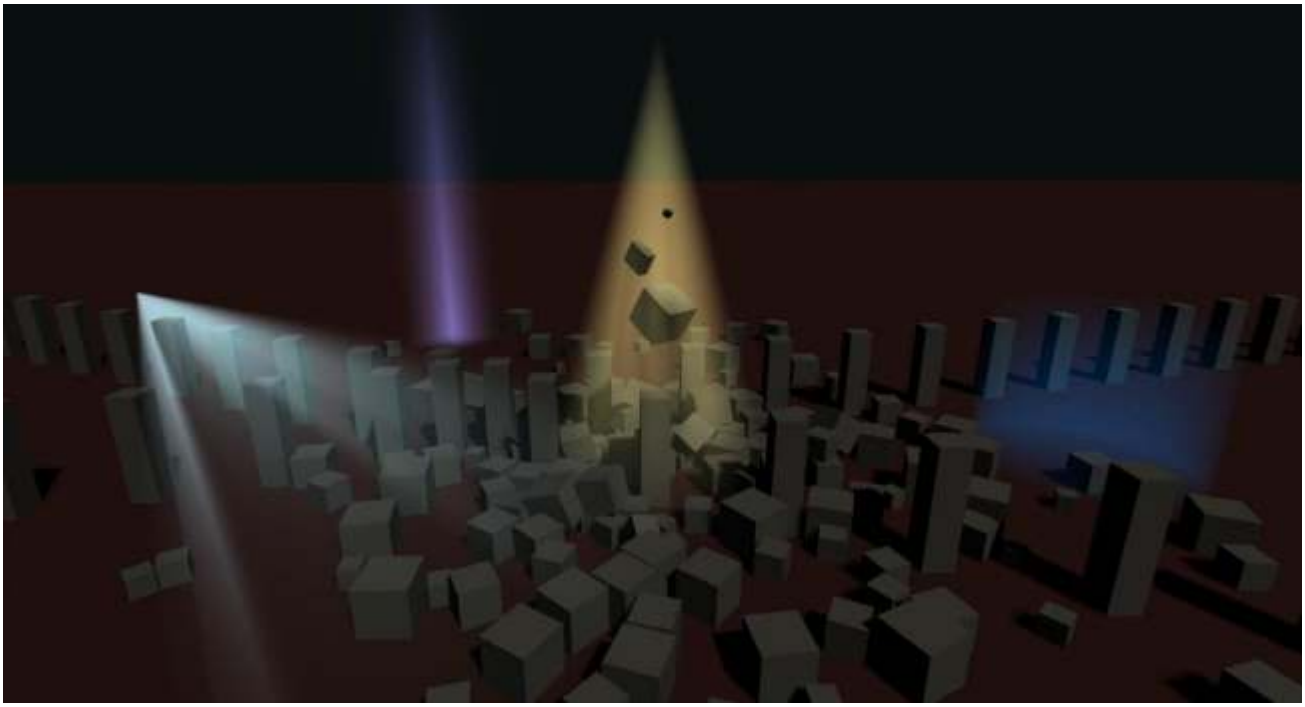


VOLUMETRIC LIGHTS

Built-in Pipeline Edition

Quick Start Guide

Kronnect

Contents

Introduction

Thanks for purchasing!

Volumetric Lights is a powerful, yet lightweight, volumetric lighting solution for Unity that adds realistic ambient to your scenes.

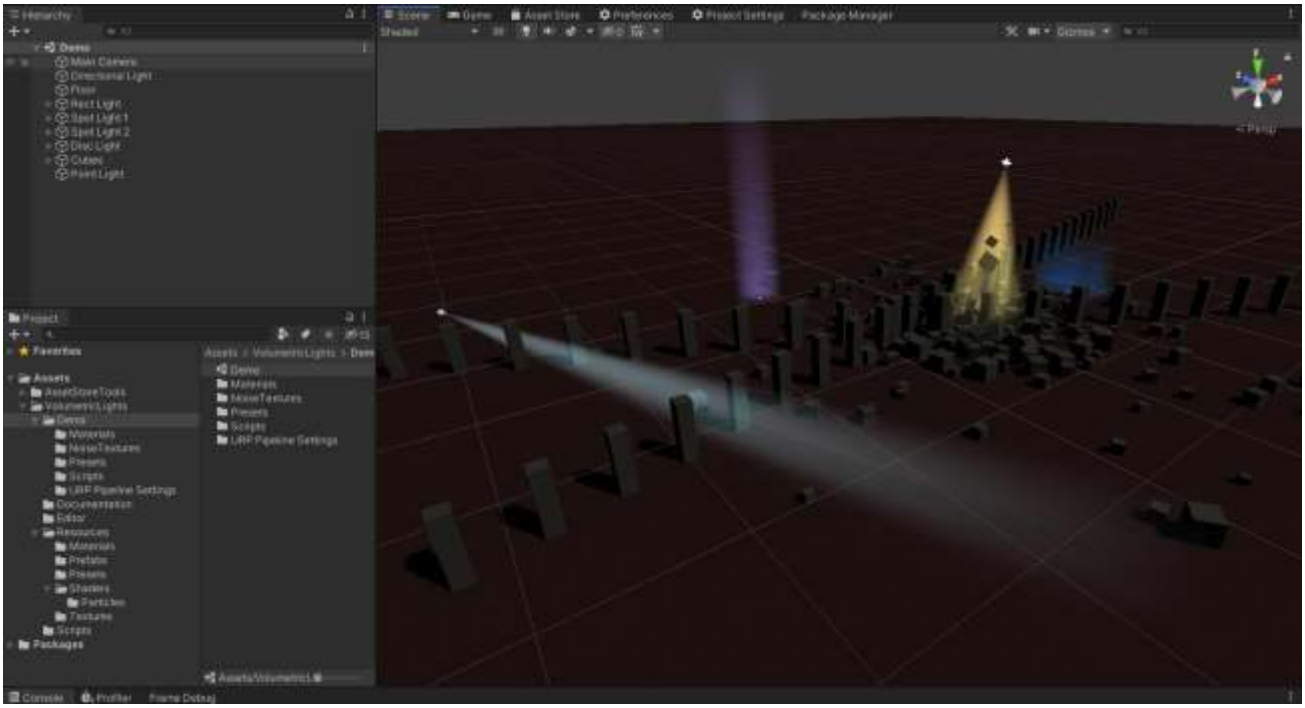
This version of Volumetric Lights works only with built-in pipeline. You'll find a version designed for Universal Rendering Pipeline in the corresponding folder of the asset.

Requirements

Volumetric Lights for built-in pipeline requires Unity 2019.3 or later.

Demo Scenes

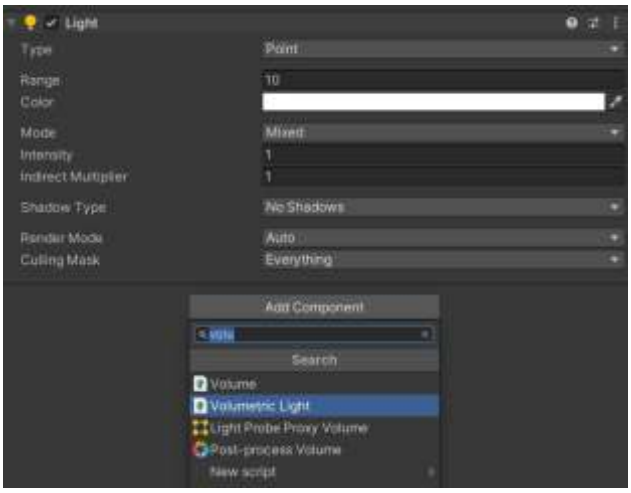
The asset includes two demo scenes to let you quickly familiarize with the different features.



Demo running on iPhone 7: https://youtu.be/s_hdefX4P9k

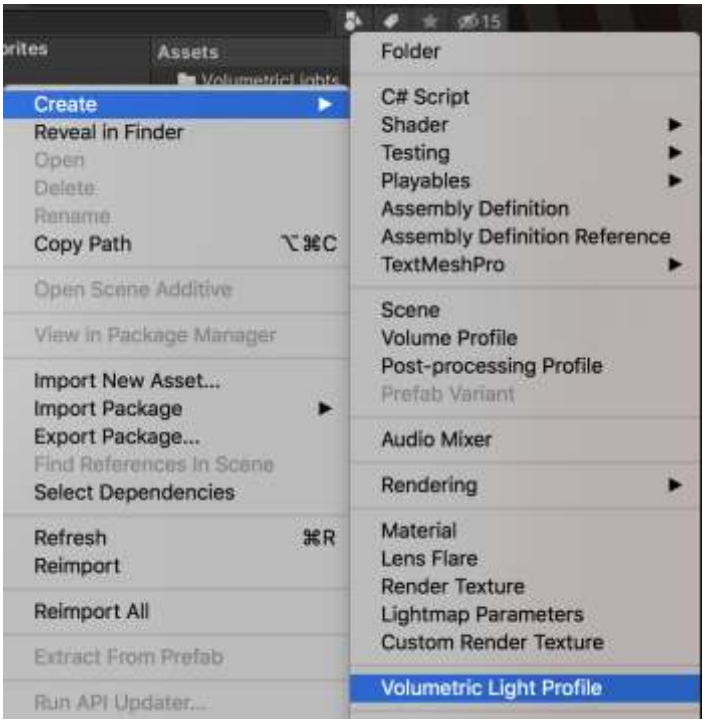
Adding Volumetric Effect to existing lights

Just add the “Volumetric Light” component to any of your lights. Please note that volumetric lights asset is currently compatible with point, spot and area lights.



Optional: Create or assign a fog profile

You can create a new volumetric light profile at any moment and assign it to the component. Right click in on the Project panel and select Create -> Volumetric Light Profile:

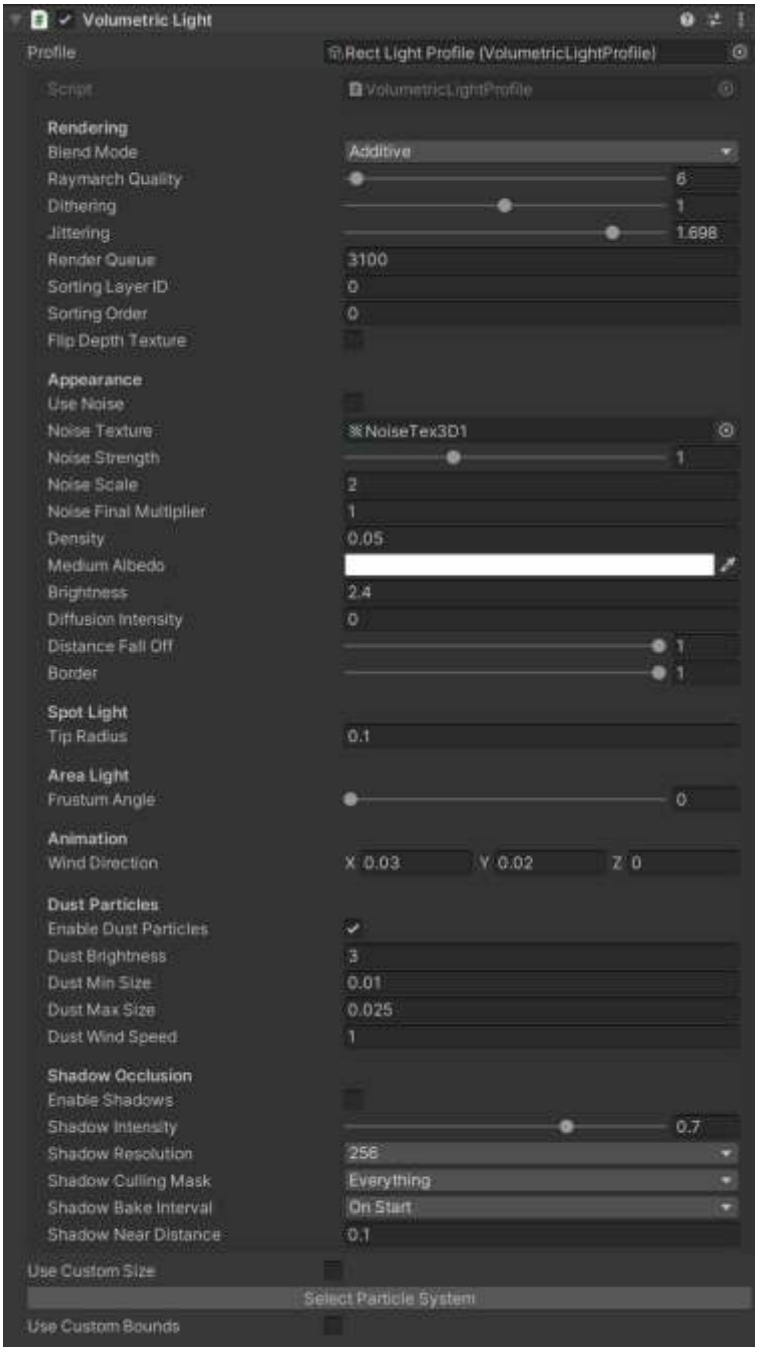


Adding new Volumetric Lights to the scene

You can create a normal light and add the “Volumetric Light” script to it as described in the previous section or you can just select the menu option GameObject -> Light -> Volumetric *** Light as shown in the picture below:

Settings Description

The following options are visible when you add a Volumetric Lights component:



Profile: this field shows which profile is being used (if any).

Rendering section

- **Blend Mode**: blend or additive. Blend does the traditional alpha blending with the background while additive adds the light intensity to the existing pixels.

- **Raymarch Quality**: influences the number of iterations executed in the raymarching loop. The lower value, the better performance.
- **Min Step Size**: determines the minimum step size. Increase to improve performance (accuracy will be reduced as well).
- **Max Steps**: determines the maximum number of steps or samples taken along each ray. This is a maximum value which can be lowered to improve performance by ensuring there're no rays that take too many samples.
- **Dithering**: reduces banding effect.
- **Jittering**: reduces banding effect (especially useful when shadows are enabled).
- **Use Blue Noise**: enables blue noise for jittering computation. It adds an additional texture fetch but reduces moiré pattern caused by regular jittering algorithm. Use only if you get a noticeable improvement.
- **Render Queue / Sorting Layer / Sorting Order**: the volumetric effect renders in world space in the transparent queue. These settings allow you to customize the order of the rendering.
- **Always On**: enabling this option will force the volumetric effect to be visible regardless of the light enable state. This option is useful to create fake volumetric lights, where only the volumetric effect is visible but the light component itself doesn't add any overhead since you can disable it.
- **Cast Direct Light**: this option can only be used in deferred rendering mode (enable it on the camera). It will illuminate the objects reached by the volumetric effect and can be used along other effects like translucency (see the Church demo scene for an example).

Appearance section

- **Use Noise**: uses an internal noise texture instead of assuming an homogeneous medium.
- **Noise Texture**: the asset will use a default 3D noise texture located in Resources/Textures folder. You can find more noise textures in Demo/NoiseTextures folder. You can also provide your own textures.
- **Density**: density of the medium used during the raymarching loop. The greater value, the opaquer effect. A low-density value used in a very large light space can impact performance as the ray march loop needs to run many steps.
- **Diffusion Intensity**: controls the intensity of the diffusion of the light when looking directly to the source through the medium.
- **Distance Falloff / Border**: controls the falloff of the volume. Border has no effect on point lights.

Dust particles

The component will use a particle system with a custom particle shader that's aware of the lighting volume geometry.

Shadow Occlusion

This option adds shadow support to the effect.

- **Shadow Intensity**: amount of light cancelling due to shadows.
- **Shadow Resolution**: resolution of the shadow map. Usually you don't need a very high value to create a good effect. Try to use the lower texture size as possible.
- **Shadow Culling Mask**: specifies which objects cause shadows.
- **Shadow Bake Interval**: specifies if shadow map is computed during start only or on every frame. Note that if the light is moved or rotated, the shadow map will be automatically recomputed.
- **Shadow Bake Mode** (only for point lights): point light shadows are expensive – this option let you choose between computing shadows on a half sphere oriented to player (faster) or a cubemap (slower). If cubemap option is selected, you can choose to spread the rendering across several frames (1 face per frame) or render all 6 faces every frame.
- **Shadow Orientation** (only for point lights): baked shadows captured in a half sphere (180º) for point lights requires orienting the camera. This option let you specify a fixed direction for the alignment of such half sphere or automatically orient it to the player camera.
- **Shadow Near Distance:** specifies the near clip plane of the camera used to create the shadow map. This setting allows you to skip objects that are too near to the light.
- **Use Default RT Format**: when enabled (by default), Volumetric Lights will use a default render texture format when rendering shadows. If disabled, it will render to a single depth buffer which is a bit faster but can cause trouble with some shaders that use Grab Pass command.
- **Translucency**: when enabled, colors from transparent objects that have the "Volumetric Lights Translucency" script attached will be used in the effect.

Pro tip! When **Shadow Bake Interval** is set to **OnStart**, you can force shadows update anytime calling `ScheduleShadowCapture()` method of the VolumetricLight component attached to the light.

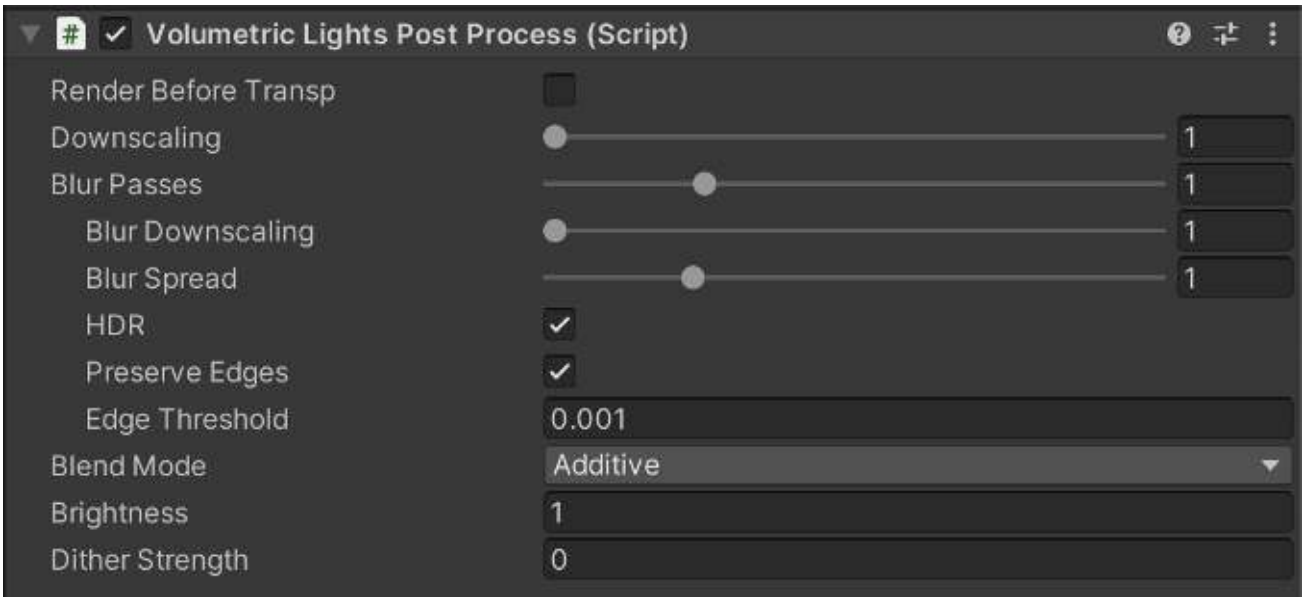
Other Settings

- **Use Custom Size**: let you override light properties like range or size.

- **Use Custom Bounds**: let you customize the boundary of the light effect effectively clipping the volumetric effect. This is useful to clamp the volumetric effect to certain corners for example. When this option is enabled, you will see the actual bounds in the Scene View and you can use the handlers of the cube to adjust it size.

Global Settings

Volumetric Lights render in world space. To enable additional options like blur and downscale, the post process component must be added to the camera. This can be done automatically by clicking “Show Global Settings” in any Volumetric Light inspector or by adding the Volumetric Lights Post Process component to the camera manually:



When using this post process component, the volumetric light effects can render either before or after any other transparent object. Click the toggle “Render Before Transp” to switch this behaviour.

The **Downscaling** slider let you reduce the resolution of the volumetric light rendering which will improve performance. This is especially useful on mobile devices.

The **Blur Passes** slider controls the smoothness of the result. Using this option reduces the visual noise and creates a more compelling effect. Note that on 4K screens, this option is less necessary and can reduce performance.

- **Blur Downscaling**: reduces the resolution of the intermediate buffers used during blur improving performance.
- **Blur Sprea**d: increases or decreases the blur kernel size.
- **HDR**: allows HDR colors to be used in the blur buffers.
- **Preserve Edges**: enabled the bilateral filter which will reduce the bleeding or blurring of geometry edges when composing the blurred result onto the scene.

Blend Mode, **Brightness** and **Dither Strength** are optional “artistic” control settings that affect the entire composition.

Scripting Support

Accessing properties

All properties shown in the inspector are accessible through the volumetric light component. First you need to get a reference to the main script which can be done easily using:

using VolumetricLights;
…
VolumetricLight vl = lightGameObject.GetComponent<VolumetricLight>;
(where lightGameObject is the gameobject of the light)

Then, you can set any property like density or wind speed/direction:
vl.density = 0.2f;
vl.windDirection = Vector3.right;
etc.

Call **vl.UpdateMaterialProperties()** to issue a refresh after setting the new values.

Creating volumetric lights at runtime

Use this code to create a new volumetric light using code:

VolumetricLight vl = lightGameObject.AddComponent<VolumetricLight>();

Build Optimizations

Volumetric Lights uses a few shader keywords to optimize the execution of the effects. They're needed to enable the desired functionality. However, each keyword multiplies the number of shader variants so you may want to disable or remove some of them manually if you want to optimize your build. As a result, building the shaders for the first time can take a few minutes. Once it's built, Unity caches the compilation so next builds are much faster.

To reduce the number of shader variants and speed up the build, you can remove some keywords related to VolumetricLights options that you're not using in your project.

Locate and edit the file VolumetricLight.shader inside VolumetricLights/Resources/Shaders folder. The following lines declare the keywords. Feel free to comment out or remove any of these lines or keywords to reduce the number of shader variants:

```
#pragma multi_compile _ VF2_DEPTH_PREPASS        // used only if depth prepass is enabled
#pragma multi_compile_local _ VL_NOISE           // used if Noise option is enabled
#pragma multi_compile_local _ VL_BLUENOISE       // used if Blue Noise option is enabled
#pragma multi_compile_local _ VL_DIFFUSION       // used by the Diffusion Intensity option
#pragma multi_compile_local _ VL_PHYSICAL_ATTEN        // used by Quadratic attenuation
#pragma shader_feature_local VL_CUSTOM_BOUNDS   // used by Custom Bounds option
```

The following keywords are required per light type. If you don't use a specific light type, you can remove that keyword:

```
#pragma multi_compile_local VL_SPOT VL_SPOT_COOKIE VL_POINT VL_AREA_RECT VL_AREA_DISC
```

If you don't use shadows in the volumetric lights, you can remove this line. Or if you don't use the cubemap based shadows (only for point lights), you can remove the VL_SHADOWS_CUBEMAP keyword:

```
#pragma multi_compile_local _ VL_SHADOWS VL_SHADOWS_CUBEMAP
```

Important: if you upgrade Volumetric Lights to a newer version, any changes done to the VolumetricLight.shader will be lost! Remember to remove any unwanted keywords again after upgrading.

Performance Tips

Volumetric Lights uses an extremely optimized ray-marching algorithm to provide “volumetric sense” effect in front of your player. If you need to improve performance, you can try the following options:

- Reduce Raymarch Quality: reducing this value will indeed reduce the number of texture fetches per pixel.
- Increase “Min Step Size” value.
- Decrease “Max Steps” value.
- If Shadow Occlusion is used, make sure the shadow culling mask only includes objects that you want to cast shadows. By default, shadow culling mask doesn’t include Transparent FX layer as volumetric lights are set to that layer to avoid being rendered again by the occlusion cameras.
- Disable “Use Blue Noise” option.
- Reduce the range of the volumetric effect by using the “Use Custom Size” and specifying new range or size
- Set Shadow Bake Interval to “On Start” whenever possible.

Orthographic Camera Support

To enable fully support of orthographic camera, locate and edit the Options.hlsl file and uncomment this line:
//#define ORTHO_SUPPORT

Support

Please visit kronnect.com for questions, support and more info.
If you have any suggestion to improve the asset, please contact us. We’ll gladly consider it.