

# Computer Graphics - Assignment 1

Berra Dogan

April 2025

This report presents the results obtained during the first half of the course as part of Assignment 1. The images are sequential, with all previously mentioned properties carrying over to subsequent ones. Each image can be reconstructed by running the command make SRC=assignment1.cpp followed by ./assignment1 image\_num. This process will regenerate and save the images in the output\_images folder, and also print the execution duration. The relevant classes are organized in the headers folder. All images were generated on my local machine (Chip: Apple M1 Pro, Memory: 16GB).

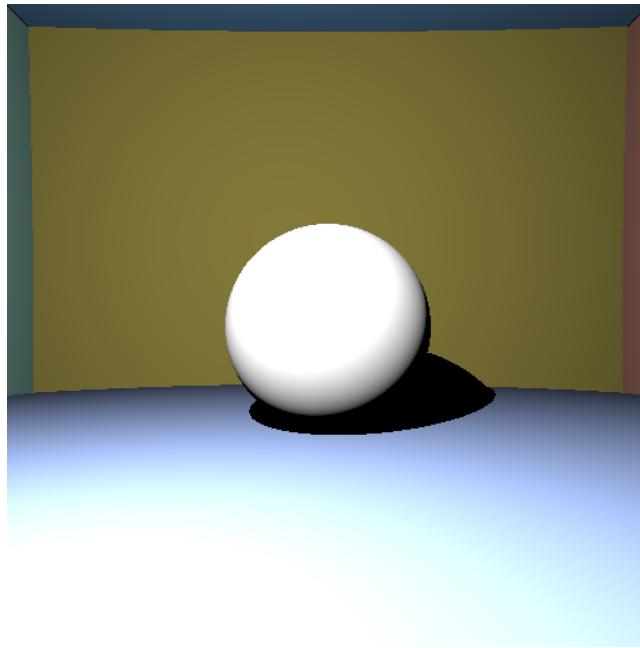


Figure 1: Point Light, Shadows, Gamma Correction - Elapsed Time: 0.0968715s

The time comparison for BVH, single bounding box, and no optimization is shown in Table 1. The image produced for these times are the 2-path version of Figure 5.

	Simple	Single Bounding Box	BVH
Duration(s)	447.504	59.1001	1.40615

Table 1: Ray-Mesh Intersection: W = H = 512, NB\_PATHS = 2

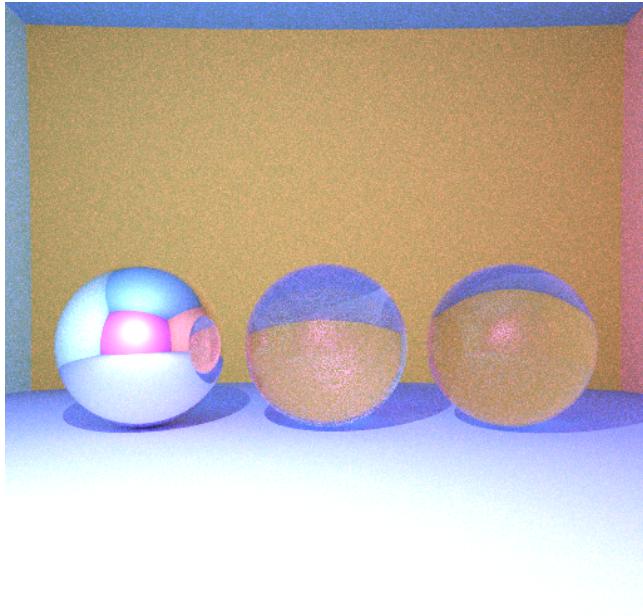


Figure 2: Reflection, Refraction, Fresnel, Indirect Light, Monte Carlo Integration, Parallelization, Antialiasing (ray\_depth = 10, NB\_PATHS = 32) - Elapsed Time: 40.3686s

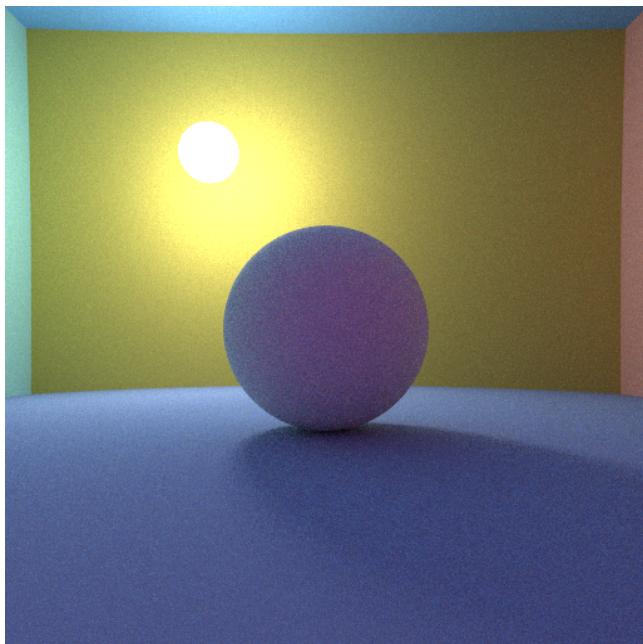


Figure 3: Spherical Light (NB\_PATHS = 32) - Elapsed Time: 20.5062s

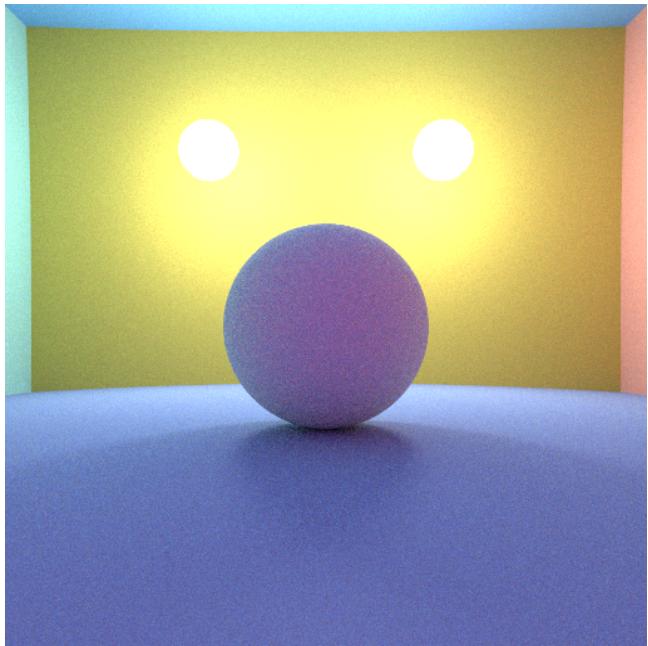


Figure 4: Multiple Light Sources (NB\_PATHS = 32) - Elapsed Time: 29.0958s

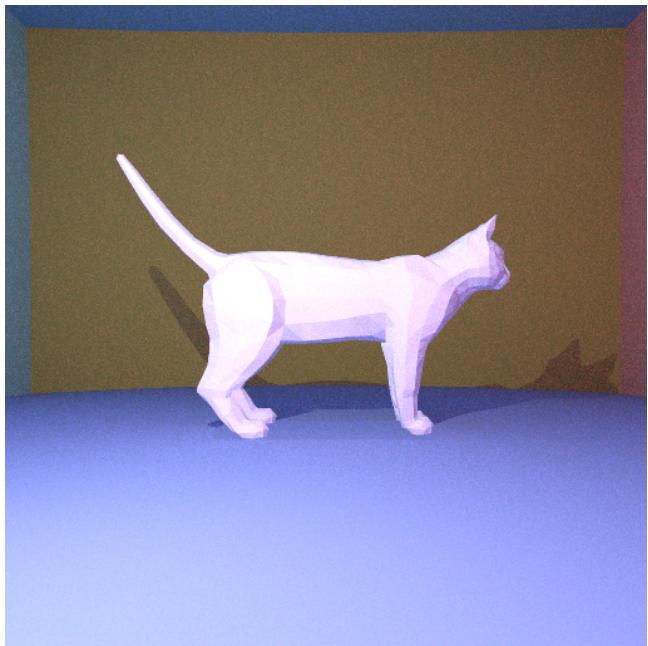


Figure 5: Ray-Mesh Intersection (W = H = 512, NB\_PATHS = 32) - Elapsed Time: 21.9376s

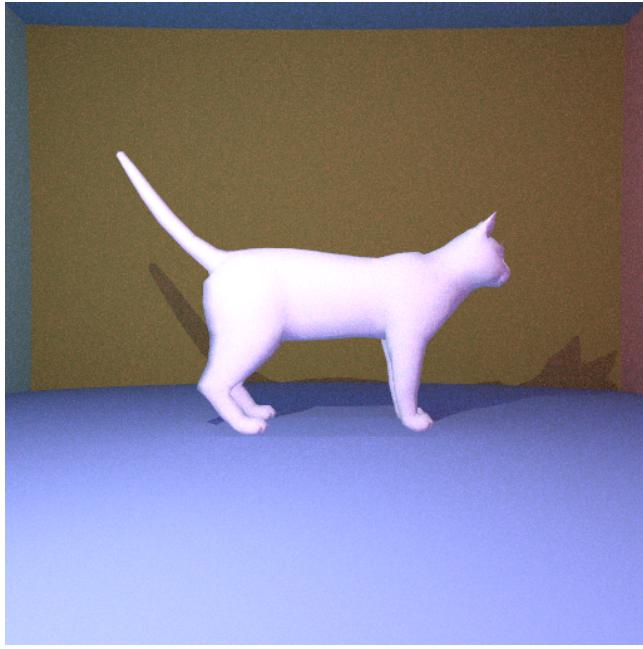


Figure 6: Normals (W = H = 512, NB\_PATHS = 32) - Elapsed Time: 22.3552s

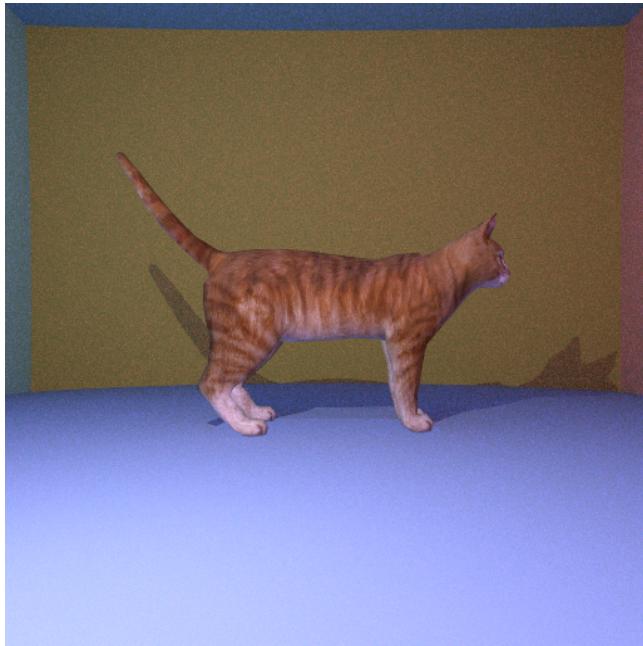


Figure 7: Texture (W = H = 512, NB\_PATHS = 32) - Elapsed Time: 22.1697s