



CSE 423

Lab Assignment 2

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SEC: 05

Task 1

CODE:

```
from OpenGL.GL import *
from OpenGL.GLUT import *
from OpenGL.GLU import *

#Eight Ways Symmetry
def find_zone(x1, y1, x2, y2):
    dx = x2 - x1
    dy = y2 - y1
    if dx > 0 and dy > 0 and abs(dx)>abs(dy):
        return 0
    elif dx > 0 and dy > 0 and abs(dy) > abs(dx):
        return 1
    elif dx < 0 and dy > 0 and abs(dy) > abs(dx):
        return 2
    elif dx < 0 and dy > 0 and abs(dx) > abs(dy):
        return 3
    elif dx < 0 and dy < 0 and abs(dx) > abs(dy):
        return 4
    elif dx < 0 and dy < 0 and abs(dy) > abs(dx):
        return 5
    elif dx > 0 and dy < 0 and abs(dy) > abs(dx):
        return 6
    elif dx > 0 and dy < 0 and abs(dx) > abs(dy):
        return 7
```

#Zone Convert to Zone 0

def convert_zone(X, Y, zone):

if zone == None:

x=X

y=Y

if zone==0:

x = X

y = Y

if zone==1:

x = Y

y = X

elif zone==2:

x = Y

y = -X

elif zone==3:

x = -X

y = Y

elif zone==4:

x = -X

y = -Y

elif zone==5:

x = -Y

y = -X

elif zone==6:

x = -Y

y = X

```
elif zone==7:
```

```
    x = X
```

```
    y = -Y
```

```
return x, y
```

#Midpoint Line Drawing Algorithms

```
def midpointLine(x1, y1, x2, y2):
```

```
    glPointSize(4) #pixel size. by default 1 thake
```

```
    glBegin(GL_POINTS)
```

```
    dy = y2-y1
```

```
    dx = x2-x1
```

```
    zone = find_zone(x1, y1, x2, y2)
```

```
    x = x1
```

```
    y = y1
```

```
    x3, y3 = convert_zone(x, y, zone=zone)
```

```
    glVertex2f(x3, y3)
```

```
    if abs(dx)>=abs(dy):
```

```
        d = 2*dy - dx
```

```
        E = 2 * dy
```

```
        NE = 2*(dy-dx)
```

```
        while (x < x2):
```

```
            if d > 0:
```

```
                d = d + NE
```

```
                x += 1
```

```
                y += 1
```

```
            else:
```

```
                d = d + E
```

```

        x += 1
        x3, y3 = convert_zone(x, y, zone=zone)
        glVertex2f(x3, y3)
    else:
        d = 2*dx - dy
        E = 2 * dx
        NE = 2*(dx-dy)
        while (y < y2):
            if d > 0:
                d = d + NE
                x += 1
                y += 1
            else:
                d = d + E
                y += 1
            x3, y3 = convert_zone(x, y, zone=zone)
            glVertex2f(x3, y3)
    glEnd()

```

```

def letters(inputs, a=150, b=300, c=10, d=100, e=200):

```

```

    if inputs == "0":
        midpointLine(a, c, b, c)
        midpointLine(a, c, a, e)
        midpointLine(b, c, b, e)
        midpointLine(a, e, b, e)
    if inputs == "1":
        midpointLine(a, c, a, e)

```

if inputs == "2":

midpointLine(a, c, b, c)

midpointLine(a, c, a, d)

midpointLine(a, d, b, d)

midpointLine(b, d, b, e)

midpointLine(a, e, b, e)

if inputs == "3":

midpointLine(a, c, b, c)

midpointLine(b, c, b, d)

midpointLine(a, d, b, d)

midpointLine(b, d, b, e)

midpointLine(a, e, b, e)

if inputs == "4":

midpointLine(a, d, a, e)

midpointLine(b, c, b, d)

midpointLine(a, d, b, d)

midpointLine(b, d, b, e)

if inputs == "5":

midpointLine(a, c, b, c)

midpointLine(a, d, a, e)

midpointLine(b, c, b, d)

midpointLine(a, d, b, d)

midpointLine(a, e, b, e)

if inputs == "6":

midpointLine(a, c, b, c)

midpointLine(a, c, a, d)

midpointLine(a, d, a, e)

```
    midpointLine(b, c, b, d)
    midpointLine(a, d, b, d)
    midpointLine(a, e, b, e)
```

```
if inputs == "7":
```

```
    midpointLine(b, c, b, e)
    midpointLine(a, e, b, e)
```

```
if inputs == "8":
```

```
    midpointLine(a, c, b, c)
    midpointLine(a, c, a, d)
    midpointLine(a, d, a, e)
    midpointLine(b, c, b, d)
    midpointLine(a, d, b, d)
    midpointLine(b, d, b, e)
    midpointLine(a, e, b, e)
```

```
if inputs == "9":
```

```
    midpointLine(a, c, b, c)
    midpointLine(a, d, a, e)
    midpointLine(b, c, b, d)
    midpointLine(a, d, b, d)
    midpointLine(b, d, b, e)
    midpointLine(a, e, b, e)
```

```
def draw_points(a, b):
```

```
    glPointSize(4) #pixel size. by default 1 thake
    glBegin(GL_POINTS)
    glVertex2f(a, b)
    glEnd()
```

```
def iterate():
```

```
    glViewport(0, 0, 500, 500)
```

```
    glMatrixMode(GL_PROJECTION)
```

```
    glLoadIdentity()
```

```
    glOrtho(0.0, 500, 0.0, 500, 0.0, 1.0)
```

```
    glMatrixMode (GL_MODELVIEW)
```

```
    glLoadIdentity()
```

```
def showScreen():
```

```
    glClear(GL_COLOR_BUFFER_BIT | GL_DEPTH_BUFFER_BIT)
```

```
    glLoadIdentity()
```

```
    iterate()
```

```
    glColor3f(0.0, 1.0, 0.0) #konokichur color set (RGB)
```

```
    a = 70
```

```
    b= a+150
```

```
    c=100
```

```
    d=250
```

```
    e=400
```

```
    letters(inputs[-2], a=a, b=b, c=c, d=d, e=e)
```

```
    a = b + 40
```

```
    b = a + 150
```

```
    letters(inputs[-1], a=a, b=b, c=c, d=d, e=e)
```

```
    glutSwapBuffers()
```

```
glutInit()
```

```
glutInitDisplayMode(GLUT_RGBA)
```



```
glutInitWindowSize(500, 500) #window size
```

```
glutInitWindowPosition(0, 0)
```

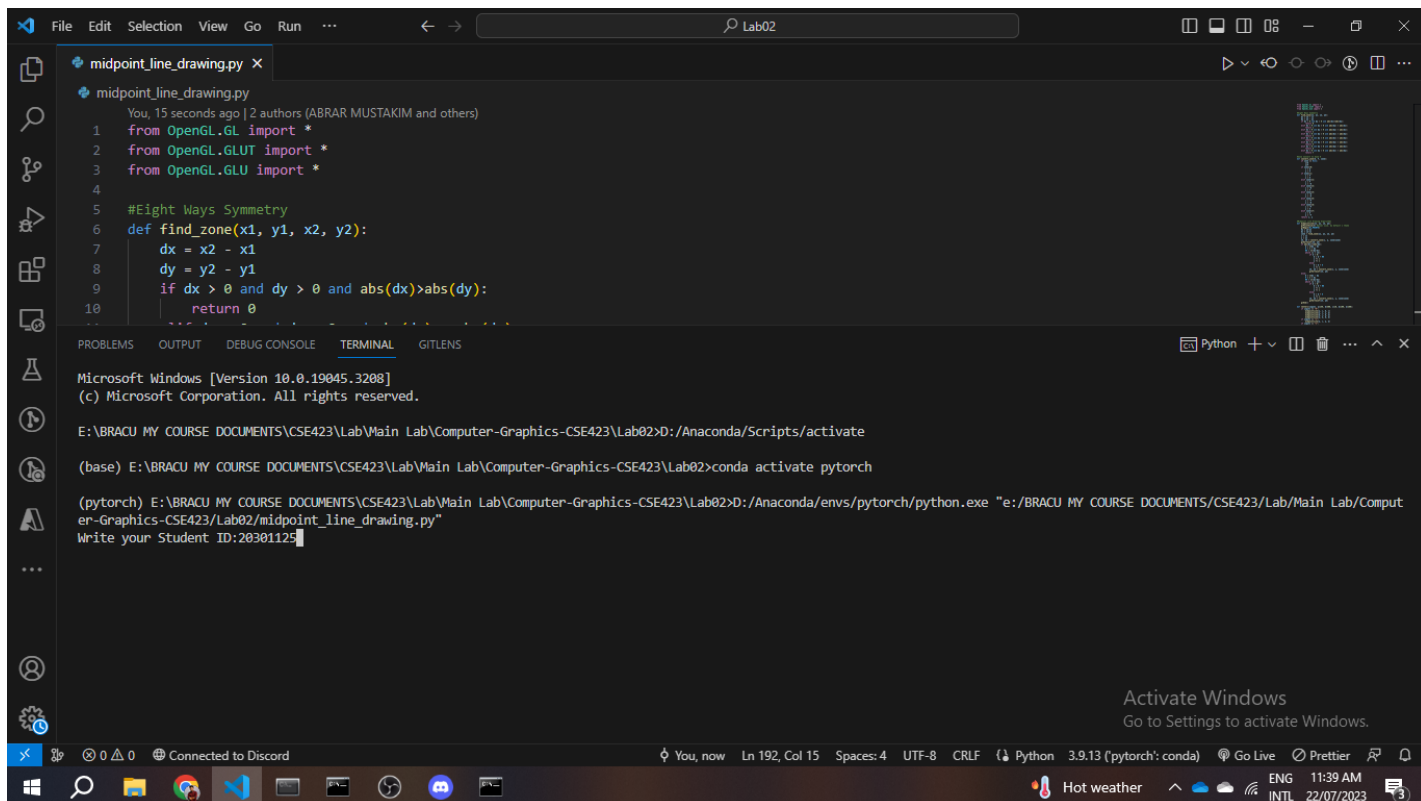
```
inputs=input("Write your Student ID:")
```

```
wind = glutCreateWindow(f"Student ID: {inputs}. Let's draw: {inputs[-2]}{inputs[-1]}") #window name
```

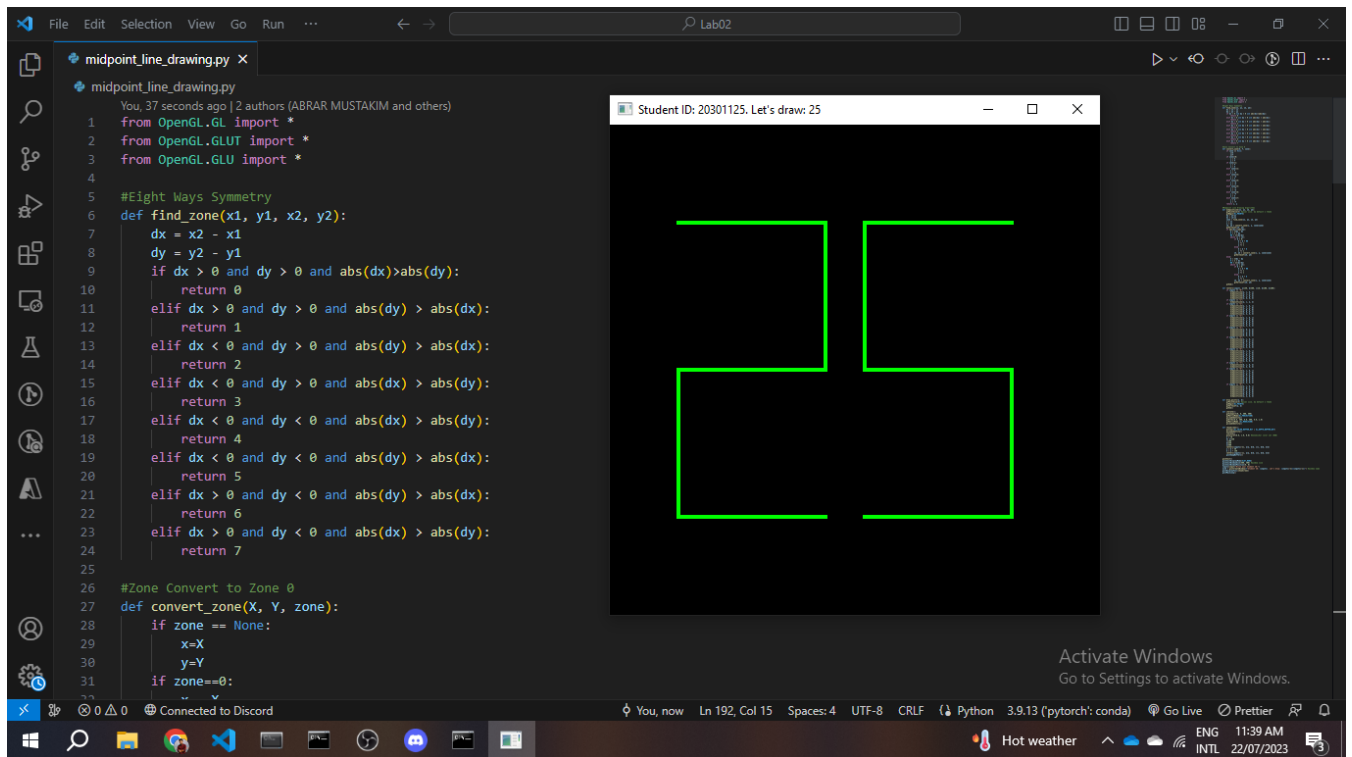
```
glutDisplayFunc(showScreen)
```

```
glutMainLoop()
```

ScreenSHOT



```
File Edit Selection View Go Run ... Lab02
midpoint_line_drawing.py x
midpoint_line_drawing.py
You, 15 seconds ago | 2 authors (ABRAR MUSTAKIM and others)
1 from OpenGL.GL import *
2 from OpenGL.GLUT import *
3 from OpenGL.GLU import *
4
5 #Eight Ways Symmetry
6 def find_zone(x1, y1, x2, y2):
7     dx = x2 - x1
8     dy = y2 - y1
9     if dx > 0 and dy > 0 and abs(dx)>abs(dy):
10         return 0
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