

CS 352

Computer Graphics & Visualization

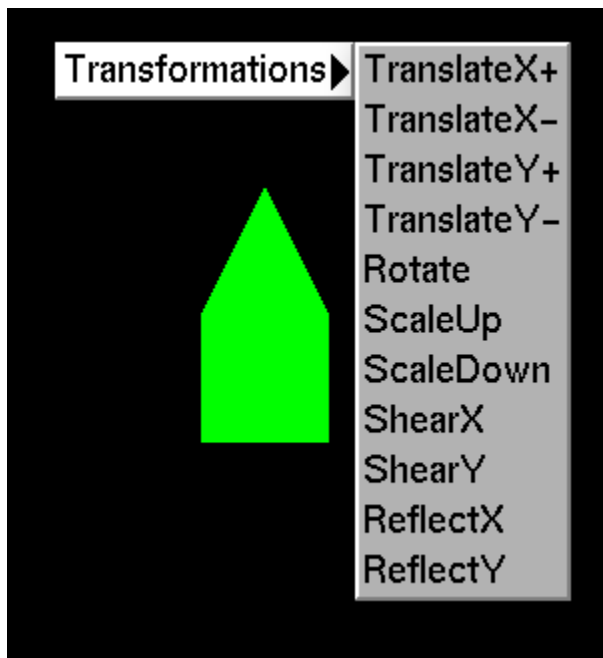
Assignment - 6

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1. Transforms



```
#include <GL/glut.h>
#include <iostream>
#include <cmath>
using namespace std;
```

```
/*
Sairaj R. Loke 210001035
CS352 Lab6 Transforms
```

Note:

Note both run.sh and Makefile not needed but i have kept them as it is as I was trying both of them to compare the use

I have added some simple modern c++ features and constructors as this assignment was very simple and very low differentiating factor

```
*/
```

```
struct Color{
    GLfloat r = 0.0;
    GLfloat g = 0.0;
    GLfloat b = 0.0;

    Color(GLfloat r, GLfloat g, GLfloat b): r(r),g(g), b(b){}
};
```

```
//static just a good practice while working with larger system where i dont want this variable to
go out of this translational unit
static GLfloat polygon_vertices[][2] = {{-1,0},{1, 0},{1, 2},{0,4},{-1,2}}; //initialoizing the pentagon
vertices
GLfloat PI_ = 3.14159 ;
static int polygon_sides = 5; // say a pentagon
static Color colorPoly(0.0,1.0,0.0) ;
```

```
void drawPolygon() {
    glBegin(GL_POLYGON);
    for(auto& val: polygon_vertices){ //using modern c++ features like range based for loops
        glVertex2fv(val);
    }
    glEnd();
}

void display() {
```

```

    glClear(GL_COLOR_BUFFER_BIT);
    glColor3f(colorPoly.r, colorPoly.g, colorPoly.b);
    drawPolygon();
    glFlush();
}

void translate(float dx, float dy) {
    for (auto& vertex : polygon_vertices) {
        vertex[0] += dx;
        vertex[1] += dy;
        cout<<vertex[0]<<" "<<vertex[1]<<endl;
    }
    glutPostRedisplay();
}

void rotate(float angle) {
    float theta = angle*(PI_ / 180.0);
    float tempX, tempY;
    for (auto&vertex: polygon_vertices) {
        tempX = vertex[0];
        tempY = vertex[1];
        vertex[0] = tempX*cos(theta) - tempY*sin(theta);
        vertex[1] = tempX*sin(theta) + tempY*cos(theta);
        cout<<vertex[0]<<" "<<vertex[1]<<endl;
    }
    glutPostRedisplay(); //https://www.opengl.org/resources/libraries/glut/spec3/node20.html ,.
    // The next iteration through glutMainLoop, the window's display callback will be called to
    redisplay the window's normal plane.
}

void scale(float sx, float sy) {
    for (auto& vertex: polygon_vertices) {
        vertex[0] *= sx;
        vertex[1] *= sy;
        cout<<vertex[0]<<" "<<vertex[1]<<endl;
    }
    glutPostRedisplay();
}

void shear(float shx, float shy) {
    for (auto& vertex: polygon_vertices) {
        vertex[0] += shx*vertex[1];
        vertex[1] += shy*vertex[0];
        cout<<vertex[0]<<" "<<vertex[1]<<endl;
    }
}

```

```
    }  
    glutPostRedisplay();  
}
```

```
void reflect(char dir) {  
    if (dir == 'y'){  
        for (auto& vertex: polygon_vertices)  
            vertex[0] = -vertex[0]; // y axis  
    }  
    else if (dir == 'x'){  
        for (auto& vertex: polygon_vertices)  
            vertex[1] = -vertex[1]; // x axis  
    }  
}
```

```
    glutPostRedisplay();  
}
```

```
void menu(int choice) {  
    switch (choice) {  
        case 1:  
            translate(5, 0);  
            break;  
        case 2:  
            translate(-5, 0);  
            break;  
        case 3:  
            translate(0, 5);  
            break;  
        case 4:  
            translate(0, -5);  
            break;  
        case 5:  
            rotate(20);  
            break;  
        case 6:  
            scale(2, 2);  
            break;  
        case 7:  
            scale(0.5, 0.5);  
            break;  
        case 8:  
            shear(0.5, 0);  
            break;  
    }  
}
```

```

        case 9:
            shear(0, 0.5);
            break;
        case 10:

            reflect('x');
            break;
        case 11:
            cout<<"Y";
            reflect('y');
            break;
        case 12:
            exit(0);
            break;

    }
}

int main(int argc, char** argv) {
    glutInit(&argc, argv);
    glutInitDisplayMode(GLUT_SINGLE | GLUT_RGB);
    glutInitWindowSize(800, 800);
    glutCreateWindow("Sairaj's 2D Transformations");
    gluOrtho2D(-200, 200, -200, 200); //n sets up a two-dimensional orthographic viewing
region...so -200 to +200 in x, -200 to 200 in y
    glutDisplayFunc(display);

    int submenu = glutCreateMenu(menu);
    glutAddMenuEntry("TranslateX+", 1);
    glutAddMenuEntry("TranslateX-", 2);
    glutAddMenuEntry("TranslateY+", 3);
    glutAddMenuEntry("TranslateY-", 4);
    glutAddMenuEntry("Rotate", 5);
    glutAddMenuEntry("ScaleUp", 6);
    glutAddMenuEntry("ScaleDown", 7);
    glutAddMenuEntry("ShearX", 8);
    glutAddMenuEntry("ShearY", 9);
    glutAddMenuEntry("ReflectX", 10);
    glutAddMenuEntry("ReflectY", 11);

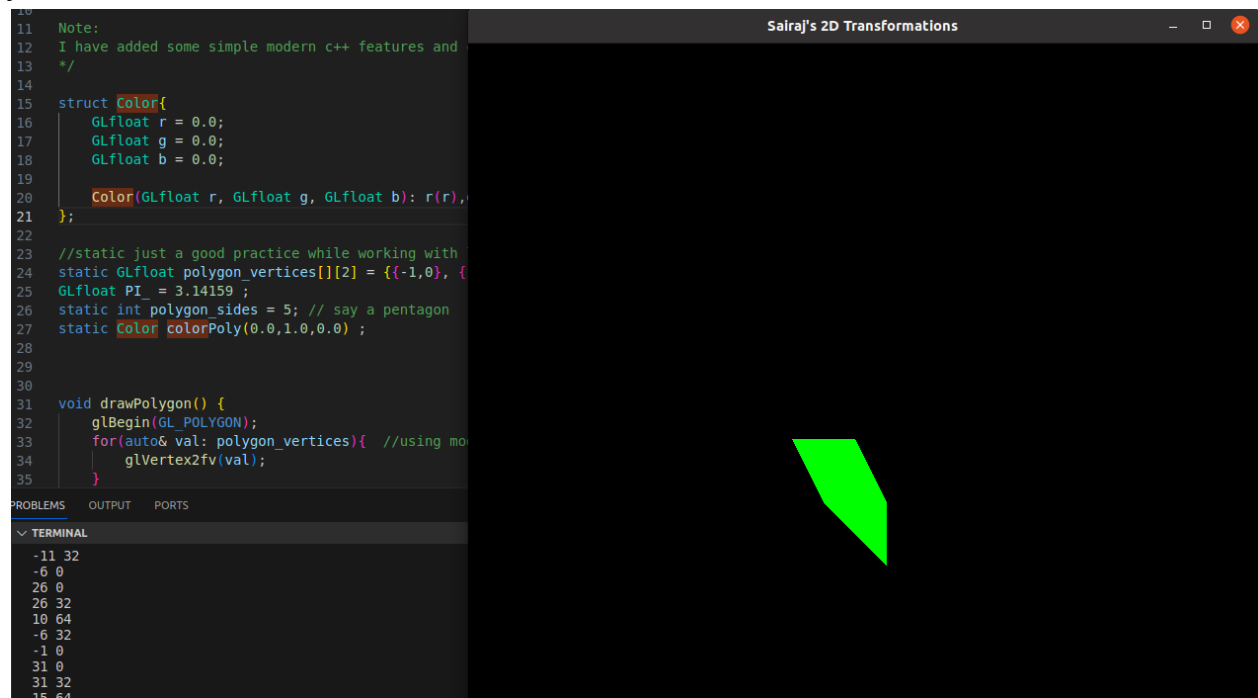
```

```
glutCreateMenu(menu);  
glutAddSubMenu("Transformations", submenu);  
// glutAddMenuEntry("Exit", 6);  
glutAttachMenu(GLUT_RIGHT_BUTTON);
```

```
glutMainLoop();
```

```
return 0;
```

```
}
```



```
10  
11 Note:  
12 I have added some simple modern c++ features and  
13 */  
14  
15 struct Color{  
16     GLfloat r = 0.0;  
17     GLfloat g = 0.0;  
18     GLfloat b = 0.0;  
19  
20     Color(GLfloat r, GLfloat g, GLfloat b): r(r),  
21 };  
22  
23 //static just a good practice while working with  
24 static GLfloat polygon_vertices[][2] = {{-1,0}, {  
25 GLfloat PI_ = 3.14159 ;  
26 static int polygon_sides = 5; // say a pentagon  
27 static Color colorPoly(0.0,1.0,0.0) ;  
28  
29  
30  
31 void drawPolygon() {  
32     glBegin(GL_POLYGON);  
33     for(auto& val: polygon_vertices){ //using mo  
34         glVertex2fv(val);  
35     }  
36 }  
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