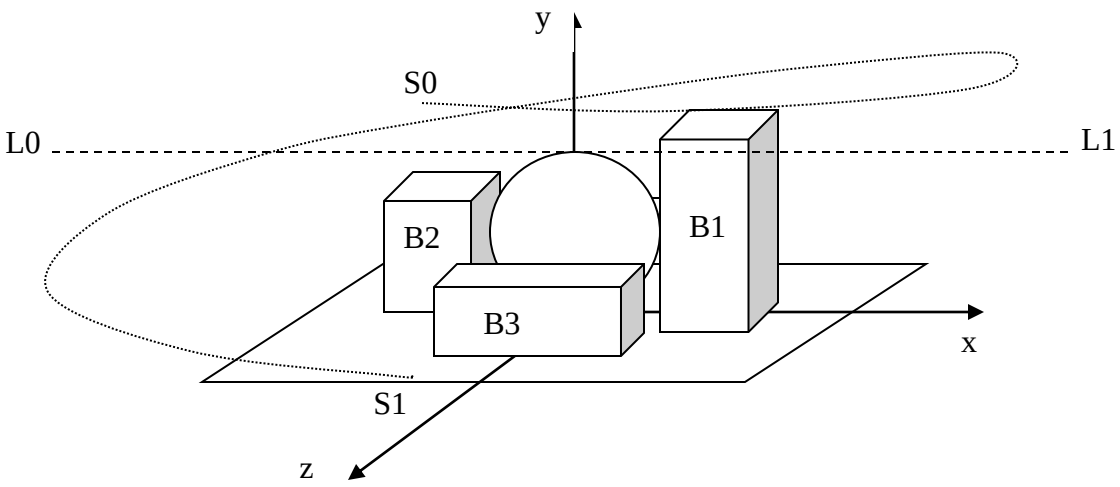
CS315 – Introduction to Computer Graphics
Winter, 2022

Assignment 3

Assigned Date: Monday, March 7, 2022
Due Date: Monday, March 21, 2022

On *Model-View Transformation* (also called *Viewing Transformation*)



The following objects are placed in the scene:

- Floor: 10 X 10 rectangle, centered at the (0, 0, 0), perpendicular to y-axis
- Sphere: radius = 1, centered at (0, 1, 0)
- Building 1: 1 X 3 X 1, centered at (1.5, 1.5, 0.0)
- Building 2: 1 X 1.5 X 1, centered at (-1.5, 0.75, 0.0)
- Building 3: 2 X 1 X 1, centered at (0.0, 0.5, 1.5)
- Building 4: 2 X 1 X 1, centered at (0.0, 0.5, -1.5) (behind in the diagram)

You may select your favorite colors for each object.

1. Generate an animation by "flying" the camera from point L0 to L1 along a linear path. During the "flying", your camera is always looking at the center of the scene.

L0 = (-6.0, 8.0, 6.0)
L1 = (6.0, 8.0, 6.0)
The center of the scene: At = (0.0, 0.75, 0.0)

2. The camera is to fly in a circular spiral path from S0 to S1around the scene.

   S0 = (0.0, 5.0, 10.0)
   S1 = (0.0, 0.0, 10.0)
   The radius of the circle: R = 10.0
   The center of the scene: At = (0.0, 0.75, 0.0)

General Notes:

1. All objects are represented by triangular meshes. That is, each rectangle is split into two triangles.

2. For the four building blocks, I suggest you to write a general function that takes six parameters (the corners of a block): x0, x1, y0, y1, z0, and z1 as its input, and generates the vertices of the triangles and store them into a vertex array.

3. The sphere can be generated using one of the two methods: (a) fan and strip approximation in Section 2.4.3, pages 57 to 58; and (b) recursive subdivision approximation in Section 6.6, pages 297 to 299.

4. All triangles are stored in a single vertex array. The triangles from the same object should be stored consecutively. The order of objects is arbitrary.

5. There should a color array corresponding to the vertex array. You may set any colors. But, different objects should have different colors.

6. You need to adjust the parameters (i.e. left, right, top, bottom) in calling the Frustum( ) function, such that the all objects are in the pictures, and are not too small. This is equivalent to "zooming" the lens virtually.

Hand-ins:

1. The electronic version of your source program with sufficient documents along with a few screen shots should be submitted online through UR Courses – CS315 on the due date.
2. The animation results will also be evaluated by the marker. That is, the marker will download your HTML and js files and run it from a web browser.