Optimization: Texture Budget

Keeping your texture budget under control is fairly simple. Check how much memory is on your graphics card, and aim for under 75% of that.

When textures are loaded onto your graphics card, they are stored in an uncompressed state. Therefore, even though you have a 2048x2048 pixel image that is only a few hundred kilobytes as a jpeg, on the graphics card it will be 12mb.

If you exceed that budget, you will start having massive drops in framerate as your card attempts to constantly load and unload textures. You have three main options: Use fewer textures, use lower resolution textures, or use DXT Compression.

As a general rule of thumb, don't worry much about close up detail. At any given time, 95% of your scene will be at a distance. Therefore, first focus on making the scene look good as a whole, and only then add close-up detail where it's absolutely necessary.

As a rule of thumb, if a texture looks sharp from 4 meters away it has enough detail. Though this varies depending on the current field of view, the works out to be somewhere between 256 and 512 pixels stretched across every meter.

Notes

• It is easy to calculate the uncompressed file size of an image. Most textures will be 8 bits per pixel. Multiply the width in pixels by the height. Since 8 bits is 1 byte, this give you the number of bytes for the image. Divide that number by 1024 for the number of kilobytes, and again for the number of megabytes. Eg. An uncompressed 2048x2048 image is 12mb.

• Another simple way to find the uncompressed file size is to open Photoshop, create a new image, type in the pixel size, then look at the value under "Image Size"

• Some special cases may require higher bit-depth images. To calculate the size of a 16 bits per pixel image, multiply the number of pixels by 2 bytes. For 32 bits per pixel, multiply by 4 bytes (32 bits/pixel).

• The amount of texture detail in a scene is often described in terms of pixels per inch or pixels per centimeter. When pixels are used in a texture, they are called texels and the amount of texels per cm is referred to as the texel density. For the main area of your scene, a good density to aim for is about 2.56 pixels per cm. This means that a tiling map that is 1 meter x 1 meter wide should have a resolution of 256 x 256 pixels.

• Not all parts of the scene need the same amount of close-up detail. A building that is never seen closer than 100 meters away can get away with having a much lower texel density than a prop that the user can walk right up to.

• It's common practice to attempt to keep your texel density consistent across all objects in the section of your environment that the user can get close to. Changes in density calls attention to differences in texture sharpness, which can be jarring for the user, affecting immersion.