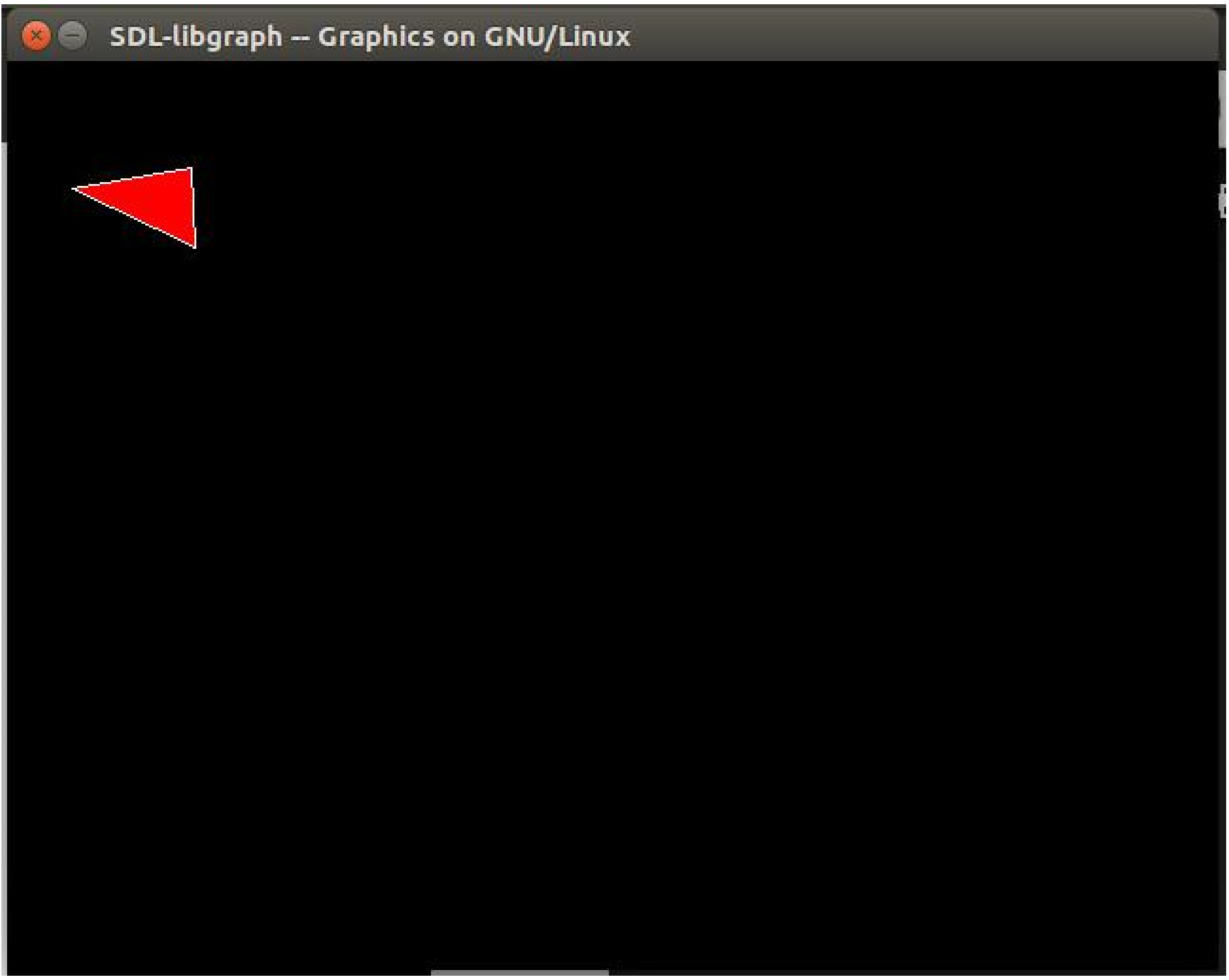
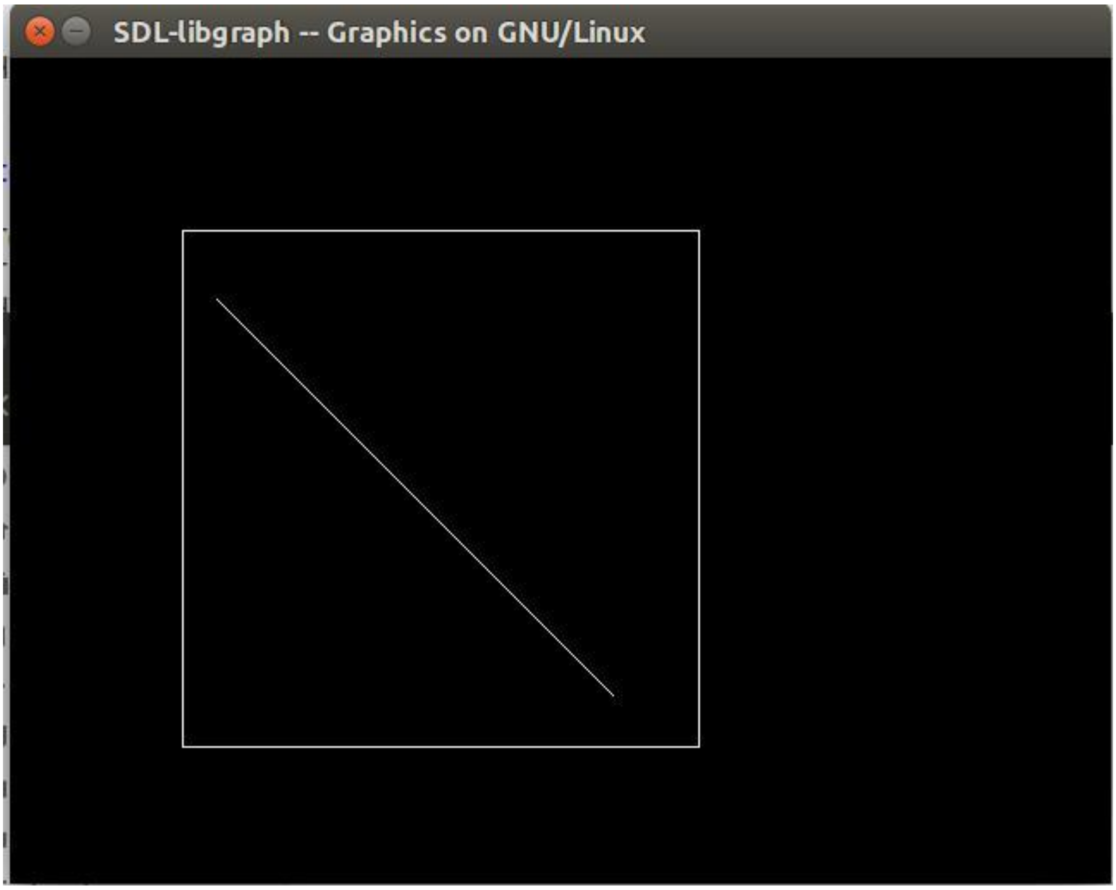
```
#include<graphics.h>

#include<iostream>

#include<stdlib.h>

using namespace std;

void ffill(int x,int y,int o_col,int n_col)

{

int current = getpixel(x,y);

if(current==o_col)

{

delay(1);

putpixel(x,y,n_col);

ffill(x+1,y,o_col,n_col);

ffill(x-1,y,o_col,n_col);

ffill(x,y+1,o_col,n_col);

ffill(x,y-1,o_col,n_col);

}

}

int main()

{

int x1,y1,x2,y2,x3,y3,xavg,yavg;

cout << " \n\t Enter the points of triangle";

setcolor(1);

cin >> x1 >> y1 >> x2 >> y2 >> x3 >> y3;

xavg = (int)(x1+x2+x3)/3;

yavg = (int)(y1+y2+y3)/3;

int gdriver = DETECT,gmode;

initgraph(&gdriver,&gmode,NULL);

line(x1,y1,x2,y2);

line(x2,y2,x3,y3);

line(x3,y3,x1,y1);

ffill(xavg,yavg,BLACK,RED);

getch();

return 0;
```


SDL-libgraph -- Graphics on GNU/Linux

```
}
```

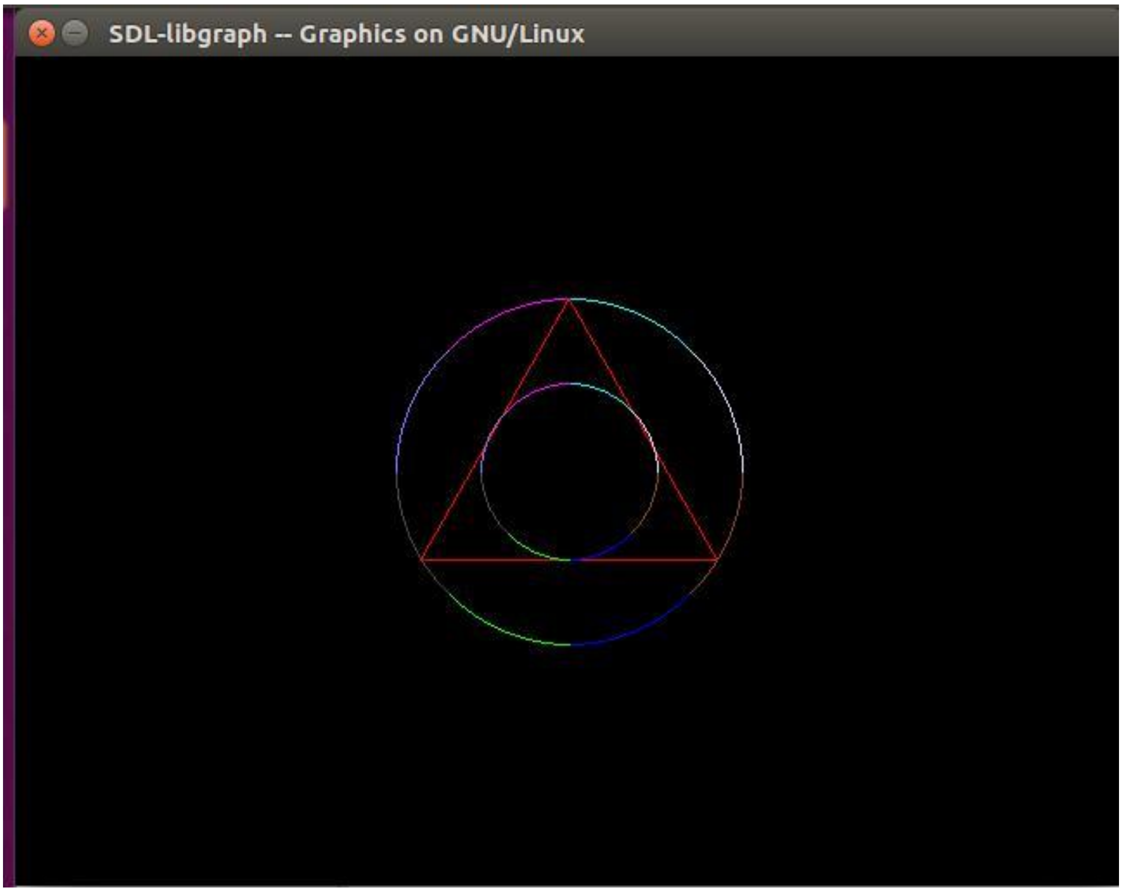
```
#include<iostream>

#include<graphics.h>

using namespace std;

static int LEFT=1,RIGHT=2,BOTTOM=4,TOP=8,xl,yl,xh,yh;

int getcode(int x,int y){

int code = 0;

//Perform Bitwise OR to get outcode

if(y > yh) code |=TOP;

if(y < yl) code |=BOTTOM;

if(x < xl) code |=LEFT;

if(x > xh) code |=RIGHT;

return code;

}

int main()

{

int gdriver = DETECT,gmode;

initgraph(&gdriver,&gmode,NULL);

setcolor(WHITE);

cout<<"Enter bottom left and top right co-ordinates of window: ";

cin>>xl>>yl>>xh>>yh;

rectangle(xl,yl,xh,yh);

int x1,y1,x2,y2;

cout<<"Enter the endpoints of the line: ";

cin>>x1>>y1>>x2>>y2;

line(x1,y1,x2,y2);

getch();

int outcode1=getcode(x1,y1),

outcode2=getcode(x2,y2); int accept = 0; //decides if

line is to be drawn while(1){

float m =(float)(y2-y1)/(x2-x1);

if(outcode1==0 && outcode2==0){

accept = 1;

break;

}
else if((outcode1 & outcode2)!=0){
break;
}else{
int x,y;
int temp;
if(outcode1==0)
temp = outcode2;
else
temp = outcode1;
if(temp & TOP){
x = x1+ (yh-y1)/m;
y = yh;
}
else if(temp & BOTTOM){ //Line clips bottom edge
x = x1+ (yl-y1)/m;
y = yl;
}else if(temp & LEFT){ //Line clips left edge
x = xl;
y = y1+ m*(xl-x1);
}else if(temp & RIGHT){ //Line clips right edge
x = xh;
y = y1+ m*(xh-x1);
}
if(temp ==
outcode1){ x1 = x;
y1 = y;
outcode1 = getcode(x1,y1);
}
else{
x2 = x;
y2 = y;
outcode2 = getcode(x2,y2);
} } }
setcolor(WHITE);
```

```
cout<<"After clipping:";
if(accept)
line(x1,y1,x2,y2);
return 0;
closegraph();
}
```



```
#include<iostream>

#include<graphics.h>

#include <bits/stdc++.h>

using namespace std;

class algo

{

public:

void dda_line(float x1, float y1, float x2, float y2);

void bresneham_cir(int r);

};

void algo::dda_line(float x1, float y1, float x2, float y2)

{

float x,y,dx,dy,step;

int i;

dx=abs(x2-x1);

dy=abs(y2-y1);

cout<<"dy="<<dy<<"\tdx="<<dx;

if(dx>=dy)

step=dx;

else

step=dy;

cout<<"\n"<<step<<endl;

float xinc=float((x2-x1)/step);

float yinc=float((y2-y1)/step);

x=x1;

y=y1;

i=1;

while(i<=step)

{

cout<<endl<<"\t"<<i<<"\t(x,y)=("<<x<<","<<y<<")";

putpixel(320+x,240-y,4);

x=x+xinc;

y=y+yinc;

i=i+1;
}
}
void algo::bresneham_cir(int r)
{
float x,y,p;
x=0;
y=r;
p=3-(2*r);
while(x<=y)
{
putpixel(320+x,240+y,1);
putpixel(320-x,240+y,2);
putpixel(320+x,240-y,3);
putpixel(320-x,240-y,5);
putpixel(320+y,240+x,6);
putpixel(320+y,240-x,7);
putpixel(320-y,240+x,8);
putpixel(320-y,240-x,9);
x=x+1;
if(p<0)
{
p=p+4*(x)+6;
}
else
{
p=p+4*(x-y)+10;
y=y-1;
}
}
}
int main()
{
algo a1;
int i;
```

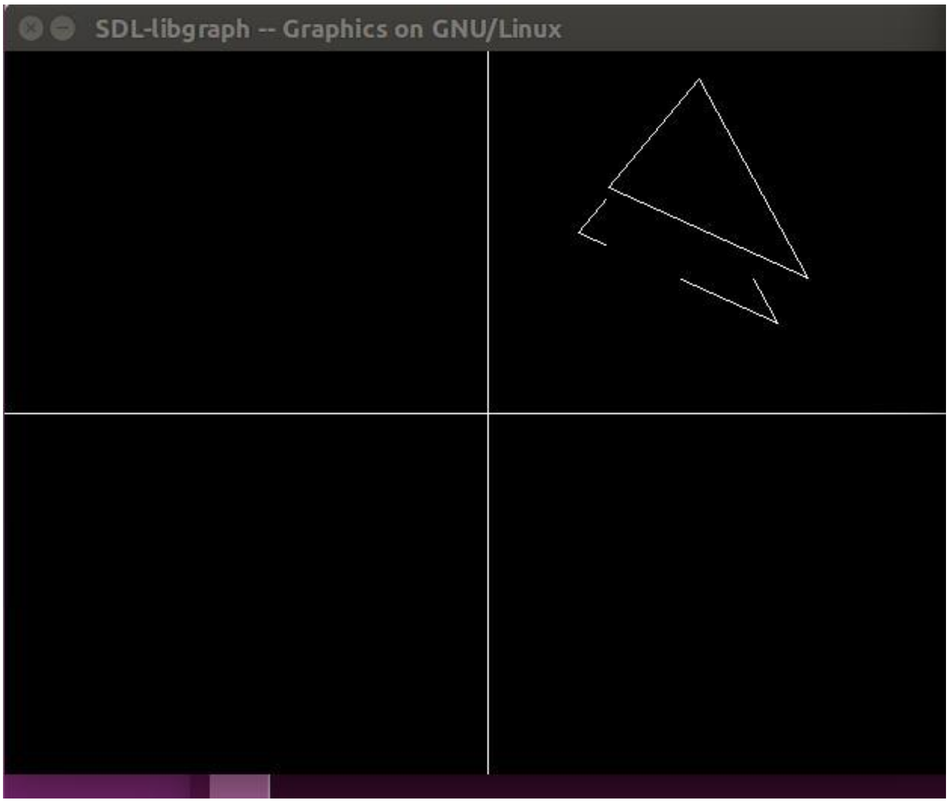
```
float r,ang,r1;

int gmode,gdriver=DETECT;

initgraph(&gdriver, &gmode, NULL)

cout<<"Enter radius of circle";

cin>>r;

a1.bresneham_cir((int)r);

ang=3.24/180;

float c=r*cos(30*ang);

float s=r*sin(30*ang);

a1.dda_line(0,r,0-c,0-s);

a1.dda_line(0-c,0-s,0+c,0-s);

a1.dda_line(0+c,0-s,0,r);

r1=s;

a1.bresneham_cir((int)r1);

getch();

closegraph();

return 0;

}
```

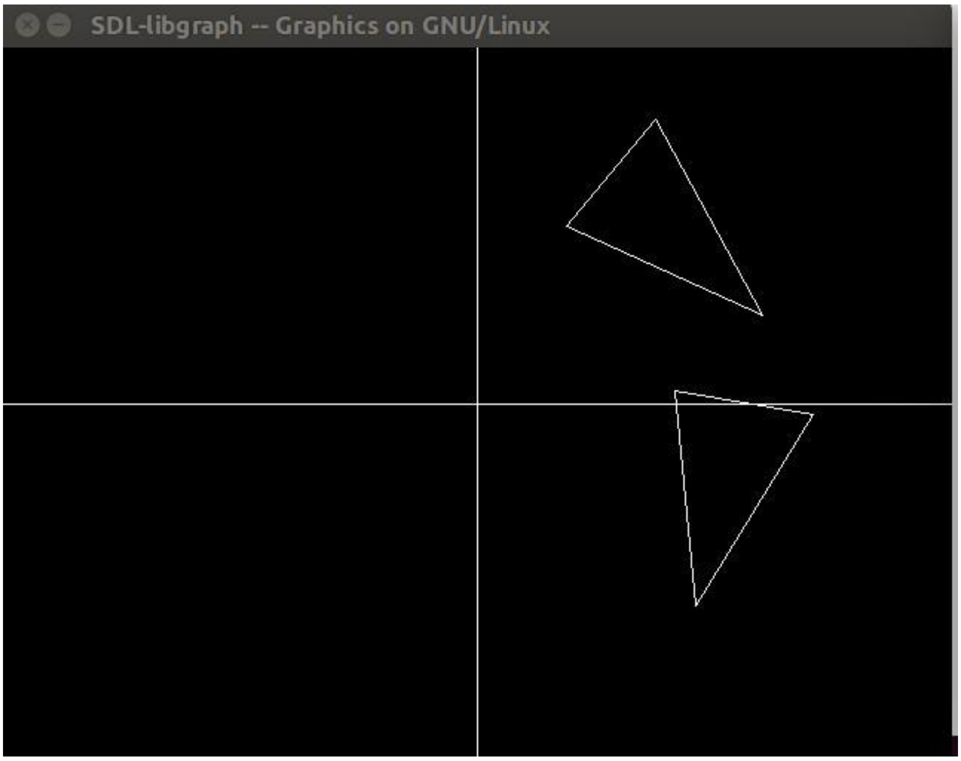


```
#include<iostream>

#include<stdlib.h>

#include<graphics.h>

#include<math.h>

using namespace std;

class POLYGON

{

private:

int p[10][10],Trans_result[10][10],Trans_matrix[10][10];

float Rotation_result[10][10],Rotation_matrix[10][10];

float Scaling_result[10][10],Scaling_matrix[10][10]; float

Shearing_result[10][10],Shearing_matrix[10][10]; int

Reflection_result[10][10],Reflection_matrix[10][10];

public:

int accept_poly(int [][10]);

void draw_poly(int [][10],int);

void draw_polyfloat(float [][10],int);

void matmult(int [][10],int [][10],int,int,int,int [][10]);

void matmultfloat(float [][10],int [][10],int,int,int,float [][10]);

void shearing(int [][10],int);

void scaling(int [][10],int);

void rotation(int [][10],int);

void translation(int [][10],int);

void reflection(int [][10],int);

};

int POLYGON :: accept_poly(int p[][10])

{

int i,n;

cout<<"\n\n\t\tEnter no.of vertices:";

cin>>n;

for(i=0;i<n;i++)

{

cout<<"\n\n\t\tEnter (x,y)Co-ordinate of point P"<<i<<":
"; cin >> p[i][0] >> p[i][1];
p[i][2] = 1;
}
for(i=0;i<n;i++)
{
cout<<"\n";
for(int j=0;j<3;j++)
{
cout<<p[i][j]<<"\t";
}
}
return n;
}
void POLYGON :: draw_poly(int p[][10], int n)
{
int i,gd = DETECT,gm;
initgraph(&gd,&gm,NULL);
line(320,0,320,480);
line(0,240,640,240);
for(i=0;i<n;i++)
{
if(i<n-1)
{
line(p[i][0]+320, -p[i][1]+240, p[i+1][0]+320, -p[i+1][1]+240);
}
else
line(p[i][0]+320, -p[i][1]+240, p[0][0]+320, -p[0][1]+240);
}
delay(10000);
}
void POLYGON :: draw_polyfloat(float p[][10], int n)
{
int i,gd = DETECT,gm;
initgraph(&gd,&gm,NULL);
line(320,0,320,480);
line(0,240,640,240);

for(i=0;i<n;i++)

{

if(i<n-1)

{

line(p[i][0]+320, -p[i][1]+240, p[i+1][0]+320, -p[i+1][1]+240);

}

else

line(p[i][0]+320, -p[i][1]+240, p[0][0]+320, -p[0][1]+240);

}

}

void POLYGON :: translation(int p[10][10],int n)

{

int tx,ty,i,j; int i1,j1,k1,r1,c1,c2;

r1=n;c1=c2=3;

cout << "\n\n\t\tEnter X-Translation tx: ";

cin >> tx;

cout << "\n\n\t\tEnter Y-Translation ty: ";

cin >> ty;

for(i=0;i<3;i++)

for(j=0;j<3;j++)

Trans_matrix[i][j] = 0;

Trans_matrix[0][0] = Trans_matrix[1][1] = Trans_matrix[2][2] = 1;

Trans_matrix[2][0] = tx;

Trans_matrix[2][1] = ty;

for(i1=0;i1<10;i1++)

for(j1=0;j1<10;j1++)

Trans_result[i1][j1] = 0;

for(i1=0;i1<r1;i1++)

for(j1=0;j1<c2;j1++)

for(k1=0;k1<c1;k1++)

Trans_result[i1][j1] = Trans_result[i1][j1]+(p[i1][k1] *

Trans_matrix[k1][j1]); cout << "\n\n\t\tPolygon after Translationâ€¦";

draw_poly(Trans_result,n);
```

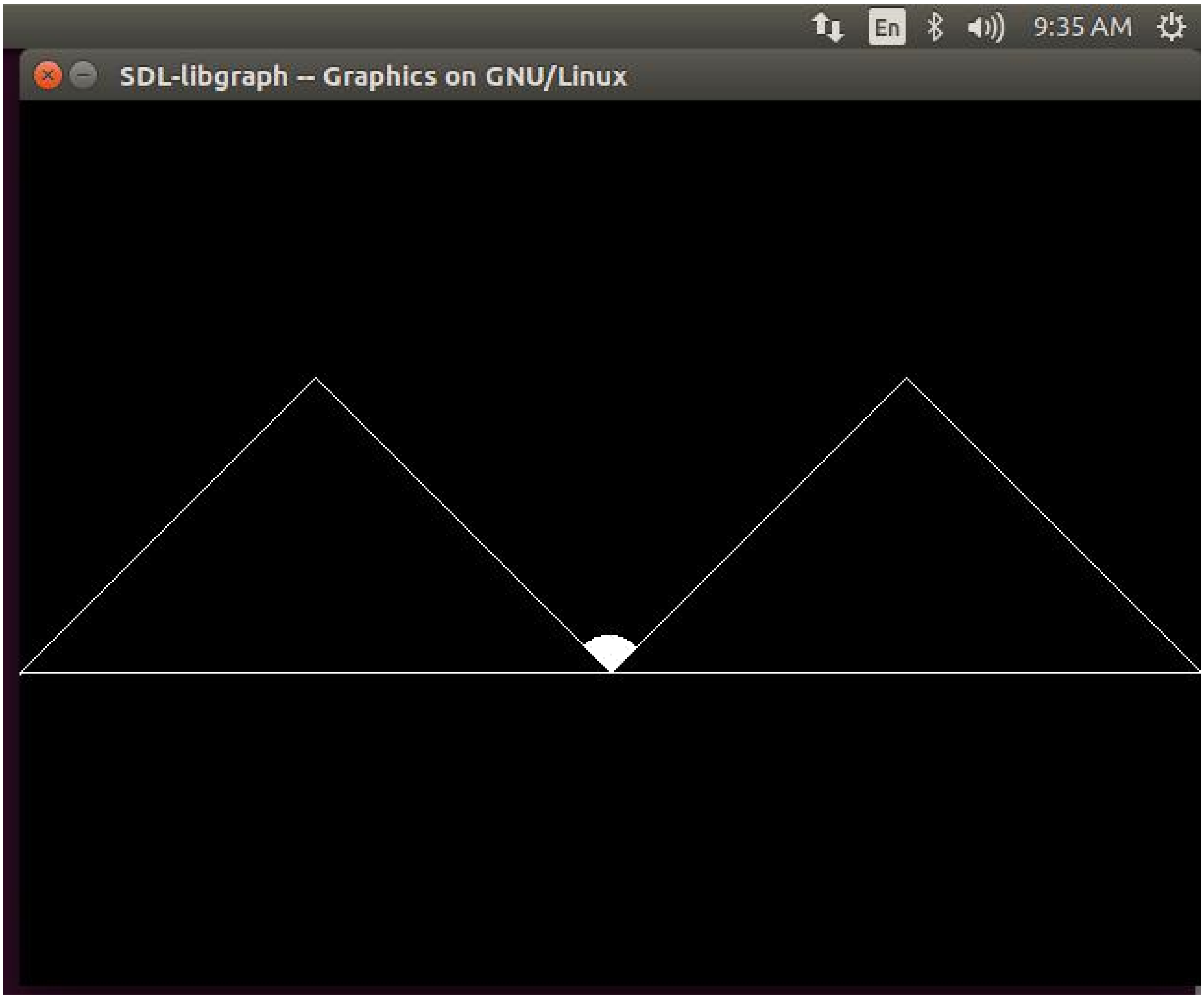
```
}
void POLYGON :: rotation(int p[][10],int n)
{
float type,Ang,Sinang,Cosang;
int i,j; int i1,j1,k1,r1,c1,c2;
r1=n;c1=c2=3;
cout << "\n\n\t\tEnter the angle of rotation in degrees:
"; cin >> Ang;
cout << "\n\n **** Rotation Types ****";
cout << "\n\n\t\t1.Clockwise Rotation \n\n\t\t2.Anti-Clockwise Rotation
"; cout << "\n\n\t\tEnter your choice(1-2): "; cin >> type;

Ang = (Ang * 6.2832)/360;
Sinang = sin(Ang);
Cosang = cos(Ang);
cout<<"Mark1";
for(i=0;i<3;i++)
for(j=0;j<3;j++)
Rotation_matrix[i][j] = 0;
cout<<"Mark2";
Rotation_matrix[0][0] = Rotation_matrix[1][1] = Cosang;
Rotation_matrix[0][1] = Rotation_matrix[1][0] = Sinang;
Rotation_matrix[2][2] = 1;
if(type == 1)
Rotation_matrix[0][1] = -Sinang;
else
Rotation_matrix[1][0] = -Sinang;
for(i1=0;i1<10;i1++)
for(j1=0;j1<10;j1++)
Rotation_result[i1][j1] = 0;
for(i1=0;i1<r1;i1++)
for(j1=0;j1<c2;j1++)
for(k1=0;k1<c1;k1++)
Rotation_result[i1][j1] = Rotation_result[i1][j1]+(p[i1][k1] *
Rotation_matrix[k1][j1]);
cout << "\n\n\t\tPolygon after Rotationâ€¦";
for(i=0;i<n;i++)
{
cout<<"\n";
for(int j=0;j<3;j++)
{
cout<<Rotation_result[i][j]<<"\t";
}
}
draw_polyfloat(Rotation_result,n);
}
void POLYGON :: scaling(int p[][10],int n)
{
float Sx,Sy;
int i,j; int i1,j1,k1,r1,c1,c2;
r1=n;c1=c2=3;
cout<<"\n\n\t\tEnter X-Scaling Sx: ";
cin>>Sx;
cout<<"\n\n\t\tEnter Y-Scaling Sy: ";
cin>>Sy;
for(i=0;i<3;i++)
{
for(j=0;j<3;j++)
{
Scaling_matrix[i][j] = 0;
}
}
Scaling_matrix[0][0] = Sx;
Scaling_matrix[0][1] = 0;
Scaling_matrix[0][2] = 0;
Scaling_matrix[1][0] = 0;
Scaling_matrix[1][1] = Sy;
Scaling_matrix[1][2] = 0;
```

```
Scaling_matrix[2][0] = 0;
Scaling_matrix[2][1] = 0;
Scaling_matrix[2][2] = 1;
for(i1=0;i1<10;i1++)
for(j1=0;j1<10;j1++)
Scaling_result[i1][j1] = 0;
for(i1=0;i1<r1;i1++)
for(j1=0;j1<c2;j1++)
for(k1=0;k1<c1;k1++)
Scaling_result[i1][j1] = Scaling_result[i1][j1]+(p[i1][k1] *
Scaling_matrix[k1][j1]);
cout<<"\n\n\t\tPolygon after Scalingâ€¦";
draw_polyfloat(Scaling_result,n);
}
int main()
{
int ch,n,p[10][10];
POLYGON p1;
cout<<"\n\n **** 2-D TRANSFORMATION ****";
n= p1.accept_poly(p);
cout <<"\n\n\t\tOriginal Polygon â€¦";
p1.draw_poly(p,n);
do
{
int ch;
cout<<"\n\n **** 2-D TRANSFORMATION ****";
cout<<"\n\n\t\t1.Translation \n\n\t\t2.Scaling \n\n\t\t3.Rotation \n\n\t\t4.Exit";
cout<<"\n\n\tEnter your choice(1-6):";
cin>>ch;
switch(ch)
{
case 1:
p1.translation(p,n);
break;
case 2:
cout<<"case2";
p1.scaling(p,n);
break;
case 3:
cout<<"case3";
p1.rotation(p,n);
break;
case 4:
exit(0);
}
}while(1);
return 0;
}
```





```
#include<graphics.h>
int main()
{
int gd = DETECT, gm;
initgraph(&gd, &gm,NULL);
int midx,midy,r=10;
midx=getmaxx()/2;
while(r<=50)
{
cleardevice();
setcolor(WHITE);
line(0,310,160,150);
line(160,150,320,310);
line(320,310,480,150);
line(480,150,640,310);
line(0,310,640,310);
arc(midx,310,225,133,r);
floodfill(midx,300,15);
if(r>20)
{
setcolor(7);
floodfill(2,2,15);
setcolor(6);
floodfill(150,250,15);
floodfill(550,250,15);
setcolor(2);
floodfill(2,450,15);
}
delay(50);
r+=2;
}
getch();
closegraph();
}
```



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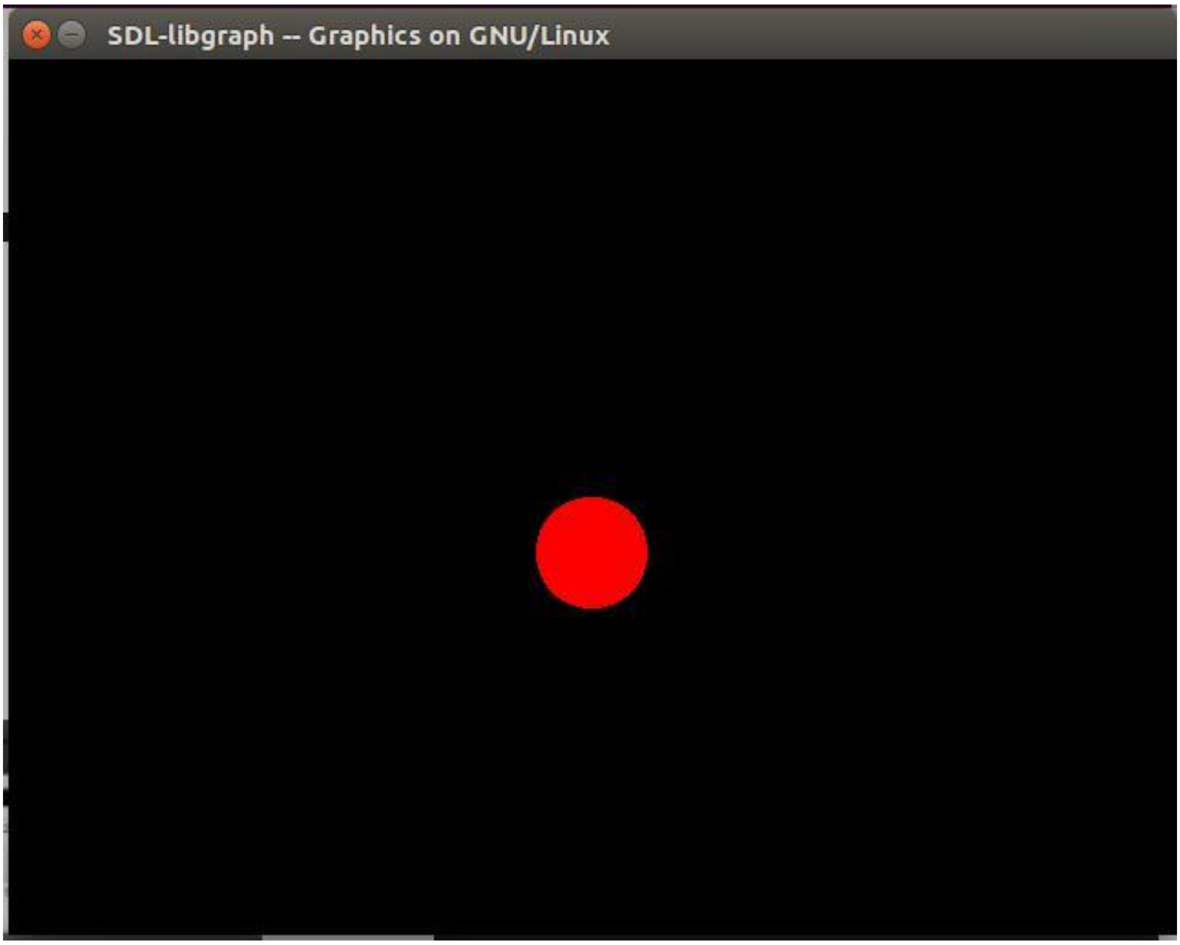
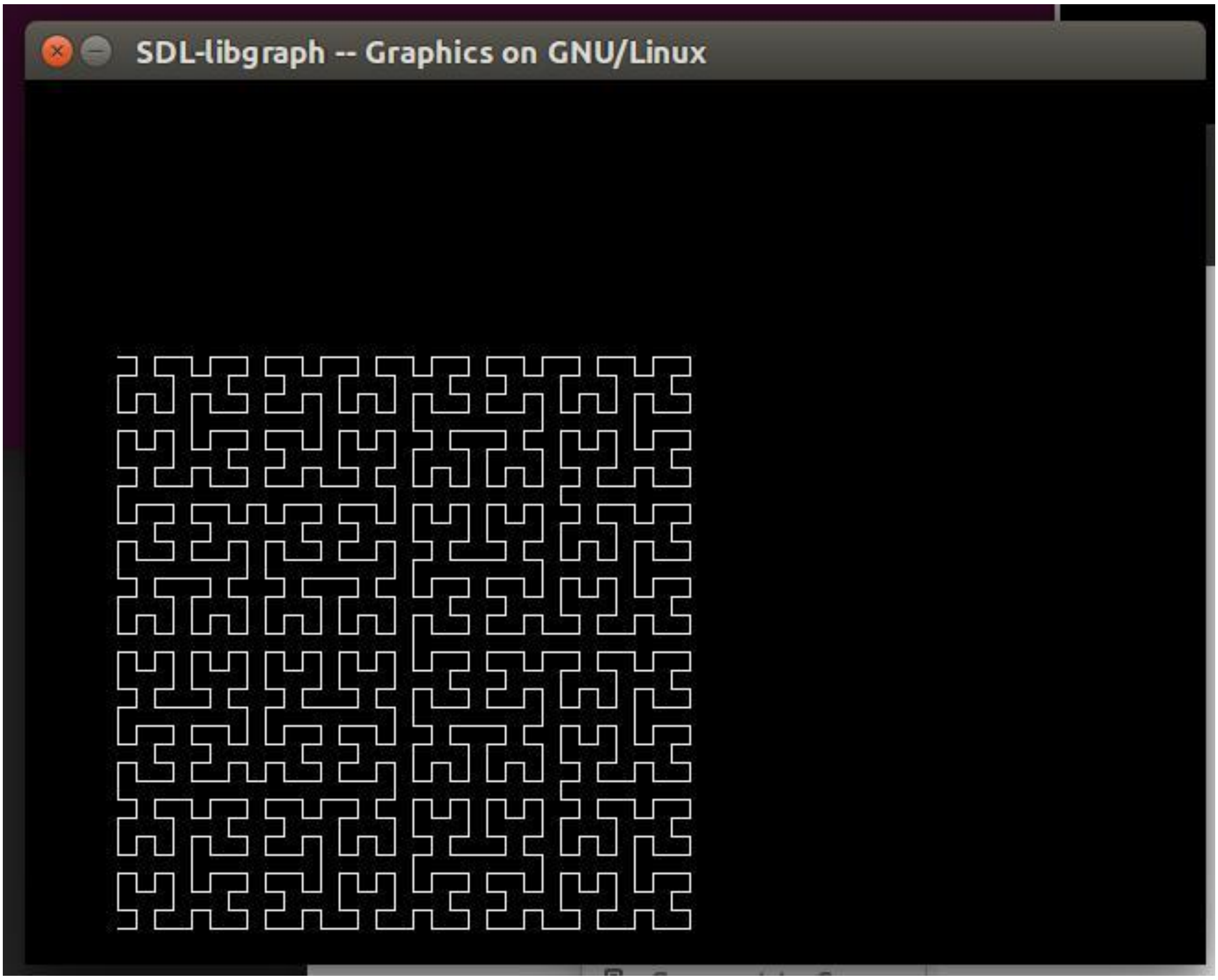
SDL-libgraph -- Graphics on GNU/Linux

```
#include <iostream>

#include <cstdlib>

#include <graphics.h>

using namespace std;

int main()

{

int gd = DETECT, gm;

int i, x, y, flag=0;

initgraph(&gd, &gm,NULL);

x = getmaxx()/2;

y = 30;

while (1)

{

if(y >= getmaxy()-30 || y <= 30)

flag = !flag;

setcolor(RED);

circle(x, y, 30);

floodfill(x, y, RED);

delay(50);

cleardevice();

if(flag)

{

y = y + 5;

}

else

{

y = y - 5;

}

}

delay(5000);

closegraph();

return 0;

}
```


SDL-libgraph -- Graphics on GNU/Linux

```
#include<iostream>
#include<graphics.h>
#include<math.h>
#include<cstdlib>
using namespace std;
void move(int j, int h, int &x,int &y)
{
if(j==1)
y-=h;
else
if(j==2)
x+=h;
else if(j==3)
y+=h;
else if(j==4)
x-=h;
lineto(x,y);
}
void hilbert(int r,int d,int l ,int u,int i,int h,int &x,int &y)
{
if(i>0)
{
i--;
hilbert(d,r,u,l,i,h,x,y);
move(r,h,x,y);
hilbert(r,d,l,u,i,h,x,y);
move(d,h,x,y);
hilbert(r,d,l,u,i,h,x,y);
move(l,h,x,y);
hilbert(u,l,d,r,i,h,x,y);
}
}
int main()
{
```

```
int n,x1,y1;

int x0=50,y0=150,x,y,h=10,r=2,d=3,l=4,u=1;

cout<<"Give the value of n=";

cin>>n;

x=x0;

y=y0;

int driver=DETECT,mode=0;

initgraph(&driver,&mode,NULL);

moveto(x,y);

hilbert(r,d,l,u,n,h,x,y);

delay(10000);

closegraph();

return 0;

}
```


SDL-libgraph -- Graphics on GNU/Linux