Experiment no : 01

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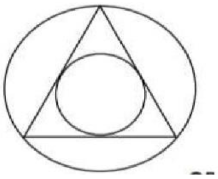
Problem Statement :

Write a C++ program to draw the following pattern. Use DDA line and Bresenham's circle algorithm. Apply the concept of encapsulation.



Code :

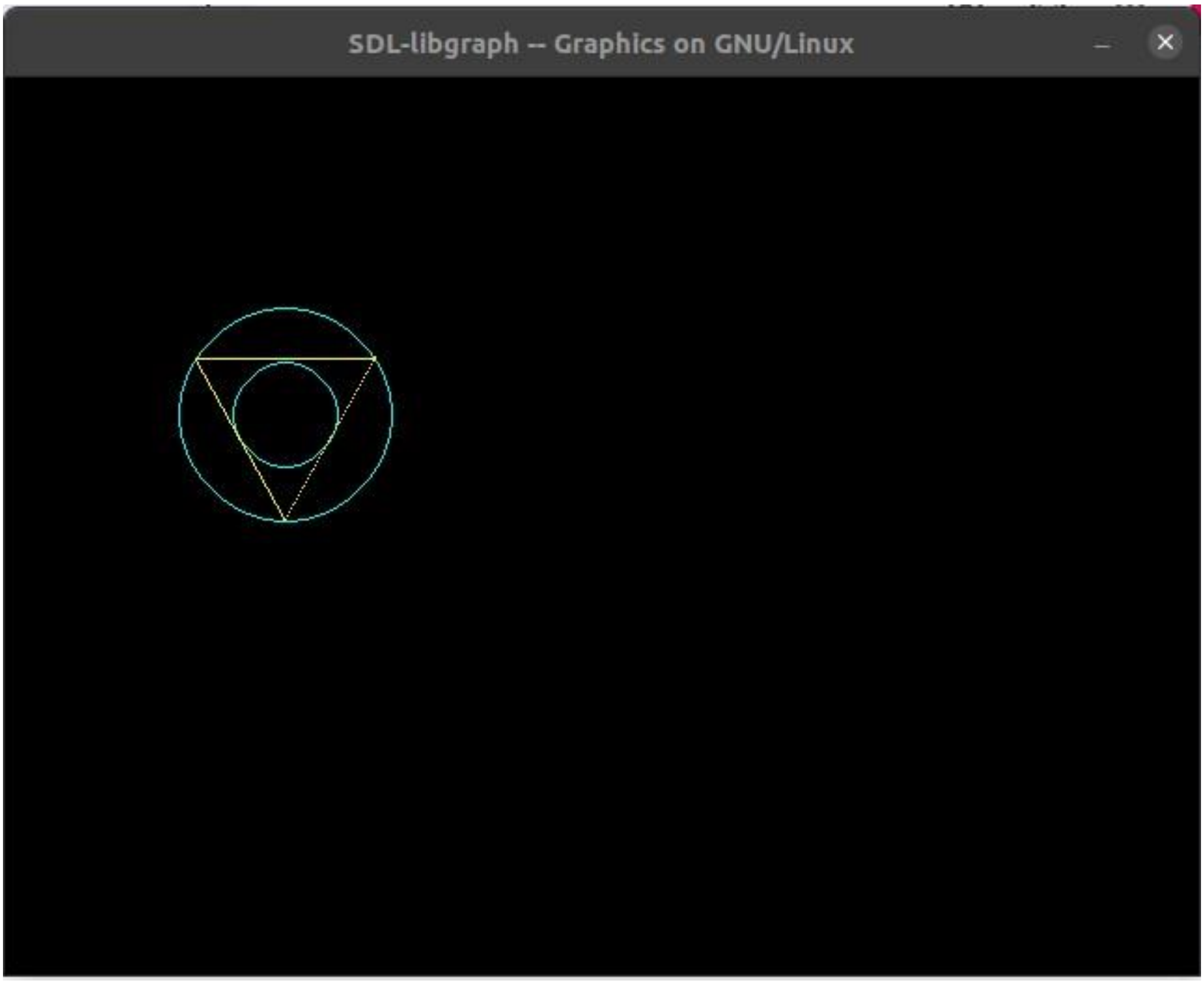
```
#include<iostream>

#include<graphics.h>

using namespace std;

class Shape {

protected:  int x, y;

public:

 Shape(int x = 0, int y = 0) : x(x), y(y) {}

virtual void draw() = 0;

};

class Line : public Shape { private:

 int x1, y1, x2, y2; public:

 Line(int x1, int y1, int x2, int y2) : Shape((x1 + x2) / 2, (y1 + y2) / 2),

x1(x1), y1(y1), x2(x2), y2(y2) {}  void draw() {  int dx = x2 - x1;
```

```
 int dy = y2 - y1;  int steps = dx
> dy ? dx : dy;  float xInc = dx
/ (float)steps;  float yInc = dy /
(float)steps;  float x = x1;  float
y = y1;  for (int i = 0; i <=
steps; i++) {  putpixel(x, y,
14);  x += xInc;  y += yInc;
 }
 } };
class Circle : public Shape {
private:  float radius;
public:
 Circle(int x, int y, float radius) : Shape(x, y), radius(radius) {}
void draw() {  float x = 0, y = radius;  float d = 3 - 2 * radius;
display(x, y);  while (y >= x) {  x++;  if (d > 0) {  y--;  d = d +
4 * (x - y) + 10;
 } else {  d = d +
4 * x + 6;
 }
 display(x, y);
 }  }  void display(int x, int y) {
putpixel(this->x + x, this->y + y, 3);
putpixel(this->x - x, this->y + y, 3);
putpixel(this->x + x, this->y - y, 3);
putpixel(this->x - x, this->y - y, 3);
putpixel(this->x + y, this->y + x, 3);
putpixel(this->x - y, this->y + x, 3);
putpixel(this->x + y, this->y - x, 3);
putpixel(this->x - y, this->y - x, 3);
 }
}; int main() {  int gd =
DETECT, gm;  initgraph(&gd,
&gm, NULL);
 float cx, cy, radius;     cout << "Enter the center coordinates (x y) for the
circumscribed circle: "<<endl;     cin >> cx >> cy;     cout << "Enter the radius for
the circumscribed circle: ";     cin >> radius;
    Circle circumscribedCircle(cx, cy, radius);

    cout << "Enter the center coordinates (x y) for the inscribed circle: "<<endl;
cin >> cx >> cy;     cout << "Enter the radius for the inscribed circle: ";     cin
>> radius;
    Circle inscribedCircle(cx, cy, radius);

    int x1, y1, x2, y2;     cout << "Enter the coordinates (x1 y1 x2 y2) for
the first line: "<<endl;     cin >> x1 >> y1 >> x2 >> y2;
    Line line1(x1, y1, x2, y2);

    cout << "Enter the coordinates (x1 y1 x2 y2) for the second line: "<<endl;
cin >> x1 >> y1 >> x2 >> y2;
    Line line2(x1, y1, x2, y2);

    cout << "Enter the coordinates (x1 y1 x2 y2) for the third line: "<<endl;
cin >> x1 >> y1 >> x2 >> y2;
    Line line3(x1, y1, x2, y2)
 circumscribedCircle.draw();
inscribedCircle.draw();
line1.draw();  line2.draw();
line3.draw();  getch();
closegraph();  return 0;
}
```

Output :

```
d-comp-pl-1L-15@dcompplt115-OptiPlex-3076:-/Downloads$ g++ Pattern.cpp-op-lgraph
d-comp-pl-11-15@dcomppli115-OptiPlex-3070:-/Downloads$ ./p
Enter the center coordinates (x y) for the circumscribed circle:
[xcb] Unknown sequence number while processing queue
[xcb] Most likely this is a multi-threaded client and XInitThreads has not been called
[xcb] Aborting, sorry about that.
p: ../../src/xcb_io.c:260: poll_for_event: Assertion Ixcb_xlib_threads_sequence_lost'
failed.
150
180
Enter the radius for the circumscribed circle: 57
Enter the center coordinates (x y) for the inscribed circle:
150
180
Enter the radius for the inscribed circle: 28.5
Enter the coordinates (x1 y1 x2 y2) for the first line:
102
150
198
150
Enter the coordinates (x1 y1 x2 y2) for the second line:
102
156
150
```

```
236
Enter the coordinates (x1 y1 x2 y2) for the third line:
150
236
198
150
```


SDL-libgraph -- Graphics on GNU/Linux