Rendering Tutorial 8

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Assigment 1

Implement support for opacity maps and normal maps as part of `MaterialPhong`, as discussed in the lecture. The constructor should take two additional arguments that are optional:

```
class MaterialPhong : public Material {
    const Texture* k_d;
    const Texture* k_s;
    const Texture* s;
    const Texture* opacity;
    const Texture* normal;

    MaterialPhong(const Texture* k_d, const Texture* k_s, const Texture* s,
            const Texture* opacity = nullptr, const Texture* normal = nullptr) :
        k_d(k_d), k_s(k_s), s(s), opacity(opacity), normal(normal)
    {
    }
    ...
}
```

The tutorial material includes OBJ import code that supports normal maps, bump maps (which are converted to normal maps automatically) and opacity maps for a `MaterialPhong` class with the interface shown above.

Furthermore, the tutorial material includes support for a `tangent` entry in `HitRecord` and tangent generation for sphere and triangle surfaces. The `Mesh` class now generates tangents automatically if normals and texture coordinates are available, using the method discussed in the lecture.

With the modified `MaterialPhong` material, you can render the Crytek Sponza scene from the McGuire Computer Graphics Archive.

Example scene setups and camera transformations for both the Sponza scene and the normal map example scene from the lecture are also given in the tutorial material.