# CS488 Project: Ray Tracing Demo

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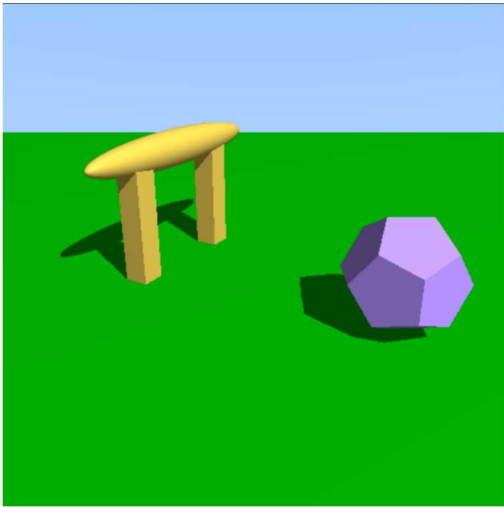
**Objectives**

- Soft shadow

- Anti-Aliasing

- Glossy reflection

- Refraction

- Texture Mapping

- Lambertian Reflection

- Simple CSG

- Hard CSG

- Phong shader

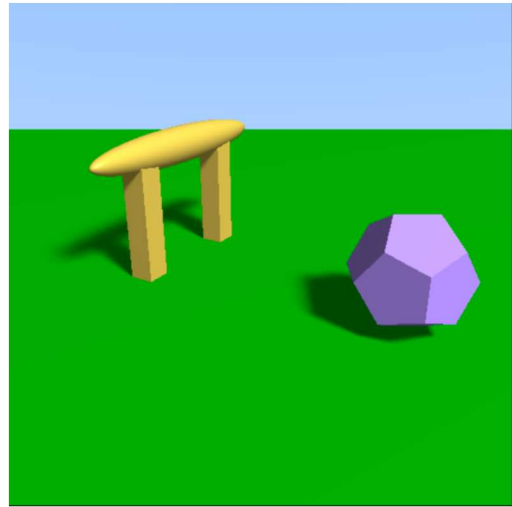- Final Scene

- A4 Extra: Reflection

**Extra Implementation**
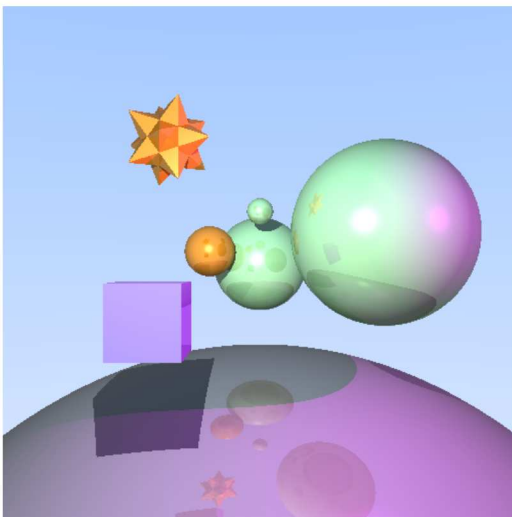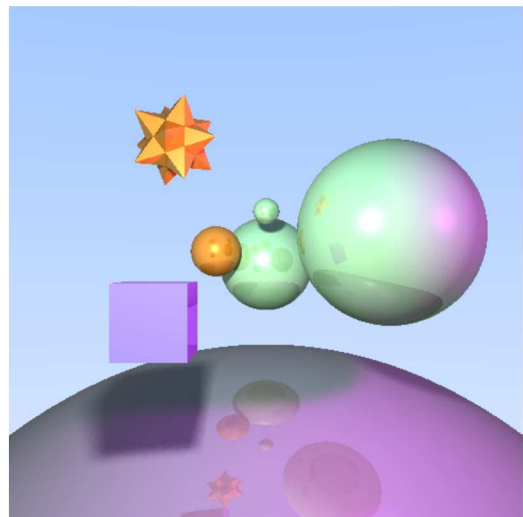
- Multi-threading

1. Soft Shadow



Without Soft Shadowing
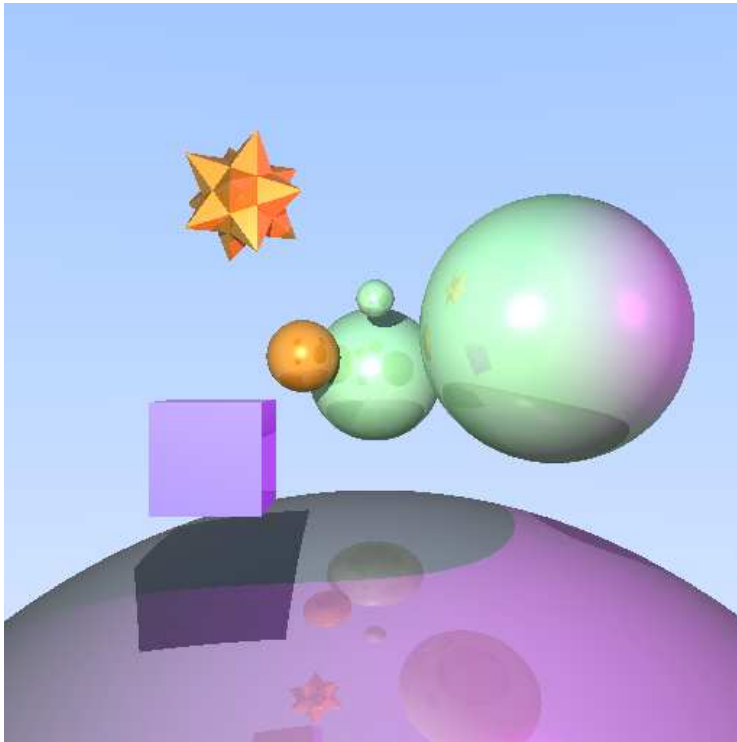


With Soft Shadowing



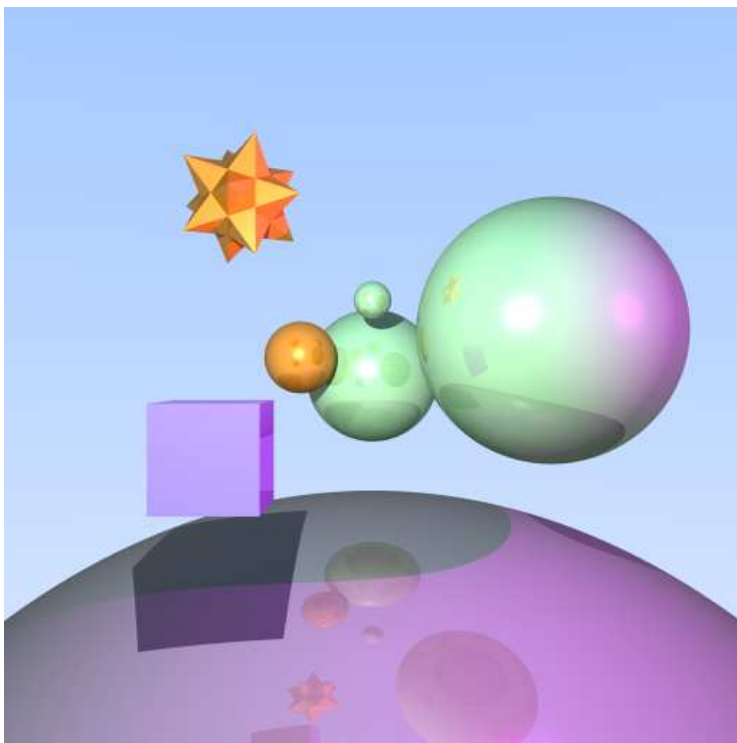Without Soft Shadowing



With Soft Shadowing
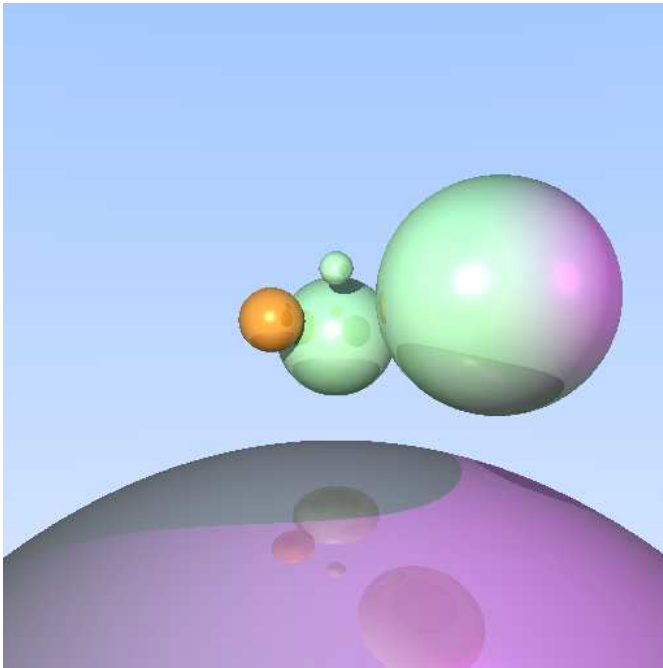
2. Anti-Aliasing
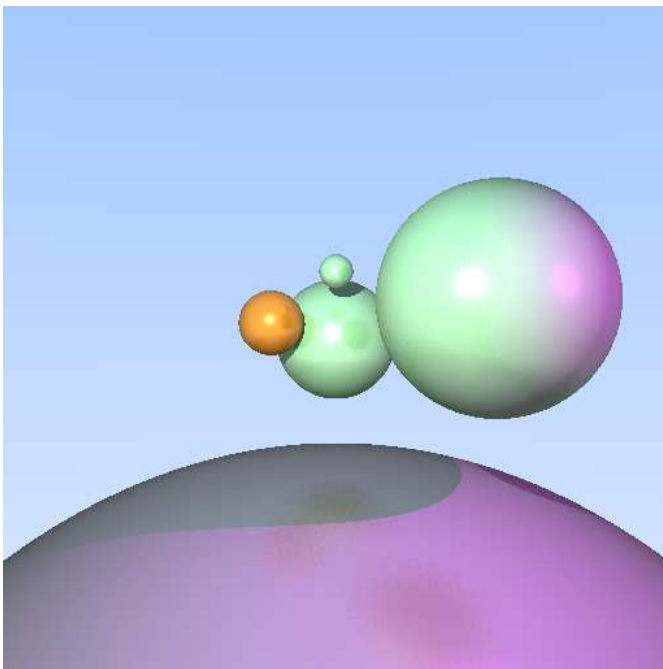


Without Anti-Aliasing



With Anti-Aliasing (100 sample)
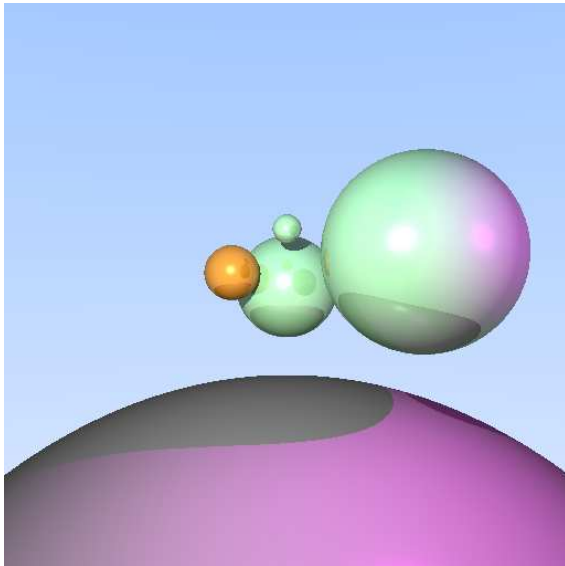
3.  Glossy Reflection


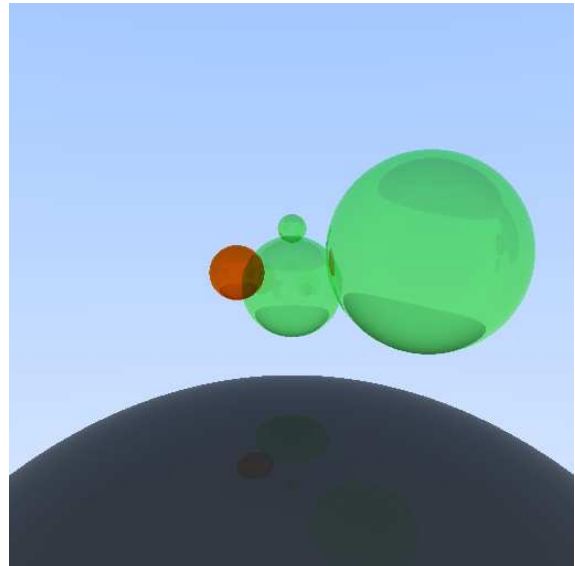Normal reflection


Glossy reflection
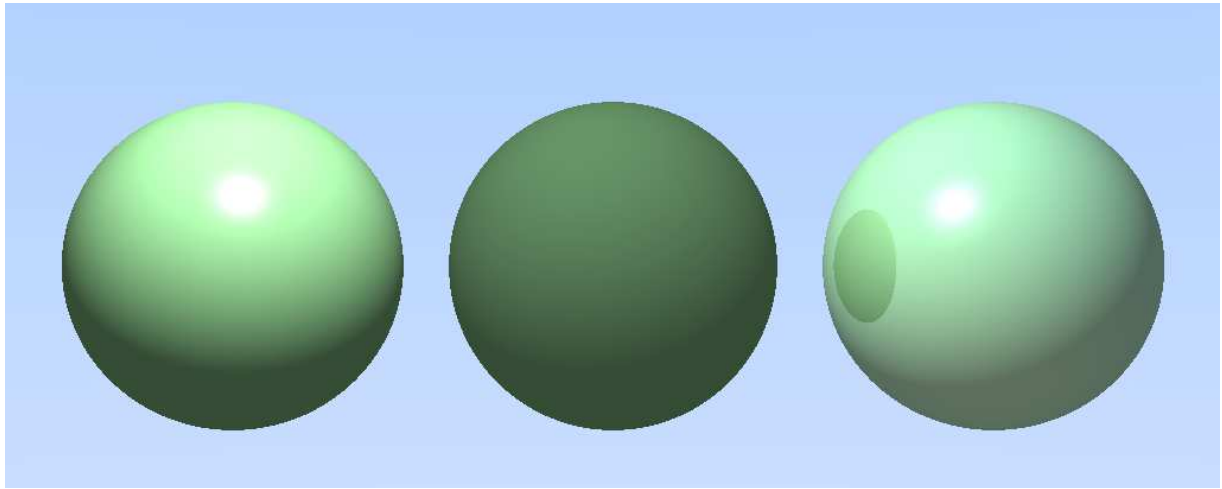
4. Refraction



No Refraction



All with refraction (coefficient = 1.0)



Refraction in the final scene (coefficient = 1.2)
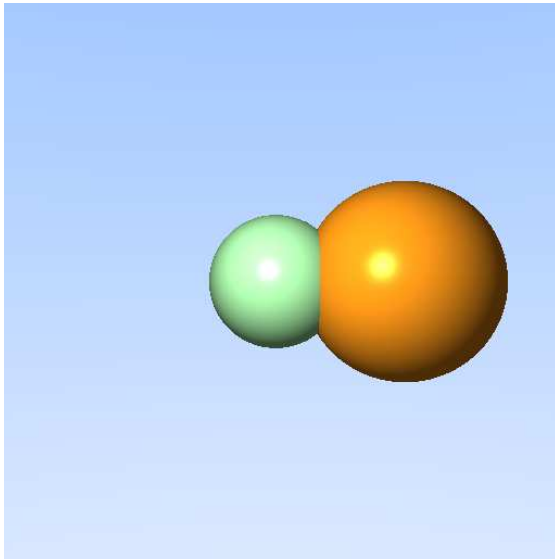
5. Lambertian Reflection



No reflection          Lambertian reflection          Normal reflection
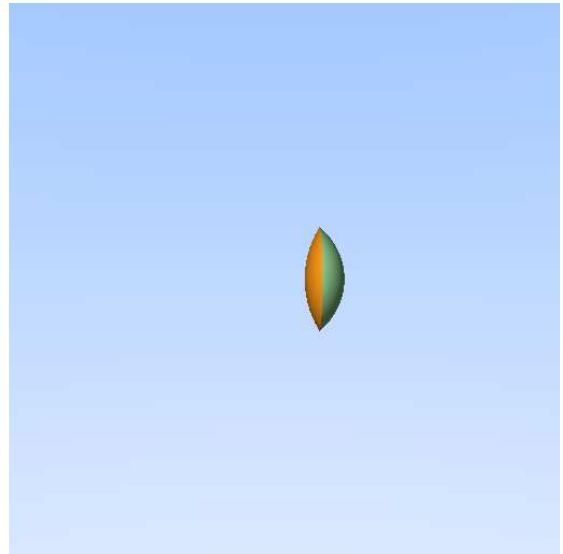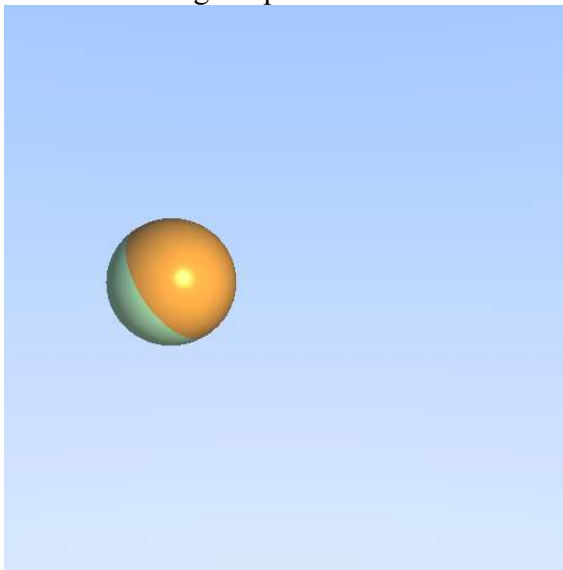
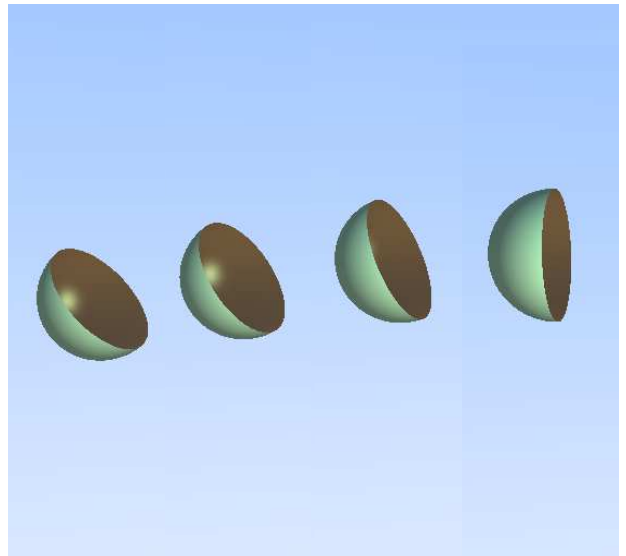6. Texture Mapping

7. Simple CSG



Original picture



CSG intersection



Original picture



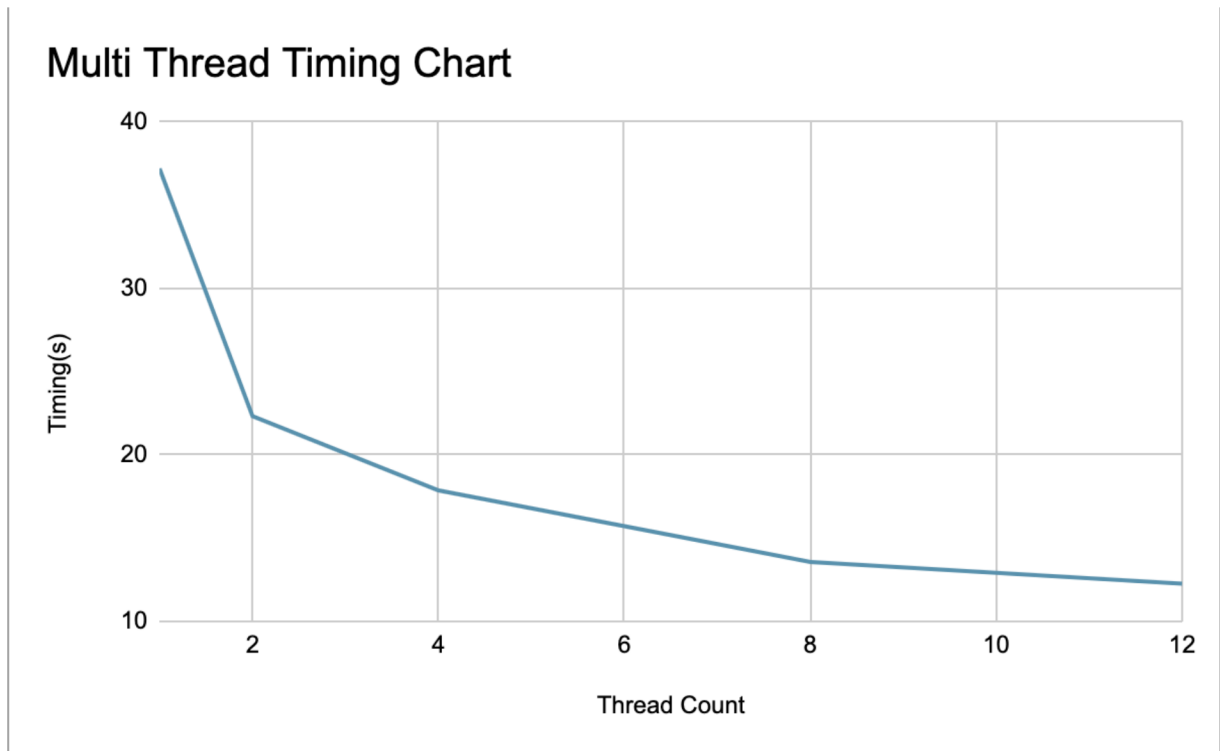CSG difference

8. Hard CSG

Not implemented

9. Phong Shader

Not implemented

## 10. Final Scene

11. Multi-Threading (running simple.lua with AA sample size = 10)

| Thread Count | 1 | 2 | 4 | 8 | 12 |
|---|---|---|---|---|---|
| Timing(s) | 37.2 | 22.33 | 17.87 | 13.57 | 12.27 |



The changes from 8 threads to 12 threads is small and it make sense because the machine that I am running on has 4 cores.