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Assignment 14.

class - SE IV
Batch - F4

Roll NO - 21430
DOS :

Title - Animation Using c++.

Problem statement :-
Write a c++ program to control a ball using a arrow keys. Apply the concept of polymorphism.

Learning Objectives :-
To learn scaling polygon fill algorithm

Theory :-

OpenGL functions to be used in this program.

i) glutInit(&argc, argv)
glutInit will initialize the GLUT library and negotiate a session with the window system.

ii) GLUT InitDisplayMode (unsigned int mode)

mode - Display mode, normally, the bitwise ORing of GLUT display mode bit masks.

GLUT_SINGLE - Bit mask of select single buffered window.

GLUT_PUBLIC - to select double buffered window.

The initial display mode is used when creating top level windows subwindows and avenays to determine the openGL display mode for the to-be-created window or overlay.

3. glut_Init_windowposition(int x, int y)
   x - window x location in pixels.
   y - window y location in pixels

The input of initial window position values is to provide a suggestion to the window system for a windows initial size and position.

4. glutInitwindow size (int width, int height)
   width - width in pixels
   height - height in pixels.

To initialize window size with specific desired width and height.

5. glut Idle function (void (*func)(void))

   func - new idle call back function.

glutIdle function sets the global Idle call back to be func so a GLUT program can perform background processing tasks or continuous animation when

window system events are not being received
If enabled the idle callback is continuously called when events are not being received

* Algorithm / Pseudocode :-

```
Declare pas_y = 0, s_x = 0.0001
Declare tx = 0.0, ty = 0.0, tz = 0.0
Declare ball_x = -1.0 to 0.05, ball_y = 0.1, ball_z = 0
Declare flag = true

procedure Update Ball (float i)

    if (flag)
        if (ball_x > 1 - 0.05)
            flag = !flag
        else
            ball_x = ball_x + s_x
    end if
    else
        if (ball_x < -1 to 0.005)
            flag = ! flag
        else
            ball_x = ball_x - s_x
    end else

    ball_y = i - 0.1
end procedure
```

```
procedure mod (float i)
    return i>=0 ? i : -1;
end procedure.

procedure display()
    glclear (GL_COLOR_BUFFER_BIT)
    glclearcolor (0,0,0,0)

    glBegin (GL_POLYGON)
    glcolor (GL_POLYGON)
    glcolorf (1,4,4)
    glvertex2f (-1.0, 0.15)
    glvertex2f (-1.0, -0.175)
    glvertex2f (+1.0, -0.175)
    glvertex2f (1.0, -0.15)
    glEND()

    glpushMatrix()
    glcolor (1,0,0)
    glTransleft (ball_x, ball_y, ball_z)
    glutsolidsphere (0.05, 100, 100)
    glpopmatrix()

    updateBall (mood (sin (pos_y * 3.1416/ 180)))
    pos_y = pos_y + 0.02

    glutswapBuffers()
end procedure
```

procedure main(int argc, char **argv)

glutInit (&argc, argv)
glutInitDisplayMode (GLUT_DOUBLE | GLUT_RGB)
glutInitWindowposition (300, 0)
glutInitWindowsize (600, 600)
glutCreateWindow("Bouncing Ball")
glutDisplayfunc(display)
glutIdlefunc(display)
glutMainLoop()

end procedure

* Conclusion-
We learnt to implement the function of openGL and using this function we implemented simple animations on different types of objects and also use of polymorphism.

```
6
7   #include<GL/glut.h>
8   #include <Math.h>
9   #include<iostream>
10  using namespace std;
11  #define PI 3.14159265f
12
13  float xr = 0, yr = 0, zr = 0;
14  GLfloat ballRadius = 0.1f;
15
16
17  void display()
18  {
19      glClear(GL_COLOR_BUFFER_BIT);  // Clear the color buffer
20      glMatrixMode(GL_MODELVIEW);    // To operate on the model-view matrix
21      glLoadIdentity();              // Reset model-view matrix
22
23      glTranslatef(xr, yr, 0.0f);  // Translate to (xPos, yPos)
24      // Use triangular segments to form a circle
25      glBegin(GL_TRIANGLE_FAN);
26      glColor3f(1.0f, 0.0f, 0.0f);  // Blue
27      glVertex2f(0.0f, 0.0f);       // Center of circle
28      int numSegments = 100;
29      GLfloat angle;
30      for (int i = 0; i <= numSegments; i++)
31      { // Last vertex same as first vertex
32          angle = i * 2.0f * PI / numSegments;  // 360 deg for all segments
33          glVertex2f(cos(angle) * ballRadius, sin(angle) * ballRadius);
34      }
35      glEnd();
36
37      glFlush();
38      glutPostRedisplay();
39      glutSwapBuffers();
40  }
41
```

```
40  }
41
42
43  void specialkey(int key, int x, int y)
44  {
45      switch (key)
46      {
47      case GLUT_KEY_UP:
48          yr += 0.1;
49          glutPostRedisplay();
50          break;
51      case GLUT_KEY_DOWN:
52          yr -= 0.1;
53          glutPostRedisplay();
54          break;
55      case GLUT_KEY_LEFT:
56          xr -= 0.1;
57          glutPostRedisplay();
58          break;
59      case GLUT_KEY_RIGHT:
60          xr += 0.1;
61          glutPostRedisplay();
62          break;
63      }
64  }
65
66
67  int main(int argc, char** argv)
68  {
69      cout << "Use array keys to move object";
70
71      glutInit(&argc, argv);
72      glutInitDisplayMode(GL_DOUBLE | GLUT_RGB);
73      glutInitWindowSize(500, 500);
74      glutInitWindowPosition(250, 50);
75      glutCreateWindow("Moving object using arrow keys");
```

Report ...

```
52          yr -= 0.1;
53          glutPostRedisplay();
54          break;
55      case GLUT_KEY_LEFT:
56          xr -= 0.1;
57          glutPostRedisplay();
58          break;
59      case GLUT_KEY_RIGHT:
60          xr += 0.1;
61          glutPostRedisplay();
62          break;
63      }
64  }
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67  int main(int argc, char** argv)
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72      glutInitDisplayMode(GL_DOUBLE | GLUT_RGB);
73      glutInitWindowSize(500, 500);
74      glutInitWindowPosition(250, 50);
75      glutCreateWindow("Moving object using arrow keys");
76
77      glutDisplayFunc(display);
78
79      glClearColor(0, 0, 0, 0);
80      gluOrtho2D(0.0, 400, 0.0, 400);
81      glutSpecialFunc(specialkey);
82
83      glutMainLoop();
84
85      return 0;
86  }
```
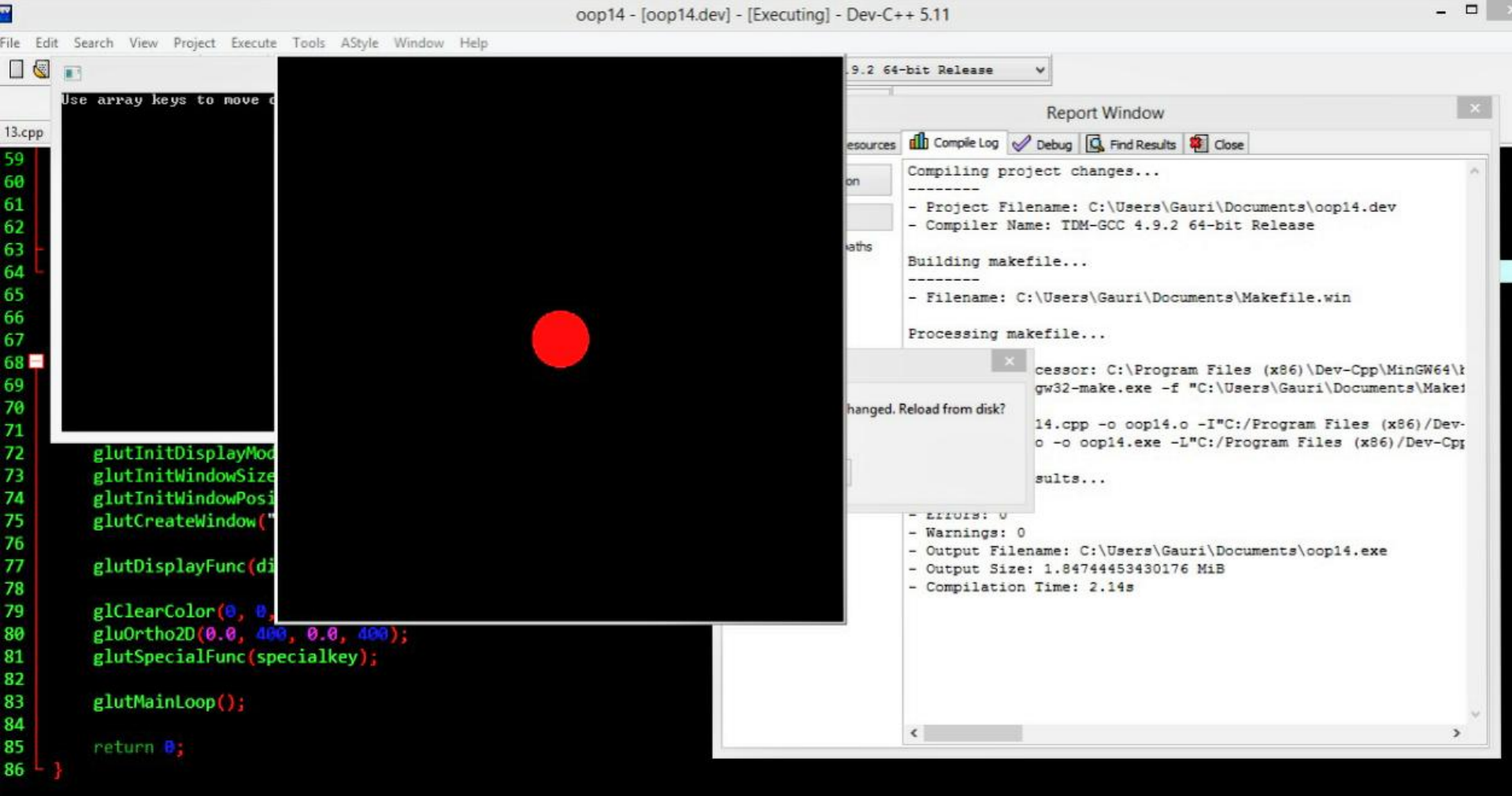

Report ...


oop14 - [oop14.dev] - [Executing] - Dev-C++ 5.11
File Edit Search View Project Execute Tools AStyle Window Help
Use array keys to move
13.cpp
Report Window
Compile Log
Debug
Find Results
Close
Compiling project changes...
- Project Filename: C:\Users\Gauri\Documents\oop14.dev
- Compiler Name: TDM-GCC 4.9.2 64-bit Release
Building makefile...
- Filename: C:\Users\Gauri\Documents\Makefile.win
Processing makefile...
hanged. Reload from disk?
- Warnings: 0
- Output Filename: C:\Users\Gauri\Documents\oop14.exe
- Output Size: 1.84744453430176 MiB
- Compilation Time: 2.14s
glutInitDisplayMod
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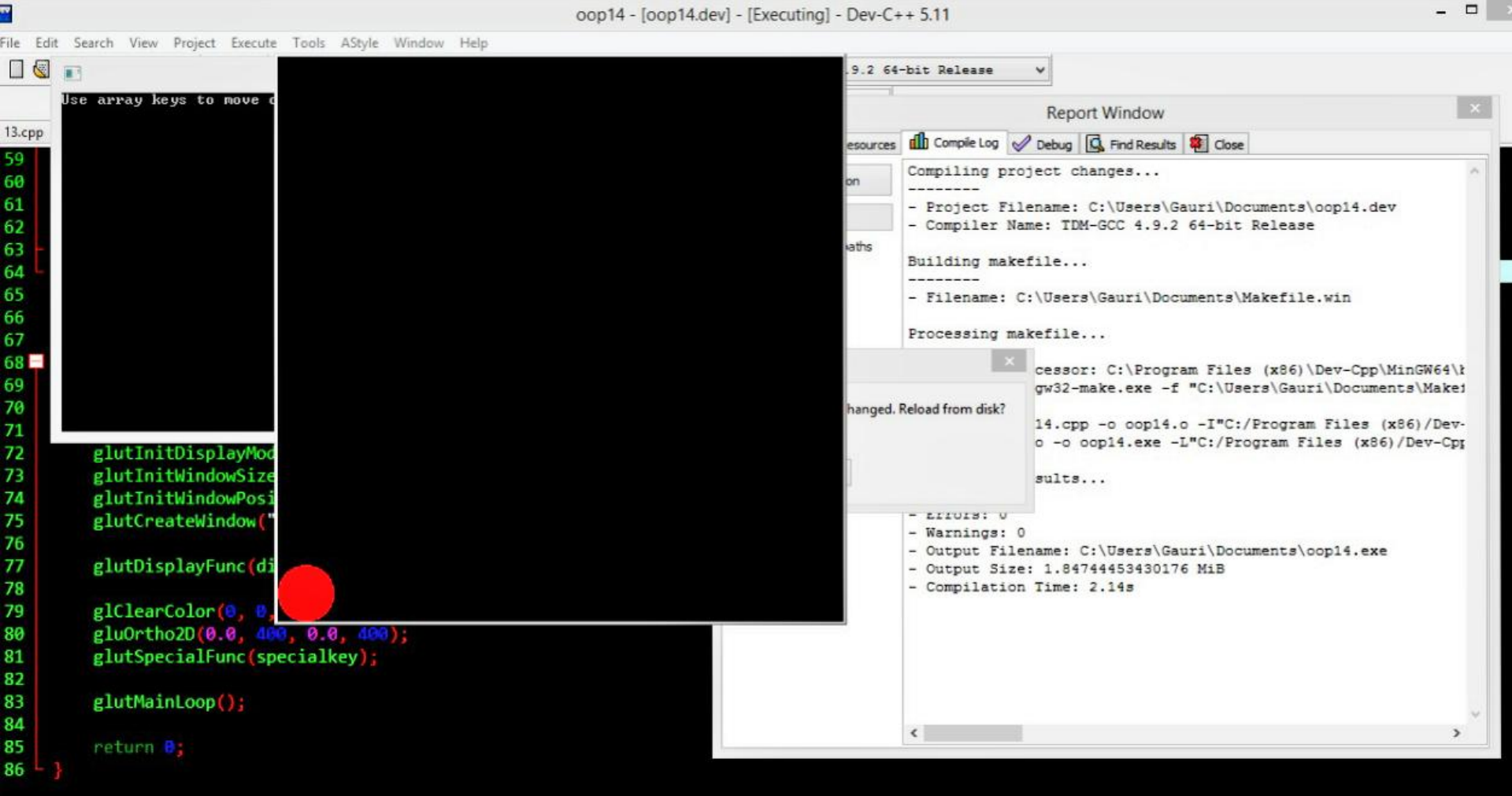
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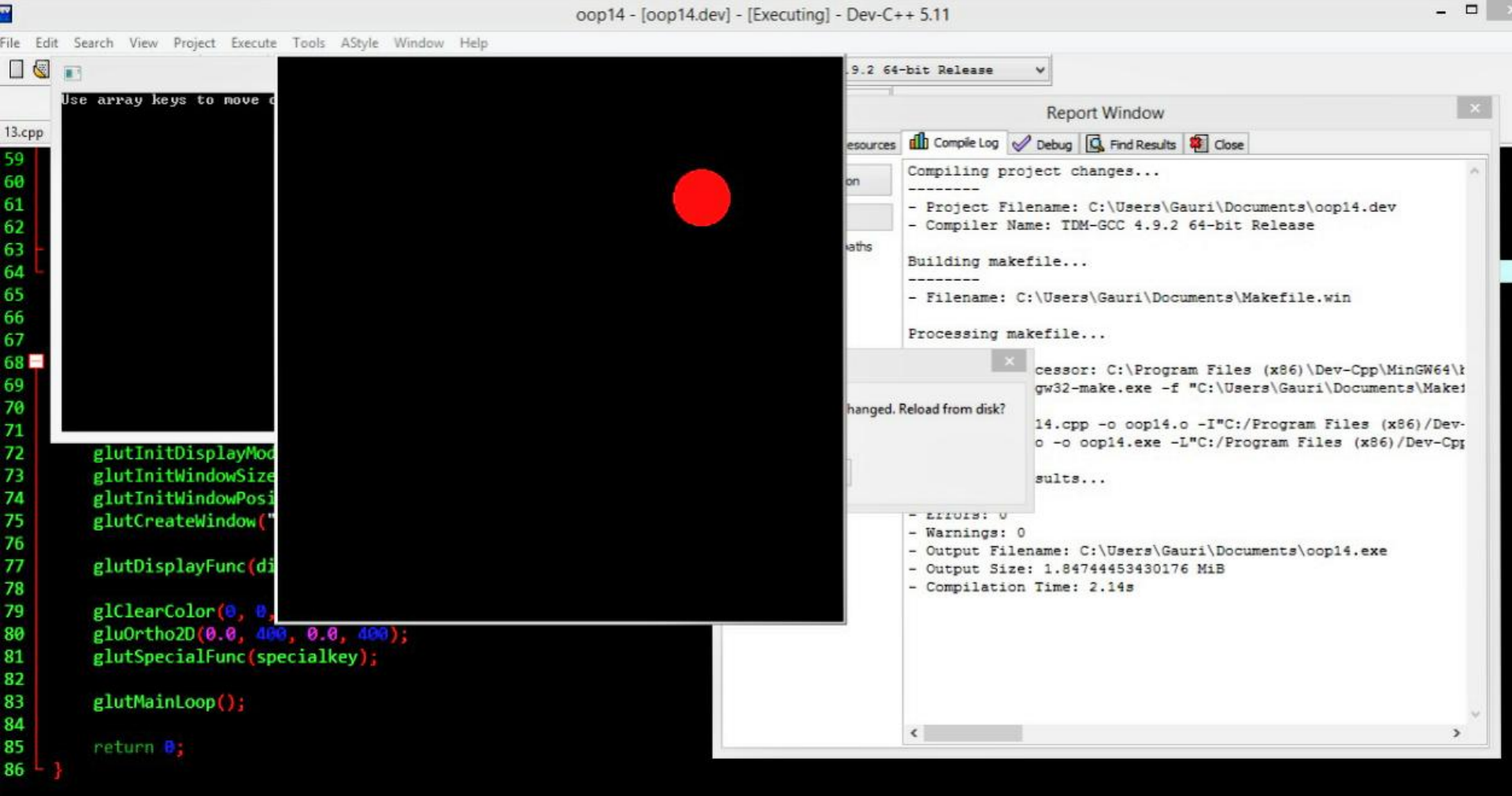
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