

# Assignment 4: Image Reference

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This document was created to provide a visual reference for the results of the ray-tracing in assignment 4. Specifically it gives you a guide of how your ray-tracer should look at each stage of implementation. Use of these images for any other purpose than to serve as a visual guide is strictly prohibited.

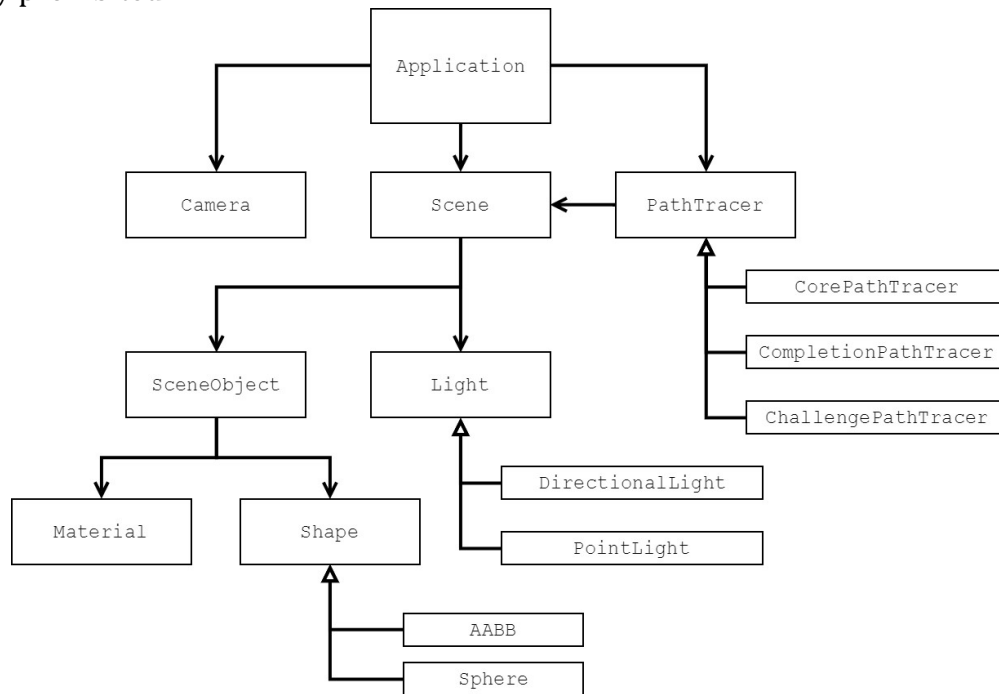


Figure 1: Setting the Working Directory

Additionally the above diagram has been provided to show an overview of the structure of the ray tracer for your convenience. All of the classes related to ray-tracing can be found in the scene folder of the project.

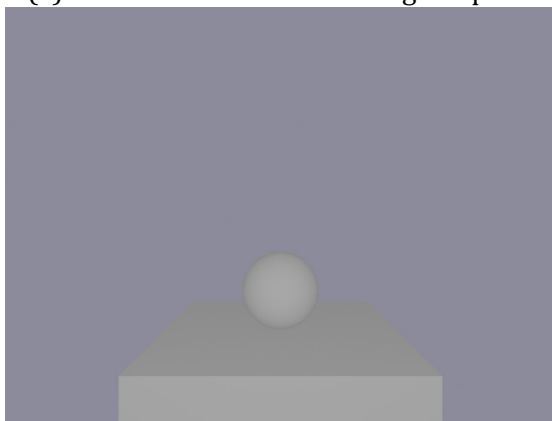
The Application class contains a Camera, a Scene and a PathTracer. For every pixel in the image, for every sample, it asks the Camera to generate a Ray. This Ray is then given to the PathTracer to determine the colour to contribute to the original pixel. The PathTracer can intersect against the Scene which returns a RayIntersection containing the nearest intersection data if any valid intersection occurred. The PathTracer can also get a list of the Light objects from the scene to calculate the final colour.



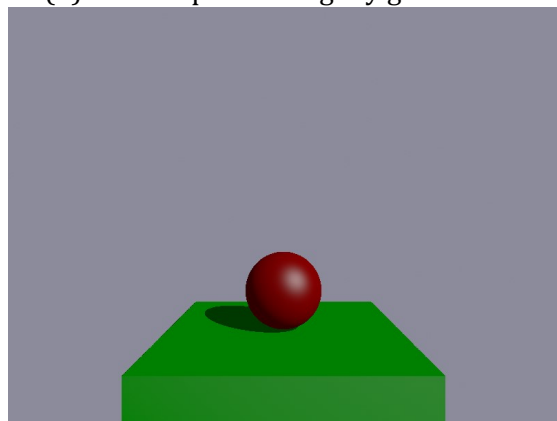
(a) Window when first running template



(b) After implementing ray generation

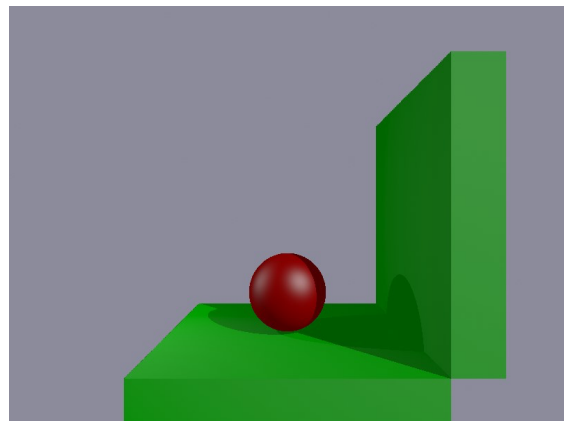
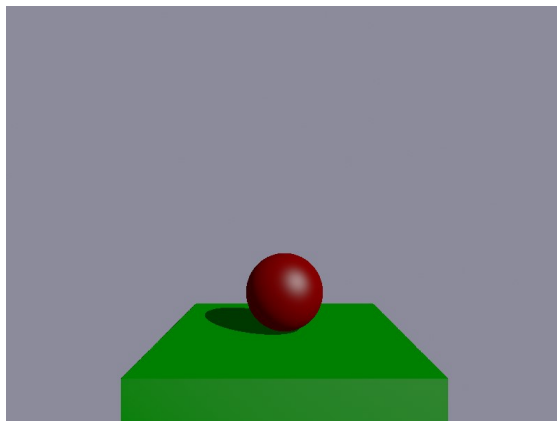


(c) After implementing ray-sphere intersection

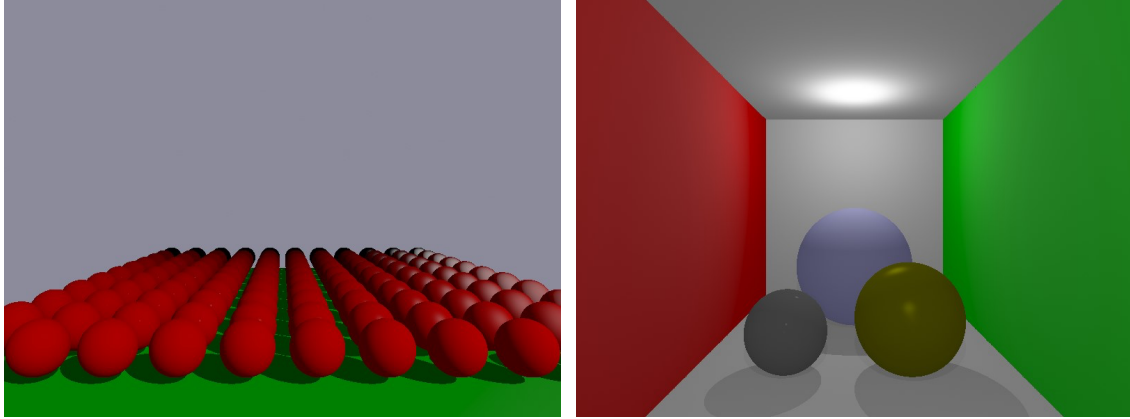


(d) After implementing CorePathTracer

Figure 2: First few stages of the assignment.

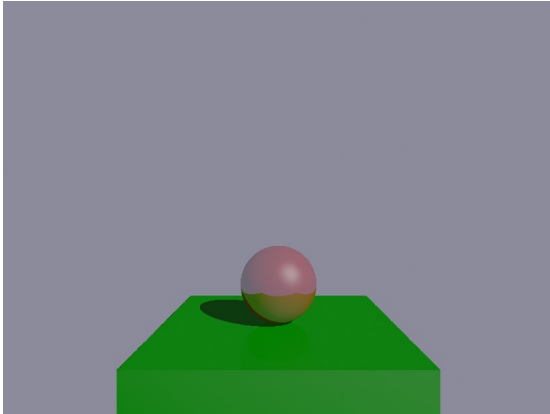


(a) Simple Scene. Contains a box and a (b) Lighting Scene. Contains boxes, a sphere with a single directional light. Should sphere, one directional light and two point produce a single shadow. lights (one is occluded by the right box).

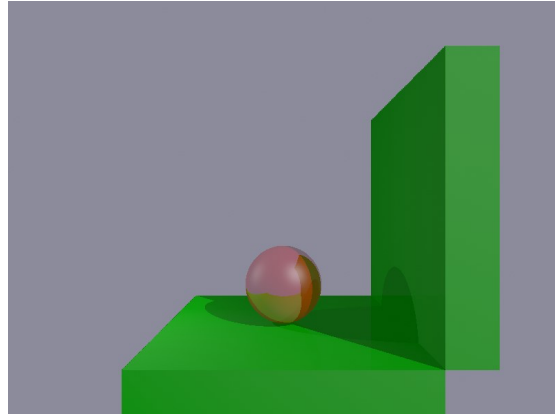


(c) Material Scene. Contains 11 by 11 (d) Cornell Box Scene. Contains: three spheres in a grid (over a box) with one direc- spheres of varying colour and 6 boxes with tional light. Shininess decreases left to right, left and right walls being red and green respecular ratio increases near to far. spectively. Also contains three point lights.

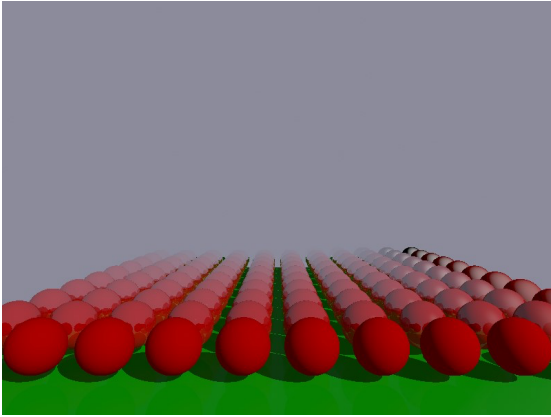
Figure 3: Core Renderer. Default settings



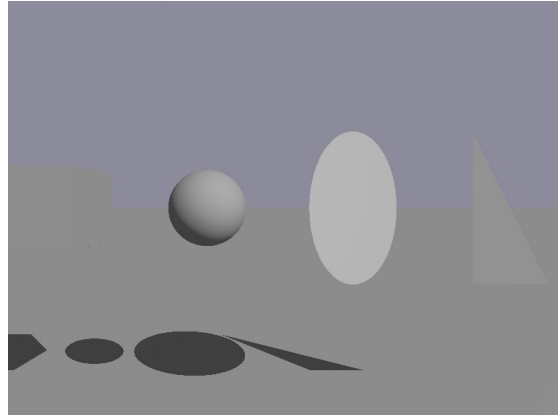
(a) Simple Scene



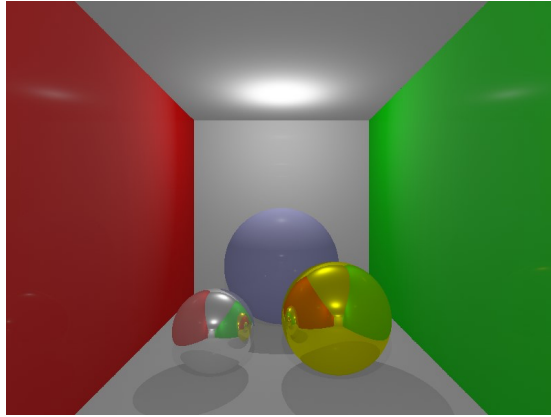
(b) Lighting Scene



(c) Material Scene

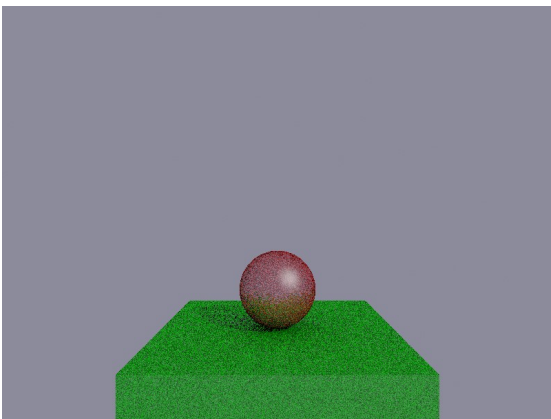


(d) Shape Scene

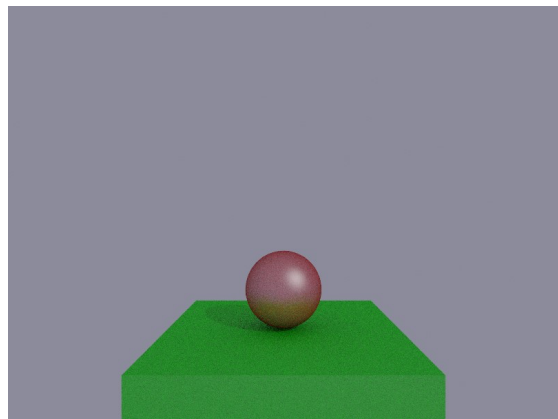


(e) Cornell Box Scene

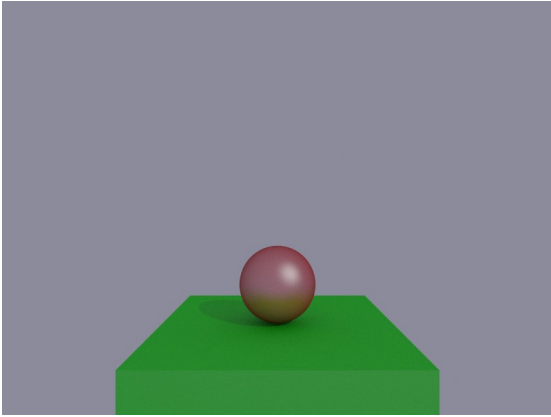
Figure 4: Completion Renderer. 1 sample, 4 ray depth



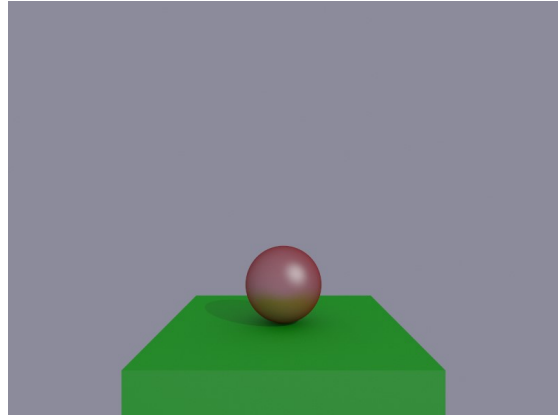
(a) 1 sample



(b) 10 sample

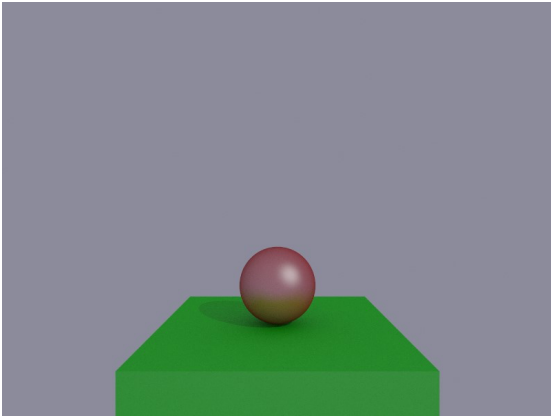


(c) 100 sample

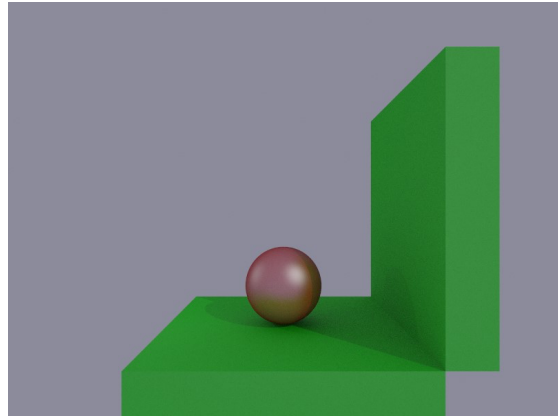


(d) 1000 sample

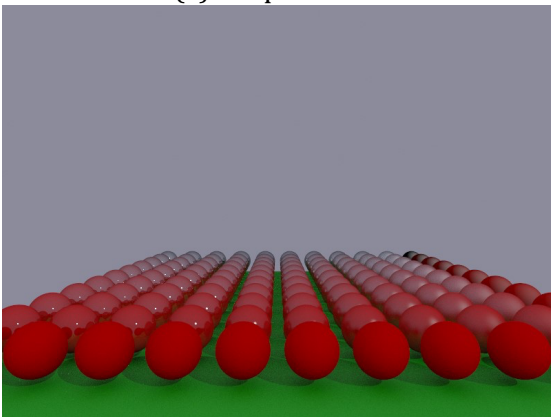
Figure 5: Simple Scene with the Challenge Renderer. 4 ray depth.



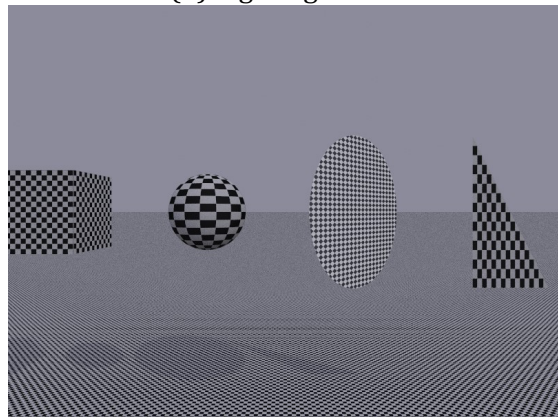
(a) Simple Scene



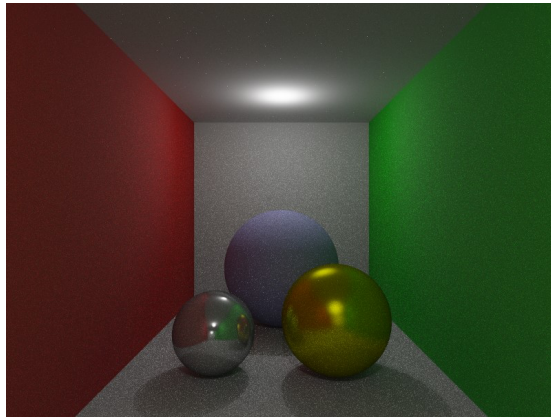
(b) Lighting Scene



(c) Material Scene



(d) Shape Scene



(e) Cornell Box Scene

Figure 6: Challenge Renderer. 100 samples, 4 ray depth. Note that this implementation also uses lighting normalization in order to get the best results.