Programming Assignment 1

Due Date: 11:59pm, January 31

Your first assignment is to write a basic ray tracer.

One goal of this assignment is to familiarize you with the SGI graphics workstations and the software tools that you will use during the remainder of the quarter.

The main goal of this assignment, however, is to give you experience with basic image synthesis algorithms. Your ray tracer should have the following capabilities:

1. Read a scene description describing the camera, lights and a set of shapes with associated material properties.

2. Cast rays into the scene to simulate the image formed by a pin-hole camera.

3. Intersect rays with the geometric primitives.

4. Implement a simple shading model that traces rays towards the light source, and recursively traces perfectly reflected and refracted rays.

5. Write an image file containing your synthetic image.

In order for you to spend your time on the more interesting aspects of this assignment, we will provide some infrastructure to get you going. We have created several simple scenes and code to parse the scene description files. We will also provide a simple wrapper program: this program will present a simple graphical user interface so that you may add buttons, sliders, etc. to control the rendering; it will also save your images in a file. Finally, we will make available a simple library of geometric routines that implement common operations on points and vectors. In the directory cs348b/assignment1 will be a handout describing these support libraries and data files.

In order to simplify the problem, your ray tracer need only handle scenes consisting of polygons and spheres. You should implement the simplest pin-hole camera model. Finally, only simulate point light sources, and the surface reflection model should be Lambert's Law (N.L).

Don't add any other features! Don't worry, you will get a chance to add many more additional capabilities.

Grading:

You ray tracer should be able to handle the three test scenes test1.scene, test2.scene, and test3.scene. You should run the ray tracer on those scenes and save the images it produces. We will look at those images and use that as the basis for your grade. In addition you should create 2 more scenes of limited complexity to test your system, save those scenes and the images produced. The majority of your grade will be based on your results, although we will look briefly at your code to make sure it is plausible.

When you have completed your assignment make a copy of your code, and the test scenes and associated images in the directory cs348b.1 in your home directory. Write a README file with enough information so that we know what is there. Then send email to cs348b@cs declaring that you are done. Don't touch the files in that directory after the due date.

We will accept late assignments for up to one week past the due date. However, for each day they are late, we will deduct 10% of your grade.