



The Unity roadmap in 2023

2023

张黎明



**Stable, fast, unified
platform and core**



**Rendering that scales
with your needs**



**Profiling and performance
optimization**



**Expanded scale for
ambitious games**



**Create and operate
connected games**



**Reach more players over
multiple platforms**



**Empowering teams with
codeless and cloud**



Stable, fast, unified platform and core



Content pipeline

A simple and scalable content management experience, from Unity's ecosystem to the hands of your players

- Faster iteration
 - **Multi-process AssetBundle build pipeline**

- Optimize your Addressables use
 - Addressables Build Report
 - Addressables Profiler Module

- **USD integration**
 - New interoperability workflows

.NET and IL2CPP

A standards-based approach to coding with fine-tuned compilation performance, regardless of your target platform, along with improved debugging to ensure top quality in your projects

→ .NET Modernization

- **Migration to Microsoft's CoreCLR**
- **Fast-enter Play Mode**

→ Async/Await

- **Unify existing asynchronous constructs in the engine with async/await**

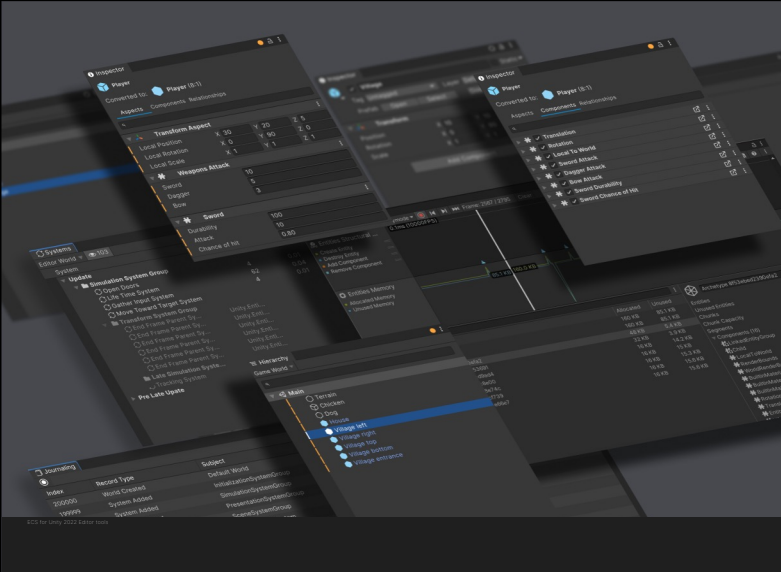
→ Burst quality-of-life improvements

- **Iteration times, debuggability, Inspector**

Enabling creators
to build more
ambitious games

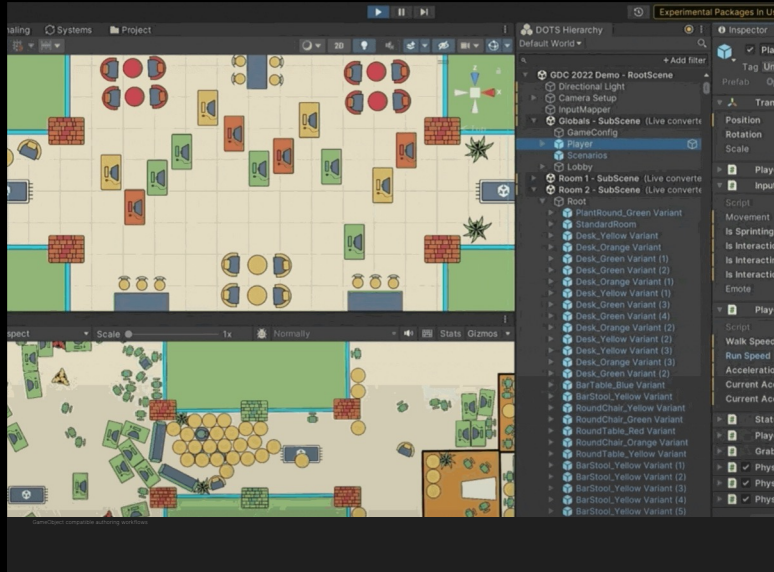


ECS for Unity 2022



Fully supported ECS foundation

ECS for Unity enables seasoned Unity creators to build more ambitious games.



Streamlined ECS workflows

Streamlined workflows and a familiar authoring experience in the Unity Editor, compatible with GameObject ecosystems.



Control and determinism

Flexible architectures, maximized performance, large-scale simulation, rendering, and streaming

Rendering Performance

Drawcall Performance Test
Unity 2022.2.0b8

Heavy Drawcall Submission



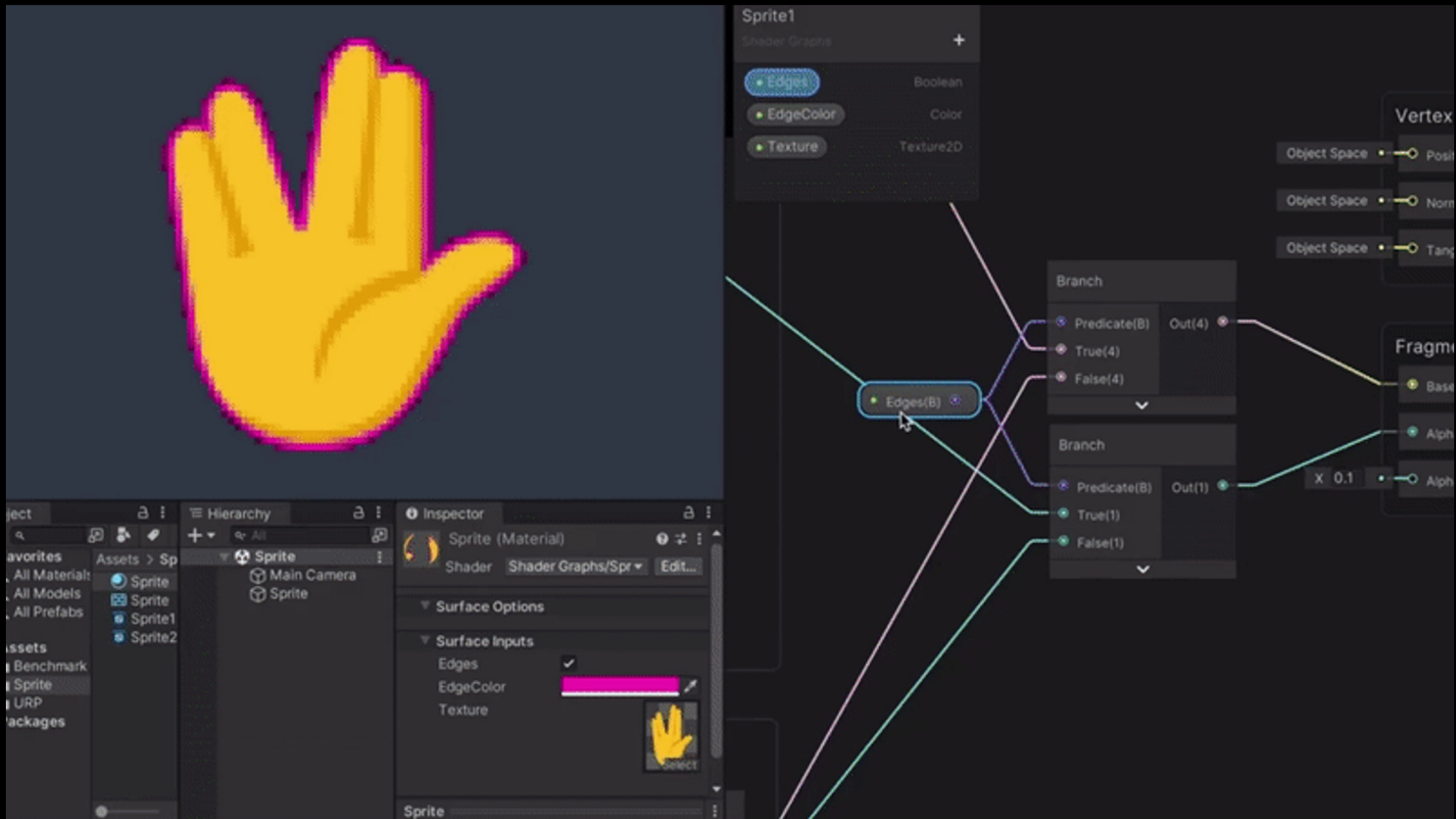
PC/consoles

- **DirectX 12 out of preview (22 LTS)**
- **Split Graphics Jobs (23.1)**
Accelerates CPU multithreading performance
- **Ray tracing out of Preview (23.1)**
Stability, performance and feature compatibility improvements

All platforms

- **Batched compute skinning**
Improves GPU Skinning and Blendshapes performance
- **Volumes optimizations (23.1)**
Reduced CPU time when using multiple volumes

Project Build Time

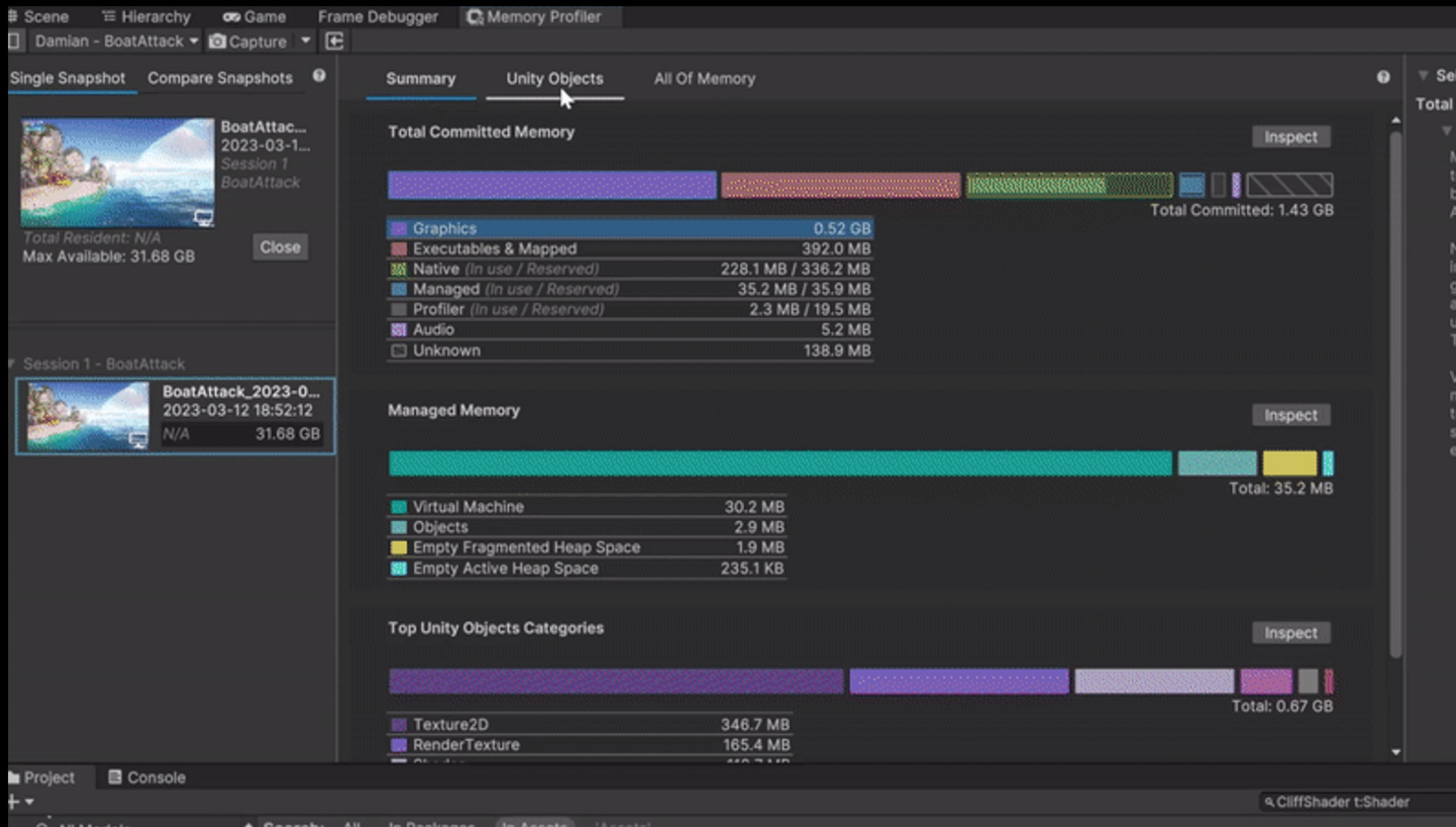


Shader Variant Prefiltering (21.3.15+)

Optimized URP **build times** thanks to reduced shader variant generation (additional optimizations underway)

Blog post: "Improvements to shader build times and memory usage in 2021 LTS"

Memory Usage



Dynamic Shader Loading (21.3.12+)

Reduced shader memory usage with better control of the memory budget at runtime (Player Settings or C# API)

Learn more in Unity Blog post: “Improvements to shader build times and memory usage”

Mipmap limit groups (22LTS)

Per-texture quality settings for different devices

Extensibility and unification



SRP RenderGraph (23.2)

- HDRP RenderGraph now integrated with URP
- Enables additional native render pass optimizations for improving performance on tile-based mobile GPUs (URP)

SRP Rendering Layers (23.1)

- URP Rendering Layers now integrated with HDRP, allows dedicated layers for lights and decals instead of using GameObject layers

SRP Lights/Cameras/Settings

- Per quality render pipeline settings – Lights and Cameras shared between SRPs (internal only)



Universal Render Pipeline (URP)

Feature richness

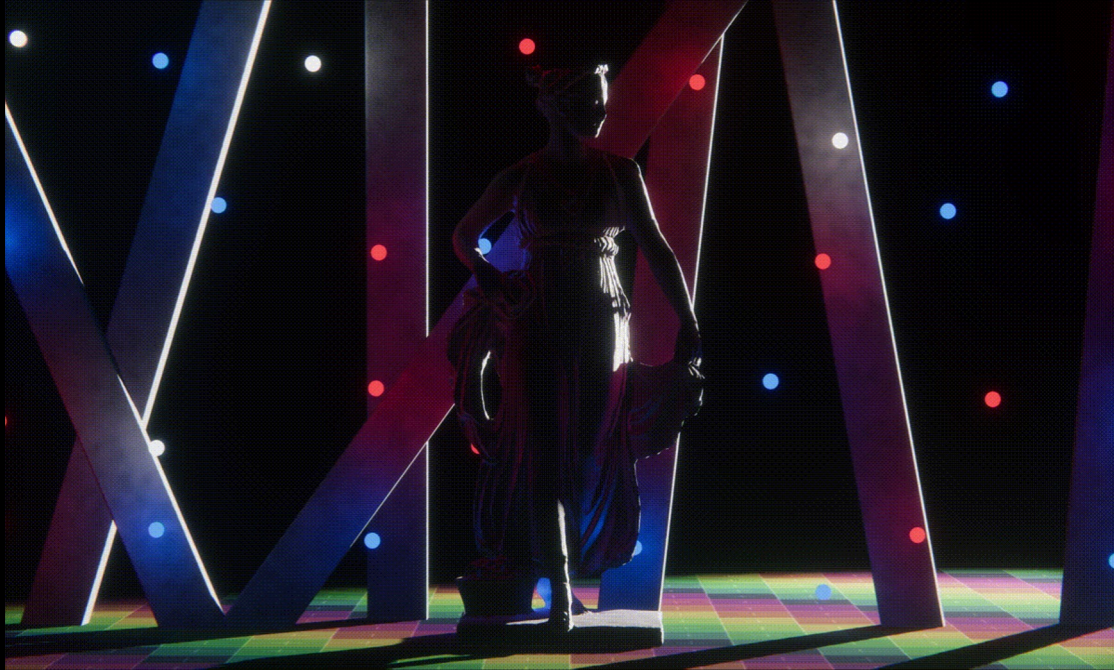
Familiar Built-In Render Pipeline functionality

Workflow improvements

Greater customizability and more productive workflows

Platform scalability

Feature scalability across all Unity supported platforms



Forward+ rendering path (22LTS)

High-quality real-time lighting across a wide range of platforms



LOD Fade off

LOD Fade on

LOD crossfade (22LTS)

Smother transition blending between the current LOD and the next LOD



Decal Layers (22LTS)

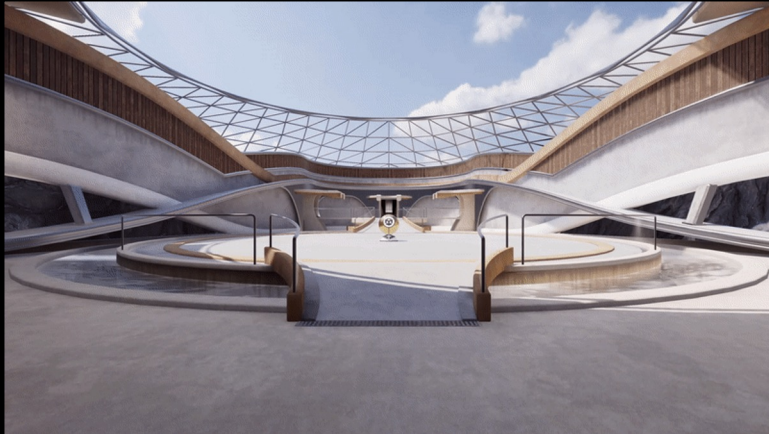
High-quality real-time lighting across a wide range of platforms



Temporal Anti-aliasing (23.1)

Supplements MSAA, FXAA, SMAA

New URP 3D sample scenes!



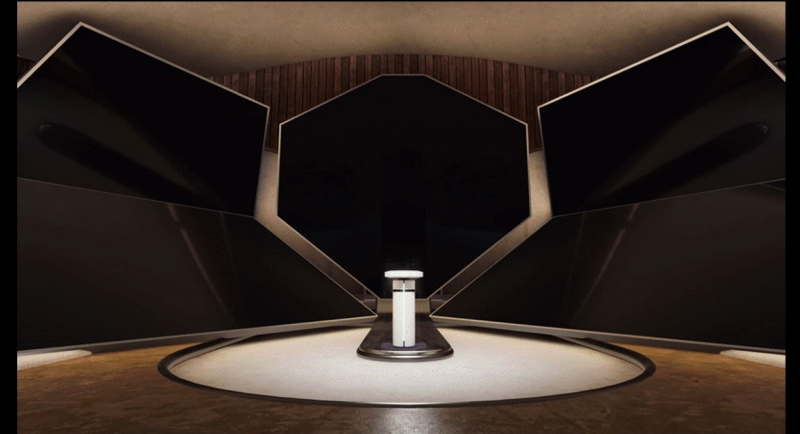
Terminal

Features photorealistic showcase. Lookdev, hub to other samples



Garden

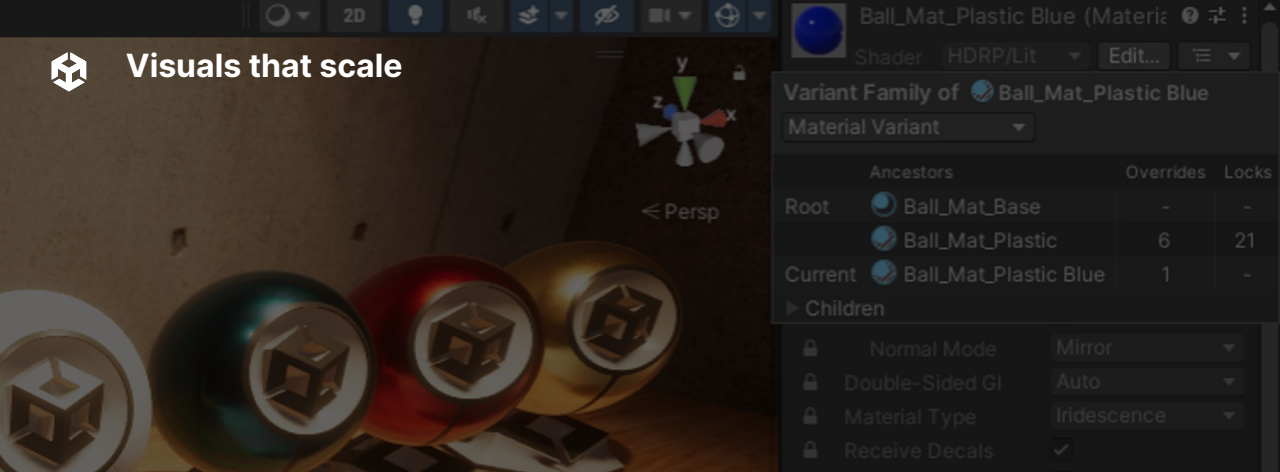
Detailed cross-platform 3D stylized environments with many lights



Cockpit

Lightweight low-poly, highly stylized with custom lighting made with a custom renderer

Visuals that scale

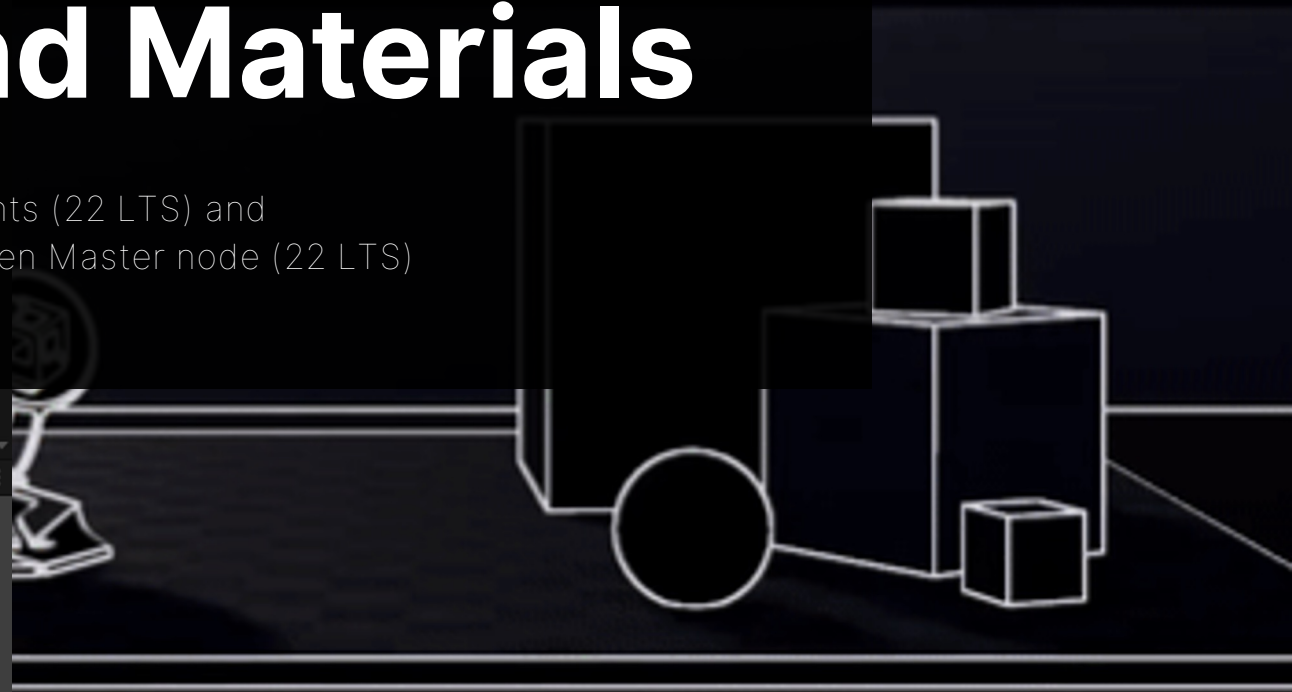
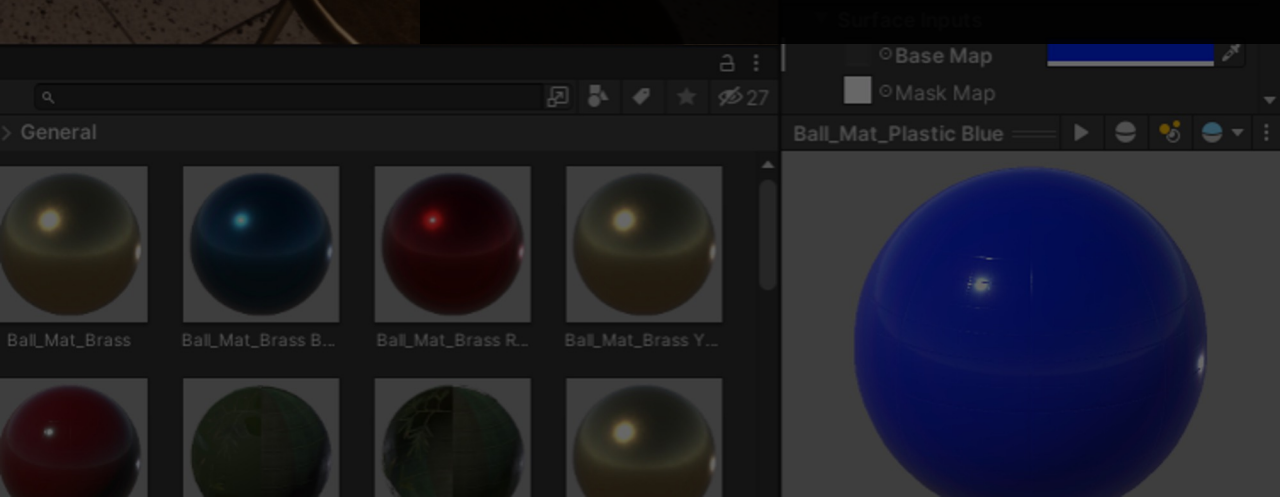


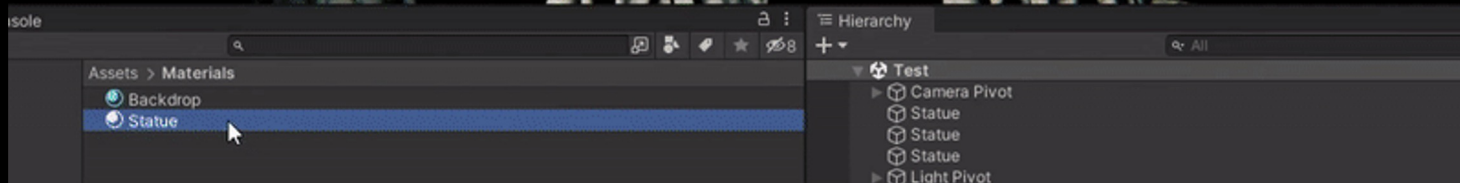
Fullscreen Custom Pass using a Shadergraph.
Material performs a Robert Cross Edge Detection on the Scene Depth and Normal Buffer.
The normal and depth buffer happens before Transparency in the rendering pipeline.
It means that transparent objects won't be seen by this effect.

Codeless.

Shaders and Materials

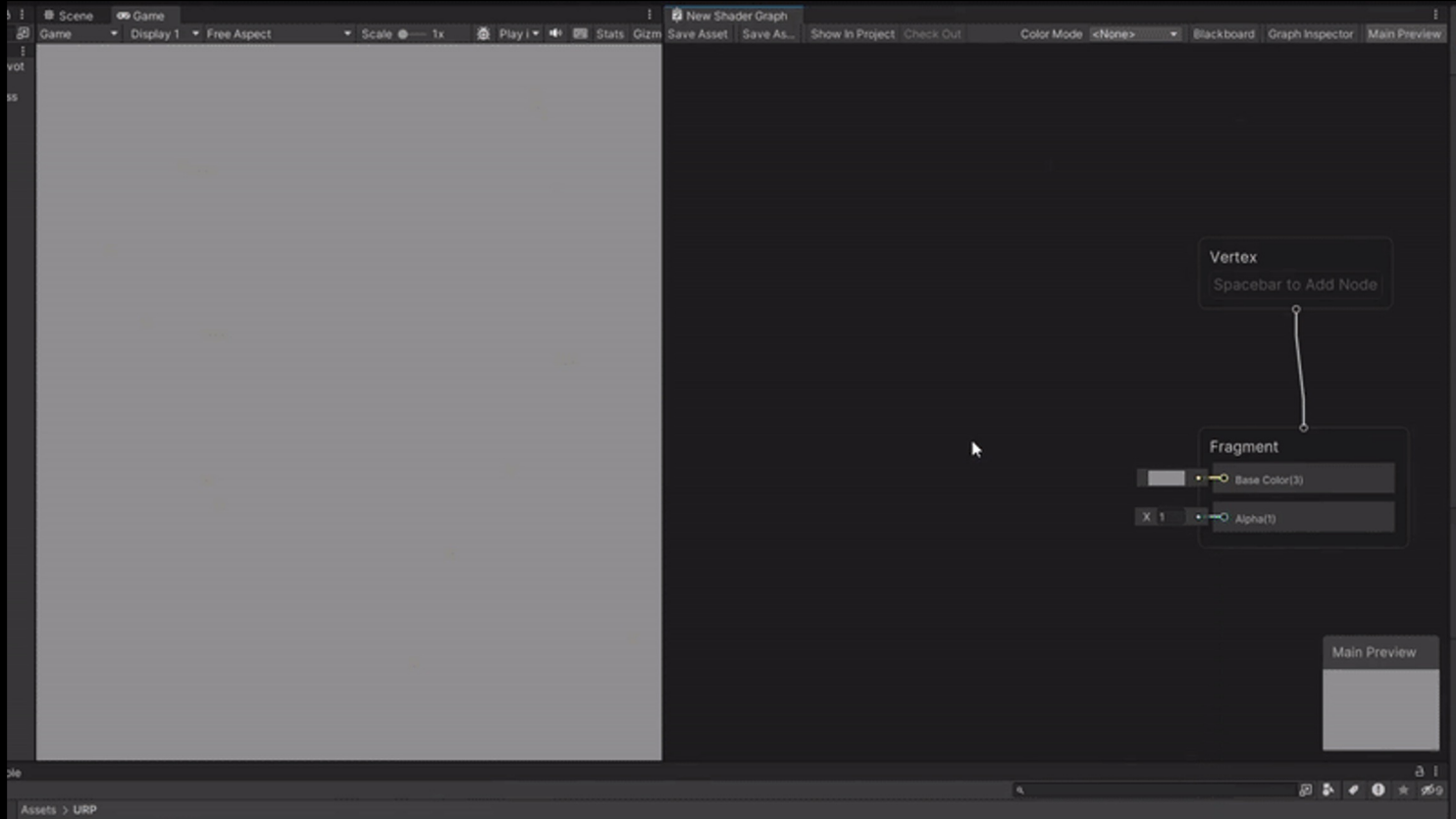
Material Variants (22 LTS) and
Shader Graph Full Screen Master node (22 LTS)



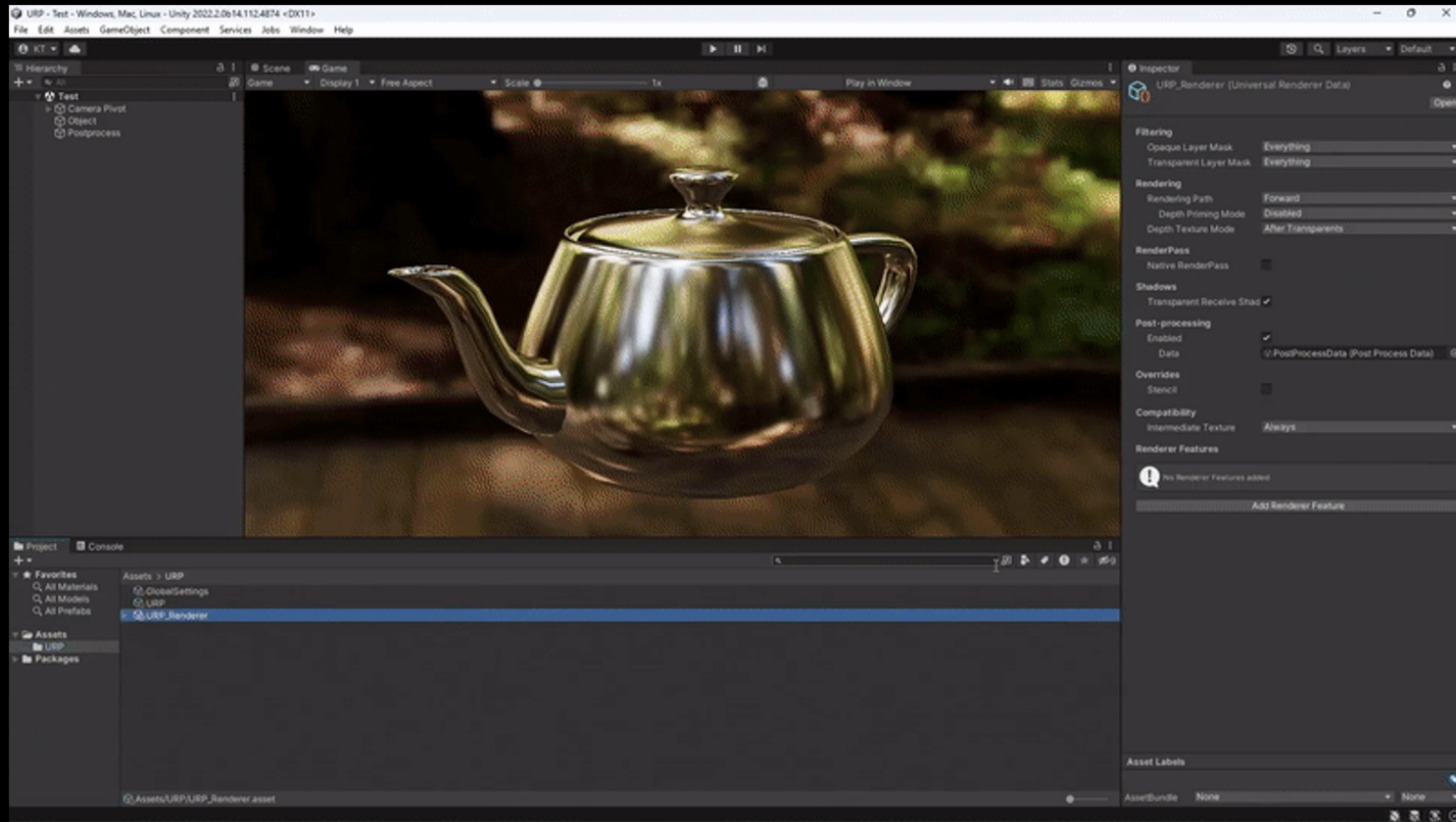


Material Variants (22.1)

- Build and reuse libraries of materials
- Override only the properties you need
- Lock properties to prevent mistakes
- Easily propagate changes from the reference materials

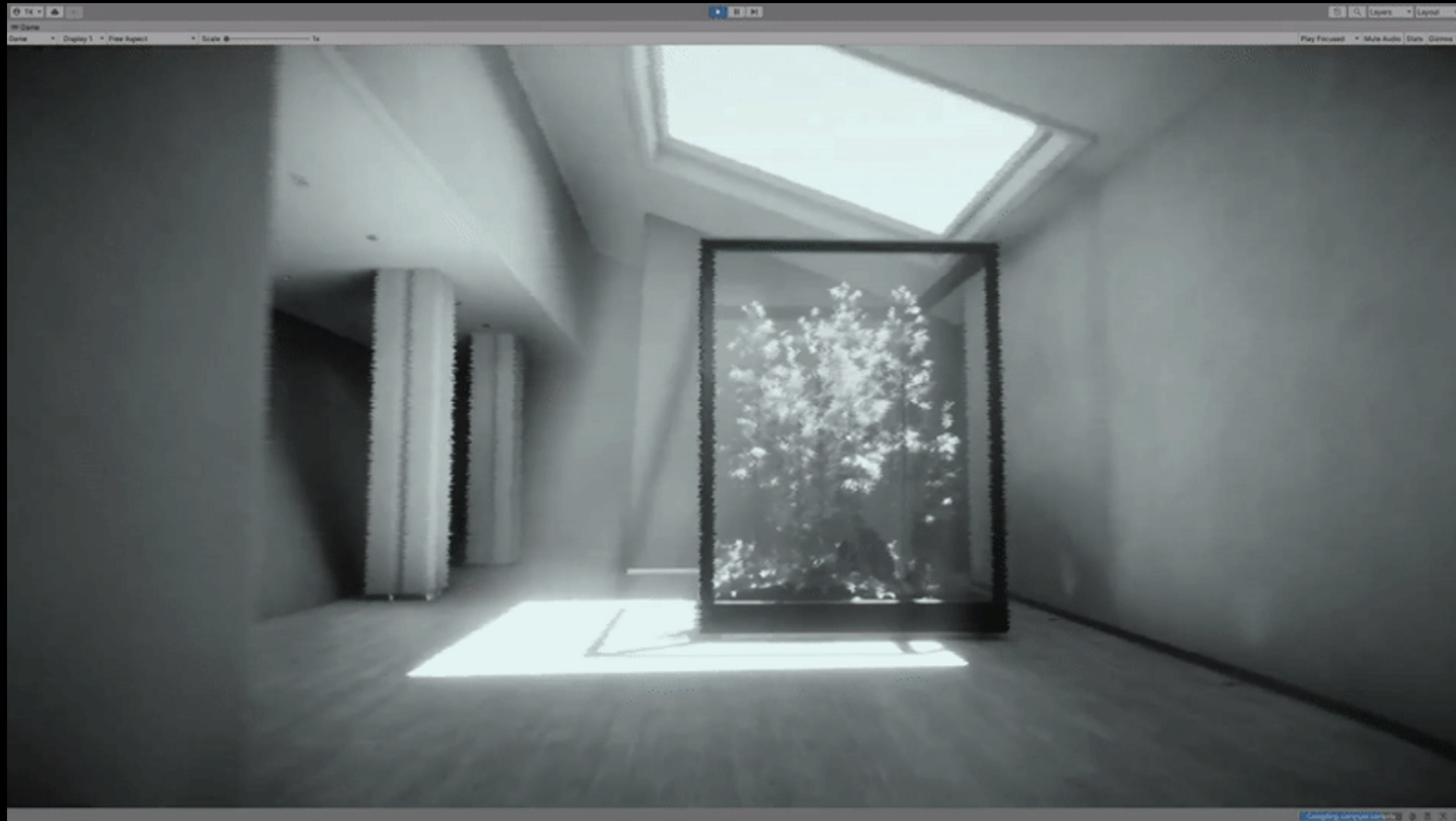


Shader Graph Full Screen Master node (22 LTS)



Shader Graph Full Screen Master node (22 LTS)

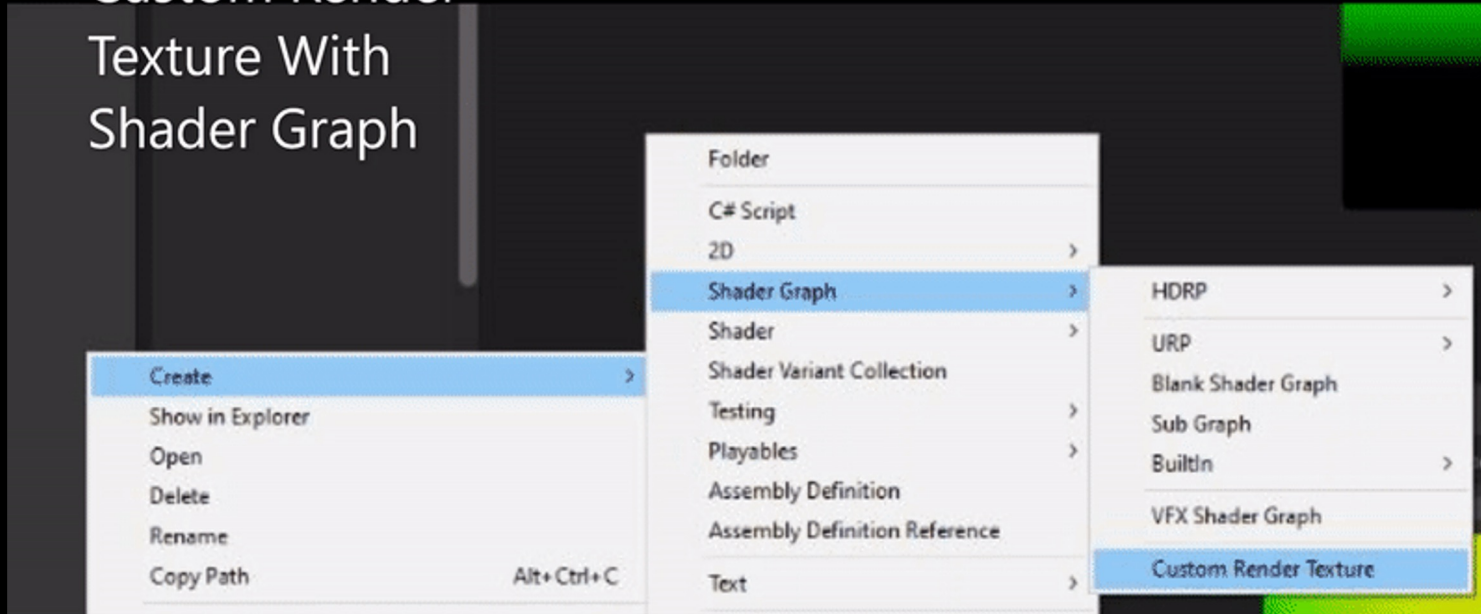
1. URP Custom Renderer Features and HDRP Custom Passes



Shader Graph Full Screen Master node (22 LTS)

1. URP Custom Renderer Features and HDRP Custom Passes
2. Custom post processes

Custom Render Texture With Shader Graph



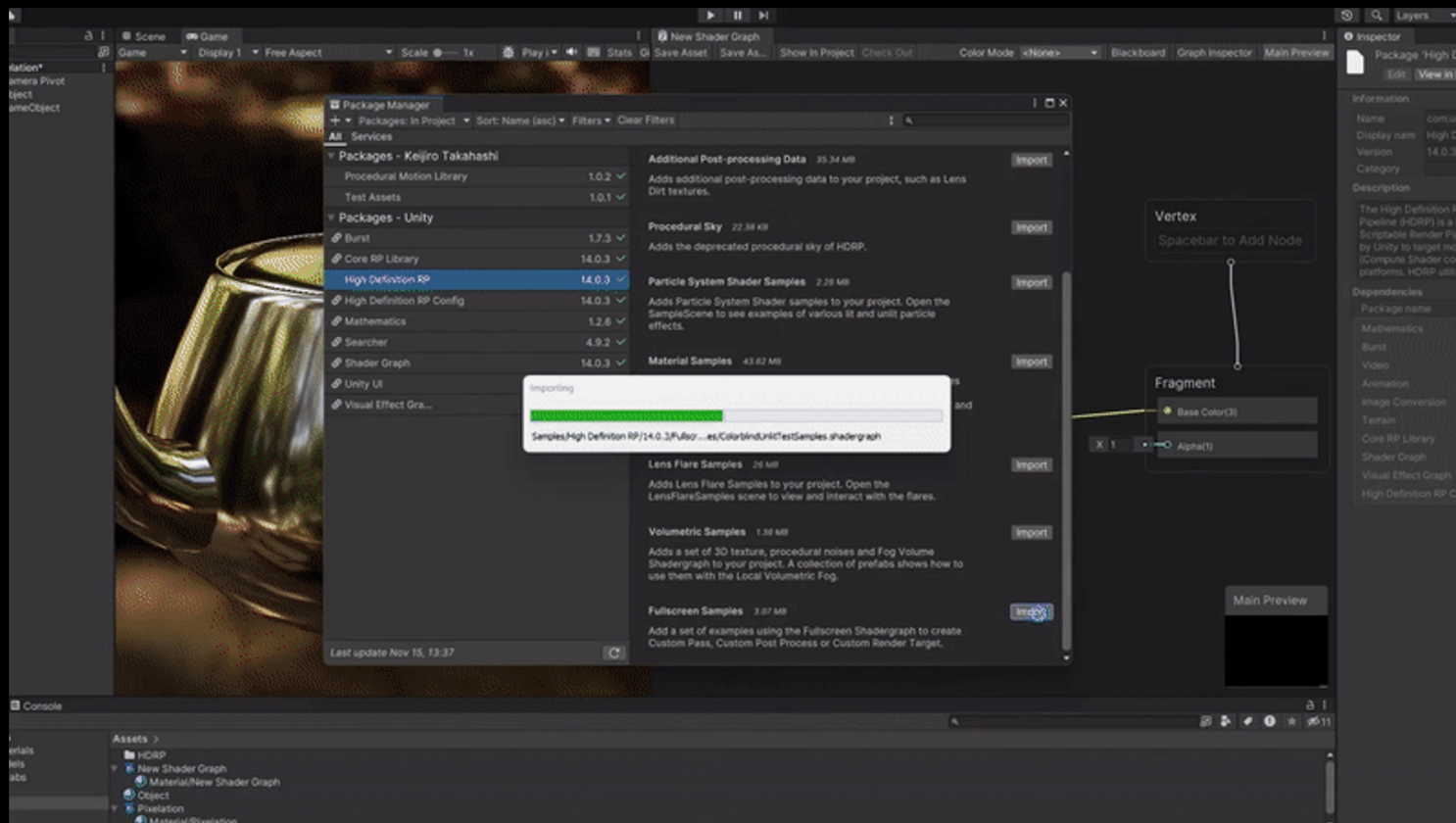
Shader Graph Full Screen Master node (22 LTS)

1. URP Custom Renderer Features and HDRP Custom Passes
2. Custom post processes
3. Custom render textures (SRP)



Shader Graph Full Screen Master node (22 LTS)

1. URP Custom Renderer Features and HDRP Custom Passes
2. Custom post processes
3. Custom render textures (SRP)
4. Procedural volumetric fog (HDRP 23.1)



Shader Graph Full Screen Master node (22 LTS)

1. URP Custom Renderer Features and HDRP Custom Passes
2. Custom post processes
3. Custom render textures (SRP)
4. Procedural volumetric fog (HDRP 23.1)

Get started now with our Full Screen Samples in the HDRP package.



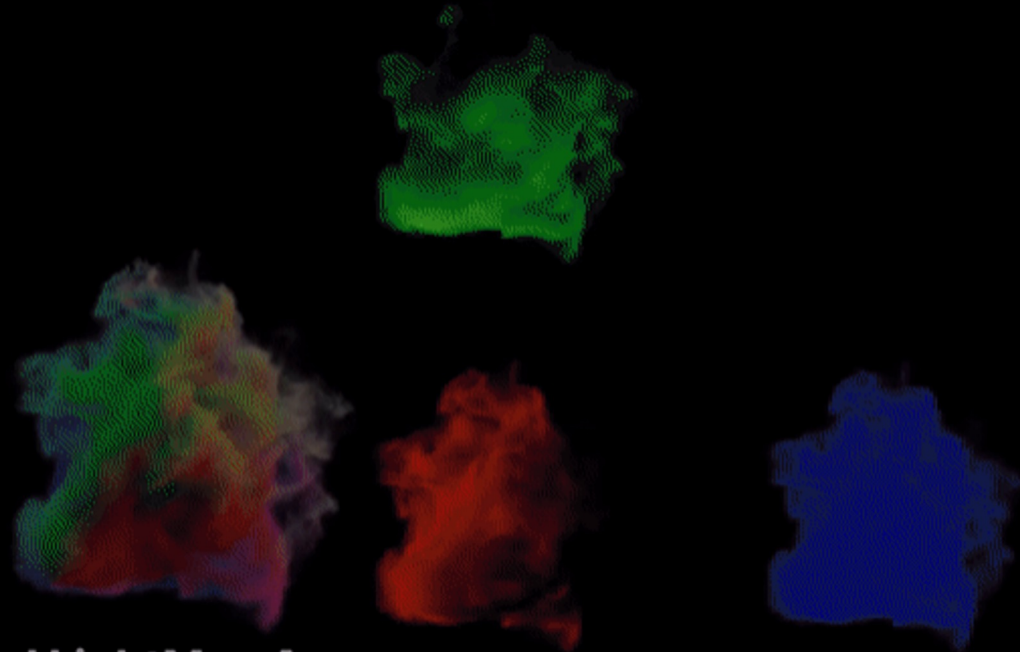
VFX Graph

Build advanced effects that can be reused at scale



VFX Graph Instancing (22LTS)

Reuse the same effect with low overhead on the CPU



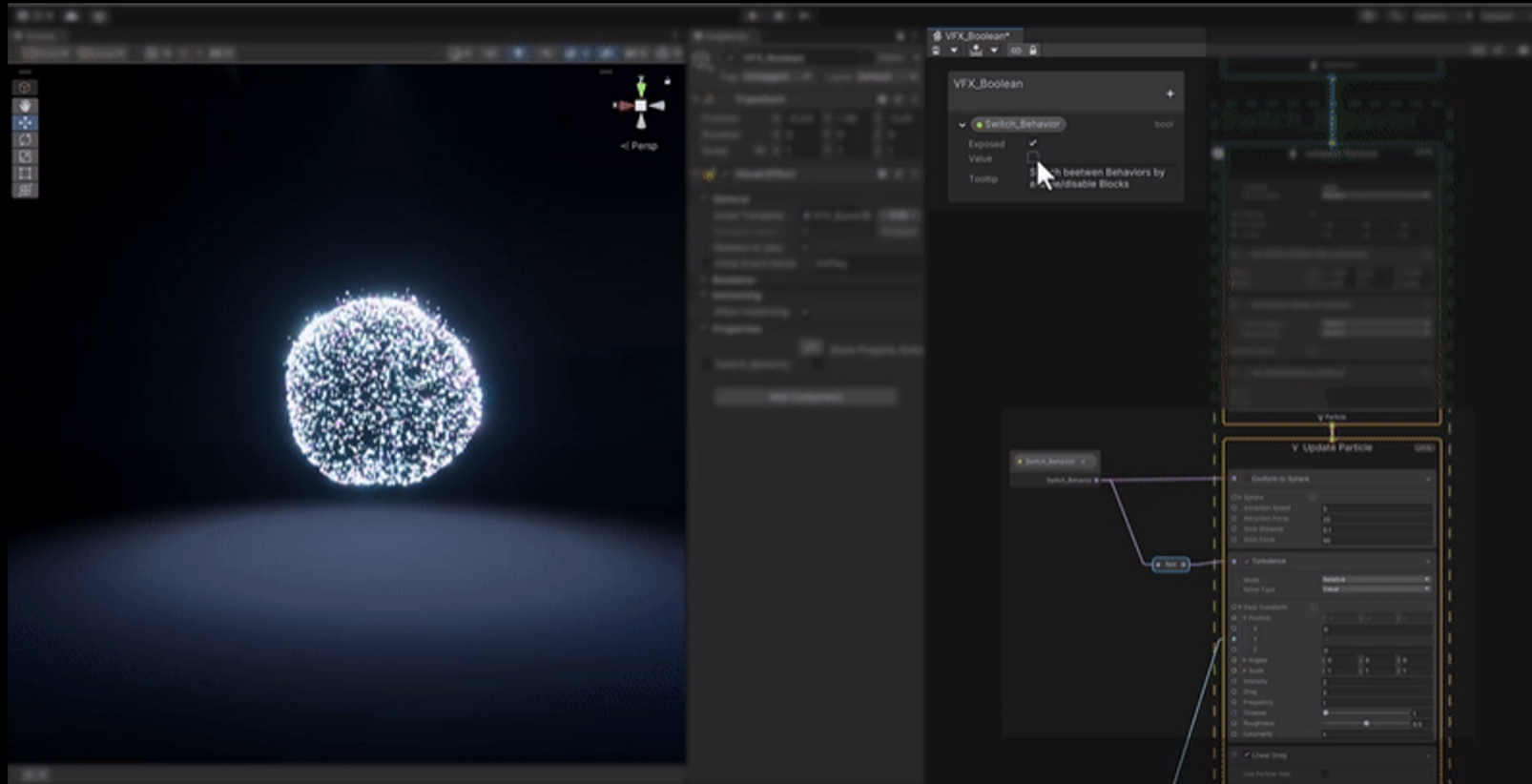
Packed LightMap A

Six-way lighting (22LTS)

Reuse the same smoke-simulation flipbook in various lighting conditions and for multiple effects

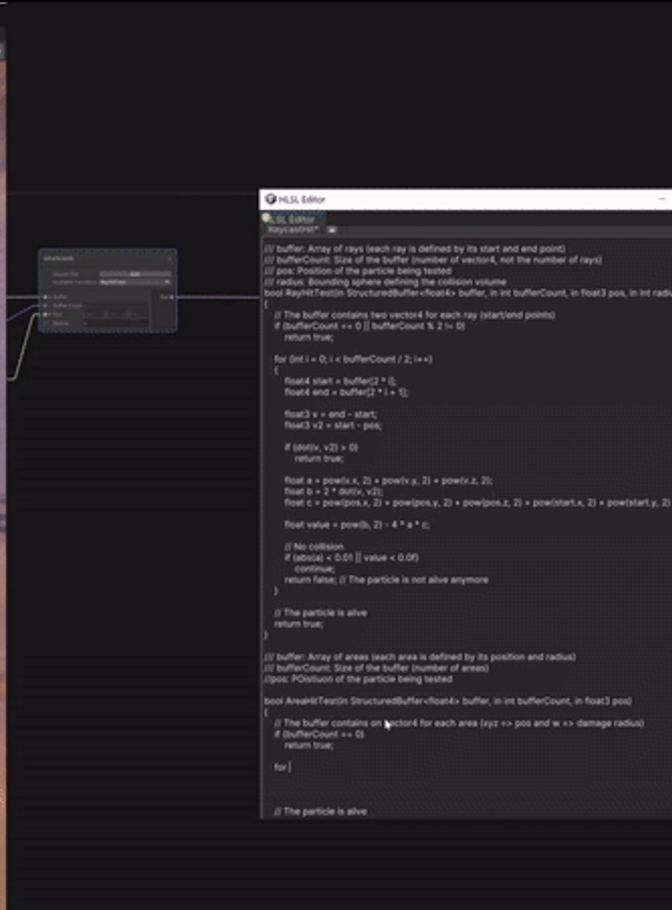
Blog post: "Realistic smoke lighting with 6-way lighting in VFX Graph"

Credits: [HDRP] Abandoned Factory Building by Scans Factory on the Unity Asset Store



Boolean Ports (22LTS)

Dynamically toggle entire blocks to create configurable uber effects



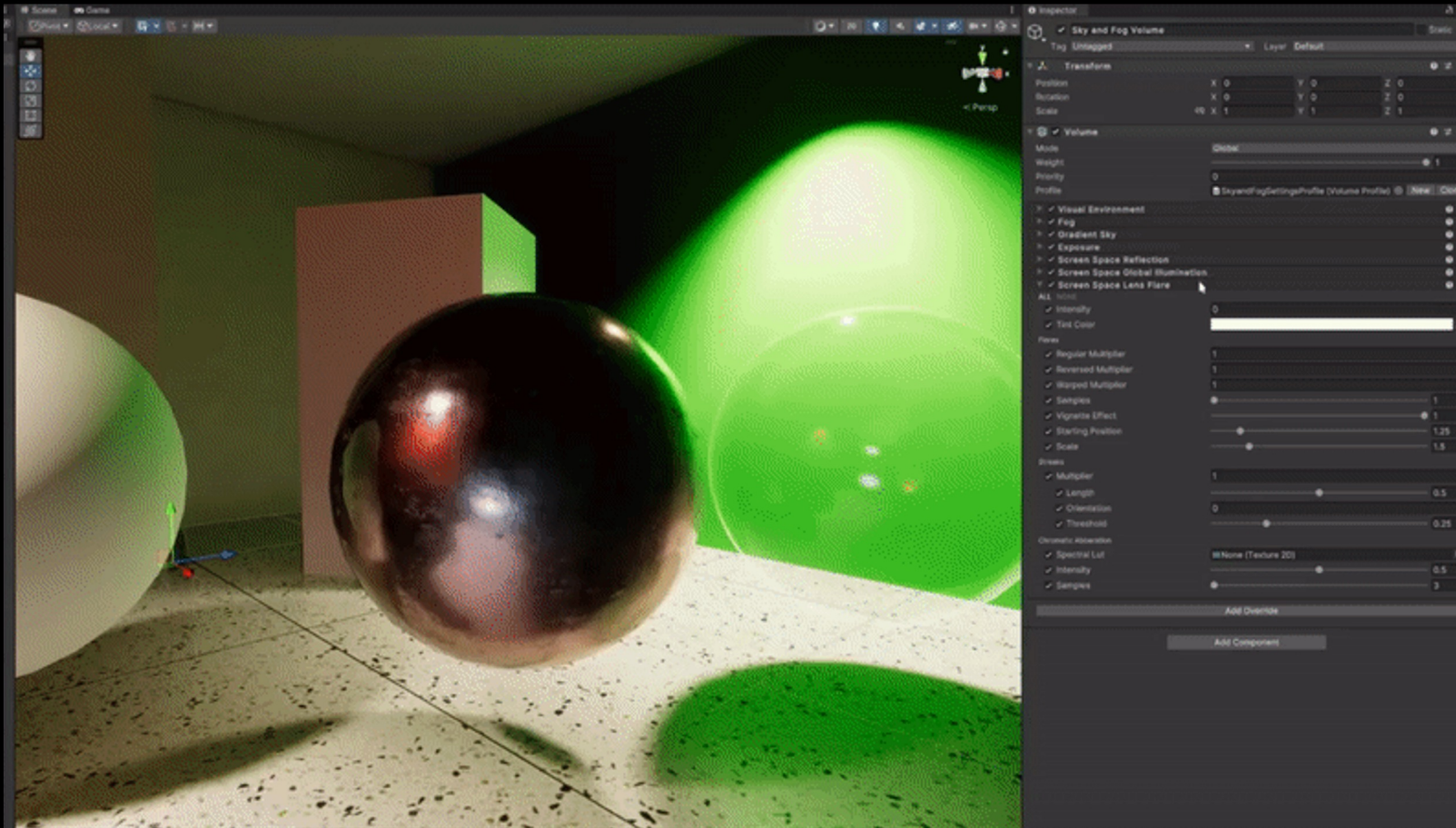
Custom HLSL Blocks (23.2)

Create custom blocks using code to create advanced behaviors



Lighting

Global Illumination solutions for each platform



Screen Space Lens Flares (23.1)

Automatic Lens Flares on any shiny light source or surface (SRP)



GPU Lightmapper

Best-in-class GPU lightmapper

New light baking architecture (23.1)

LightBaker v1.0 provides a more predictable and stable light baking foundation

GPU Lightmapper out of preview (23.2)

GPU Lightmapper is out of preview, reduced min spec to 2GB



Adaptive Probe Volumes

Simplifies light probe placement, and improves Global Illumination visual quality for Light Probe-lit objects

HDRP Preview (21LTS, 22 LTS)

Out of preview (23.1)

More robust light leaking prevention workflows, improved user experience

URP first release (23.1)

Core features enabled, limitations on scenarios & performance for mobile

Precomputed Realtime GI (next)

Dynamic Global Illumination, based on light probes built with Adaptive Probe Volumes



Adaptive Probe Volumes

Easier probe placement

Simply place probe volumes
or use Automatic Scene or Selection fit

Credits: [HDRP] Abandoned Factory Building by Scans Factory on the Unity Asset Store



Adaptive Probe Volumes

Faster Iterations

Automatic volume grid update based on the Scene density

Credits: [HDRP] Abandoned Factory Building by Scans Factory on the Unity Asset Store

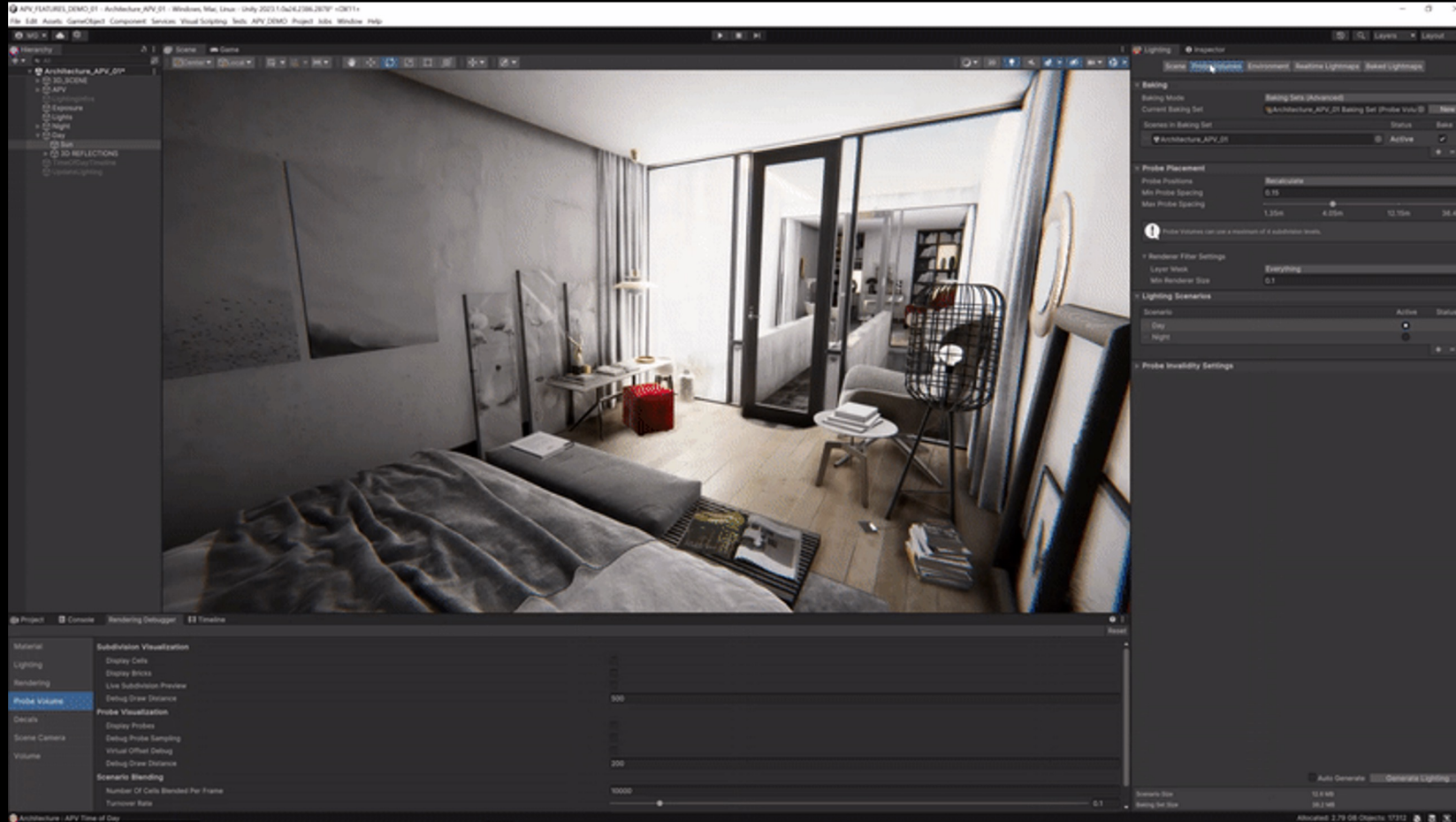


Adaptive Probe Volumes

Improved Visual Fidelity

Per-pixel indirect lighting and improved integration with volumetric fog (HDRP)

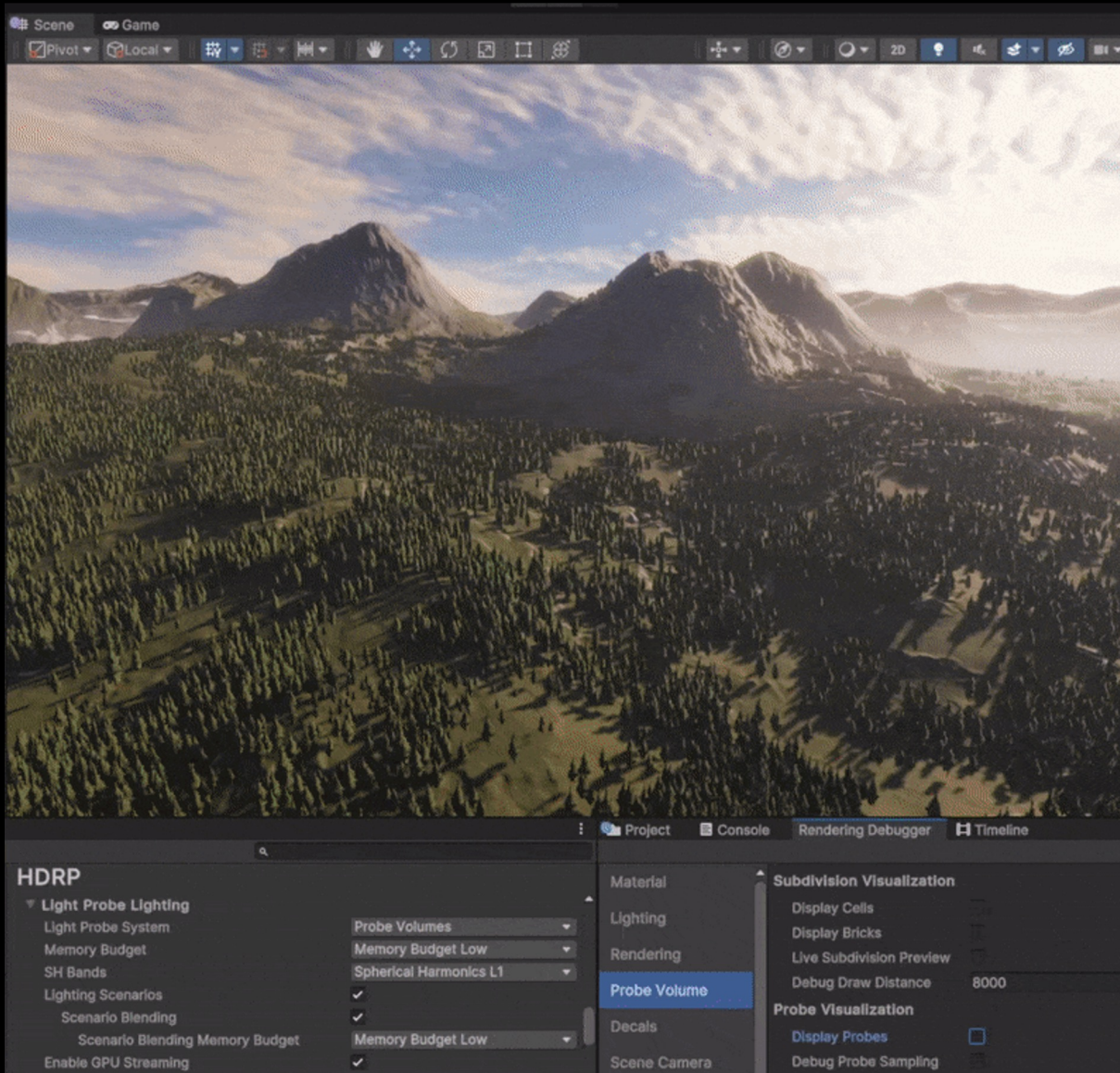
Credits: Tanker Truck by Pukamakara on the Unity Asset Store & Abandoned Factory Building by Scans Factory on the Unity Asset Store



Adaptive Probe Volumes

Lighting scenarios, HDRP (23.1)

Manage multiple lighting scenario baking sets and blend between them at runtime



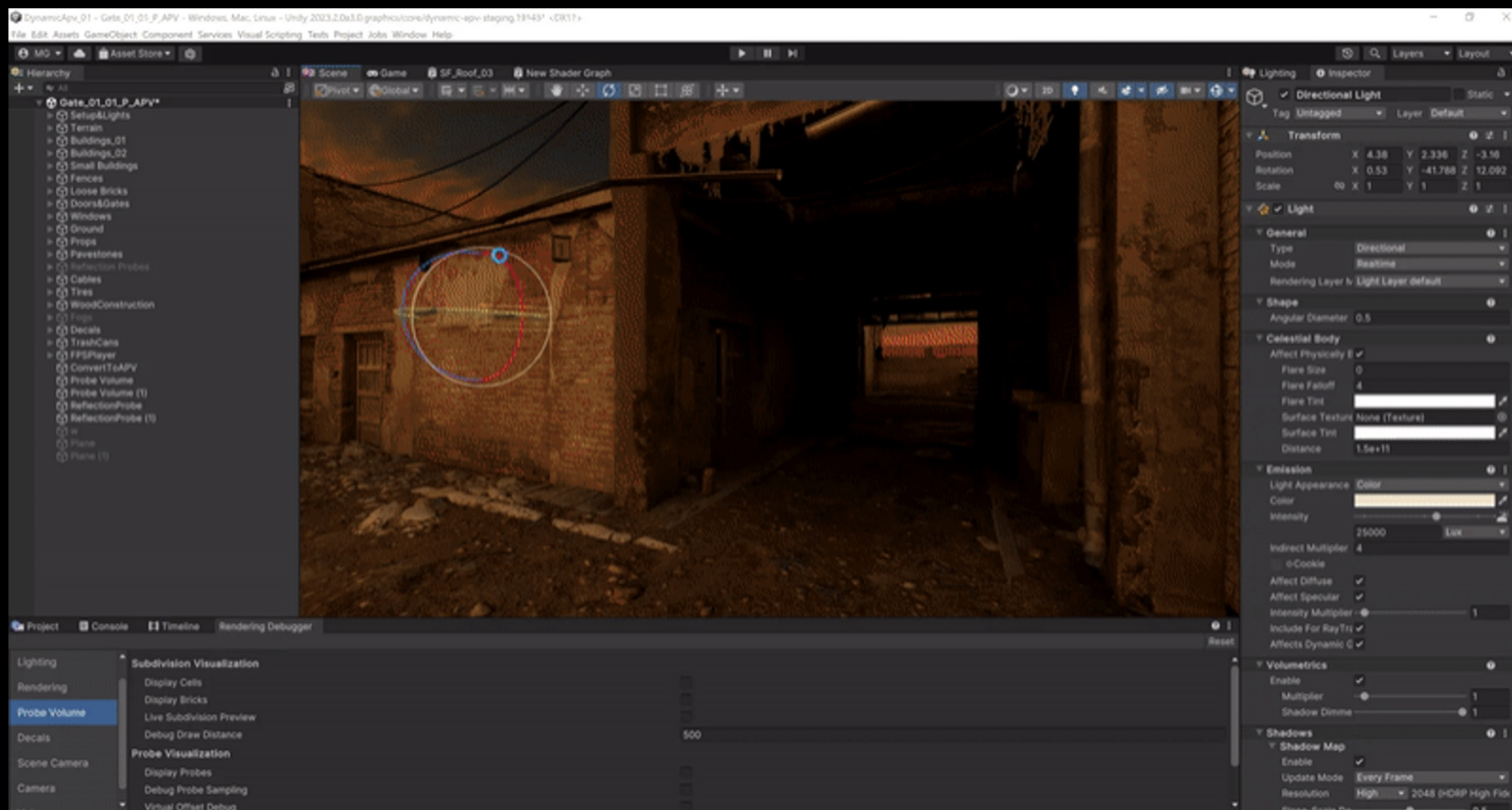
Adaptive Probe Volumes

GPU Streaming (23.1)

Stream light probe data to use less GPU memory at runtime



Visuals that scale: Lighting



Adaptive Probe Volumes

Precomputed Dynamic GI (next)

Dynamic update of indirect lighting from static contributors like the ground, walls, and ceilings

Credits: [HDRP] Gate Backyard by Scans Factory on the Unity Asset Store



Time of day

Render large worlds with dynamic lighting conditions

HDRP Real-time Reflection Probes

Time-sliced Reflection Probe rendering (22LTS)
Real-time Reflection Probes relighting

HDRP Physical Sky

Add support for night sky
Improved sky visual fidelity

HDRP Clouds

Improved clouds rendering (22LTS)
Volumetric clouds Beer shadow maps (23.2)

HDRP improved exposure

Local tone mapping and Luminance-Based Exposure for improved exposure under any lighting conditions



Ray tracing

Enhance visual fidelity for productions on PC and consoles

Ray-tracing out of Preview (23.1)

Production-ready pipeline agnostic Ray-Tracing API and out-of-the-box HDRP effects for consoles and PC

VFX Graph and Terrain Heightmap support (HDRP 23.1)

Path-tracing denoisers (HDRP 22 LTS)

Better and faster results for high-quality frame capture or cinematics

Ray tracing in the HDRP Template (22 LTS)

Two new quality settings for raytracing



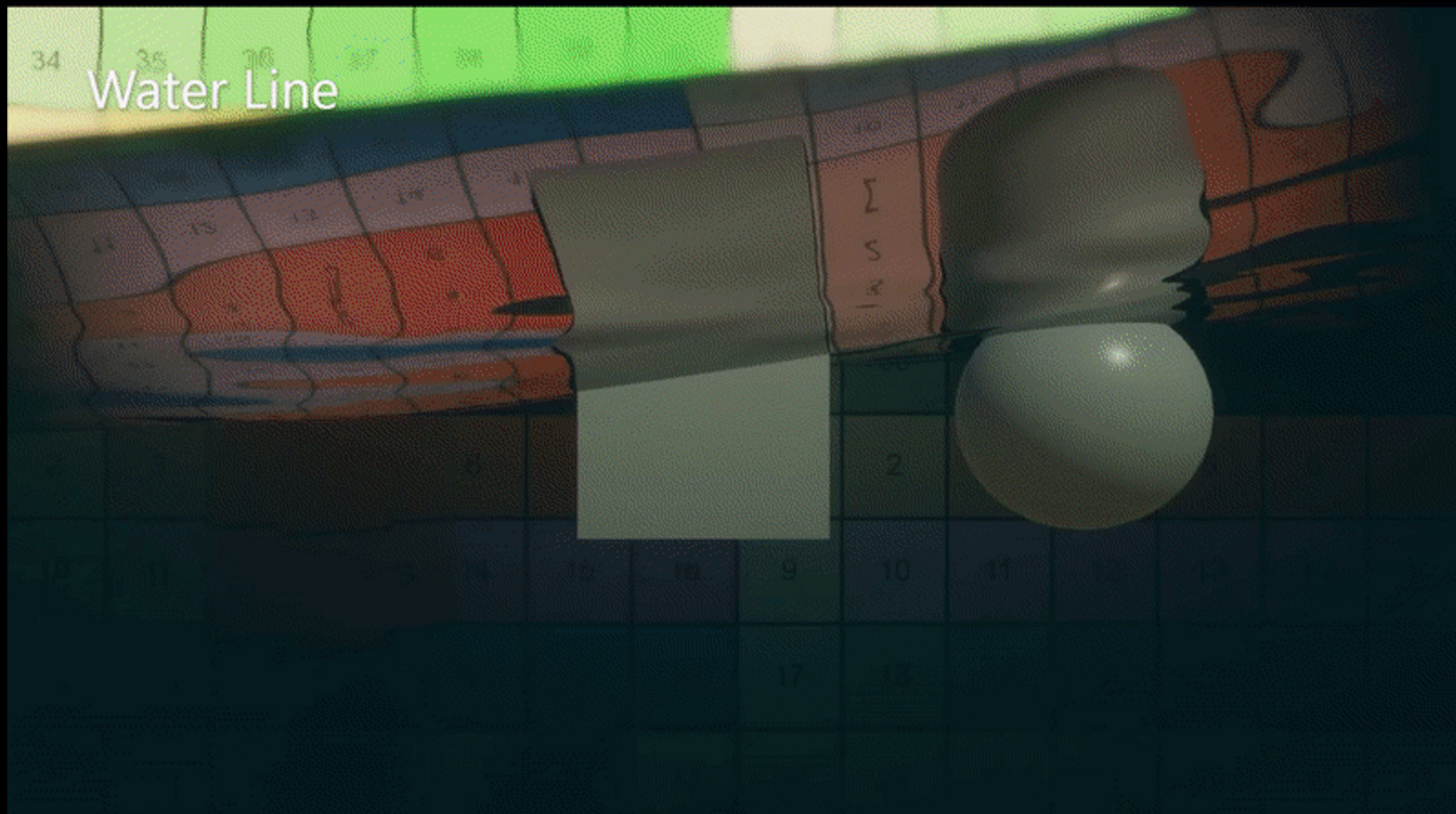
Environment

Detailed and dynamic environments



Water System (HDRP)

Simulation (waves, ripples and foam) and Physically Based Water Rendering (22LTS)

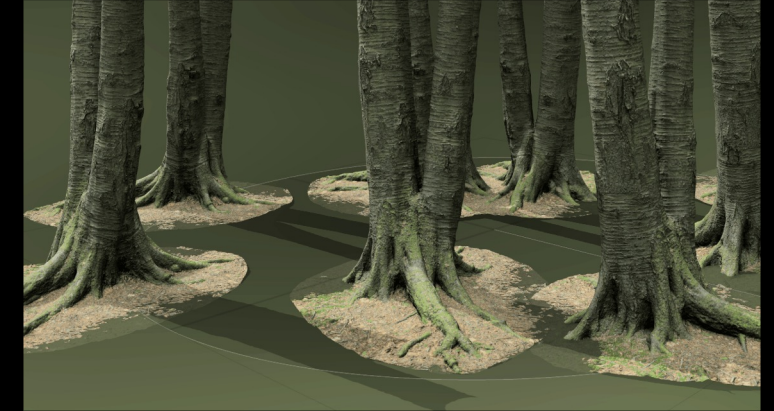
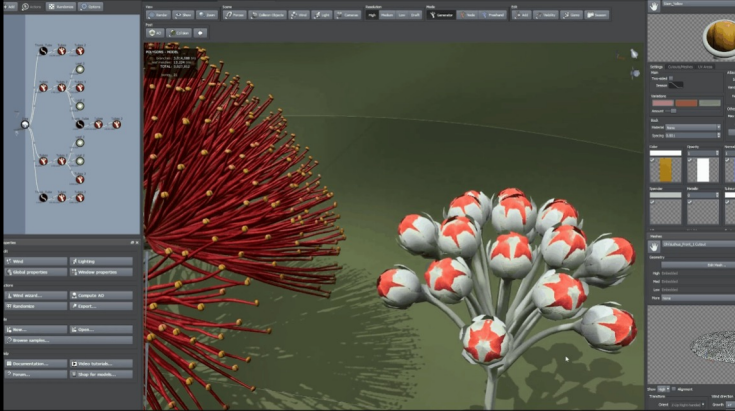


Water System (HDRP)

Simulation (waves, ripples and foam) and Physically Based Water Rendering (22 LTS)

Water excluder, deformer, current maps, foam generator, and CPU Simulation leveraging Burst to query water deformation and currents (23.1)

SpeedTree



SpeedTree Modeler

Artist-first workflows

- 9.4** Custom vertex color packing for game formats
- New global lighting workflows for canopy rendering
- FBX Camera import and Cutout editor improvements
- More features and updates coming throughout 2023

SpeedTree + Unity

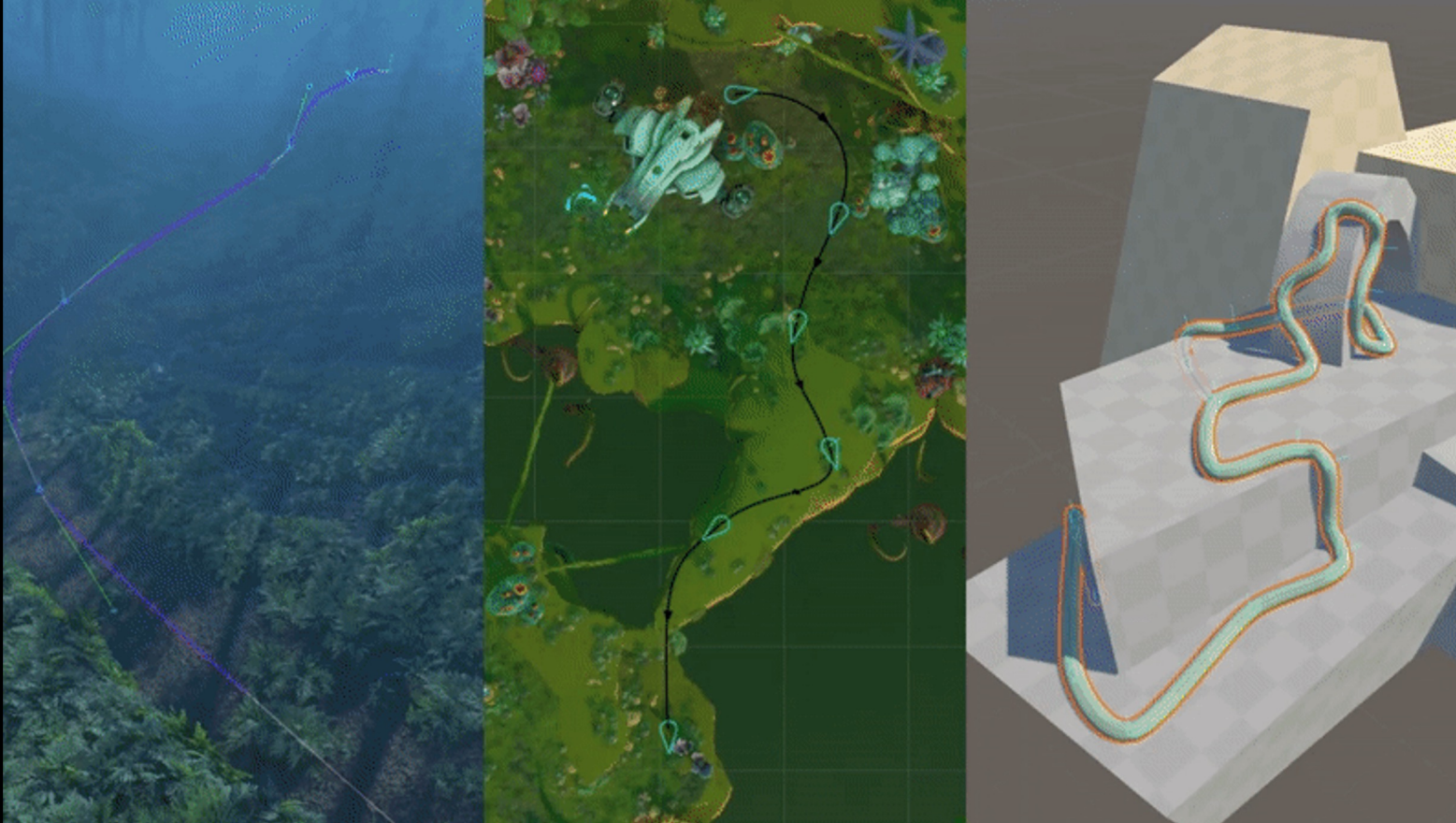
Growing a complete solution

- Quality of life
- Motion Vectors for trees
- SSS Masking
- Next: Octahedral Imposter pipeline in development

SpeedTree Library

New features, new trees

- 130 new models added to the SpeedTree Library this year, more coming every quarter
- Sample assets in the URP and HDRP demos
- A starting point to build on, or completed ready-to-use asset for Unity



Splines 2.1 (22.2, 22 LTS)

Create tools to draw geometry
Branch, merge, extrude

Blog post: “Building better paths while
maintaining creative flow with Splines in
2022.2”



Characters and creatures

Render high-fidelity characters and creatures in real-time



Rendering high-fidelity characters

High-fidelity playable humans and creatures
real-time rendering

Hair and Fur Rendering (HDRP)

Physical hair and fur **shading** and samples (22 LTS)
Hair and fur **rasterizer** for high-fidelity lighting and anti-aliasing (23.1)

Eyes (HDRP)

High-fidelity eyes with optional **caustics**
and eye sample (22.2, 22 LTS)

Skin (HDRP)

Dual lobe to account for the thin oily layer
covering the epidermis and diffuse power for
improved ears rendering (23.1)

Hair and Fur Simulation

Real-time hair and fur **simulation** (experimental,
for all render pipelines in 21 LTS and above)

Bringing Ziva to real-time



Ziva VFX

Advanced simulation to replicate organic physics and biomechanics of muscles, fat, skin and cloth for photorealistic character and creature assets



Ziva Real-time and Ziva Real-time Player

Machine learning to adapt high-quality character simulations into real-time game engine assets, bridging the gap between film, real-time gaming and metaverse environments



Ziva Face Trainer

- Automatically generate a facial rig for any characters to perform VFX-quality facial deformations in real-time
- Deploy ZFT assets to Unity with ZivaRT Player, in 2023.2 as a supported package



XR

XR

Augmented, virtual, and mixed reality

 Meta Quest

 PlayStation VR2

 ARKit

Magic Leap 

 Microsoft
HoloLens

 ARCore

Vision Pro





OpenXR

For cross-platform development on headset devices

OpenXR Plugin (Ongoing)

→ The future of OpenXR development

Composition layers (by 23.2)

→ Higher-resolution text, video, and UI elements

HMI Made with  Unity®



Unity已经被众多车企应用于智能座舱领域





更多请关注：工业专场

**14:00团结引擎（车机）
-专为中国车企打造的HMI引擎**



Thank you

2023

For more information, visit:
unity.com/roadmap







