



الأكاديمية العربية للعلوم والتكنولوجيا والنقل البحري

Arab Academy for Science, Technology & Maritime Transport

COLLEGE OF ENGINEERING AND TECHNOLOGY
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Lab #3
OpenGL Transformations

C/C++ Template

Listing 1: template.c

```
1 #include <windows.h>    // Only for Windows
2 #include <GL/gl.h>
3 #include <GL/glu.h>
4 #include <GL/glut.h>
5 #include <stdio.h>
6 #include <math.h>
7
8 int v=0, h=0;
9 int ceta = 0;
10 float width=1.0, height=1.0;
11
12 void myStyleInit ()
13 {
14     glClearColor(1.0, 1.0, 1.0, 0.0);
15     glMatrixMode(GL_PROJECTION);
16     glLoadIdentity();
17     glOrtho(-250, 250, -250, 250, 0, -1);
18 }
19
20 void myDisplay ()
21 {
22     glClear(GL_COLOR_BUFFER_BIT);
23     glMatrixMode(GL_MODELVIEW);
24     glLoadIdentity();
25     glPointSize(4.0);
26
27     glPushMatrix();
28     glColor3f(1.0, 0.0, 0.0);
29     glTranslatef(h, v, 0);    // <— Try to shuffle them!!!
30     glScalef(width, height, 1);
31     glRotatef(ceta, 0, 0, 1);
32     // Draw a 100x100 square
33     glBegin(GL_POLYGON);
34     glVertex2i(-50, -50);
```

```

35     glVertex2i(-50, 50);
36     glVertex2i(50, 50);
37     glVertex2i(50, -50);
38     glEnd();
39     glPopMatrix();
40     glFlush();
41 }
42
43 // This function will be called on every key stroke
44 void keyboard(unsigned char ch, int x, int y)
45 {
46     if(ch == 'w')
47         v += 10;
48     else if(ch == 's')
49         v -= 10;
50     else if(ch == 'd')
51         h += 10;
52     else if(ch == 'a')
53         h -= 10;
54     else if(ch == 'i')
55         width *= 2;
56     else if(ch == 'o')
57         width /= 2;
58     else if(ch == 'j')
59         height *= 2;
60     else if(ch == 'k')
61         height /= 2;
62     else if(ch == 'r')
63         ceta += 5;
64     else if(ch == 'e')
65         ceta -= 5;
66     else if(ch == 'q')
67         exit(0);
68     myDisplay();           // ← remember to call the display function
69 }
70
71 int main(int argc, char **argv)
72 {
73     glutInit(&argc, argv);
74     glutInitDisplayMode(GLUT_SINGLE | GLUT_RGB);
75     glutInitWindowSize(600, 600);
76     glutInitWindowPosition(50, 50);
77     glutCreateWindow("OpenGL Template");
78     myStyleInit();
79     glutDisplayFunc(myDisplay);
80     glutKeyboardFunc(keyboard); // ← call keyboard() on every key stroke
81     glutMainLoop();
82     return 0;
83 }

```

Java

Listing 2: Template.java

```

1  import javax.swing.*;
2  import javax.media.opengl.*;
3  import com.sun.opengl.util.Animator;
4  import java.awt.event.*;
5
6  public class Template extends JFrame implements GLEventListener, KeyListener{
7      private int moveX = 0, moveY = 0;
8      private int ceta = 0;
9      private float width=1.0f, height=1.0f;
10     public static void main(String[] args){
11         Template window = new Template();

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12     window.setVisible(true);
13 }
14 public Template(){
15     setSize(600, 600);
16     setTitle("OpenGL Template");
17     setDefaultCloseOperation(EXIT_ON_CLOSE);
18     GLCanvas canvas = new GLCanvas(new GLCapabilities());
19     canvas.addGLEventListener(this);
20     canvas.addKeyListener(this);
21     getContentPane().add(canvas);
22     Animator animator = new Animator(canvas);
23     animator.start();
24 }
25 // Called by the drawable immediately after the OpenGL context is initialized
26 public void init(GLAutoDrawable drawable){
27     GL gl = drawable.getGL();
28     gl.glClearColor(1.0f, 1.0f, 1.0f, 0.0f);
29     gl.glMatrixMode(gl.GL_PROJECTION);
30     gl.glLoadIdentity();
31     gl.glOrtho(-250, 250, -250, 250, 0, -1);
32     gl.glMatrixMode(gl.GL_MODELVIEW);
33     gl.glLoadIdentity();
34 }
35 // Called by the drawable to initiate OpenGL rendering by the client
36 public void display(GLAutoDrawable drawable){
37     GL gl = drawable.getGL();
38     gl.glClear(GL.GL_COLOR_BUFFER_BIT | GL.GL_DEPTH_BUFFER_BIT);
39
40     gl.glPushMatrix();
41     gl.glColor3f(1.0f, 0.0f, 0.0f);
42     gl.glTranslatef(moveX, moveY, 0); // ← Try to shuffle them!!!
43     gl.glScalef(width, height, 1);
44     gl.glRotatef(ceta, 0, 0, 1);
45     // Draw a 100x100 square
46     gl.glBegin(gl.GL_POLYGON);
47         gl.glVertex2i(-50, -50);
48         gl.glVertex2i(-50, 50);
49         gl.glVertex2i(50, 50);
50         gl.glVertex2i(50, -50);
51     gl.glEnd();
52     gl.glPopMatrix();
53     gl.glFlush();
54 }
55 // Called by the drawable during the first repaint after the component has been resized
56 public void reshape(GLAutoDrawable drawable, int x, int y, int w, int h){
57 }
58 // Called by the drawable when the display mode or the display device associated with ←
59 // the GLAutoDrawable has changed
60 public void displayChanged(GLAutoDrawable drawable, boolean modeChanged, boolean ←
61 // deviceChanged){
62 }
63 public void keyPressed(KeyEvent e){
64 }
65 public void keyReleased(KeyEvent e){
66 }
67 public void keyTyped(KeyEvent e){
68     char key = e.getKeyChar();
69     if(key == 'w')
70         moveY += 10;
71     else if(key == 's')
72         moveY -= 10;
73     else if(key == 'd')
74         moveX += 10;
75     else if(key == 'a')
76         moveX -= 10;
77     else if(key == 'i')
78         width *= 2;
79     else if(key == 'o')
80         width /= 2;
81     else if(key == 'j')

```

```
80     height *= 2;
81     else if(key == 'k')
82         height /= 2;
83     else if(key == 'r')
84         ceta += 5;
85     else if(key == 'e')
86         ceta -= 5;
87     else if(key == 'q')
88         System.exit(0);
89     }
90 }
```