

COMP 3271 Assignment 4 Report

Team Members:

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We have implemented the Phong lighting model in part1 and the basic shadow and mirror reflection effects in part 2. Combining with the six advanced features implementation listed below, we designed a final scene to showcase a rocket composed of cylinders and cone in a 3D space with two reflective walls and a reflective floor with board texture. The metallic rocket's and balls shadow is on the wall. Through the walls, we can see the reflections of the rocket, shadows, balls and floor. The right-most glass ball shows the refraction feature. The ball next to it shows the reflection of the rocket and the floor. Similar to this ball, we can see the highlight of the source light clearly due to the Phong lighting model implementation in the white and pink one. The reflection of the pink one under the floor can be seen in the scene.

In addition, we improve the rendering efficiency by flattening scene graph. The statistics are presented below. Because of the anti-aliasing improvement, we make the final scene boundaries look smoother.

The texture mapping for sphere effect is not presented in the final scene and the result .bmp file can be found in the specific folder.

Vivi is responsible for implementing the Part 1 and Anti-aliasing, Texture mappings, Soft Shadow effects.

Bing is responsible for implementing the Part 2 and Flattening scene graph, Refraction, and Additional primitives effects.

We work together on the final scene design, debugging, and solving the generated problems promptly.

(The different part of effects implementations are commented showing in the files.)

//Can read the features along the order of images in the folder, also clearly comments in code
Part 1

- a) Scene Signature -> sig/sig1.bmp && sig/sig2.bmp
- b) Diffuse + Ambient -> diffuse/diffuse1.bmp && diffuse/diffuse2.bmp
- c) Phong lighting model -> phong/phong1.bmp && phong/phong2.bmp

Part 2

- a) shadows->shadow/shadow.bmp
- b) mirror reflection

Part 3

- a) Flattening scene graph:

The efficiency improvement ://(we provide the timer to track the running time, can be seen in the end of main()) called fscCache() before the traverseScene() to cache the transformations

The 2 view scenes running time comparison :

6.23243s—> 0.985891s

6.1716s —->0.964833s

- b) Refraction
- c) Anti-aliasing->anti-aliasing/non-anti-aliasing.bmp && anti-aliasing/anti-aliasing.bmp
- d) Additional primitives (Cylinders and cones)
- e) Texture mapping for Square and Sphere->texture/2Dtexture.bmp
- f) Area light sourced (Soft Shadow)-> softshadow/softshadow.bmp && softshadow/shadow.bmp

The timeline to build up the final scene is(add features along the timeline)

shadow--->reflection--->texture mapping-> adding additional primitives(cylinders and cone)
---->Flattening scene graph to improve the efficiency---->adding refraction---->
anti-aliasing---->area light and soft shadow----> The final scene