আন্তর্জাতিক ইসলামী বিশ্ববিদ্যালয় চট্টগ্রাম

الجامعة الإسلامية العالمية شيتاغونغ

International Islamic University Chittagong

Department of Computer Science & Engineering(CSE)

Lab -08

Name : Jabed Iqbal Joy

Student ID : C193049

Semester : 7th

Section : 7BM

Email : c193049@ugrad.iiuc.ac.bd

Contact : 01837844828

Course Code : CSE-4742

Course Title : Computer Graphics Lab

Name of the course Teacher :

Mahadi Hassan

Assistant Professor

Department of CSE, IIUC

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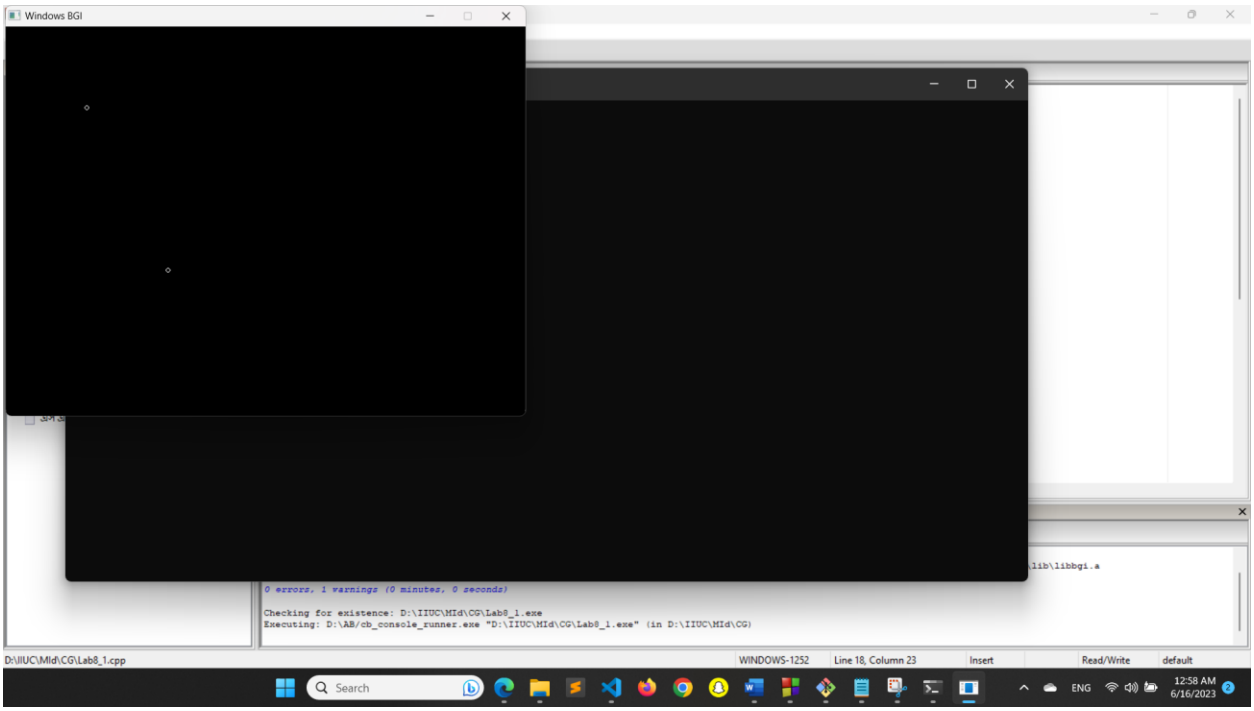
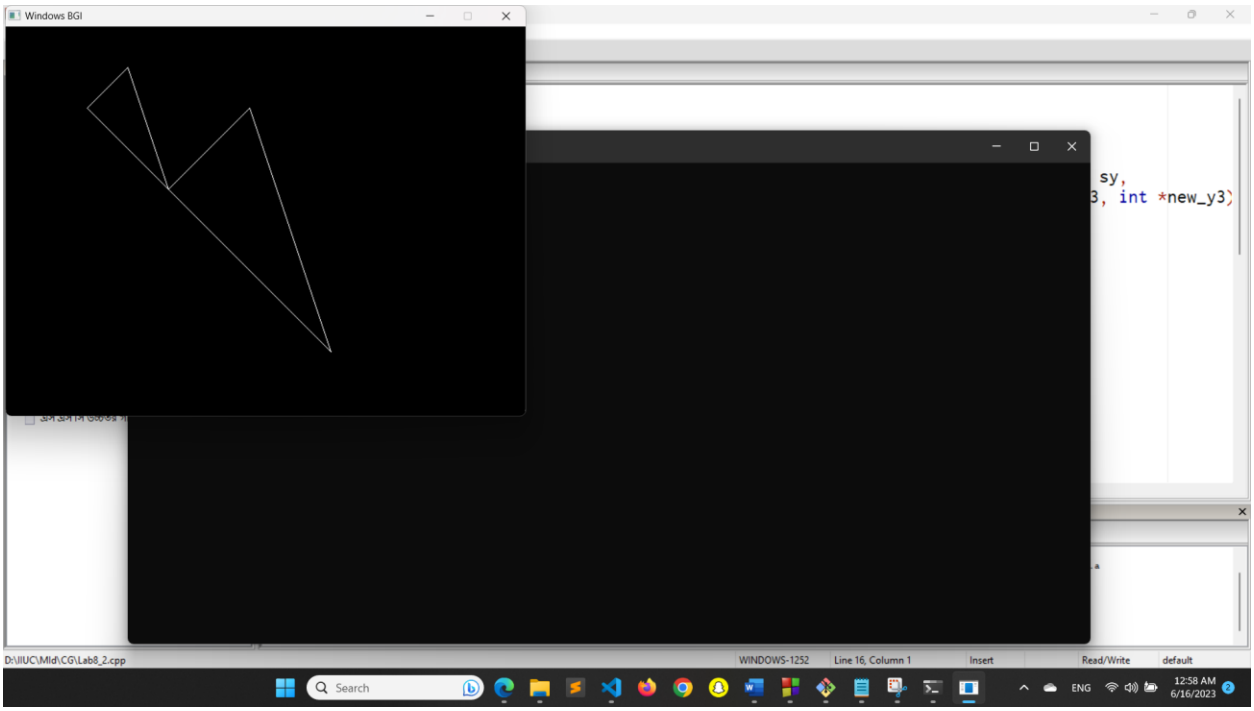
1. Scaling a point about origin.
   Code:
```
#include <graphics.h>
#include <stdlib.h>

void scale_point(int x1, int y1, float sx, float sy, int *new_x, int *new_y)
{
   // Scale point
   *new_x = x1 * sx;
   *new_y = y1 * sy;
}

int main()
{
   int gd = DETECT, gm;
   initgraph(&gd, &gm, "");

   // Original point
   int x1 = 100, y1 = 100;
   circle(x1, y1, 3);

   // Scaling factors
   float sx = 2.0, sy = 3.0;

   // Scale point
   int new_x, new_y;
   scale_point(x1, y1, sx, sy, &new_x, &new_y);

   // Display scaled point
   circle(new_x, new_y, 3);

   getch();
   closegraph();

   return 0;
}
```



2. Scaling a triangle about origin.
   Code:

```
#include <graphics.h>
#include <stdlib.h>

void scale_triangle(int x1, int y1, int x2, int y2, int x3, int y3, float sx, float
sy,
                    int *new_x1, int *new_y1, int *new_x2, int *new_y2, int
*new_x3, int *new_y3)
{
   // Scale points
   *new_x1 = x1 * sx;
   *new_y1 = y1 * sy;
   *new_x2 = x2 * sx;
   *new_y2 = y2 * sy;
   *new_x3 = x3 * sx;
   *new_y3 = y3 * sy;
}
```

```
int main()
{
   int gd = DETECT, gm;
   initgraph(&gd, &gm, "");

   // Original triangle
   int x1 = 100, y1 = 100, x2 = 200, y2 = 200, x3 = 150, y3 = 50;
   line(x1, y1, x2, y2);
   line(x2, y2, x3, y3);
   line(x3, y3, x1, y1);

   // Scaling factors
   float sx = 2.0, sy = 2.0;

   // Scale triangle
   int new_x1, new_y1, new_x2, new_y2, new_x3, new_y3;
   scale_triangle(x1, y1, x2, y2, x3, y3, sx, sy, &new_x1, &new_y1, &new_x2,
&new_y2, &new_x3, &new_y3);

   // Display scaled triangle
   line(new_x1, new_y1, new_x2, new_y2);
   line(new_x2, new_y2, new_x3, new_y3);
   line(new_x3, new_y3, new_x1, new_y1);
   getch();
   closegraph();
   return 0;
}
```



3. Scaling a triangle about another point.

Code:

```
#include <graphics.h>
#include <stdlib.h>

void scale_triangle(int x1, int y1, int x2, int y2, int x3, int y3, int cx, int cy,
float sx, float sy,
                int *new_x1, int *new_y1, int *new_x2, int *new_y2, int
*new_x3, int *new_y3)
{
   // Translate points
   x1 -= cx;
   y1 -= cy;
   x2 -= cx;
   y2 -= cy;
   x3 -= cx;
   y3 -= cy;

   // Scale points
   x1 *= sx;
```

```
    y1 *= sy;
    x2 *= sx;
    y2 *= sy;
    x3 *= sx;
    y3 *= sy;

    // Translate points back to original position
    x1 += cx;
    y1 += cy;
    x2 += cx;
    y2 += cy;
    x3 += cx;
    y3 += cy;

    *new_x1 = x1;
    *new_y1 = y1;
    *new_x2 = x2;
    *new_y2 = y2;
    *new_x3 = x3;
    *new_y3 = y3;
}

int main()
{
    int gd = DETECT, gm;
    initgraph(&gd, &gm, "");

    // Original triangle
    int x1 = 100, y1 = 100, x2 = 200, y2 = 200, x3 = 150, y3 = 50;
    line(x1, y1, x2, y2);
    line(x2, y2, x3, y3);
    line(x3, y3, x1, y1);

    // Point to scale around
    int cx = 150, cy = 150;
```

```
    circle(cx, cy, 3);

    // Scaling factors
    float sx = 2.0, sy = 3.0;

    // Scale triangle
    int new_x1, new_y1, new_x2, new_y2, new_x3, new_y3;
    scale_triangle(x1, y1, x2, y2, x3, y3, cx, cy, sx, sy, &new_x1, &new_y1,
&new_x2, &new_y2, &new_x3, &new_y3);

    // Display scaled triangle
    line(new_x1, new_y1, new_x2, new_y2);
    line(new_x2, new_y2, new_x3, new_y3);
    line(new_x3, new_y3, new_x1, new_y1);

    getch();
    closegraph();

    return 0;
}
```