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Experiment B-9

Aim:

To write C++ program to generate fractal patterns by using Koch Curve

Algorithm:

1). Start.

2). Read the two end points of the line as x1,y1 & x2,y2 and the number of iterations as i (iteration – no. of times you want to repeat the Koch curve online).

3). Start first by drawing a line (in-built function or line drawing algorithm.

4). Divide the line drawn into three equal parts.

5). Erase the middle part of the three equal parts.

6). Now read the end point of the first line (first-section of the three equal parts) as x3,y3 and for the other line (other section) as x4,y4.

7). Now, draw and connect the two sides of the equilateral triangle with the middle section.

8). Repeat the steps considering each line as separate for i(iteration) times.

9). End.

Program:

```
#include<iostream>
#include<graphics.h>
#include<math.h>

using namespace std;

void koch(int x1, int y1, int x2, int y2, int it) {
    float angle = 60 * M_PI / 180;
    int x3 = (2 * x1 + x2) / 3;
    int y3 = (2 * y1 + y2) / 3;
    int x4 = (x1 + 2 * x2) / 3;
    int y4 = (y1 + 2 * y2) / 3;
    int x = x3 + (x4 - x3) * cos(angle) + (y4 - y3) * sin(angle);
    int y = y3 - (x4 - x3) * sin(angle) + (y4 - y3) * cos(angle);

    if (it > 0) {
        koch(x1, y1, x3, y3, it - 1);
        koch(x3, y3, x, y, it - 1);
        koch(x, y, x4, y4, it - 1);
        koch(x4, y4, x2, y2, it - 1);
    } else {
        line(x1, y1, x3, y3);
        line(x3, y3, x, y);
        line(x, y, x4, y4);
        line(x4, y4, x2, y2);
    }
}

int main(void) {
    int gd = DETECT, gm;
    initgraph( & gd, & gm,
        NULL);
    int x1, y1, x2, y2, i;
    cout << "Enter start and end points of line: -";
    cin >> x1 >> y1 >> x2 >> y2;
    cout << "Enter the number of iterations: -";
    cin >> i;
    koch(x1, y1, x2, y2, i);
    getch();
    return 0;
}
```

Output :

```
proxima@proxzima:~/Documents/Extras/CG/Practicals

~/Doc/E/C/Practicals
 g++ -g "/home/proxima/Documents/Extras/CG/Practicals/koch.cpp" -o "/home/proxima/Documents/Extras
/CG/Practicals/koch" -lgraph -lGL -lGLU -lglut && "/home/proxima/Documents/Extras/CG/Practicals/koch
"
Enter start and end points of line: -[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.
koch: ../../src/xcb_io.c:260: poll_for_event: Assertion `!xcb_xlib_threads_sequence_lost' failed.
0 300 500 300
Enter the number of iterations: -4

~/Doc/E/C/Practicals
```

SDL-libgraph -- Graphics on GNU/Linux