.RAY Scene Description Format Specification
COMP 575, Fall 2007

General Guidelines:

Feel free to choose default parameter values if nothing is specified.
Each command appears on its own line
Empty lines and lines beginning with # should be ignored
All operands are floats, except for filenames, which are strings
This is an ASCII plaintext format
The .RAY format is adapted from the scene description used by Eric Bennett and Dr. Leonard McMillan.
NOTE: Not all commands are required to be implemented. Some are for extra credit, and some are just included for completeness. The assignment specifies which are required.

Camera Frustum Commands: These commands define the camera frustum's shape and location

eye *x y z*
: 3D point indicating the location of the eye

lookat *x y z*
: 3D point indicating what the eye is looking at

up *x y z*
: 3D vector indicating the up direction in the scene

fov *theta*
: Angle, in degrees, of the field of view

Global Commands: These commands define the scene contents

background *r g b*
: RGB triple indicating the color to be rendered when no intersection occurs

sphere
: Adds a unit sphere (radius 1) to the scene centered at (0,0,0)

plane
: Adds a infinite plane that passes through (0,0,0) with a normal of (0,1,0)

cylinder
: Adds an cylinder of height 1 (y-dimension), a base radius of 1, and centered at (0,0,0)

cone
: Adds a cone of height 1 (y-dimension), a base radius 1, and centered at (0,0,0)

triangle *x0 y0 z0 x1 y1 z1 x2 y2 z2*
: Draws a triangle with the given coordinates as its corners

Lighting Commands: These commands define the scene's lights in world space

light *r g b parameters*

Defines a light of color RGB. The *parameters* are one of the following

- ambient
  - An ambient light
- point *x y z*
  - A point light centered at the given 3D point
- directional *x y z*
  - A directional light with the given 3D vector
- spotlight *x y z x'y'z' shapeCoefficient*
  - A point light that with maximum brightness in the direction (x', y', z')

Stack Commands: The stack is applied in its current state whenever an object is declared (lights and cameras are not affected). Earlier stack statements are applied first.

translate *x y z*

Translates the stack by the specified 3D vector

scale *x y z*

Scales the stack in each of the specified directions

rotateX *theta*
rotateY *theta*
rotateZ *theta*

Rotates the stack by *theta* degrees around the specified axis

reset

Restores the stack to an identity matrix (The stack begins at identity)

pop

Removes the last transform from the stack

Material Command: Each object's surface is of the material most recently declared. Please parse for all parameters even if you are not using them

material *r g b ambientMix diffuseMix specularMix phongCoeff reflectivity refractivity indexOfRefraction*

Definition of each of the terms:

r g b – base color of the material
ambientMix – multiplier for the amount of ambient illumination
diffuseMix – multiplier for the amount of diffuse illumination
specularMix – multiplier for the amount of specular illumination
phongCoeff – Phong power coefficient for specularities
reflectivity – multiplier for the amount of reflection illumination
refractivity – multiplier for the amount of refractive illumination
indexOfRefraction – light transfer property of the interior of the material

texture *filename*

Loads an .FSF as a texture to be used as appropriate

checkerboard *size*

Enables checkerboarding of planes. The given size is the size of checkers in object space. A value of -1 indicates no checkering.