

Computer Science 215
Fall 2003
Project 3 – Ray Tracer

Due: Tuesday, 11/25/2003 midnight

Overview

For this project, you will extend the ray tracer you wrote for Project 2. Features of this ray tracer include: arbitrary aspect ratio, color, light attenuation, antialiasing, boxes, reflection, and code enhancement and re-organization.

Description

Your ray tracer should include the following enhancements of the basic ray tracer:

- arbitrary aspect ratio – e.g., 640x480, 500x500, 1024x768, 480x640, etc.
- color images – simply change all grayscale computations to act on RGB color components (a new color type should be defined)
- light attenuation – light loses power as distance grows
- boxes – added to object types
- reflection – through recursive ray tracing
- antialiasing – through pixel subsampling
- code enhancement and re-organization –
 - o image data structure – (i.e., 2D array) so that it can be output after all processing, rather than during processing (images will not be larger than 1024x1024)
 - o file processing – output using file operations rather than stdout (filename given in command line argument, or defaults to img.ppm)
 - o light array – for multiple light sources
 - o new data types – **SCENE_T** and **IMG_T**
 - o multiple source files – ray.c, vector.c, sphere.c, plane.c, box.c, light.c, and ppm.c, with associated header files
 - o makefile – must be included for compiling code
- reading the scene description from an external file (format given on the webpage)
- storing objects and lights in linked lists

Your code must be modular and use functions, structures, typedefs, and arrays. We will discuss program structure and useful data constructs in class.

Image Output

The images your ray tracer produces should fulfill the following requirements:

- scene geometry must include multiple light sources, spheres, polygons, checkerboard ground plane, and a sky (or background), with at least one reflective object
- the images should be 1024x768 pixels in color (output in ppm format)

Sample scene files are available on the course webpage.

You must also create an interesting image of your own design that shows off the features of your ray tracer. Be creative!