CSE 333 - Monsoon 2023

Assignment 03: Lighting And Shading

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Output Screenshot:

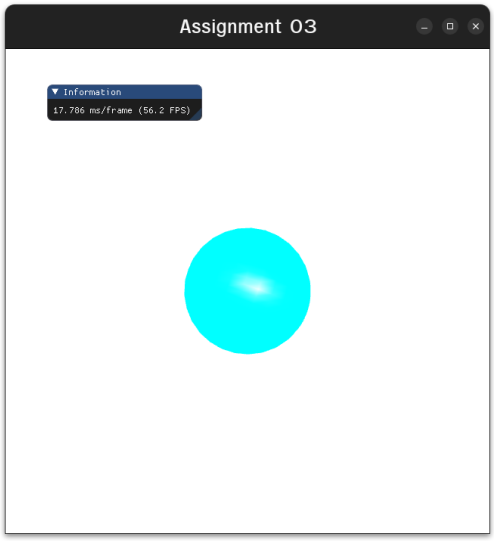

Figure 1

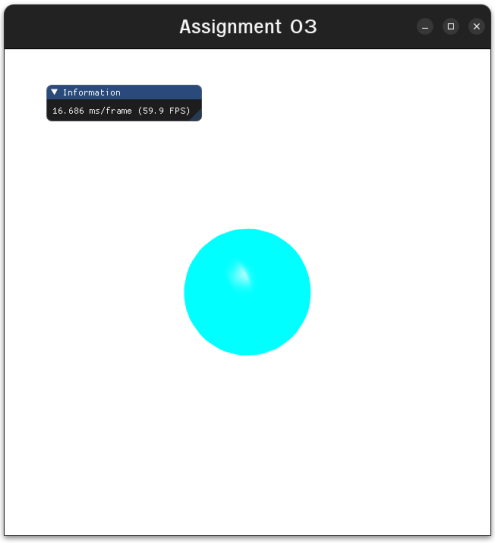

Figure 2

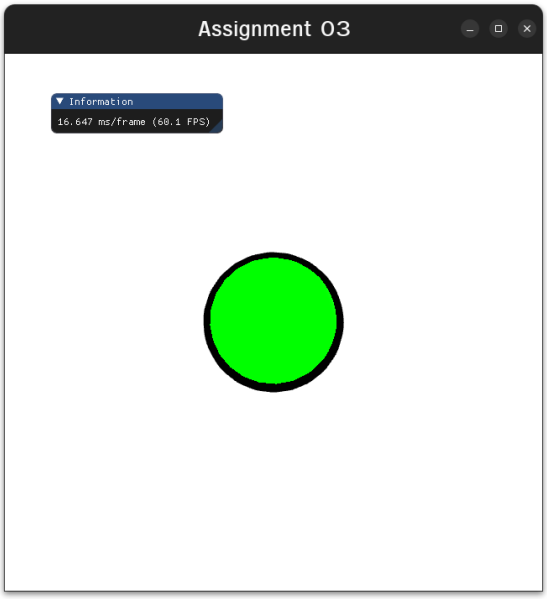

Figure 3

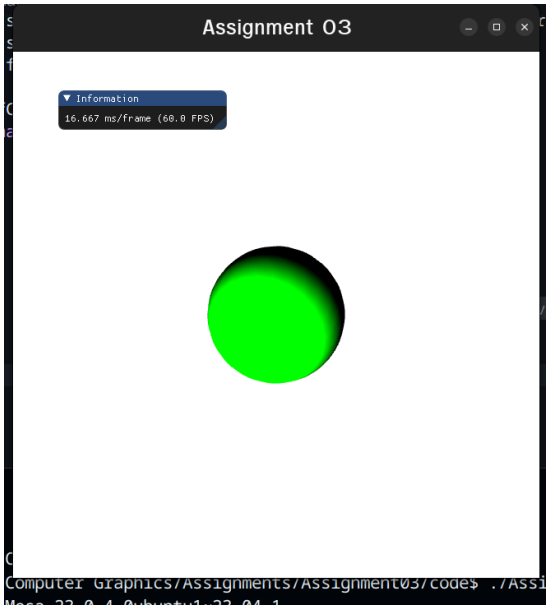

Figure 4

Logic:

- For generating parametric, I used binders taught in earlier labs.
- For the parametric surface, I used my implementation from lab2
- For normals, we can directly use partial derivate and then calculate. Since we use the sphere as a parametric surface, we can do partial derivatives concerning theta and phi and then simplify equations. We will get that normal is X*1/r, Y*1/r, Z*1/r unit vector direction.
- For shaders, we have already done them in lab5 and need to stitch them
- Since n, e and l are not directly available, we can calculate it by using the normal generated earlier and passed to shaders, the position of the light source.
- For the 2^{nd} qn, we can calculate the angle between the fragment direction and light direction to determine whether it is outside of the conic area of the spot light source. The angle can be calculated using dot product since $a.b=|a||b| \cos\theta$.
- Using a simple if and else loop, we can check whether the fragment is inside the spotlight area. For b), we can use another if loop and multiply the total fragment colour with the f value calculated using $f= (.\theta out- phi) / (\theta out - \theta in)$
- Using the Phong reflection model taught in class, we can implement shaders.
- We set some values, such as light source direction, light source position, etc, with some desired values to fetch output. Angles are set as per the given instructions in the questions
- Necessary uniforms and variables are passed through primary to shaders for calculation purposes.