2D Transformation

**Translation**

#include <windows.h> // for MS Windows

#include <GL/glut.h> // GLUT, include glu.h and gl.h

/\* Initialize OpenGL Graphics \*/

void initGL() {

// Set "clearing" or background color

glClearColor(0.0f, 0.0f, 0.0f, 1.0f); // Black and opaque

}

/\* Handler for window-repaint event. Call back when the window first appears and

whenever the window needs to be re-painted. \*/

void display() {

glClear(GL\_COLOR\_BUFFER\_BIT); // Clear the color buffer

//glMatrixMode(GL\_MODELVIEW); // To operate on Model-View matrix

glLoadIdentity(); // Reset the model-view matrix

glTranslatef(+0.0f, 0.0f, 0.0f);

glBegin(GL\_QUADS); // Each set of 4 vertices form a quad

glColor3f(1.0f, 0.0f, 0.0f); // Red

glVertex2f(-0.1f, -0.1f); // Define vertices in counter-clockwise (CCW) order

glVertex2f( 0.1f, -0.1f); // so that the normal (front-face) is facing you

glVertex2f( 0.1f, 0.1f);

glVertex2f(-0.1f, 0.1f);

glEnd();

glTranslatef(+0.3f, 0.1f, 0.0f); // Translate x right and y up

glBegin(GL\_QUADS); // Each set of 4 vertices form a quad

glColor3f(1.0f, 0.0f, 0.0f); // Red

glVertex2f(-0.1f, -0.1f); // Define vertices in counter-clockwise (CCW) order

glVertex2f( 0.1f, -0.1f); // so that the normal (front-face) is facing you

glVertex2f( 0.1f, 0.1f);

glVertex2f(-0.1f, 0.1f);

glEnd();

glLoadIdentity(); // Reset the model-view matrix

glTranslatef(-0.3f, -0.1f, 0.0f); // Translate x left and y down

glBegin(GL\_QUADS); // Each set of 4 vertices form a quad

glColor3f(1.0f, 0.0f, 0.0f); // Red

glVertex2f(-0.1f, -0.1f); // Define vertices in counter-clockwise (CCW) order

glVertex2f( 0.1f, -0.1f); // so that the normal (front-face) is facing you

glVertex2f( 0.1f, 0.1f);

glVertex2f(-0.1f, 0.1f);

glEnd();

glFlush(); // Render now

}

/\* Main function: GLUT runs as a console application starting at main() \*/

int main(int argc, char\*\* argv) {

glutInit(&argc, argv); // Initialize GLUT

glutInitWindowSize(320, 320); // Set the window's initial width & height - non-square

glutInitWindowPosition(50, 50); // Position the window's initial top-left corner

glutCreateWindow("Model Transform"); // Create window with the given title

glutDisplayFunc(display); // Register callback handler for window re-paint event

//glutReshapeFunc(reshape); // Register callback handler for window re-size event

initGL(); // Our own OpenGL initialization

glutMainLoop(); // Enter the infinite event-processing loop

return 0;

}

**Scaling:**

#include <windows.h> // for MS Windows

#include <GL/glut.h> // GLUT, include glu.h and gl.h

/\* Initialize OpenGL Graphics \*/

void initGL() {

// Set "clearing" or background color

glClearColor(0.0f, 0.0f, 0.0f, 1.0f); // Black and opaque

}

/\* Handler for window-repaint event. Call back when the window first appears and

whenever the window needs to be re-painted. \*/

void display() {

glClear(GL\_COLOR\_BUFFER\_BIT); // Clear the color buffer

//glMatrixMode(GL\_MODELVIEW); // To operate on Model-View matrix

glLoadIdentity(); // Reset the model-view matrix

glTranslatef(+0.0f, 0.0f, 0.0f);

glBegin(GL\_QUADS); // Each set of 4 vertices form a quad

glColor3f(1.0f, 0.0f, 0.0f); // Red

glVertex2f(-0.1f, -0.1f); // Define vertices in counter-clockwise (CCW) order

glVertex2f( 0.1f, -0.1f); // so that the normal (front-face) is facing you

glVertex2f( 0.1f, 0.1f);

glVertex2f(-0.1f, 0.1f);

glEnd();

glScalef(2,2,0); // increase x right and y

glTranslatef(+0.3f, 0.1f, 0.0f); // Translate x right and y up

glBegin(GL\_QUADS); // Each set of 4 vertices form a quad

glColor3f(1.0f, 0.0f, 0.0f); // Red

glVertex2f(-0.1f, -0.1f); // Define vertices in counter-clockwise (CCW) order

glVertex2f( 0.1f, -0.1f); // so that the normal (front-face) is facing you

glVertex2f( 0.1f, 0.1f);

glVertex2f(-0.1f, 0.1f);

glEnd();

glFlush(); // Render now

}

/\* Main function: GLUT runs as a console application starting at main() \*/

int main(int argc, char\*\* argv) {

glutInit(&argc, argv); // Initialize GLUT

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initGL(); // Our own OpenGL initialization

glutMainLoop(); // Enter the infinite event-processing loop

return 0;

}

**Rotation**

#include <windows.h>

#include <GL/glut.h>

GLfloat i = 0.0f;

void initGL()

{

glClearColor(0.0f, 0.0f, 0.0f, 1.0f); // Black and opaque

}

void Idle()

{

glutPostRedisplay();//// marks the current window as needing to be redisplayed

}

void display()

{

glClear(GL\_COLOR\_BUFFER\_BIT);

glLoadIdentity();//Reset the current matrix

glPushMatrix(); //glPushMatrix copies the top matrix and pushes it onto the stack, while glPopMatrix pops the top matrix off the stack

glRotatef(i,0.0,0.0,1.0);

// glTranslatef(0.f,0.0f,0.f);

/\*glBegin(GL\_QUADS);

glColor3f(1.0f, 0.0f, 0.0f);

glVertex2f(0.1f, 0.1f);

glVertex2f( 0.6f, 0.1f);

glVertex2f( 0.6f, 0.5f);

glVertex2f( 0.1f, 0.5f);

\*/

glBegin(GL\_TRIANGLES);

glColor3f(1.0f, 0.0f, 0.0f);

glVertex2f(0.1f, 0.1f);

glVertex2f( 0.6f, 0.1f);

glVertex2f( 0.3f, 0.5f);

glEnd();

glPopMatrix();//while glPopMatrix pops the top matrix off the stack

i+=0.1f;

glFlush();

}

int main(int argc, char\*\* argv)

{

glutInit(&argc, argv); // Initialize GLUT

glutInitWindowSize(320, 320);

glutCreateWindow("Model Transform");

glutDisplayFunc(display);//

initGL();

glutIdleFunc(Idle);//glutIdleFunc sets the global idle callback to be func so a GLUT program can perform background processing tasks or continuous animation when window system events are not being received.

glutMainLoop();

return 0;

}

Watch

#include <windows.h>

#include <GL/glut.h>

GLfloat i = 0.0f;

void initGL()

{

glClearColor(0.0f, 0.0f, 0.0f, 1.0f); // Black and opaque

}

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glClear(GL\_COLOR\_BUFFER\_BIT);

glLoadIdentity();//Reset the current matrix

glPushMatrix(); //glPushMatrix copies the top matrix and pushes it onto the stack, while glPopMatrix pops the top matrix off the stack

glRotatef(i,0.0,0.0,1.0);

// glTranslatef(0.f,0.0f,0.f);

/\*glBegin(GL\_QUADS);

glColor3f(1.0f, 0.0f, 0.0f);

glVertex2f(0.1f, 0.1f);

glVertex2f( 0.6f, 0.1f);

glVertex2f( 0.6f, 0.5f);

glVertex2f( 0.1f, 0.5f);

\*/

glBegin(GL\_TRIANGLES);

glColor3f(1.0f, 0.0f, 0.0f);

glVertex2f(0.1f, 0.1f);

glVertex2f( 0.6f, 0.1f);

glVertex2f( 0.3f, 0.5f);

glEnd();

glPopMatrix();//while glPopMatrix pops the top matrix off the stack

glBegin(GL\_LINES);

glColor3f(1.0f, 0.0f, 0.0f);

glVertex2f(-0.2f, 0.0f);

glVertex2f( 0.8f, 0.0f);

glVertex2f( 0.8f, 0.8f);

glVertex2f( -0.2f, 0.8f);

glEnd();

i+=0.1f;

glFlush();

}

int main(int argc, char\*\* argv)

{

glutInit(&argc, argv); // Initialize GLUT

glutInitWindowSize(320, 320);

glutCreateWindow("Model Transform");

glutDisplayFunc(display);//

initGL();

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glutMainLoop();

return 0;

}