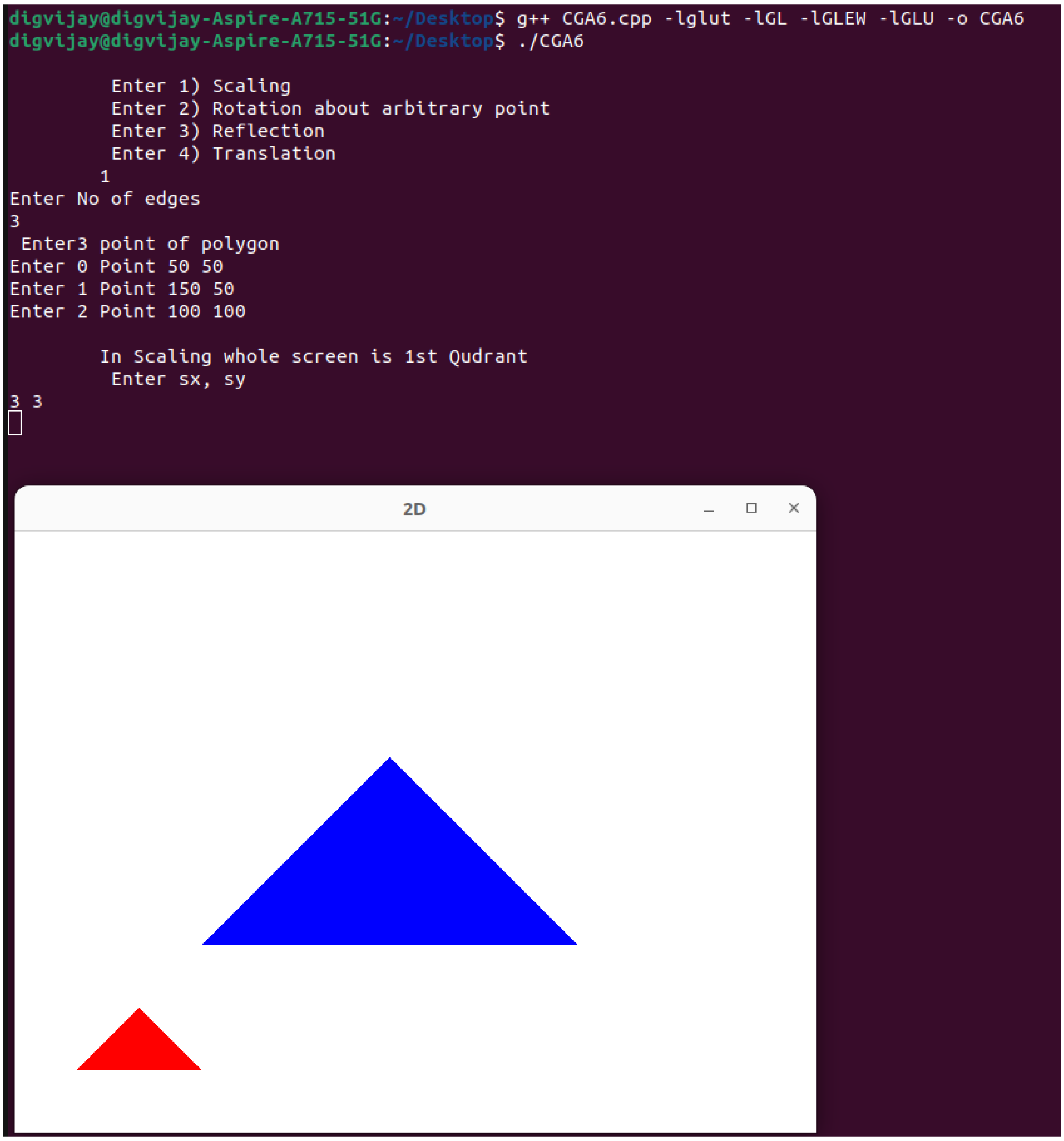
```
#include <iostream>
#include <math.h>
#include <time.h>
#include <GL/glut.h>
#include <vector>
using namespace std;
int edge;
vector<int> xpoint;
vector<int> ypoint;
int ch;
double round(double d){
return floor(d + 0.5);
}
void init(){
glClearColor(1.0,1.0,1.0,0.0);
glMatrixMode(GL_PROJECTION);
gluOrtho2D(0,640,0,480);
glClear(GL_COLOR_BUFFER_BIT);
}
void translation(){
int tx, ty;
cout<<"\t Enter Tx, Ty \n";
cin>> tx>> ty;
//Translate the point
for(int i=0;i<edge;i++){
xpoint[i] = xpoint[i] + tx;
ypoint[i] = ypoint[i] + ty;
}
glBegin(GL_POLYGON);
glColor3f(0,0,1);
for(int i=0;i<edge;i++){
glVertex2i(xpoint[i],ypoint[i]);
}
glEnd();
glFlush();
}
void rotaion(){
int cx, cy;
cout<<"\n Enter Ar point x , y ";
cin >> cx >> cy;
cx = cx+320;
cy = cy+240;
glColor3f(0.0, 1.0, 0.0);
glBegin(GL_POINTS);
glVertex2i(cx,cy);
glEnd();
glFlush();
double the;
cout<<"\n Enter thetha ";
cin>>the;
the = the * 3.14/180;
glColor3f(0,0,1.0);
glBegin(GL_POLYGON);
for(int i=0;i<edge;i++){
glVertex2i(round(((xpoint[i] - cx)*cos(the) - ((ypoint[i]-cy)*sin(the))) +
cx),
round(((xpoint[i] - cx)*sin(the) + ((ypoint[i]-cy)*cos(the))) + cy));
}
glEnd();
```

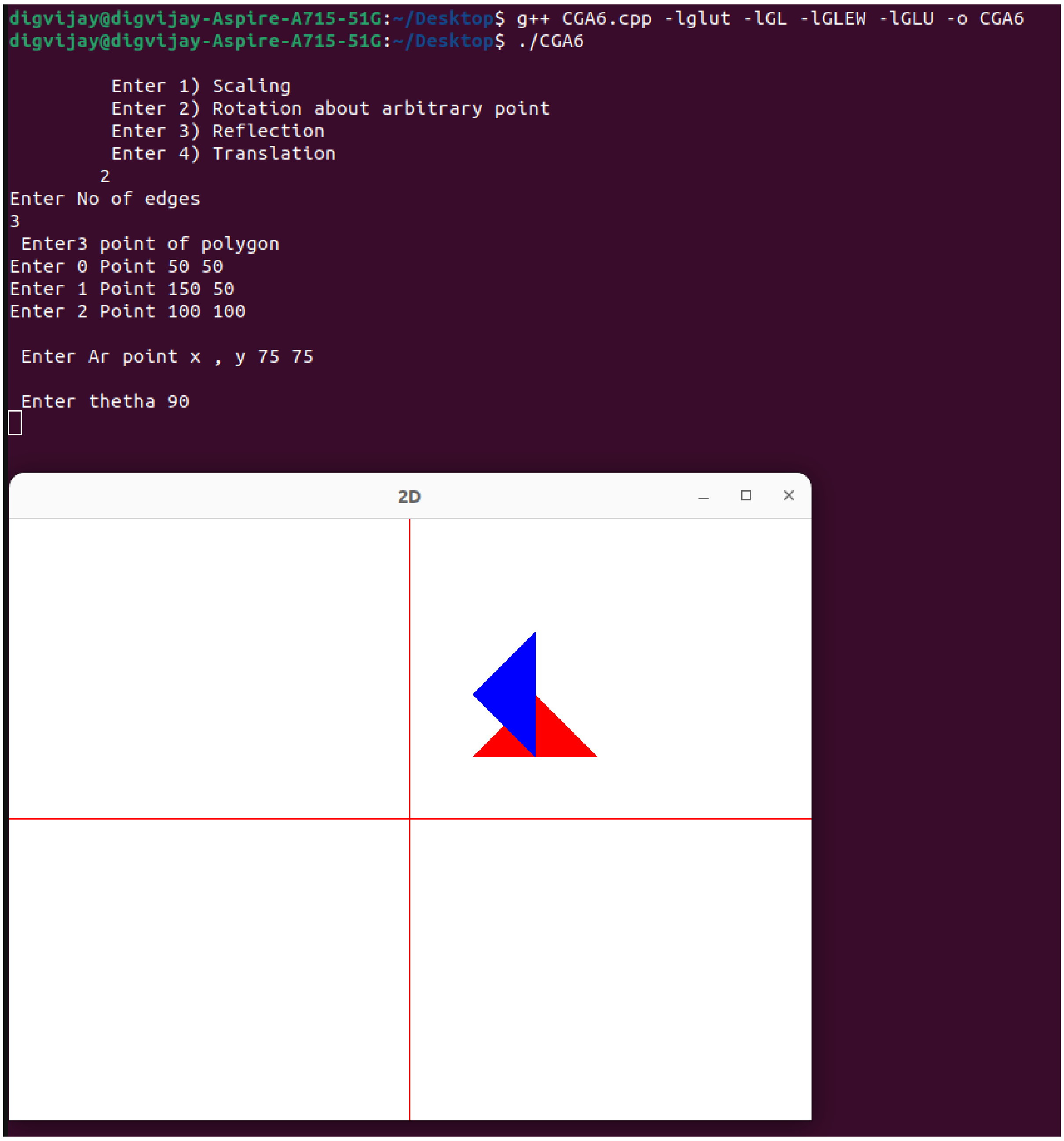
```
glFlush();
}
void scale(){
glColor3f(1.0,0,0);
glBegin(GL_POLYGON);
for(int i=0;i<edge;i++){
glVertex2i(xpoint[i]-320,ypoint[i]-240);
}
glEnd();
glFlush();
cout<<"\n\tIn Scaling whole screen is 1st Qudrant \n";
int sx, sy;
cout<<"\t Enter sx, sy \n";
cin>> sx>> sy;
//scale the point
for(int i=0;i<edge;i++){
xpoint[i] = (xpoint[i]-320) * sx;
ypoint[i] = (ypoint[i]-240) * sy;
}
glColor3f(0,0,1.0);
glBegin(GL_POLYGON);
for(int i=0;i<edge;i++){
glVertex2i(xpoint[i],ypoint[i]);
}
glEnd();
glFlush();
}
void reflection(){
char reflection;
cout<<"Enter Reflection Axis \n";
cin>> reflection;
if(reflection == 'x' || reflection == 'X'){
glColor3f(0.7,0.0,1.0);
glBegin(GL_POLYGON);
for(int i=0;i<edge;i++){
glVertex2i(xpoint[i], (ypoint[i] * -1)+480);
}
glEnd();
glFlush();
}
else if(reflection == 'y' || reflection == 'Y'){
glColor3f(0.0,0.0,1.0);
glBegin(GL_POLYGON);
for(int i=0;i<edge;i++){
glVertex2i((xpoint[i] * -1)+640,(ypoint[i]));
}
glEnd();
glFlush();
}
}
void Draw(){
if(ch==2 || ch==3 || ch==4){
glColor3f(1.0,0,0);
glBegin(GL_LINES);
glVertex2i(0,240);
glVertex2i(640,240);
glEnd();
glColor3f(1.0,0,0);
glBegin(GL_LINES);
glVertex2i(320,0);
glVertex2i(320,480);
glEnd();
glFlush();
glColor3f(1.0,0,0);
glBegin(GL_POLYGON);
for(int i=0;i<edge;i++){
glVertex2i(xpoint[i],ypoint[i]);
}
glEnd();
glFlush();
}
if(ch==1){
scale();
}
else if(ch == 2){
rotaion();
}
else if( ch == 3){
reflection();
}
else if (ch == 4){
translation();
}
}
int main(int argc, char** argv){
cout<<"\n \t Enter 1) Scaling ";
cout<<"\n \t Enter 2) Rotation about arbitrary point";
cout<<"\n \t Enter 3) Reflection";
cout<<"\n \t Enter 4) Translation \n \t";
cin>>ch;
if(ch==1 || ch==2 || ch==3 || ch==4){
cout<<"Enter No of edges \n";
cin>> edge;
int xpointnew, ypointnew;
cout<<" Enter"<< edge <<" point of polygon \n";
for(int i=0;i<edge;i++){
cout<<"Enter "<< i << " Point ";
cin>>xpointnew>>ypointnew;
xpoint.push_back(xpointnew+320);
ypoint.push_back(ypointnew+240);
}
glutInit(&argc, argv);
glutInitDisplayMode(GLUT_SINGLE|GLUT_RGB);
glutInitWindowSize(640,480);
glutInitWindowPosition(200,200);
glutCreateWindow("2D");
init();
glutDisplayFunc(Draw);
glutMainLoop();
return 0;
}
else{
cout<<"\n \t Check Input run again";
return 0;
}
}
```



```
digvijay@digvijay-Aspire-A715-51G:~/Desktop$ g++ CGA6.cpp -lglut -lGL -lGLEW -lGLU -o CGA6
digvijay@digvijay-Aspire-A715-51G:~/Desktop$ ./CGA6

         Enter 1) Scaling
         Enter 2) Rotation about arbitrary point
         Enter 3) Reflection
         Enter 4) Translation
        1
Enter No of edges
3
 Enter3 point of polygon
Enter 0 Point 50 50
Enter 1 Point 150 50
Enter 2 Point 100 100

        In Scaling whole screen is 1st Qudrant
         Enter sx, sy
3 3
```



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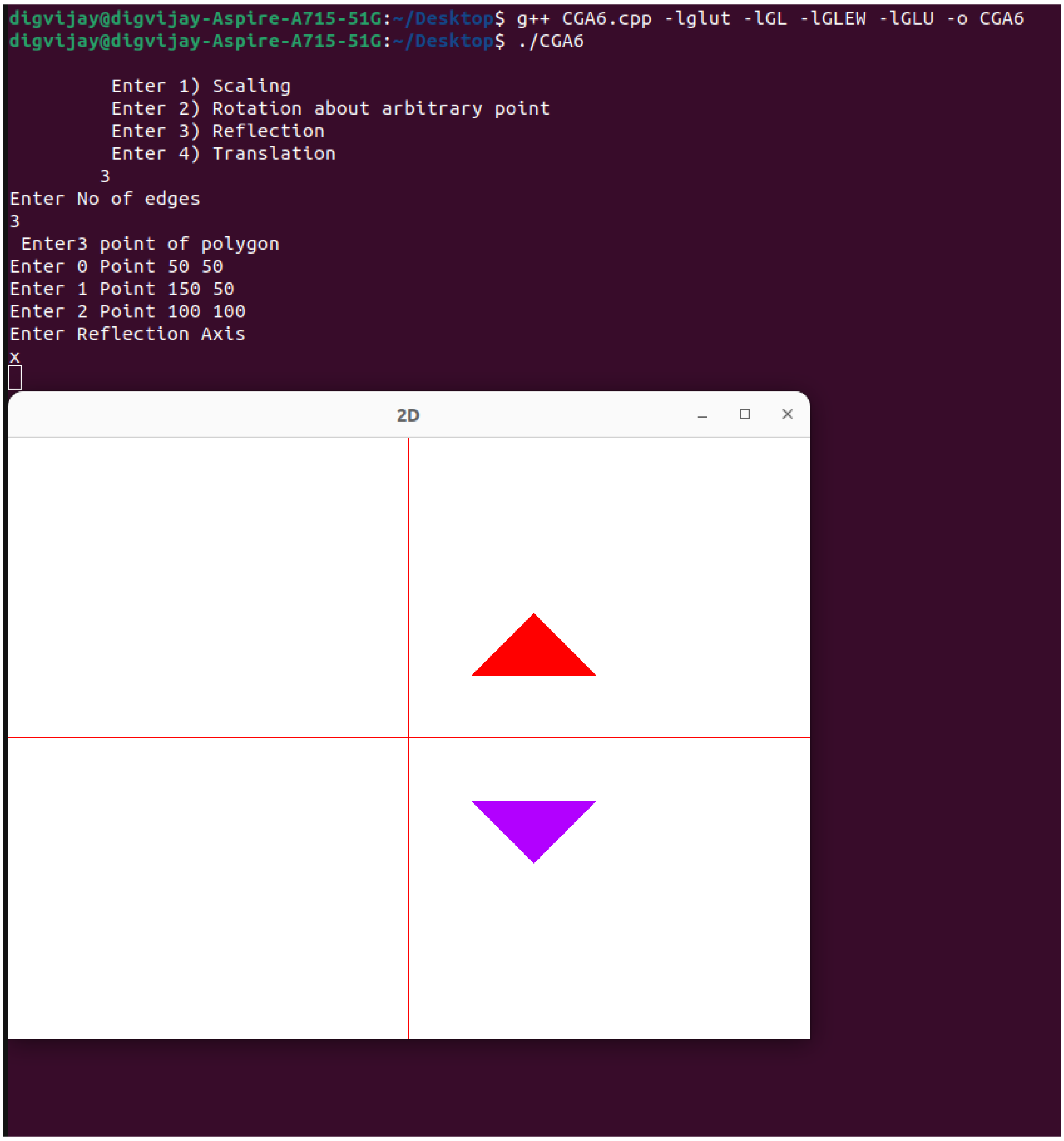
         Enter 1) Scaling
         Enter 2) Rotation about arbitrary point
         Enter 3) Reflection
         Enter 4) Translation
        2
Enter No of edges
3
 Enter3 point of polygon
Enter 0 Point 50 50
Enter 1 Point 150 50
Enter 2 Point 100 100

 Enter Ar point x , y 75 75

 Enter thetha 90
```



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         Enter 1) Scaling
         Enter 2) Rotation about arbitrary point
         Enter 3) Reflection
         Enter 4) Translation
        3
Enter No of edges
3
 Enter3 point of polygon
Enter 0 Point 50 50
Enter 1 Point 150 50
Enter 2 Point 100 100
Enter Reflection Axis
x
```

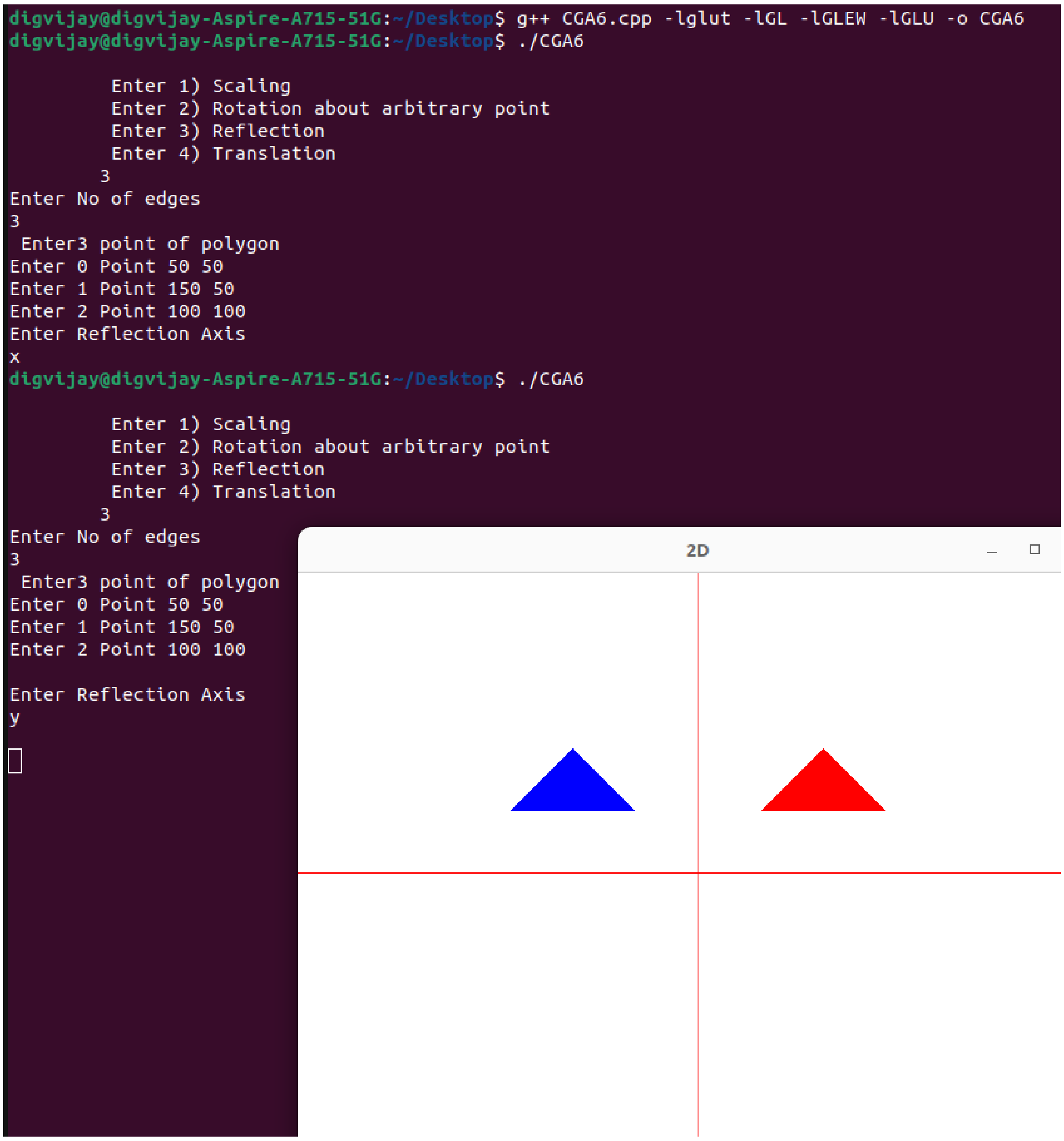

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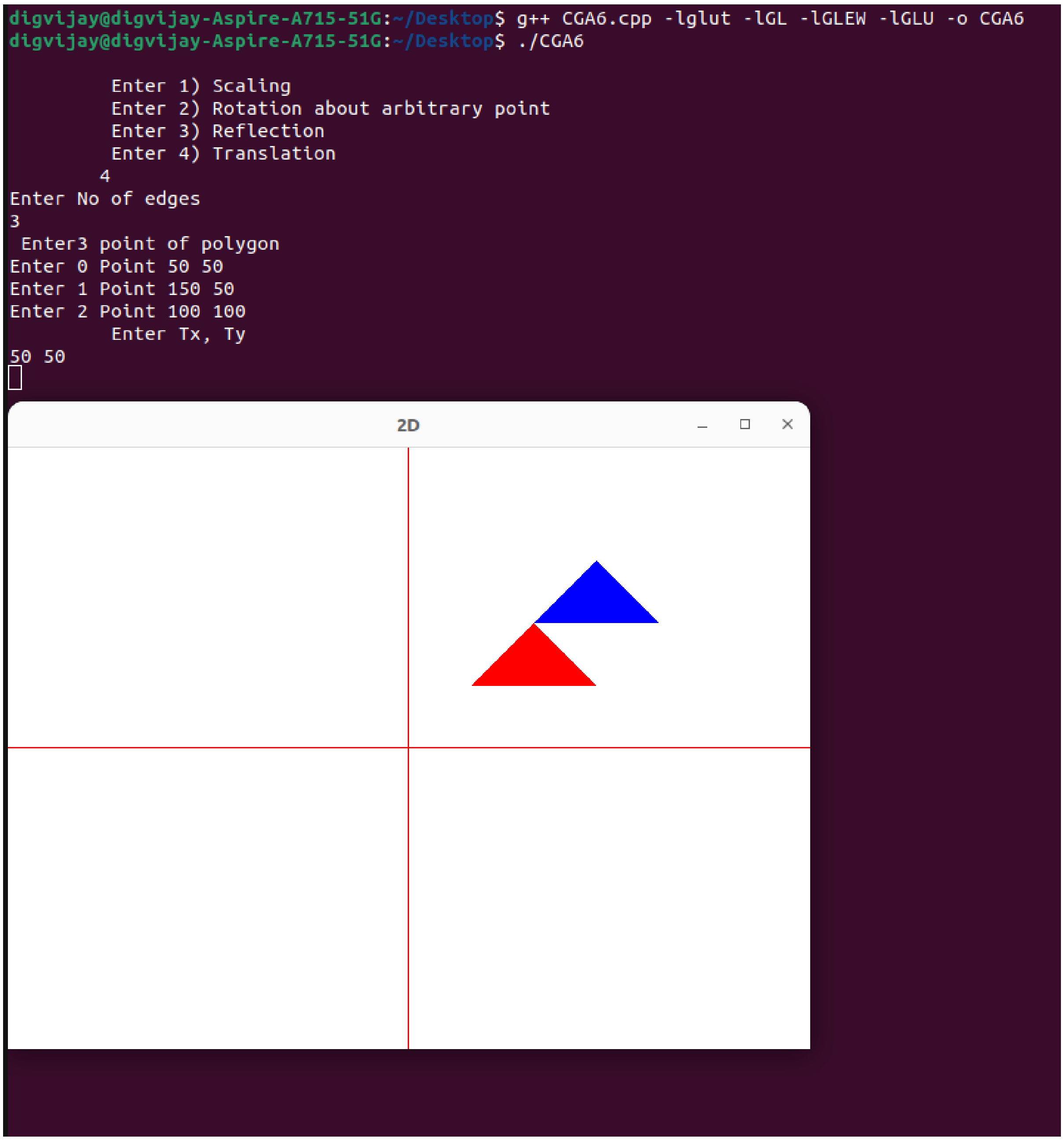
         Enter 1) Scaling
         Enter 2) Rotation about arbitrary point
         Enter 3) Reflection
         Enter 4) Translation
        3
Enter No of edges
3
 Enter3 point of polygon
Enter 0 Point 50 50
Enter 1 Point 150 50
Enter 2 Point 100 100
Enter Reflection Axis
x
digvijay@digvijay-Aspire-A715-51G:~/Desktop$ ./CGA6

         Enter 1) Scaling
         Enter 2) Rotation about arbitrary point
         Enter 3) Reflection
         Enter 4) Translation
        3
Enter No of edges
3
 Enter3 point of polygon
Enter 0 Point 50 50
Enter 1 Point 150 50
Enter 2 Point 100 100

Enter Reflection Axis
y
```



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         Enter 1) Scaling
         Enter 2) Rotation about arbitrary point
         Enter 3) Reflection
         Enter 4) Translation
        4
Enter No of edges
3
 Enter3 point of polygon
Enter 0 Point 50 50
Enter 1 Point 150 50
Enter 2 Point 100 100
         Enter Tx, Ty
50 50
```