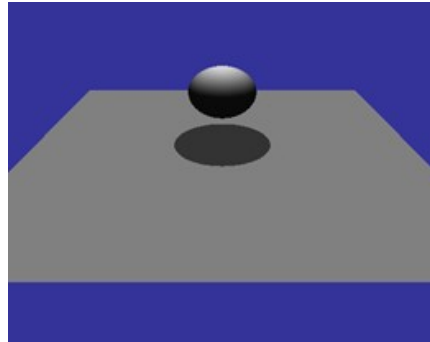


Shadow

This lab exercise, we are going to implement the squish (projection) method for shadow generation. This approach is restricted to shadows on plane surfaces. In this exercise, we will consider the plane situated at $y = 0$.



1. Draw a sphere above the plane. (let say `glTranslatef(0.0f, 3.0f, 0.0f);`)
2. Set a light source above the sphere object. As for this stage, let both x and z position be 0.
3. Now we are ready for shadow rendering.
 - a. `glTranslatef(0.0f, 0.01f, 0.0f);`
Translate the shadow to be slightly above the plane. This is to avoid the z buffer conflicts.
 - b. `GLfloat matrix[16];` Define a matrix.
The corresponding order as,

$$\begin{pmatrix} m0 & m4 & m8 \\ m1 & m5 & m9 \\ m2 & m6 & m10 \\ m3 & m7 & m11 \end{pmatrix}$$

Then set up your shadow squish matrix from your light position (lx, ly, lz) .

$$\begin{pmatrix} ly & -lx & 0 \\ 0 & 0 & 0 \\ 0 & -lz & ly \\ 0 & -1 & 0 \end{pmatrix}$$

- c. `glMultMatrixf(matrix);`
Then multiply the squish matrix with the current matrix on top of the ModelView stack.
- d. `glTranslatef(0.0f, 3.0f, 0.0f);`
Position the shadow to the same position as the sphere drawn previously.
- e. Draw the sphere to represent the shadow polygon.

Practical Exercise 8**Q1.** Moving shadow.

- (a) Using your right and left key, move the light x position.
- (b) If your shadow squish matrix was set up accordingly, you should have the shadow moving along the light position.

(2 marks)

Q2. Second light source that cast shadow.

- (a) Add another light source to your scene.
- (b) By using the same method, apply the second shadow that corresponding to the second light source.
- (c) You may want to add in another pair of key to move the light and shadow.

(4 marks)

Q3. Second object.

- (a) Add another object to your scene.
- (b) By using the same method, apply the shadow that corresponding to the newly added object.

(2 marks)

[TOTAL: 8 marks]