

Optimizations

Below are various important advice on how to get the most out of the engine. Most of these have to do with getting it to run as fast as possible, but some have to do with visual quality as well.

Transparency

Avoid overlap

Translucent materials are quite costly performance-wise to render and because they both have to read and write for each pixel. At the same time many effects that use translucent materials, like billboards and particle systems, have effects that depend on overlap. For example in a fire the movement of overlapping particles create a nice effect. For, on screen, small particle systems this is not that much of a problem. But for larger things like smoke it can be very costly. What one needs to be is to try and mimic this sort of overlap effect in a single particle in order to reduce overlap. For example by having animated textures (using sub textures for particle system) it might be possible to do this very nicely! So beware before just pushing tons of overlapping particles or billboards to do an effect!

Alpha in all trans materials

As mentioned above, a costly aspect of translucency is that it both reads and writes. This can be reduced quite a bit by skipping pixels that are not needed. Normally particles and similar are round in shape and are on square textures. This makes the corners of the image have pixels that are never drawn. This can be fixed to some extent by having an alpha channel and set alpha to zero in these areas. The important part is that this works even more additive, mul and mulx2 blend modes! So wherever your material is invisible (add=(0,0,0), mul=(1,1,1), mulx2=(0.5, 0.5, 0.5)) have alpha value of zero and for the rest of the pixels 1 (gradient is not needed). This reduces the performance of a particle system by almost 50%!!

Premultiplied alpha

Premultiplied alpha is not something that can increase performance, but is used to remove glitches. When using normal alpha blending it is common for some sort of images that the background (what is in the transparent area) seeps in on the more opaque areas. The reason for this is because of how the hardware works and premultiplied alpha totally removes the artifact. This video (which features cats!) shows the issue:

<http://www.youtube.com/watch?v=dU9AXzCabiM>

In order to use premultiplied alpha simply copy the alpha layer in Photoshop and paste it as a multiply layer on top of the RGB. Then just set the material to use pre-multiplied alpha. Note: In order for fading to work in particles, you also need to set multiply alpha with color!

Objects

- Use small number of objects. Same texture for same things + combine (force if needed in editor).
- IsOccluder only on important stuff.

Lights

- Only use spec when really needed.
- Do not use too many shadows (link to jens's article)

Physics

- Turn off or simplify collisions of static objects.

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