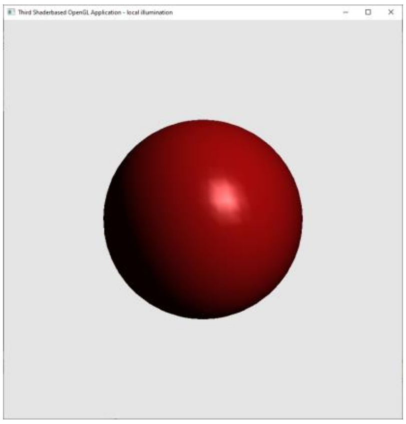
Computer Graphics
OpenGL exercise 3

Shader-Based OpenGL
Local Illumination / Texture

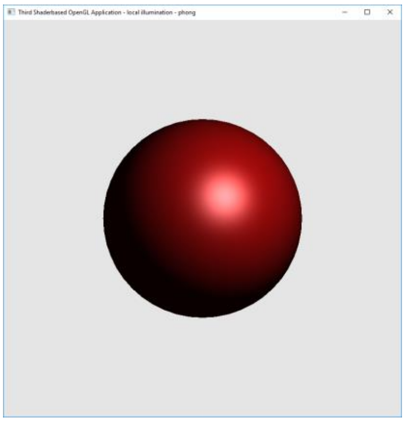
1. In this exercise, a local illumination model should be used to render a sphere. Instead of using predefined colors, the calculation of the color values based on a local illumination model and a selected shading method. For this, the light and material parameter definition is in the application and then used as uniform variable in the shader. In addition, you will get a texture file to texture the sphere. You should then implement an illumination and a texture shader.

   You will get a predefined project that implements a **Gouraud shading** based on the **Phong illumination model.** The vertex shader is implemented. You need to implement the fragment shader. Here you should implement the color computation based on the **Blinn illumination model**. When you do the light calculation within the fragment shader it is a “per fragment” shading, this is called **Phong shading**. If you would implement it in the vertex shader, it would be “per vertex” shading, which is named Gouraud shading.

   You should also modify the application in the way that you can switch between **3 different materials**. For this you can define a second and third material in the *SetLightMaterial()*-function. Using “m” allows switching between materials, using “s” switches between shader and using “a” enable/disable an animation.



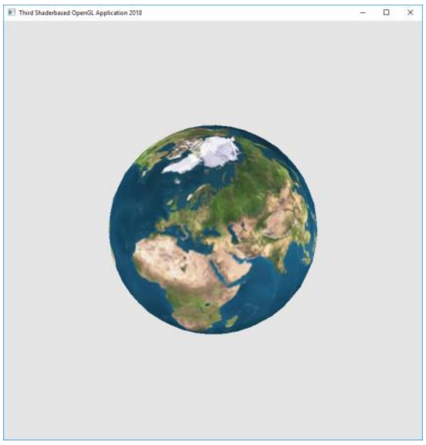
Available:
Gouraud shading
Phong illumination


Third Shaderbased OpenGL Application - local illumination - phong

To Do:
Phong shading
Blinn illumination

See second page as well.

2. You will also find a png-image in the debug-folder. The application program also implements the texture handling for texturing the sphere (see below). Please implement a texture shader that is using the texture image to define the final color of the sphere. The current project allows to switch between the different shader (illumination, texture). An animation of the sphere is also possible (see the given code). You can use the result from the second OpenGL exercise to allow rotating the sphere manually if you like.



ToDo:
Texture shading
map an image on a sphere

For this exercise, you can get up to **5 credits**.