<http://docs.unity3d.com/540/Documentation/Manual/class-LODGroup.html>

**LOD Group**

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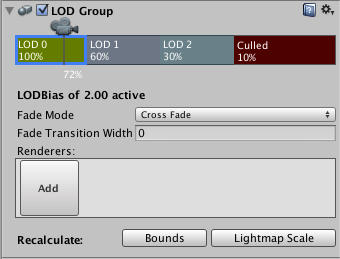
[SWITCH TO SCRIPTING](http://docs.unity3d.com/540/Documentation/ScriptReference/LODGroup.html)

As your scenes get larger, performance becomes a bigger consideration. One of the ways to manage this is to have meshes with different levels of detail depending on how far the camera is from the object. This is called**Level of Detail** (abbreviated as **LOD**).

随着场景越来越大，性能将成为更应该关心的问题。处理这个问题的一种方式是根据距离相机的远近来选择不同细节级别（levels of detail）的网格。这叫做**Level of Detail**  (简称 **LOD**).

**LOD Groups** are used to manage level of detail (LOD) for GameObjects. Level of Detail is an optimisation technique that uses several meshes for an object; the meshes represent the same object with decreasing detail in the geometry. The idea is that the low-detail meshes are shown when the object is far from the camera and the difference will not be noticed. Since meshes with simpler geometry are less demanding on the hardware, performance can be improved by using LOD judiciously.

**LOD Groups** 是用来管理游戏物体的level of detail （细节等级）。Level of Detail是一种为一个物体使用多样网格的优化技术。表示同一个对象的不同网格的几何细节是在逐渐减少的 。基本原理是远离摄像机的物体网格细节的不同将不会注意到。因为简单的几何网格对硬件的消耗较少，所以使用LOD是改善性能的明智之选。



*LOD Group* inspector

*LOD Group 展示窗口*

**Properties**

**属性**

The different LOD levels are visible in the horizontal bar with the camera icon just above it (LOD: 0, LOD: 1, LOD: 2, etc). The percentages in the LOD bars represent the fraction of the bounding box height relative to screen height where that LOD level becomes active. You can change the percentage values by dragging the vertical lines that separate the bars. You can also add and remove LOD levels from the bar by right-clicking it and selecting **Insert Before** or **Delete** from the contextual menu. The position of the camera icon along the bar shows the current percentage. The percentages in the LOD bars represent the thresholds at which the corresponding LOD level becomes active, measured by the ratio of the object’s screen space height to screen height. Note that if the LOD Bias is not 1 the camera position is not necessarily the actual position where LOD transits from one to another.

不同的LOD等级展示在上面有相机的横条中（LOD:0,LOD:1,LOD:2等）。当LOD等级开启时， LOD横条表示了了包围盒的高度相对于屏幕的高度 的百分比 。您可以通过拖动分离块的竖线改变百分比。您也可以右键点击出现上下文菜单，从中点击**Insert Before** 或者**Delete**菜单来增加或者删除LOD等级。相机的图标的沿栏位置显示了当前的百分比。LOD条显示的百分比表示的是相应的LOD级别激活的对应阈值，百分比是由对象在屏幕内的高度与屏幕自身高度的比值决定的。注意，如果LOD Bias的值不是1，那么相机的位置会LOD从一个转变到另一个的实际位置。

When you click on one of the LOD bars to select it, a **Renderers** panel will be shown beneath. The “renderers” are actually GameObjects that hold the mesh to represent the LOD level; typically, this will be a child of the object that has the LODGroup component. If you click on an empty box (with the word “Add”) in the Renderers panel, an object browser will appear to let you choose the object for that LOD level. Although you can choose any object for the renderer, you will be asked if you want to parent it to the LODGroup GameObject if it isn’t already a child.

当您点选了一个LOD的块，一个渲染器的界面将会展示在下方。”renderer”是持有的表示LOD等级的网格的游戏对象。通常，renderers将是一个对象的包涵LODGroup组件的子对象 。如果您在渲染器的界面中点击了一个空盒（带有“Add”的字段），会出现一个物体浏览器让您选择当前LOD等级的。虽然您可以为了渲染器选择任意的物体，但如果不是已经存在的子物体您将会被询问是否设置带有LODGroup的GameObject为父物体。

From Unity 5, you can choose Fade Mode for each LOD level. The fading is used to “blend” two neighboring LODs to achieve a smooth transition effect. However Unity doesn’t provide a default built-in technique to blend LOD geometries. You need to implement your own technique according to your game type and asset production pipeline. Unity calculates a “blend factor” from the object’s screen size and passes it to your shader.

从Unity5开始，您可以为每个LOD等级选择淡入淡出的模式(Fade Mode)，淡入淡出是用在”blend”(混合)两个相邻的LOD时实现的一个平滑过渡的效果。然而Unity没有提供一个默认内置的混合LOD几何体的技术。您需要根据您游戏的类型和生成资源的流水线去实现您自己的LOD技术。Unity从物体的屏幕大小计算一个混合因子并传递他到您的着色器中。

There are two modes for calculating the blend factor:

这有两种计算混合因子的模式：

Percentage: As the object’s screen height goes from the current LOD height percentage to next, the blend factor goes from 1 to 0. Only the meshes of the current LOD will be rendered. Cross-fade: You need to specify a Transition Width value to define a cross-fading zone at the end of the current LOD where it will to transit to the next LOD. In the transition zone, both LOD levels will be rendered. The blend factor goes from 1 to 0 for the current LOD and 0 to 1 for the next LOD.

百分比:伴随物体的高度从当前LOD高度百分比进入下一个，混合因子将从1到0. 只有当前LOD的网格会被渲染。Cross-fade：您需要在当前LOD的尾部指定一个转化宽度值来定义交叉褪色区域，在这个区域中会转化到下一个LOD中。在褪色区域里时，两个LOD等级都将渲染。当前的LOD混合因子从1变到0，并且下一个LOD的混合因子从0变到1。

The blend factor is accessed as the unity\_LODFade.x uniform variable in your shader program. Either keyword **LOD\_FADE\_PERCENTAGE** or **LOD\_FADE\_CROSSFADE** will be chosen for objects rendered with LOD fading.

在您的着色器中可以通过unity\_LODFade.x uniform变量访问混合因子。使用 LOD fading对对象进行渲染时,可以选择LOD\_FADE\_PERCENTAGE 或 LOD\_FADE\_CROSSFADE 作为关键字。

For more details on naming conventions see the [Level of detail](http://docs.unity3d.com/540/Documentation/Manual/LevelOfDetail.html) page.

有关命名的详细约定可以参见[Level of detail](http://docs.unity3d.com/540/Documentation/Manual/LevelOfDetail.html) 页面。

Look at the example of SpeedTree trees to see how LODGroup is configured and how the SpeedTree shader utilizes the **unity\_LODFade** variable.

查看SpeedTree树的例子，了解LODGroup如何配置以及如何使用SpeedTree着色器操作unity\_LODFade变量。

At the bottom of the inspector are two **Recalculate** buttons. The Bounds button will recalculate the bounding volume of the object after a new LOD level is added. The **Lightmap Scale** button updates the **Scale in Lightmap** property in the lightmaps based on changed LOD level boundaries.

在inspector窗口底部有两个**重新计算**的按钮。**Bounds**的按钮会重新计算当增加了一个新的LOD等级时的包围盒。

Lightmap Scale的按钮会更新当改变LOD等级的边界时的Scale in Lightmap 属性。