

## Practical No-05

Roll No:-65

### INPUT:

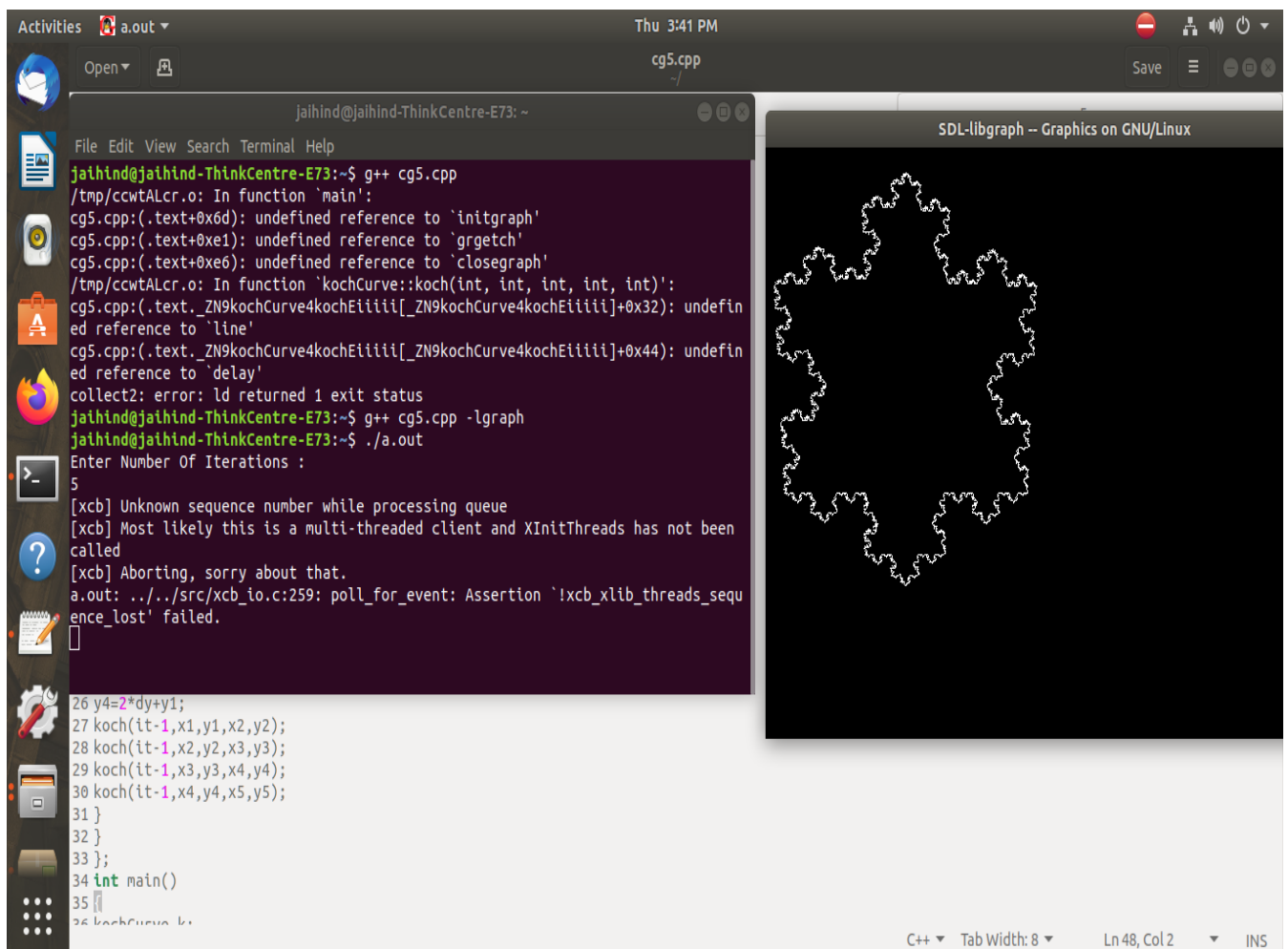
/\*Write c++ program to generate fractual pattern by using Koch curves.\*/

```
#include <iostream>
#include <math.h>
#include <graphics.h>
using namespace std;
class kochCurve
{
public:
void koch(int it,int x1,int y1,int x5,int y5)
{
int x2,y2,x3,y3,x4,y4;
int dx,dy;
if (it==0)
{
line(x1,y1,x5,y5);
}
else
{
delay(10);
dx=(x5-x1)/3;
dy=(y5-y1)/3;
x2=x1+dx;
y2=y1+dy;
x3=(int)(0.5*(x1+x5)+sqrt(3)*(y1-y5)/6);
y3=(int)(0.5*(y1+y5)+sqrt(3)*(x5-x1)/6);
x4=2*dx+x1;
y4=2*dy+y1;
koch(it-1,x1,y1,x2,y2);
koch(it-1,x2,y2,x3,y3);
```

```
    koch(it-1,x3,y3,x4,y4);
    koch(it-1,x4,y4,x5,y5);
}
}
};
int main()
{
    kochCurve k;
    int it;

    cout<<"Enter Number Of Iterations : "<<endl;
    cin>>it;
    int gd=DETECT,gm;
    initgraph(&gd,&gm,NULL);
    k.koch(it,150,20,20,280);
    k.koch(it,280,280,150,20);
    k.koch(it,20,280,280,280);
    getch();
    closegraph();
    return 0;
}
```

# OUTPUT:



The screenshot shows a Linux desktop environment. On the left is a vertical dock with icons for various applications. The main area contains two windows. The left window is a terminal titled 'jaihind@jaihind-ThinkCentre-E73: ~'. It shows the command 'g++ cg5.cpp' being executed, which results in several 'undefined reference' errors for symbols like 'initgraph', 'grgetch', 'closegraph', 'line', and 'delay'. The user then runs 'g++ cg5.cpp -lgraph', which succeeds. They then run './a.out', which prompts for the number of iterations (5) and then displays a fractal pattern. The right window is titled 'SDL-libgraph -- Graphics on GNU/Linux' and shows a black background with a white fractal pattern, which is a variation of the Koch curve.

```
Activities a.out Thu 3:41 PM cg5.cpp Save
jaihind@jaihind-ThinkCentre-E73: ~
File Edit View Search Terminal Help
jaihind@jaihind-ThinkCentre-E73:~$ g++ cg5.cpp
/tmp/ccwtALcr.o: In function `main':
cg5.cpp:(.text+0x6d): undefined reference to `initgraph'
cg5.cpp:(.text+0xe1): undefined reference to `grgetch'
cg5.cpp:(.text+0xe6): undefined reference to `closegraph'
/tmp/ccwtALcr.o: In function `kochCurve::koch(int, int, int, int, int)':
cg5.cpp:(.text._ZN9kochCurve4kochEiiii[_ZN9kochCurve4kochEiiii]+0x32): unde-
fined reference to `line'
cg5.cpp:(.text._ZN9kochCurve4kochEiiii[_ZN9kochCurve4kochEiiii]+0x44): unde-
fined reference to `delay'
collect2: error: ld returned 1 exit status
jaihind@jaihind-ThinkCentre-E73:~$ g++ cg5.cpp -lgraph
jaihind@jaihind-ThinkCentre-E73:~$ ./a.out
Enter Number Of Iterations :
5
[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.
a.out: ../../src/xcb_io.c:259: poll_for_event: Assertion `!xcb_xlib_threads_se-
quence_lost' failed.
26 y4=2*dy+y1;
27 koch(it-1,x1,y1,x2,y2);
28 koch(it-1,x2,y2,x3,y3);
29 koch(it-1,x3,y3,x4,y4);
30 koch(it-1,x4,y4,x5,y5);
31 }
32 }
33 };
34 int main()
35 {
36 kochCurve k;
```

SDL-libgraph -- Graphics on GNU/Linux

C++ Tab Width: 8 Ln 48, Col 2 INS