CS 348B
Winter '95
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January 31, 1995
Handout #3

Programming Assignment 2

Due Date: 11:59pm, Febraury 9

Your second assignment is to continue working on your ray tracer. The goal of this assignment is to speed up the ray-surface intersection module in your ray tracer. In particular, we want you to improve the running time of the program when ray tracing complex scenes containing large numbers of triangles.

There are two basic approaches to doing this:

1. Specialize and optimize the ray-triangle intersection test to run as fast as possible.
2. Add additional data structures that speed the intersection query when there are many triangles.

Make sure that you design your acceleration module so that it is able to handle the current set of geometric primitivesthat is, polygons and sphere. The resulting program should still be able to handle all the scenes created for Assignment 1.

Most of your effort should be spent on Case 2, i.e. reducing the number of ray-triangle intersections. You are free to experiment with any of the acceleration schemes mentioned in class or described in Chapter 6, "A Survey of Ray Tracing Acceleration Techniques." Of course, you are also free to invent new acceleration methods.

Grading:

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.

We will base your 50% of your grade on the speed of your ray tracer. We will provide a test scene with thousands of triangles and record the time it takes your ray tracer to make a prespecified picture. The faster the picture is created, the higher your grade.

To submit your assignment create a directory (e.g. "assignment2") with the following contents:

- A short README file that includes your name and e-mail address. In this file state any assumptions you made in writing your code. If you did something especially clever in your code, point us to it. If your test scenes are masterfully constructed, tell us why. But keep it short – one page is plenty.
- "src" subdirectory – the source code for your ray tracer. Please do NOT include the executable program or any object files.

- "tests" subdirectory – you should provide several test cases For each test scene, include the following files:
  - the Inventor ".iv" scene file ("Save Scene As..." in "composer")
  - the rendering-format ".out" file ("Export As..." in "composer")
  - your rendered image in PPM format (".ppm" extension)

  Don't make your rendered images too small or too big. If they are too small, we won't be able to see very much. If they are too big, it uses a lot of disk space (and your images will take longer to compute). Between 300x300 and 500x500 is reasonable for many scenes. Of course your images do not need to be square.

When you have finished, type

`/usr/class/cs348b/bin/submit directory-name`

This script will "tar" and compress your directory, and save it under `/usr/class/cs348b/inbox`. You do not need to send us any e-mail. That's all there is to it.