In this assignment you are to create specific animations of a polygon.

The polygon should be created using the following technique:

Each vertex is defined by clicking on the window. The final number of sides is determined by clicking on the first vertex a second time.

Once the polygon has been defined, it should be filled in and begin to rotate.

Polygon behavior is determined as follows:

clicking and dragging the polygon translates the polygon within the window

clicking and dragging the polygon while holding the shift key scales the polygon

Clicking the polygon while holding the Alt key reverses the direction of rotation.

As usual you get bonus points for doing interesting things above and beyond the program requirements such as:

allowing multiple polygons

including additional transformations such as shears or reflections,

but those are just suggestions. I'm sure you can come up with more.

Here's how you win at completing Cooper assignments

Meeting the requirements of the assignment. 70% of the grade

Internal program documentation. 10% of the grade

Appropriately professional code structure and organization. 10% of the grade

doing 'something' above and beyond. 10% of the grade

Here's how you lose at completing Cooper assignments

Failing to use appropriate features of your programming language of choice. -5%

Submitting code embedded in a .docx, .pdf, .rar, or any other file format unrelated to programming assignments. -5%

Failing to submit evidence that the code compiles, executes, and meets the assignment requirements. -5%

#include <windows.h>

#include <GL/glut.h>

#include <iostream>

#include "Shape.h"

#include "Location.h"

#include "RGBColor.h"

using namespace std;

static bool spinning = true; //animated or not

static const int FPS = 60; //frames to render

Location origin(25, 25, 0); // point coordinate

RGBColor currentColor(0.9, 0.1, 0.1); // color

Location\* vertices; // array of verteices for the shape

Shape myShape(6, currentColor, origin, GL\_POLYGON); // create a new shape

static GLfloat currentAngleOfRotation = 0.0; // rotation angle

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Function: reshape

Purpose: maintain aspect ratio

Author: Cooper

Date: 2/21/2020

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void reshape(GLint width, GLint height) {

glViewport(0, 0, width, height);

GLfloat aspect = (GLfloat)width / (GLfloat)height;

glMatrixMode(GL\_PROJECTION);

glLoadIdentity();

if (width <= height) glOrtho(-50.0, 50.0, -50.0 / aspect, 50.0 / aspect, -1.0, 1.0);

else glOrtho(-50.0 \* aspect, 50.0 \* aspect, -50.0, 50.0, -1.0, 1.0);

}

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function: init()

purpose: initalize the hape to be drawn and calcuates the vertices of the shape

Author: Cooper

Date: 2/21/2020

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void init() {

myShape.setVertices(25);

vertices = myShape.getVertices();

}

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function: display()

purpose: displays a rotating shape

Author: Cooper

Date: 2/21/2020

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void display() {

glClear(GL\_COLOR\_BUFFER\_BIT); //setup

glMatrixMode(GL\_MODELVIEW);

glLoadIdentity();

glRotatef(currentAngleOfRotation, 0.0, 0.0, 1.0); // rotate the shape

myShape.setVertices(25); // set the vertices of the shape

myShape.setOrigin(origin); // set the origin of the shape

vertices = myShape.getVertices(); // put the vertices in an array

glBegin(GL\_POLYGON); // and draw it

glColor3f(currentColor.getRed(), currentColor.getGreen(), currentColor.getBlue());

for (int i = 0; i < myShape.getSides(); i++) {

glVertex2f(vertices[i].getX(), vertices[i].getY());

}

glEnd();

glFlush();

glutSwapBuffers();

}

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function: timer()

purpose: controls the refresh rate

Author: Cooper

Date: 2/21/2020

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void timer(int v) {

if (spinning) {

currentAngleOfRotation += 1.0;

if (currentAngleOfRotation > 360.0) {

currentAngleOfRotation -= 360.0; // reset to zero every revolution

}

glutPostRedisplay();

}

glutTimerFunc(1000 / FPS, timer, v);

}

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function: mouse()

purpose: controls mouse behavior

left click starts the image rotating

right click pauses the rotation

Author: Cooper

Date: 2/21/2020

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void mouse(int button, int state, int x, int y) {

if (button == GLUT\_LEFT\_BUTTON && state == GLUT\_DOWN) {

spinning = true;

glutSetCursor(GLUT\_CURSOR\_DESTROY);

}

else if (button == GLUT\_RIGHT\_BUTTON && state == GLUT\_DOWN) {

spinning = false;

glutSetCursor(GLUT\_CURSOR\_WAIT);

}

}

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function: keyboard()

purpose: controls keyboard behavior

number key 3-8 control number of sides

keys r,g,b control shape color

Author: Cooper

Date: 2/21/2020

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void keyboard(unsigned char Key, int x, int y) {

switch (Key) {

case '3': myShape.setSides(3); break;

case '4': myShape.setSides(4); break;

case '5': myShape.setSides(5); break;

case '6': myShape.setSides(6); break;

case '7': myShape.setSides(7); break;

case '8': myShape.setSides(8); break;

case 'r': currentColor.setColors(1.0, 0.0, 0.0); break;

case 'b': currentColor.setColors(0.0, 0.0, 1.0); break;

case 'g': currentColor.setColors(0.0, 1.0, 0.0); break;

}

}

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function: SpecialKeys()

purpose: controls non alphanumeric keys

arrow keys up/down/left/right change windo size

Author: Cooper

Date: 2/21/2020

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void SpecialKeys(int key, int x, int y) {

switch (key) {

case GLUT\_KEY\_LEFT: glutReshapeWindow(glutGet(GLUT\_WINDOW\_WIDTH) - 1, glutGet(GLUT\_WINDOW\_HEIGHT)); break;

case GLUT\_KEY\_RIGHT: glutReshapeWindow(glutGet(GLUT\_WINDOW\_WIDTH) + 1, glutGet(GLUT\_WINDOW\_HEIGHT)); break;

case GLUT\_KEY\_UP: glutReshapeWindow(glutGet(GLUT\_WINDOW\_WIDTH), glutGet(GLUT\_WINDOW\_HEIGHT) + 1); break;

case GLUT\_KEY\_DOWN:glutReshapeWindow(glutGet(GLUT\_WINDOW\_WIDTH), glutGet(GLUT\_WINDOW\_HEIGHT) - 1); break;

case GLUT\_KEY\_F1: glutFullScreen(); break;

case GLUT\_KEY\_F2: glutReshapeWindow(800, 800); break;

case GLUT\_KEY\_F3: glutIconifyWindow(); break;

}

}

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function: main()

purpose: sets up the window and assigns keyboard and

mouse listeners, sets the frame rate for

snimation, and shape aspect ratio

Author: Cooper

Date: 2/21/2020

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

init();

glutInit(&argc, argv);

glutInitDisplayMode(GLUT\_DOUBLE | GLUT\_RGB);

glutInitWindowPosition(80, 80);

glutInitWindowSize(800, 500);

glutCreateWindow("Spinning Shape");

glutReshapeFunc(reshape);

glutDisplayFunc(display);

glutTimerFunc(100, timer, 0);

glutKeyboardFunc(keyboard);

glutSpecialFunc(SpecialKeys);

glutMouseFunc(mouse);

glutMainLoop();

}