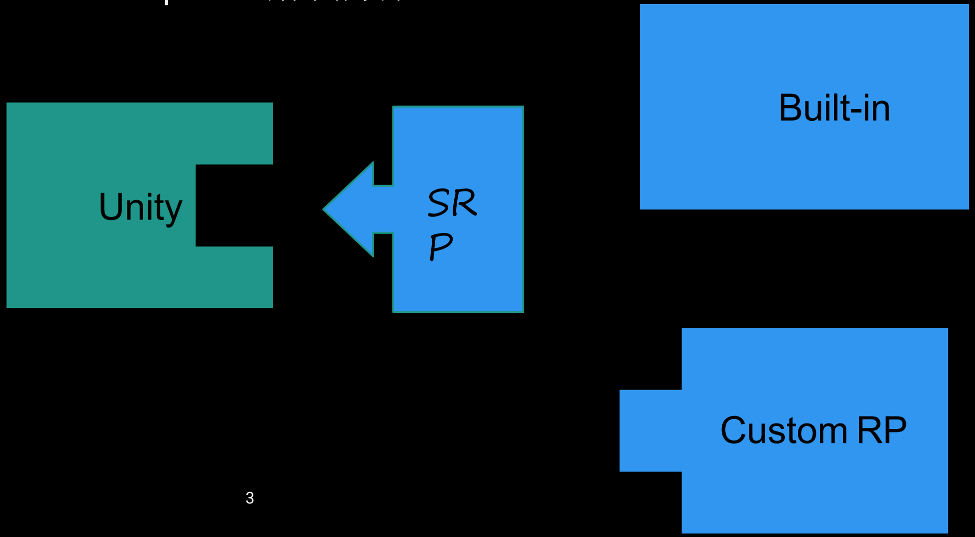
李鹏鹏 | Unity 大中华区平台技术经理 | 09 17, 2021

主要内容

- Universal Render Pipeline 设计思路
- 与内置渲染管线相比Universal Render Pipeline 优势
- Universal Render Pipeline 基本功能演示
- Universal Render Pipeline 12.0.0最新功能演示

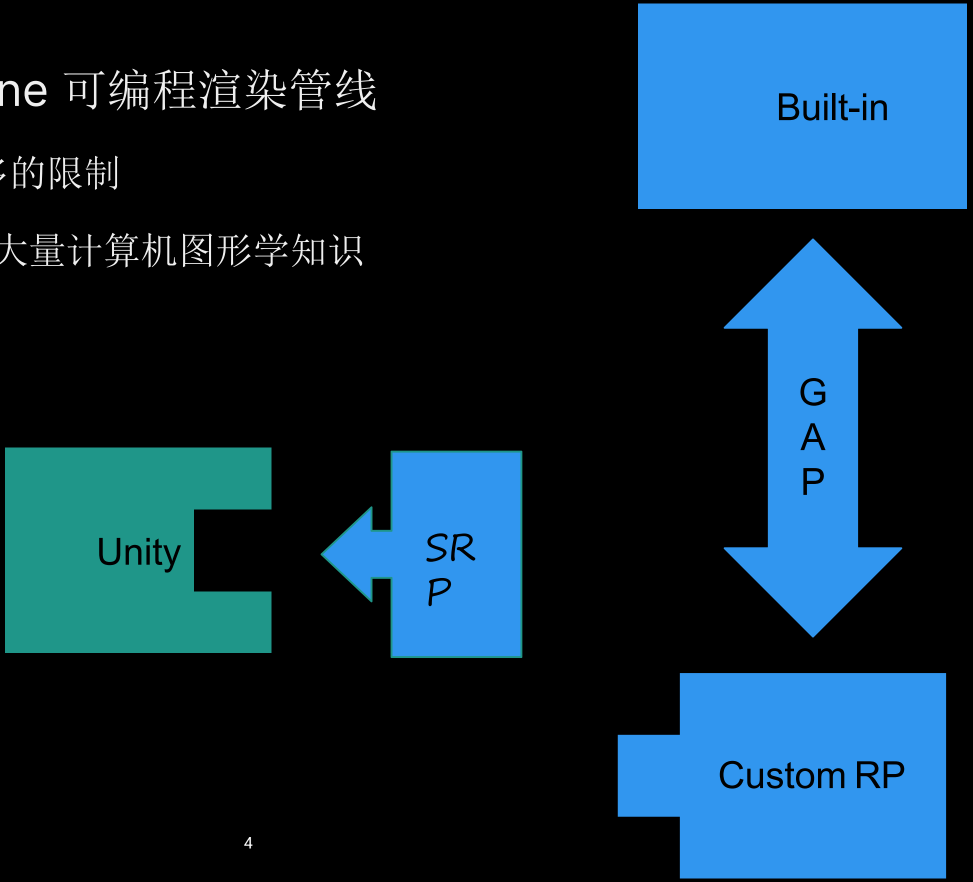
Unity Rendering Design

- Scriptable Render Pipeline 可编程渲染管线
  - C# rendering layer API
  - 开源：https://github.com/Unity-Technologies/ScriptableRenderPipeline
  - 开发人员可以创建自定义Render Pipeline解决方案


Built-in
Unity
SRP
Custom RP

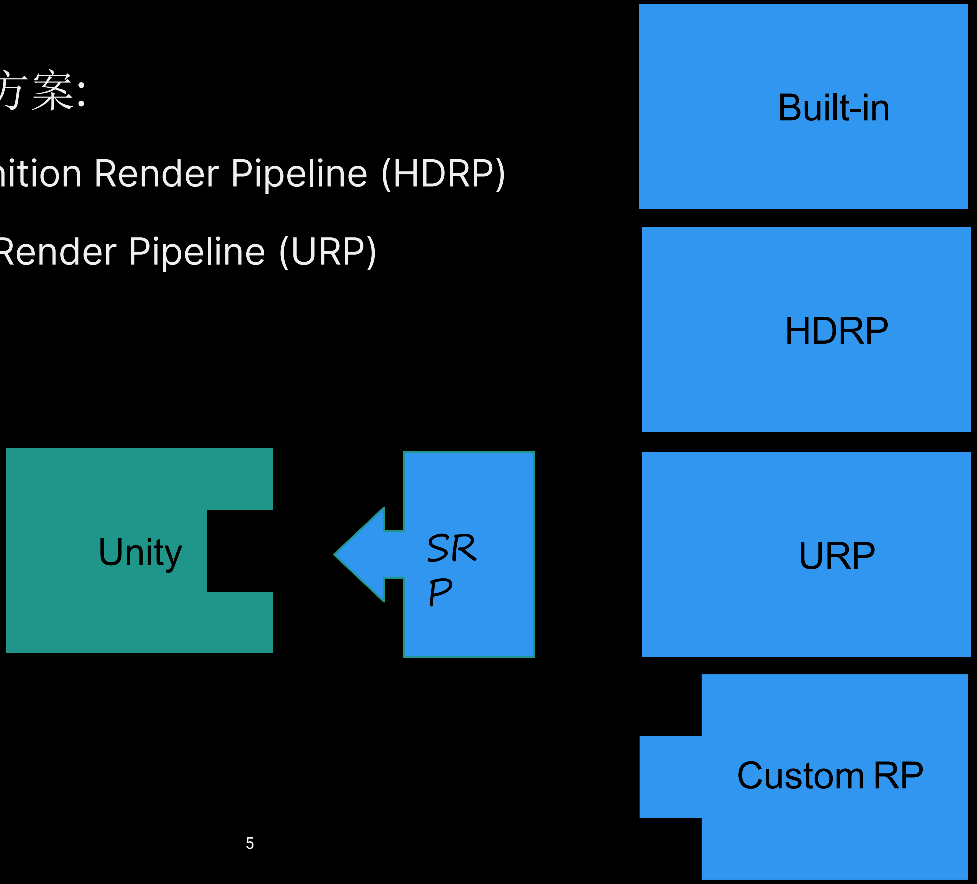
Unity Rendering Design

- Scriptable Render Pipeline 可编程渲染管线
  - Built In 内置管线存在很多的限制
  - 创建一个渲染管线，需要大量计算机图形学知识


Built-in
G
A
P
Unity
SR
P
Custom RP

Unity Rendering Design

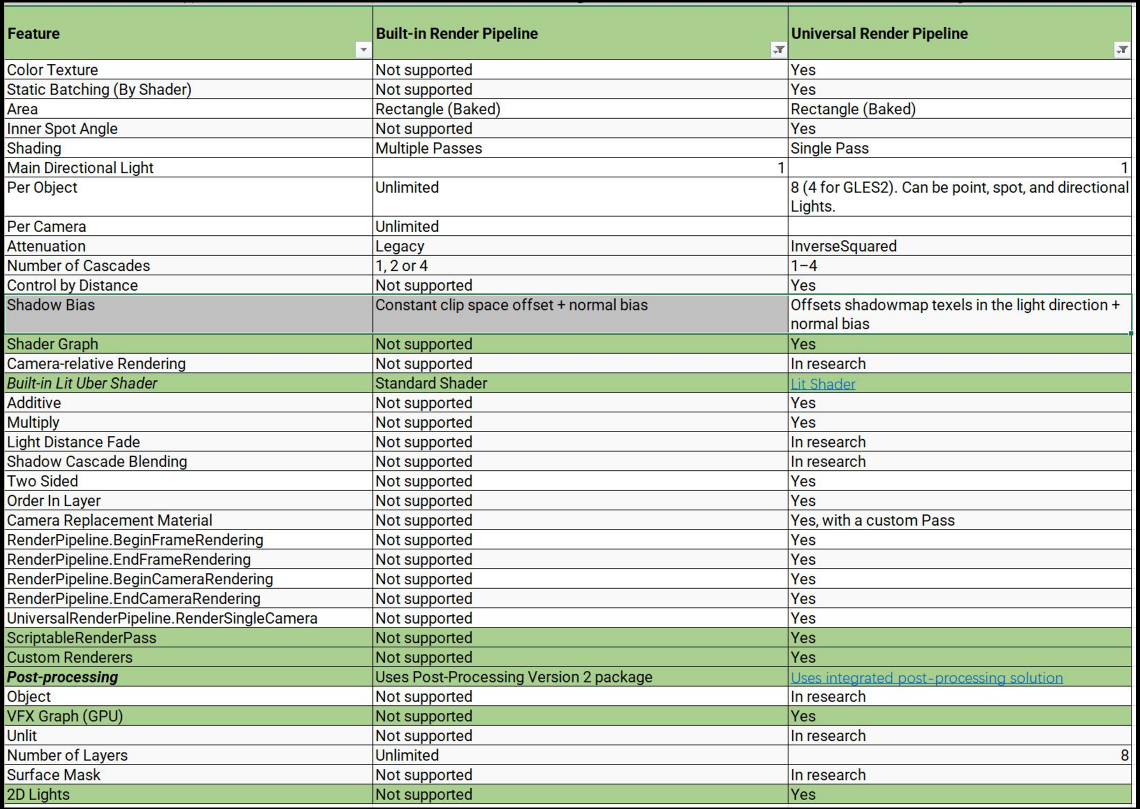
- 两种开箱即用的渲染解决方案:
  - 高清渲染管线 High-Definition Render Pipeline (HDRP)
  - 通用渲染管线 Universal Render Pipeline (URP)


Built-in
HDRP
URP
Custom RP
Unity
SR
P

Universal Render Pipeline 的优势

- 更好的图形效果
- 更高的性能
- 支持广泛的平台
- 可扩展性

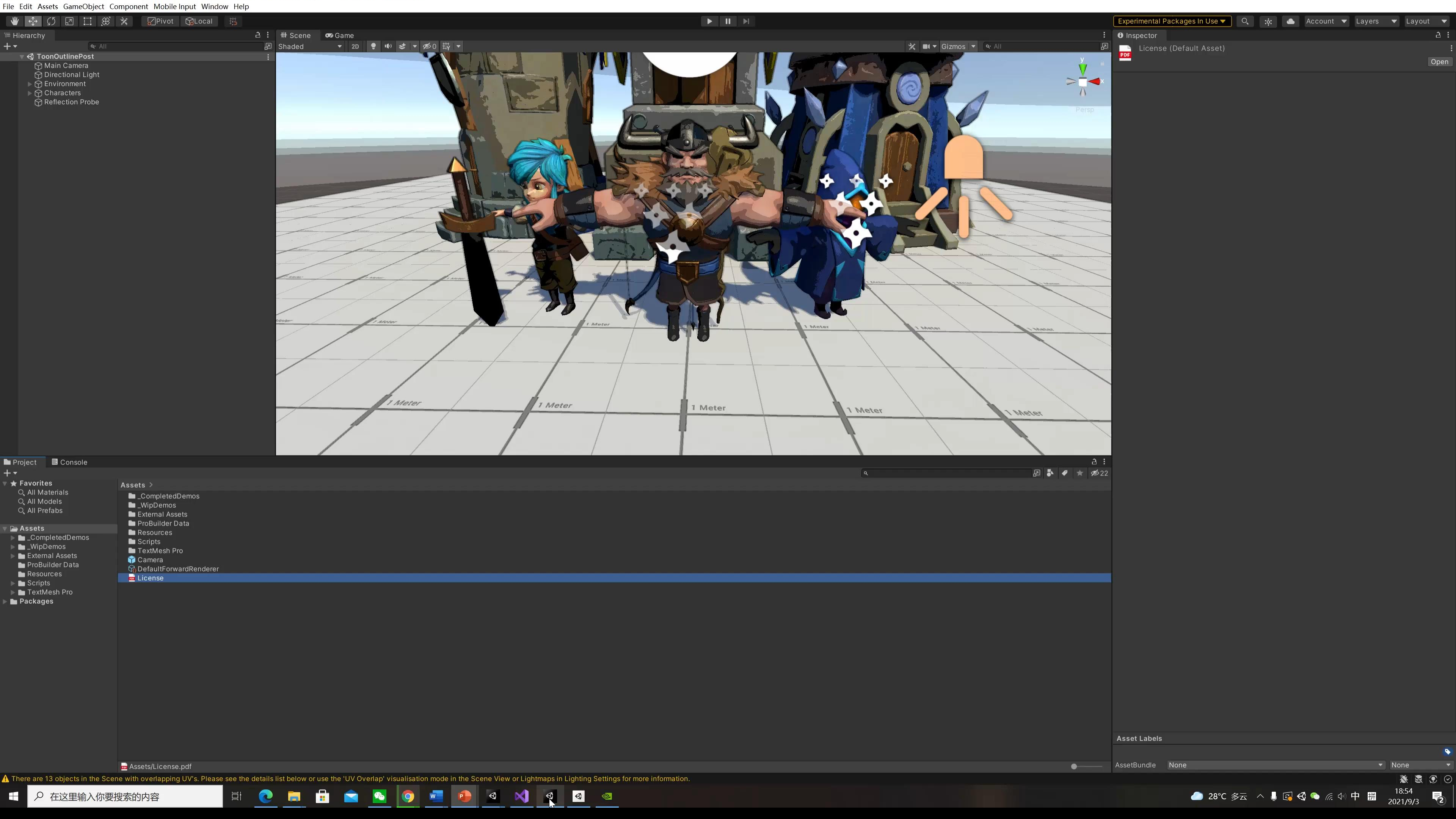
与内置渲染管线的功能对比



Feature	**Built-in Render Pipeline**	**Universal Render Pipeline**
Color Texture	Not supported	Yes
Static Batching (By Shader)	Not supported	Yes
Area	Rectangle (Baked)	Rectangle (Baked)
Inner Spot Angle	Not supported	Yes
Shading	Multiple Passes	Single Pass
Main Directional Light	1	1
Per Object	Unlimited	8 (4 for GLES2). Can be point, spot, and directional Lights.
Per Camera	Unlimited	
Attenuation	Legacy	InverseSquared
Number of Cascades	1, 2 or 4	1–4
Control by Distance	Not supported	Yes
Shadow Bias	Constant clip space offset + normal bias	Offsets shadowmap texels in the light direction + normal bias
Shader Graph	Not supported	Yes
Camera-relative Rendering	Not supported	In research
Built-in Lit Uber Shader	Standard Shader	Lit Shader
Additive	Not supported	Yes
Multiply	Not supported	Yes
Light Distance Fade	Not supported	In research
Shadow Cascade Blending	Not supported	In research
Two Sided	Not supported	Yes
Order In Layer	Not supported	Yes
Camera Replacement Material	Not supported	Yes, with a custom Pass
RenderPipeline.BeginFrameRendering	Not supported	Yes
RenderPipeline.EndFrameRendering	Not supported	Yes
RenderPipeline.BeginCameraRendering	Not supported	Yes
RenderPipeline.EndCameraRendering	Not supported	Yes
UniversalRenderPipeline.RenderSingleCamera	Not supported	Yes
ScriptableRenderPass	Not supported	Yes
Custom Renderers	Not supported	Yes
Post-processing	Uses Post-Processing Version 2 package	Uses integrated post-processing solution
Object	Not supported	In research
VFX Graph (GPU)	Not supported	Yes
Unlit	Not supported	In research
Number of Layers	Unlimited	8
Surface Mask	Not supported	In research
2D Lights	Not supported	Yes

URP Renderer Feature

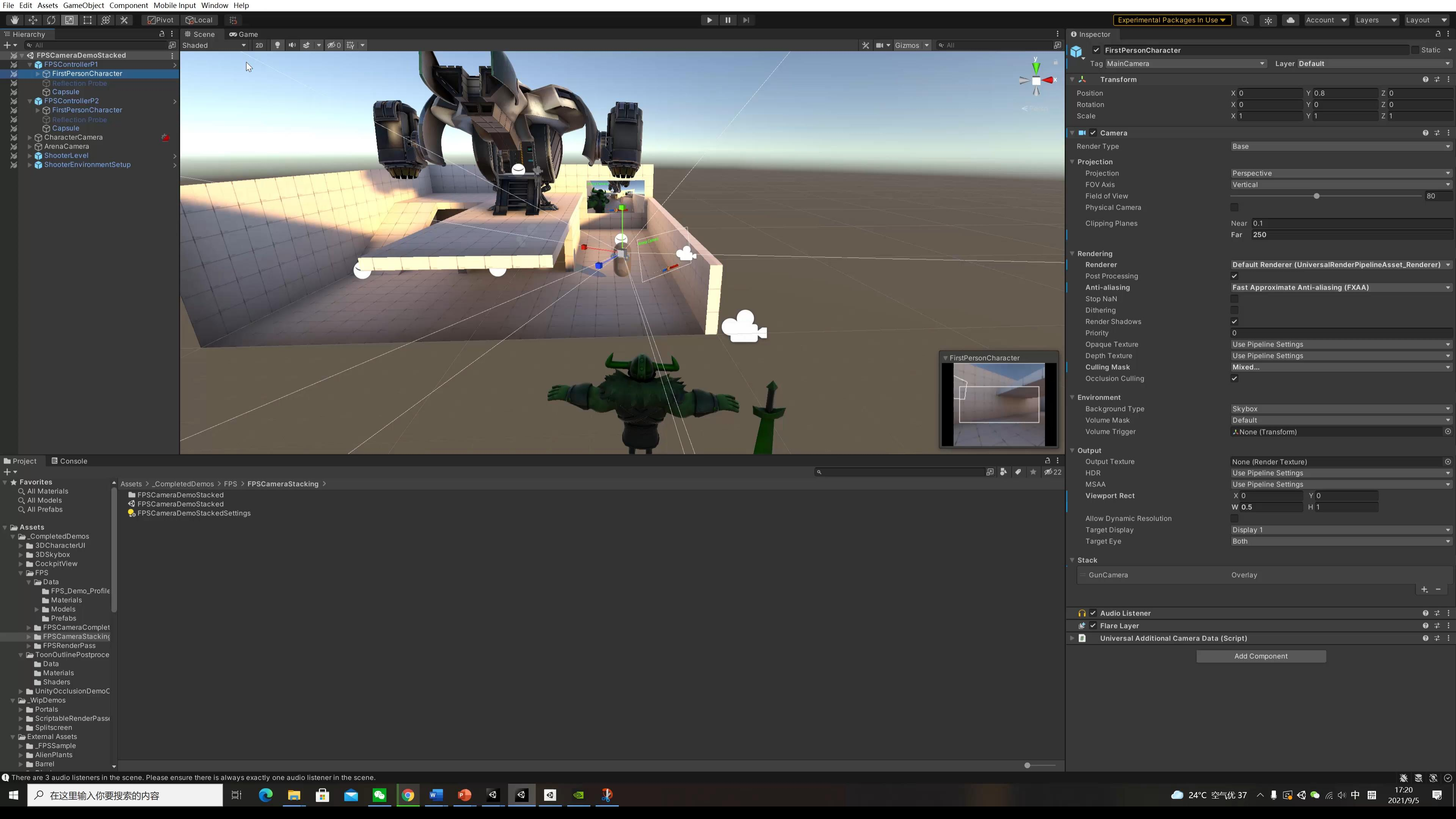
- URP 的Renderer Feature可以让我们向URP Renderer添加额外的渲染通道，从而允许我们 进行 自定义渲染 的顺序、渲染的对象或者材质等。


File Edit Assets GameObject Component Mobile Input Window Help
Pivot
Local
Experimental Packages In Use
Account
Layers
Layout
Hierarchy
ToonOutlinePost
Main Camera
Directional Light
Environment
Characters
Reflection Probe
Scene
Game
Shaded
2D
Gizmos
Persp
1 Meter
Inspector
License (Default Asset)
Open
Project
Console
Favorites
All Materials
All Models
All Prefabs
Assets
_CompletedDemos
_WipDemos
External Assets
ProBuilder Data
Resources
Scripts
TextMesh Pro
Packages
Camera
DefaultForwardRenderer
License
Assets/License.pdf
Asset Labels
AssetBundle
None
None
在这里输入你要搜索的内容
28°C 多云
中
18:54
2021/9/3

There are 13 objects in the Scene with overlapping UV's. Please see the details list below or use the 'UV Overlap' visualisation mode in the Scene View or Lightmaps in Lighting Settings for more information.

Camera Stack 相机堆叠

- URP 中设置了两种 渲染类型的相机： “Base Camera”和“Overlay Camera;
- 相机堆栈（Camera Stack）：使用相机堆栈，可以有效地定义摄影机渲染的顺序。


File Edit Assets GameObject Component Mobile Input Window Help
Pivot
Local
Experimental Packages In Use
Account
Layers
Layout
Hierarchy
Scene
Game
Shaded
2D
Gizmos
Inspector
FirstPersonCharacter
Project
Console
Add Component
在这里输入你要搜索的内容
24°C 空气优 37
17:20
2021/9/5

FPSCameraDemoStacked
- FPSControllerP1
  - FirstPersonCharacter
  - Reflection Probe
  - Capsule
- FPSControllerP2
  - FirstPersonCharacter
  - Reflection Probe
  - Capsule
- CharacterCamera
- ArenaCamera
- ShooterLevel
- ShooterEnvironmentSetup

Assets > _CompletedDemos > FPS > FPSCameraStacking >

- FPSCameraDemoStacked
- FPSCameraDemoStacked
- FPSCameraDemoStackedSettings

Favorites
- All Materials
- All Models
- All Prefabs

Assets
- _CompletedDemos
  - 3DCharacterUI
  - 3DSkybox
  - CockpitView
  - FPS
    - Data
      - FPS_Demo_Profile
      - Materials
      - Models
      - Prefabs
    - FPSCameraComplet
    - FPSCameraStacking
    - FPSRenderPass
  - ToonOutlinePostproce
    - Data
    - Materials
    - Shaders
  - UnityOcclusionDemoC
- _WipDemos
  - Portals
  - ScriptableRenderPasse
  - Splitscreen
- External Assets
  - _FPSSample
  - AlienPlants
  - Barrel

FirstPersonCharacter Static
Tag MainCamera Layer Default

Transform

Position X 0 Y 0.8 Z 0
Rotation X 0 Y 0 Z 0
Scale X 1 Y 1 Z 1

Camera

Render Type: Base

Projection
- Projection: Perspective
- FOV Axis: Vertical
- Field of View: 80
- Physical Camera: ☐
- Clipping Planes: Near 0.1, Far 250

Rendering
- Renderer: Default Renderer (UniversalRenderPipelineAsset_Renderer)
- Post Processing: ☑
- Anti-aliasing: Fast Approximate Anti-aliasing (FXAA)
- Stop NaN: ☐
- Dithering: ☐
- Render Shadows: ☑
- Priority: 0
- Opaque Texture: Use Pipeline Settings
- Depth Texture: Use Pipeline Settings
- Culling Mask: Mixed...
- Occlusion Culling: ☑

Environment
- Background Type: Skybox
- Volume Mask: Default
- Volume Trigger: None (Transform)

Output
- Output Texture: None (Render Texture)
- HDR: Use Pipeline Settings
- MSAA: Use Pipeline Settings
- Viewport Rect: X 0 Y 0 W 0.5 H 1
- Allow Dynamic Resolution: ☐
- Target Display: Display 1
- Target Eye: Both

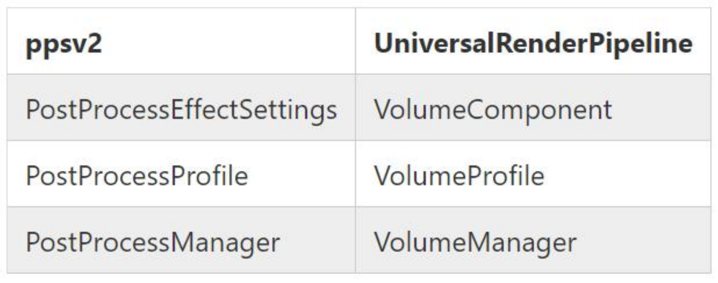
Stack
- GunCamera Overlay

Audio Listener
Flare Layer
Universal Additional Camera Data (Script)

There are 3 audio listeners in the scene. Please ensure there is always exactly one audio listener in the scene.

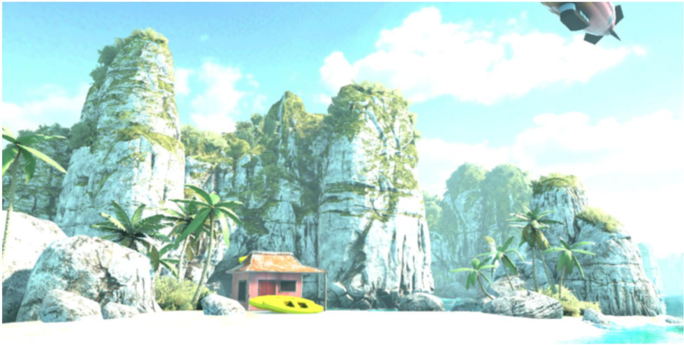
Post-processing (v3)

- URP使用全新的Volume框架进行后处理

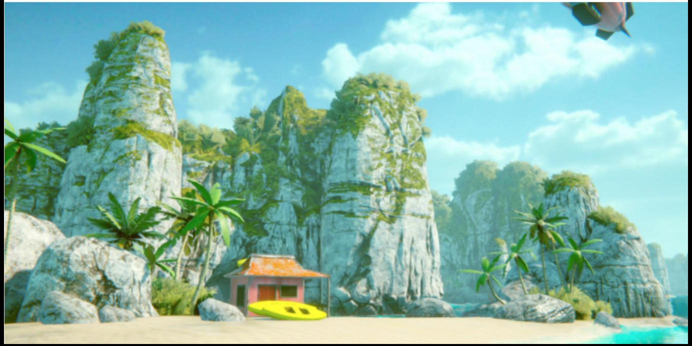


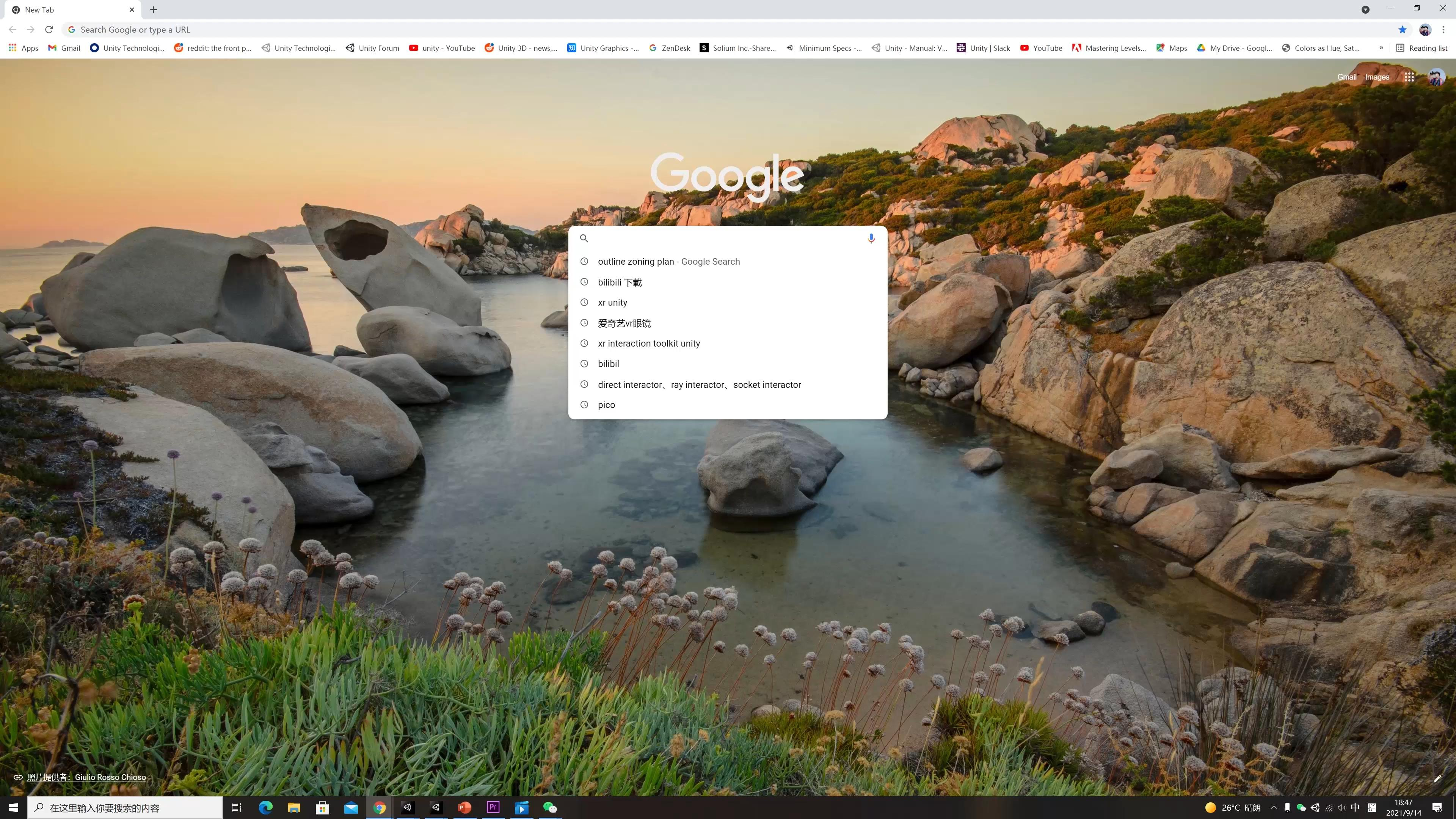
ppsv2	UniversalRenderPipeline
PostProcessEffectSettings	VolumeComponent
PostProcessProfile	VolumeProfile
PostProcessManager	VolumeManager

Without post-processing:



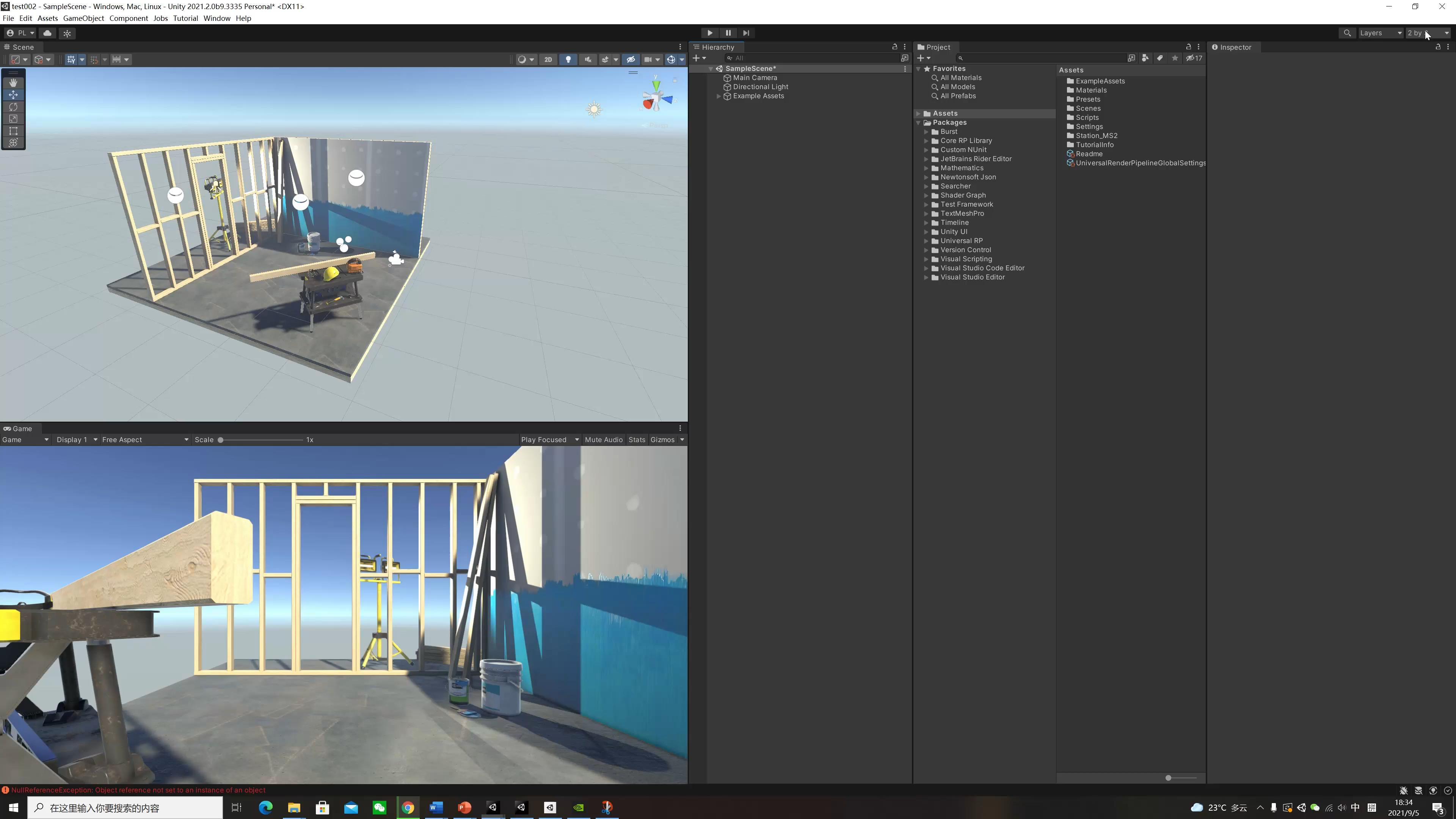
With post-processing:




New Tab
Search Google or type a URL
Apps
Gmail
Unity Technologi...
reddit: the front p...
Unity Technologi...
Unity Forum
unity - YouTube
Unity 3D - news,...
Unity Graphics -...
ZenDesk
Solium Inc.-Share...
Minimum Specs -...
Unity - Manual: V...
Unity | Slack
YouTube
Mastering Levels...
Maps
My Drive - Googl...
Colors as Hue, Sat...
Reading list
Gmail
Images
Google

outline zoning plan - Google Search
bilibili 下載
xr unity
爱奇艺vr眼镜
xr interaction toolkit unity
bilibil
direct interactor、ray interactor、socket interactor
pico

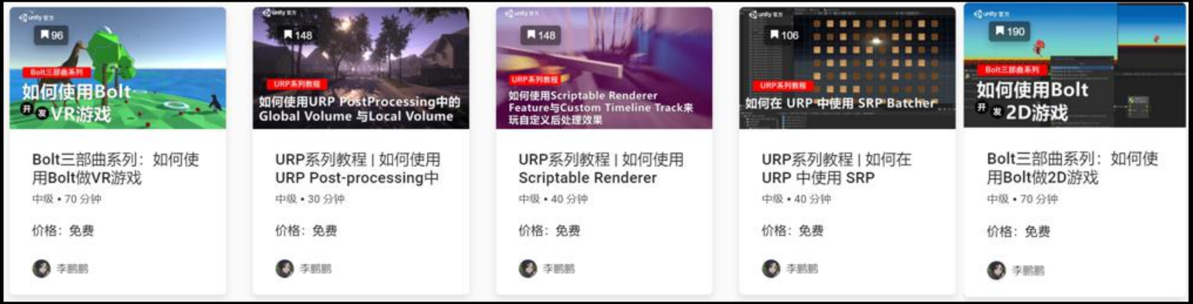
照片提供者：Giulio Rosso Chioso
在这里输入你要搜索的内容
26°C 晴朗
中
18:47
2021/9/14



test002 - SampleScene - Windows, Mac, Linux - Unity 2021.2.0b9.3335 Personal* <DX11>

NullReferenceException: Object reference not set to an instance of an object

File
Edit
Assets
GameObject
Component
Jobs
Tutorial
Window
Help
PL
Layers
2 by 3
Scene
2D
Hierarchy
All
SampleScene*
Main Camera
Directional Light
Example Assets
Project
17
Favorites
All Materials
All Models
All Prefabs
Assets
Packages
Burst
Core RP Library
Custom NUnit
JetBrains Rider Editor
Mathematics
Newtonsoft Json
Searcher
Shader Graph
Test Framework
TextMeshPro
Timeline
Unity UI
Universal RP
Version Control
Visual Scripting
Visual Studio Code Editor
Visual Studio Editor
Assets
ExampleAssets
Materials
Presets
Scenes
Scripts
Settings
Station_MS2
TutorialInfo
Readme
UniversalRenderPipelineGlobalSettings
Inspector
Game
Game
Display 1
Free Aspect
Scale
1x
Play Focused
Mute Audio
Stats
Gizmos
在这里输入你要搜索的内容
23°C 多云
中
18:34
2021/9/5


96
Bolt三部曲系列
如何使用Bolt
开发VR游戏
148
URP系列教程
如何使用URP PostProcessing中的
Global Volume 与Local Volume
148
URP系列教程
如何使用Scriptable Renderer
Feature与Custom Timeline Track来
玩自定义后处理效果
106
URP系列教程
如何在 URP 中使用 SRP Batcher
190
Bolt三部曲系列
如何使用Bolt
开发2D游戏

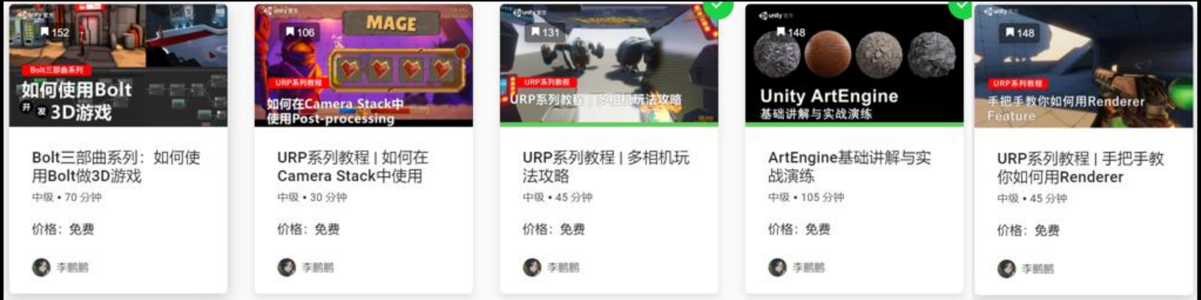
Bolt三部曲系列：如何使用Bolt做VR游戏
中级 • 70 分钟
价格：免费
李鹏鹏

URP系列教程 | 如何使用URP Post-processing中
中级 • 30 分钟
价格：免费
李鹏鹏

URP系列教程 | 如何使用Scriptable Renderer
中级 • 40 分钟
价格：免费
李鹏鹏

URP系列教程 | 如何在URP 中使用 SRP
中级 • 40 分钟
价格：免费
李鹏鹏

Bolt三部曲系列：如何使用Bolt做2D游戏
中级 • 70 分钟
价格：免费
李鹏鹏


152
Bolt三部曲系列
如何使用Bolt
开发3D游戏
106
MAGE
URP系列教程
如何在Camera Stack中
使用Post-processing
131
URP系列教程
URP系列教程 | 多相机玩法攻略
148
Unity ArtEngine
基础讲解与实战演练
148
URP系列教程
手把手教你如何用Renderer
Feature

Bolt三部曲系列：如何使用Bolt做3D游戏
中级 • 70 分钟
价格：免费
李鹏鹏

URP系列教程 | 如何在Camera Stack中使用
中级 • 30 分钟
价格：免费
李鹏鹏

URP系列教程 | 多相机玩法攻略
中级 • 45 分钟
价格：免费
李鹏鹏

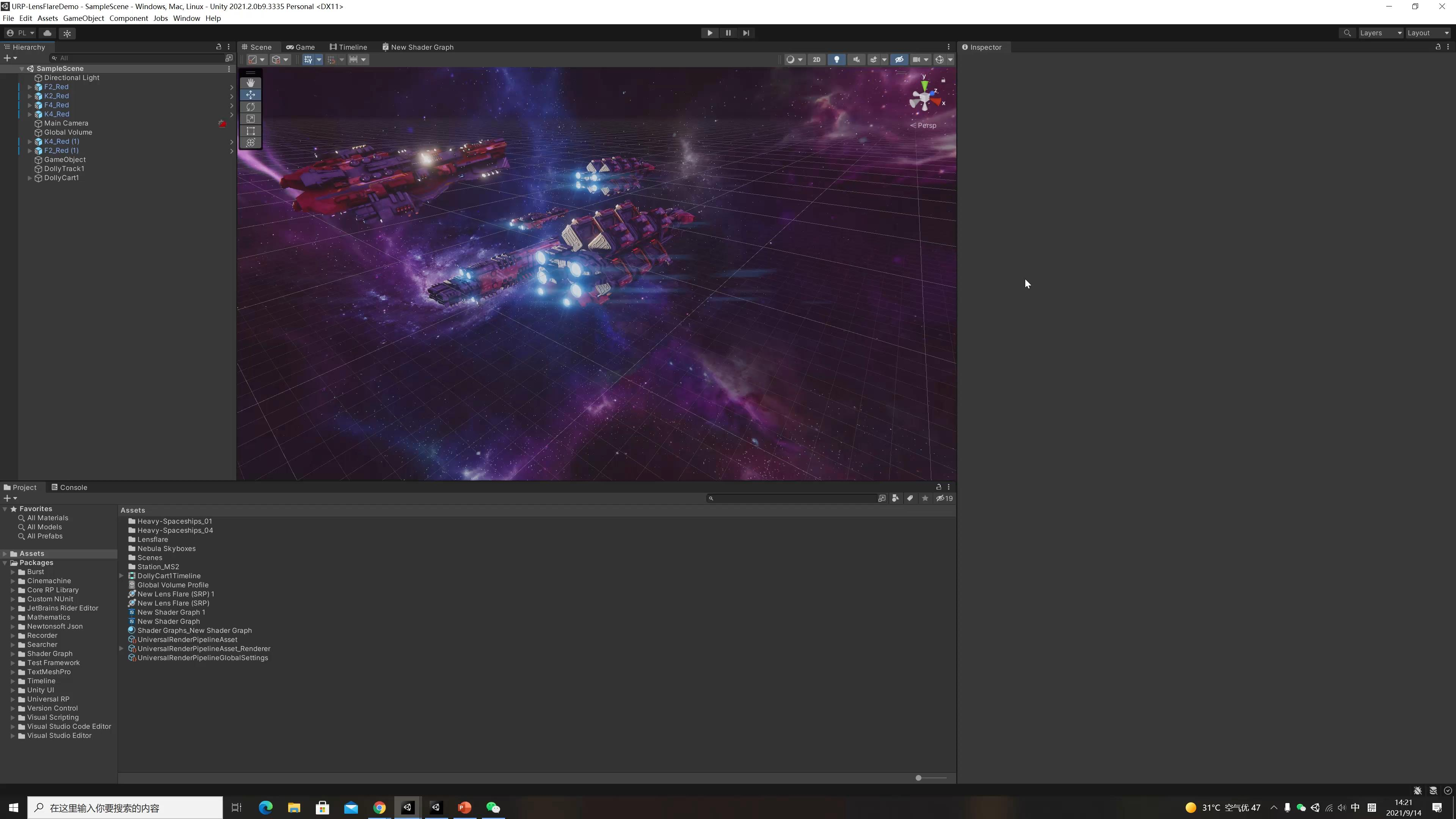
ArtEngine基础讲解与实战演练
中级 • 105 分钟
价格：免费
李鹏鹏

URP系列教程 | 手把手教你如何用Renderer
中级 • 45 分钟
价格：免费
李鹏鹏

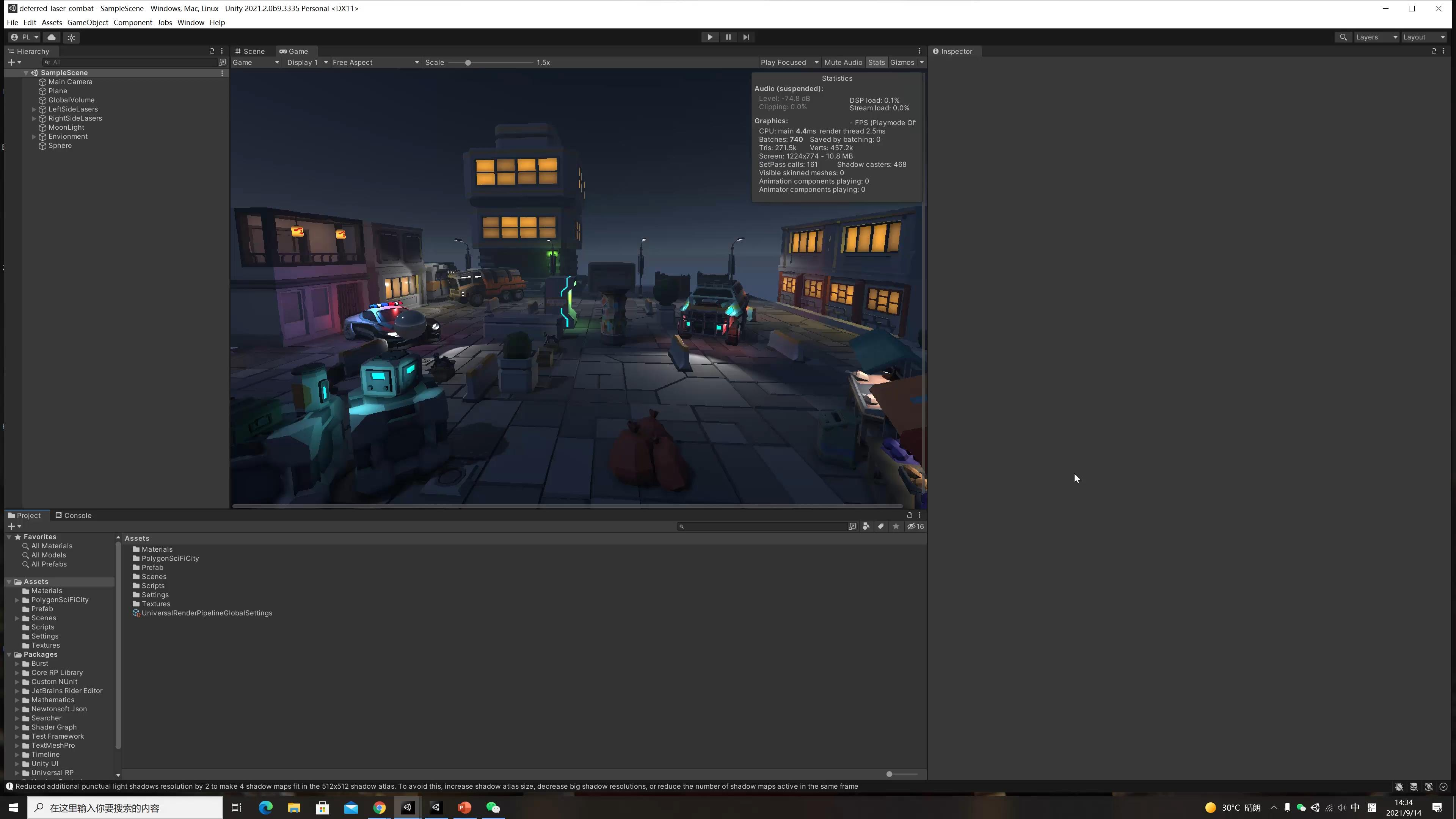
URP系列教程 | 多相机玩法攻略

URP系列教程 | 手把手教你如何用
Renderer Feature

Lens Flare system（镜头光晕）


URP-LensFlareDemo - SampleScene - Windows, Mac, Linux - Unity 2021.2.0b9.3335 Personal <DX11>
File
Edit
Assets
GameObject
Component
Jobs
Window
Help
PL
Layers
Layout
Hierarchy
All
SampleScene
Directional Light
F2_Red
K2_Red
F4_Red
K4_Red
Main Camera
Global Volume
K4_Red (1)
F2_Red (1)
GameObject
DollyTrack1
DollyCart1
Scene
Game
Timeline
New Shader Graph
2D
< Persp
Inspector
Project
Console
19
Favorites
All Materials
All Models
All Prefabs
Assets
Packages
Burst
Cinemachine
Core RP Library
Custom NUnit
JetBrains Rider Editor
Mathematics
Newtonsoft Json
Recorder
Searcher
Shader Graph
Test Framework
TextMeshPro
Timeline
Unity UI
Universal RP
Version Control
Visual Scripting
Visual Studio Code Editor
Visual Studio Editor
Assets
Heavy-Spaceships_01
Heavy-Spaceships_04
Lensflare
Nebula Skyboxes
Scenes
Station_MS2
DollyCart1Timeline
Global Volume Profile
New Lens Flare (SRP) 1
New Lens Flare (SRP)
New Shader Graph 1
New Shader Graph
Shader Graphs_New Shader Graph
UniversalRenderPipelineAsset
UniversalRenderPipelineAsset_Renderer
UniversalRenderPipelineGlobalSettings
在这里输入你要搜索的内容
31°C 空气优 47
中
14:21
2021/9/14

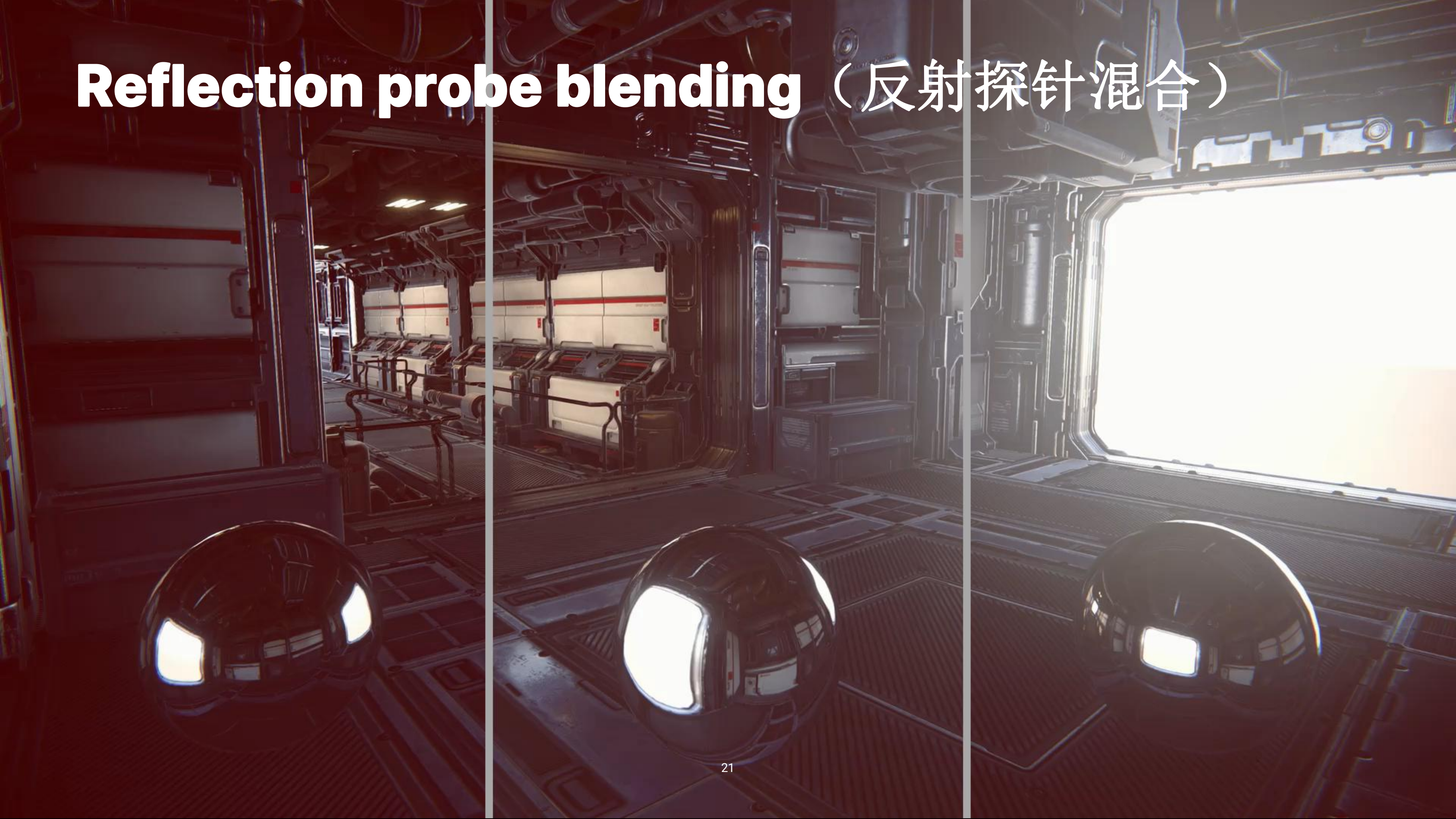
URP Deferred Rendering（延迟渲染）

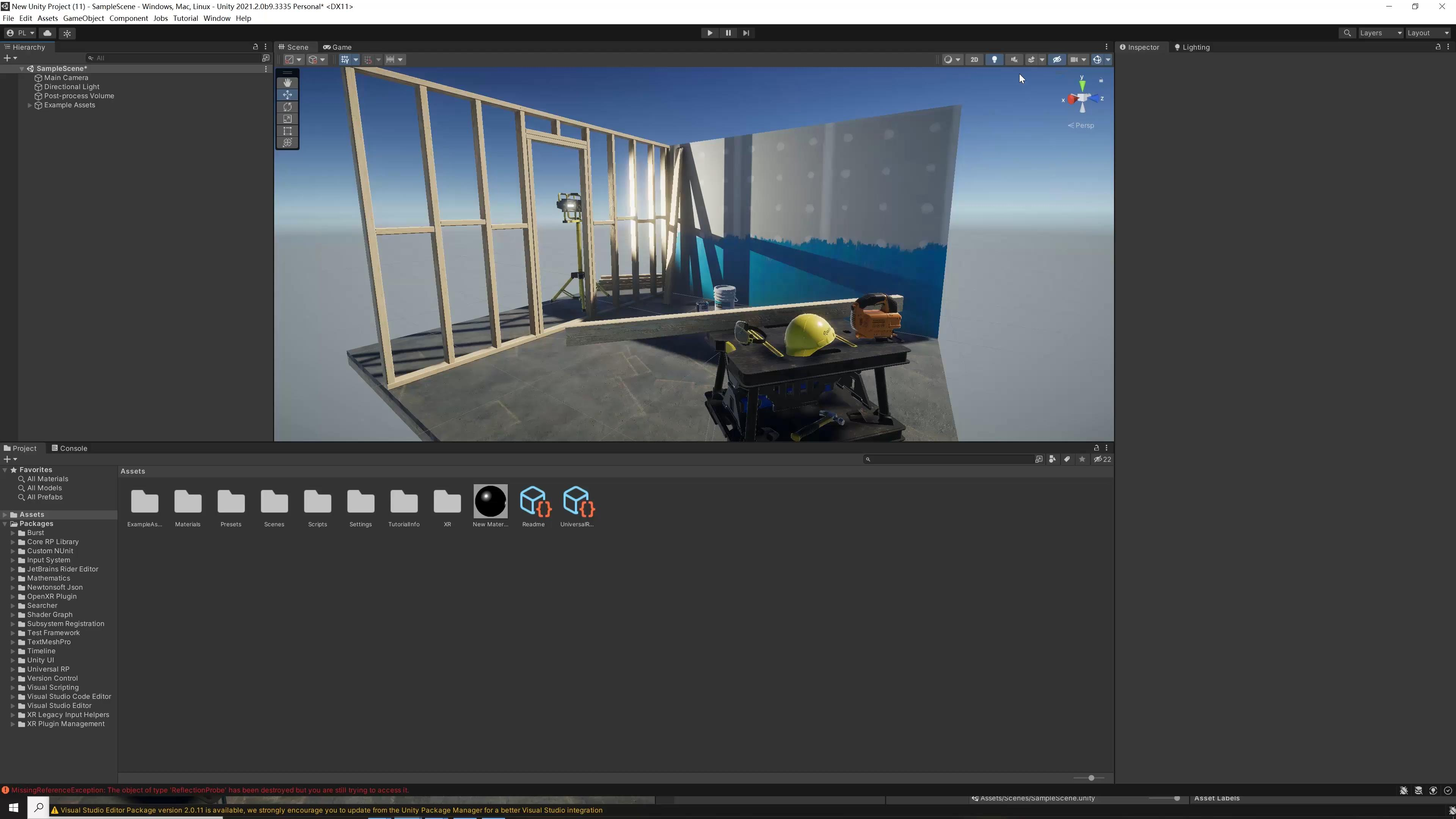

deferred-laser-combat - SampleScene - Windows, Mac, Linux - Unity 2021.2.0b9.3335 Personal <DX11>
File
Edit
Assets
GameObject
Component
Jobs
Window
Help
PL
Layers
Layout
Hierarchy
All
SampleScene
Main Camera
Plane
GlobalVolume
LeftSideLasers
RightSideLasers
MoonLight
Envionment
Sphere
Scene
Game
Game
Display 1
Free Aspect
Scale
1.5x
Play Focused
Mute Audio
Stats
Gizmos
Inspector
Project
Console
Favorites
All Materials
All Models
All Prefabs
Assets
Materials
PolygonSciFiCity
Prefab
Scenes
Scripts
Settings
Textures
Packages
Burst
Core RP Library
Custom NUnit
JetBrains Rider Editor
Mathematics
Newtonsoft Json
Searcher
Shader Graph
Test Framework
TextMeshPro
Timeline
Unity UI
Universal RP
Assets
Materials
PolygonSciFiCity
Prefab
Scenes
Scripts
Settings
Textures
UniversalRenderPipelineGlobalSettings
16
在这里输入你要搜索的内容
30°C 晴朗
中
14:34
2021/9/14

```
Statistics
Audio (suspended):
  Level: -74.8 dB                DSP load: 0.1%
  Clipping: 0.0%                 Stream load: 0.0%
Graphics:                        - FPS (Playmode Of
  CPU: main 4.4ms  render thread 2.5ms
  Batches: 740   Saved by batching: 0
  Tris: 271.5k      Verts: 457.2k
  Screen: 1224x774 - 10.8 MB
  SetPass calls: 161       Shadow casters: 468
  Visible skinned meshes: 0
  Animation components playing: 0
  Animator components playing: 0
```

```
Reduced additional punctual light shadows resolution by 2 to make 4 shadow maps fit in the 512x512 shadow atlas. To avoid this, increase shadow atlas size, decrease big shadow resolutions, or reduce the number of shadow maps active in the same frame
```

Reflection probe blending（反射探针混合）

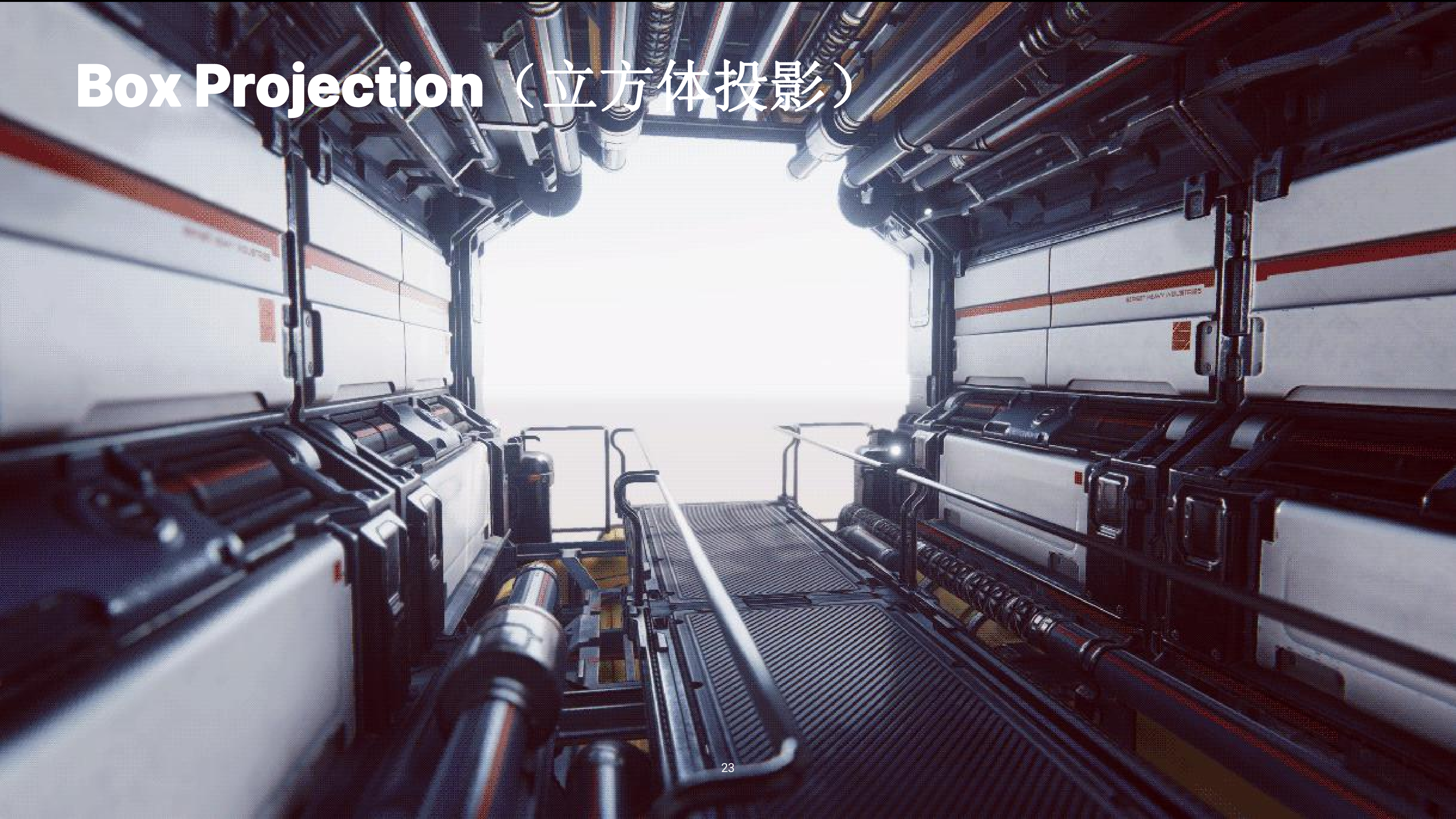


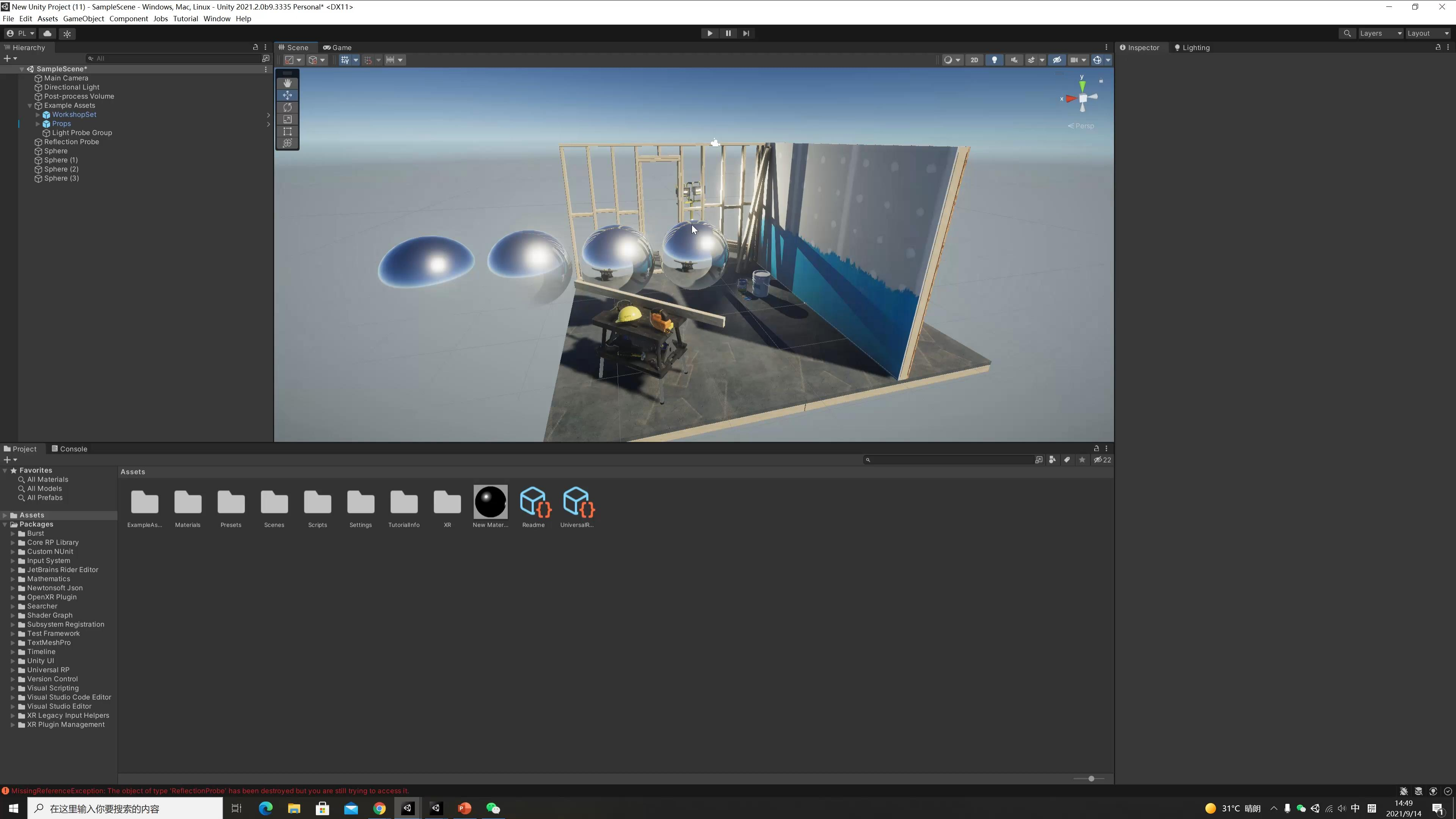

New Unity Project (11) - SampleScene - Windows, Mac, Linux - Unity 2021.2.0b9.3335 Personal* <DX11>
File Edit Assets GameObject Component Jobs Tutorial Window Help
PL
Layers
Layout
Hierarchy
All
SampleScene*
Main Camera
Directional Light
Post-process Volume
Example Assets
Scene
Game
2D
Persp
Inspector
Lighting
Project
Console
22
Favorites
All Materials
All Models
All Prefabs
Assets
Packages
Burst
Core RP Library
Custom NUnit
Input System
JetBrains Rider Editor
Mathematics
Newtonsoft Json
OpenXR Plugin
Searcher
Shader Graph
Subsystem Registration
Test Framework
TextMeshPro
Timeline
Unity UI
Universal RP
Version Control
Visual Scripting
Visual Studio Code Editor
Visual Studio Editor
XR Legacy Input Helpers
XR Plugin Management
Assets
ExampleAs...
Materials
Presets
Scenes
Scripts
Settings
TutorialInfo
XR
New Mater...
Readme
UniversalR...
Assets/Scenes/SampleScene.unity
Asset Labels

MissingReferenceException: The object of type 'ReflectionProbe' has been destroyed but you are still trying to access it.

Visual Studio Editor Package version 2.0.11 is available, we strongly encourage you to update from the Unity Package Manager for a better Visual Studio integration

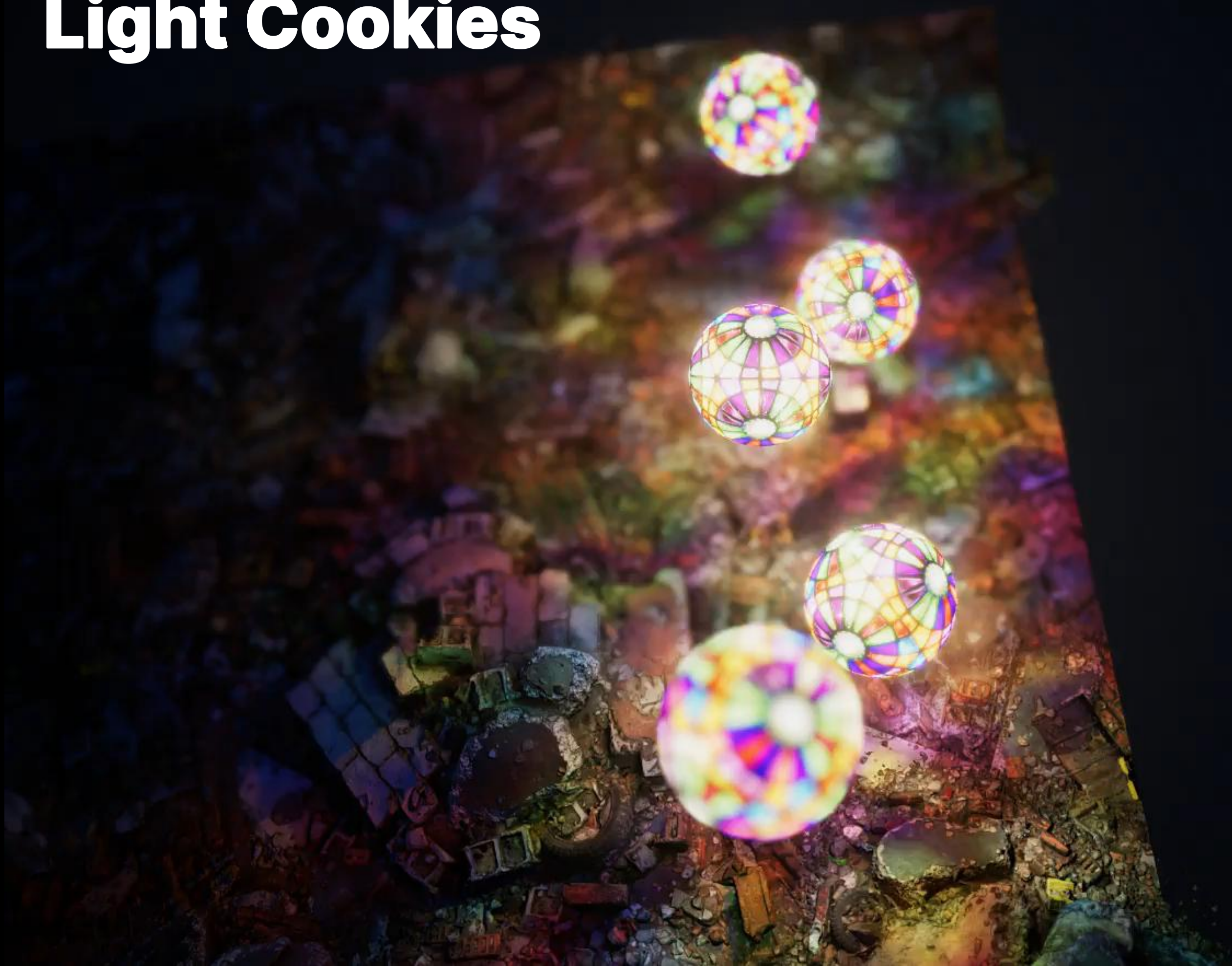
Box Projection（立方体投影）




New Unity Project (11) - SampleScene - Windows, Mac, Linux - Unity 2021.2.0b9.3335 Personal* <DX11>
File
Edit
Assets
GameObject
Component
Jobs
Tutorial
Window
Help
PL
Layers
Layout
Hierarchy
All
SampleScene*
Main Camera
Directional Light
Post-process Volume
Example Assets
WorkshopSet
Props
Light Probe Group
Reflection Probe
Sphere
Sphere (1)
Sphere (2)
Sphere (3)
Scene
Game
2D
Persp
Inspector
Lighting
Project
Console
Favorites
All Materials
All Models
All Prefabs
Assets
Packages
Burst
Core RP Library
Custom NUnit
Input System
JetBrains Rider Editor
Mathematics
Newtonsoft Json
OpenXR Plugin
Searcher
Shader Graph
Subsystem Registration
Test Framework
TextMeshPro
Timeline
Unity UI
Universal RP
Version Control
Visual Scripting
Visual Studio Code Editor
Visual Studio Editor
XR Legacy Input Helpers
XR Plugin Management
Assets
ExampleAs...
Materials
Presets
Scenes
Scripts
Settings
TutorialInfo
XR
New Mater...
Readme
UniversalR...
22
在这里输入你要搜索的内容
31°C 晴朗
中
14:49
2021/9/14

MissingReferenceException: The object of type 'ReflectionProbe' has been destroyed but you are still trying to access it.

Light Cookies



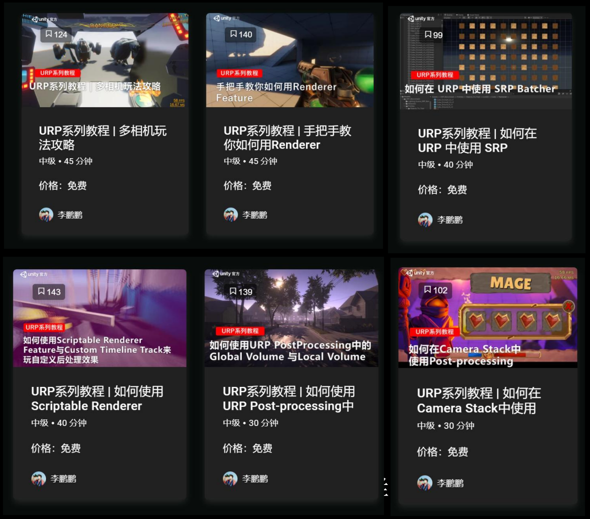
URP更多的新功能和教程

- 更多的URP 新功能欢迎大家访问:
- https://docs.unity3d.com/Packages/com.unity.render-pipelines.universal@12.0/manual/whats-new/urp-whats-new.html
- 更多URP的教程以及Unity的学习资料，大家可以访问Unity中文课堂:https://learn.u3d.cn/

unity
URP 学习
交流群

Unity URP官方学习交...
群号：1085557897

扫一扫二维码，加入群聊。


124
URP系列教程
URP系列教程 | 多相机玩法攻略
140
URP系列教程
手把手教你如何用Renderer Feature
99
URP系列教程
如何在 URP 中使用 SRP Batcher
143
URP系列教程
如何使用Scriptable Renderer Feature与Custom Timeline Track来玩自定义后处理效果
139
URP系列教程
如何使用URP PostProcessing中的Global Volume 与Local Volume
102
MAGE
URP系列教程
如何在Camera Stack中使用Post-processing

URP系列教程 | 多相机玩法攻略
中级 • 45 分钟
价格：免费
李鹏鹏

URP系列教程 | 手把手教你如何用Renderer
中级 • 45 分钟
价格：免费
李鹏鹏

URP系列教程 | 如何在URP 中使用 SRP
中级 • 40 分钟
价格：免费
李鹏鹏

URP系列教程 | 如何使用Scriptable Renderer
中级 • 40 分钟
价格：免费
李鹏鹏

URP系列教程 | 如何使用URP Post-processing中
中级 • 30 分钟
价格：免费
李鹏鹏

URP系列教程 | 如何在Camera Stack中使用
中级 • 30 分钟
价格：免费
李鹏鹏

关注我们

Unity 动态

公众号：Unity 官方平台

B站： Unity 官方

*建议设为特别关注 方便收到直播学习（chou jiang）机会

知乎： Unity 官方

抖音：Unity 官方

Unity 学习资源

Unity 中文课堂：learn.u3d.cn

问答社区： unity.cn/ask

技术专栏： unity.cn/articles

中文文档： docs.unity.cn

资源商店： assetstore.unity.com

Unity 集训营： unity.cn./university

产品交流群

Plastic SCM：825450743

游戏云： 550832645

URP QQ 群： 1085557897

Unity 官方网站：unity.cn

unity