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CSC411 Assignment 3 Report

Submission:

For part B of the assignment we built an extended ray tracer. We used recursive ray tracing to show reflections and shadows in the environment.

Sample Usage:

- For shadows:
`./raytracer -s`
- For antialiasing:
`./raytracer -a`
- For reflection and path tracing:
`./raytracer -r`

For multiple components add both flags example: Shadows and antialiasing: `./raytracer -sa`

Code Structure:

Part A and part B were separated into folders part1 and part2 respectively. Part1 contains all code for part A with the required images located in the images folder. Part2 contains all code required for Part B, the extended ray tracer. Similarly all required images are located in the images folder. The following is a breakdown of where each feature was implemented.

- raytracer.cpp
 - o ComputeShading: Includes code for computing shadows where objects are occluded to light.
 - o shadeRay: This includes reflections of objects based on the depth of the reflection.
 - o Render: This includes the implementation of antialiasing.
- Light_source.cpp
 - o Spotlight: This is an object that extends from LightSource. It includes the ability to get soft shadows. The radius of the spotlight is one and uniformly samples rays that are used for shadows.
- Scene_object.cpp
 - o UnitCylinder: This is an object that extends from SceneObject. It determines intersections between a ray and a unit cylinder centered at the origin.
 - o UnitCompound: This is a compound object between a sphere and a cylinder. The roof of the cylinder is the semisphere.
- Util.h
 - o Texture: This was added to support texture mappings. Currently only spheres are the only supported shape for the mapping.

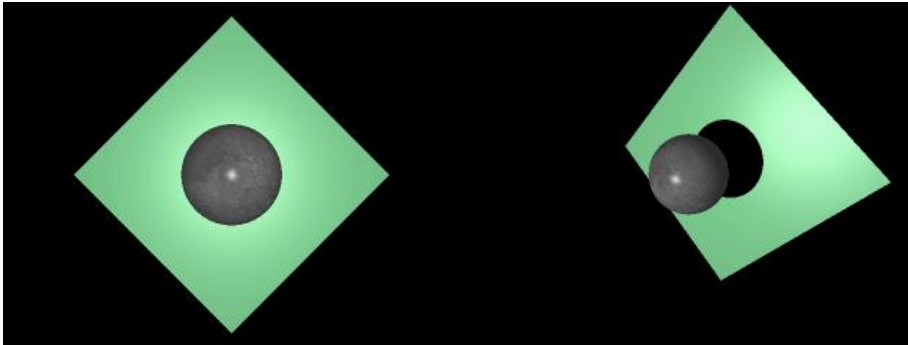
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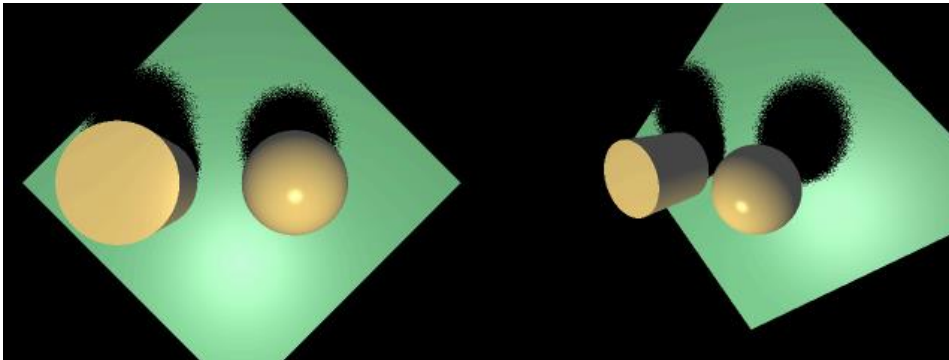
- Material: Updated to support textures. Contains a texture and a boolean to tell if the material is a texture.

Implementation

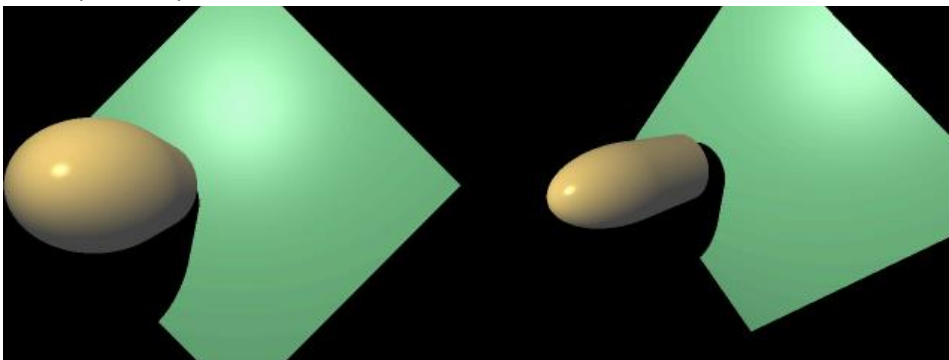
- texture mapping



- extended light sources



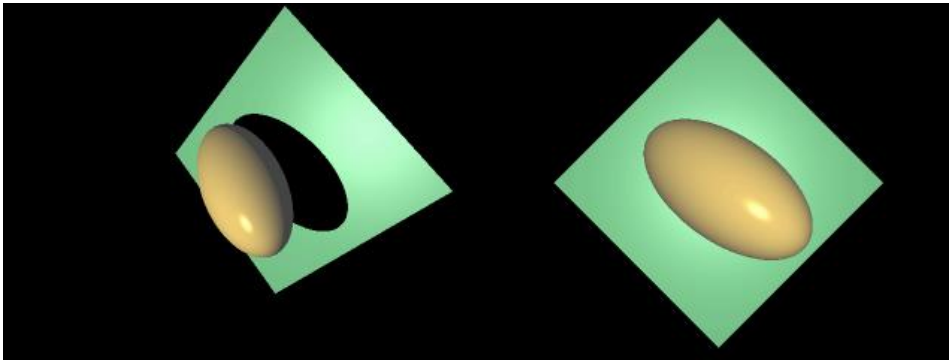
- A compound cylinder



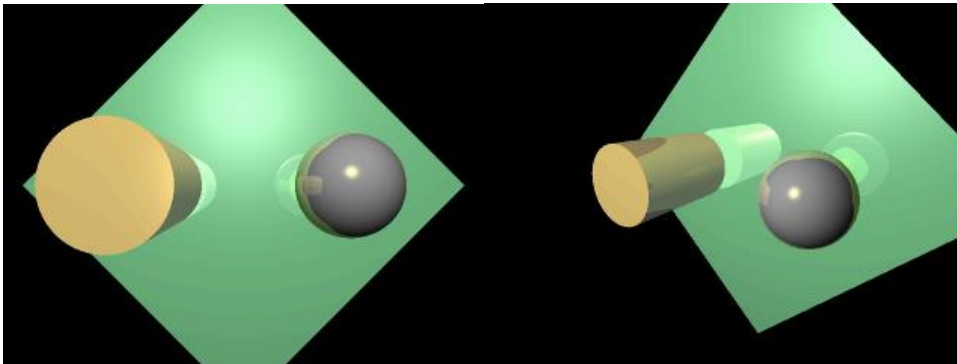
- Anti-aliasing

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- In addition we implemented path tracing



Roles

Part A:

Both members implemented their own versions of Part A. The code was a merger of both members.

Part B:

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- Extended light sources
- Compound object, cylinder

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- Anti-aliasing
- Texture mapping
- Path tracing