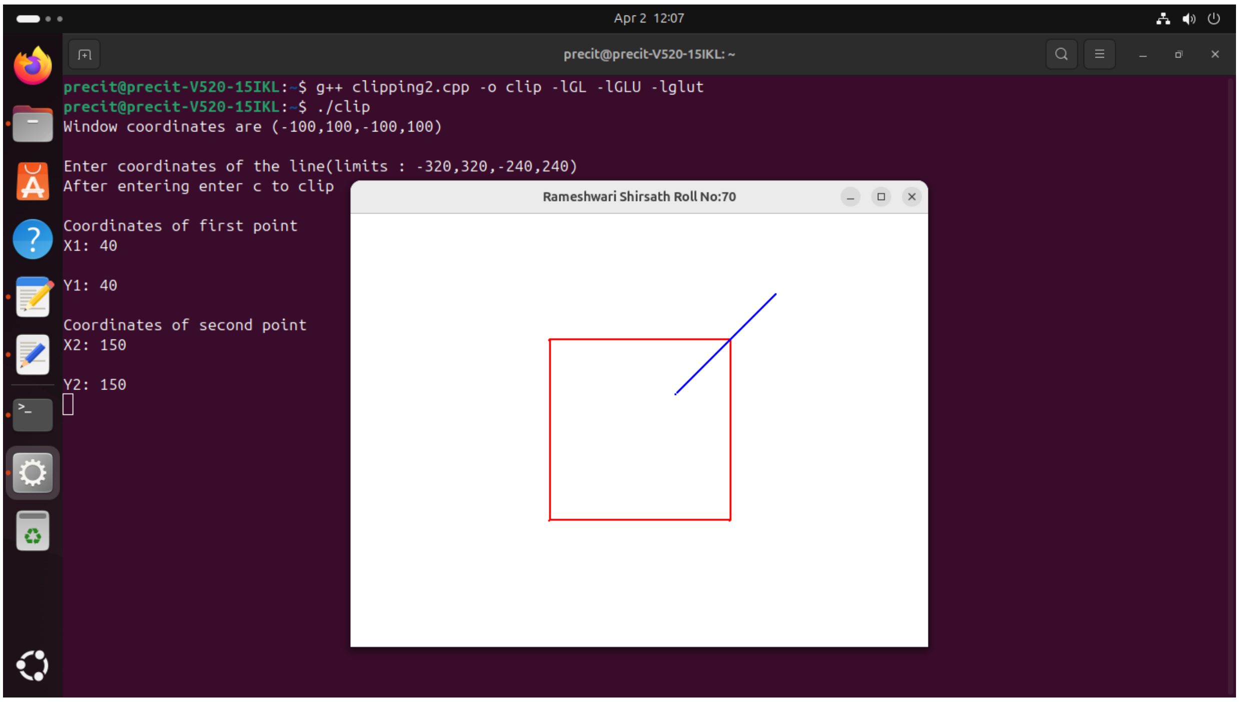
Practical -5 CLIPPING

```
#include<stdio.h> //initial inclusions
#include<GL/gl.h>
#include<GL/glu.h>
#include<GL/glut.h>
#include<math.h>
float xd1,yd1,xd2,yd2; //storing values for end points of line
int ymax=100; //initializing window coordinates
int ymin=-100;
int xmax=100;
int xmin=-100;
static int p=0;
void disp(); //declaring display function
float round_value(float v) //function to round value to next greater
float
{
return (v+0.5);
}
void plotpoint(float a,float b)
{
glBegin(GL_POINTS);
glVertex2f(a,b);
glEnd();
}
void dda(float X1,float Y1,float X2,float Y2) //dda algorithm
{
/*
* Input : Initial and final co-ordinates of line points.
* Utility : plot line using Digital Differential Analyzer
* Output : Line on initialized window.
*/
float dx,dy,x,y,xinc,yinc;//initializations
int k,steps;
dx=X2-X1; //difference of x coordinates
dy=Y2-Y1; //difference of y coordinates
steps=abs(dx)>abs(dy)?abs(dx):abs(dy); //calculation of number of steps
xinc=dx/(float)steps; //value for incrementing x
yinc=dy/(float)steps; //value for incrementing y
x=X1,y=Y1;
plotpoint(x,y); //function to plot point on window
for(k=0;k<steps;k++) //loop to plot points
{
x+=xinc; //incrementing x by xinc
y+=yinc; //incrementing y by yinc
plotpoint(round_value(x),round_value(y)); //plotting point
}
glFlush();
}
int code(int x,int y)
{
/*
* Input : x and y coordinates of the point.
* Utility : Determine outcode for given point.
* Output : Out code.
*/
int c=0;
if(y>ymax) c=8; //if greater than ymax set code to 8
if(y<ymin) c=4; //if less than ymin set code to 4
if(x>xmax) c=c|2; //if greater than xmax set code to 2
if(x<xmin) c=c|1; //if less than ymin set code to 1
return c;
}
void cohen(float x1,float y1,float x2,float y2) //implementing cohen-sutherland algorithm
{
int c1=code(x1,y1); //checking for outcode of point 1
int c2=code(x2,y2); //checking for outcode of point 2
float m=(y2-y1)/(x2-x1); //checking slope of line
while((c1|c2)>0) //iterating loop till c1|c2>0
{
if((c1 & c2)>0) //if both lie completely outside the window
{
disp();
return;
}
int c;
float xi=x1;
float yi=y1;
c=c1;
float x,y;
if(c==0) //checking if outcode is equal to 0
{
c=c2; //assigning outcode of c2
xi=x2; //assigning x coordinate of c2
yi=y2; //assigning y coordinate of c2
}
if((c & 8)>0) //checking if c&8 >0 ( greater than ymax)
{
y=ymax; //assigning new values to x and y
x=xi+1.0/(m*(ymax-yi));
}
if((c & 4)>0) //checking if c> 4 >0 (less than ymin)
{
y=ymin; //assigning new values to x and y
x=xi+1.0/(m*(ymin-yi));
}
if((c & 2)>0) //checking if c&2 >0 ( greater than xmax)
{
x=xmax;
y=yi+m*(xmax-xi);
}
if((c & 1)>0) //checking if c&1 >0 (less than xmin)
{
x=xmin;
y=yi+m*(xmin-xi);
}
if(c==c1) //checking code and assigning new values
{
xd1=x;
yd1=y;
c1=code(xd1,yd1);
}
if(c==c2) //checking code and assigning new values
{
xd2=x;
yd2=y;
c2=code(xd2,yd2);
}
}
p++;
disp(); //calling display function again to display new line
}
void mykey(unsigned char ch,int x,int y)
{
if(ch=='c')
{
cohen(xd1,yd1,xd2,yd2); //if character c is pressed calling algorithm
glFlush();
}
}
void disp()
{
glClear(GL_COLOR_BUFFER_BIT);//clearing buffer
glColor3f(1.0,0.0,0.0); //assigning color
dda(xmin,ymin,xmax,ymin); //creating window using dda algorithm to draw
lines
dda(xmax,ymin,xmax,ymax);
dda(xmax,ymax,xmin,ymax);
dda(xmin,ymax,xmin,ymin);
glColor3f(0.0,0.0,1.0); //assigning color for line
dda(xd1,yd1,xd2,yd2); //drawing line
glFlush();
}
void init()
{
glClearColor(1.0,1.0,1.0,0); //clearing background color to new color
glClear(GL_COLOR_BUFFER_BIT); //clearing buffer
glPointSize(2); //assigning point size
gluOrtho2D(-320,320,-240,240);
glFlush();
}
int main(int argc,char **argv)
{
printf("Window coordinates are (-100,100,-100,100)\n");
printf("\nEnter coordinates of the line(limits : -320,320,-240,240)
\nAfter entering enter c to clip\n");
printf("\nCoordinates of first point");
printf("\nX1: ");
scanf("%f",&xd1); //accepting value of x1
printf("\nY1: "); //accepting value of y1
scanf("%f",&yd1);
printf("\nCoordinates of second point");
printf("\nX2: ");
scanf("%f",&xd2); //accepting value of x2
printf("\nY2: "); //accepting value of y2
scanf("%f",&yd2);
glutInit(&argc,argv);
glutInitDisplayMode(GLUT_SINGLE | GLUT_RGB);
glutInitWindowPosition(100,100);
glutInitWindowSize(640,480);
glutCreateWindow("Rameshwari Shirsath Roll No:70");
init();
glutDisplayFunc(disp);
```

```
glutKeyboardFunc(mykey);
glutMainLoop();
return 0;
}
```

OUTPUT:



```
precit@precit-V520-15IKL:~$ g++ clipping2.cpp -o clip -lGL -lGLU -lglut
precit@precit-V520-15IKL:~$ ./clip
Window coordinates are (-100,100,-100,100)

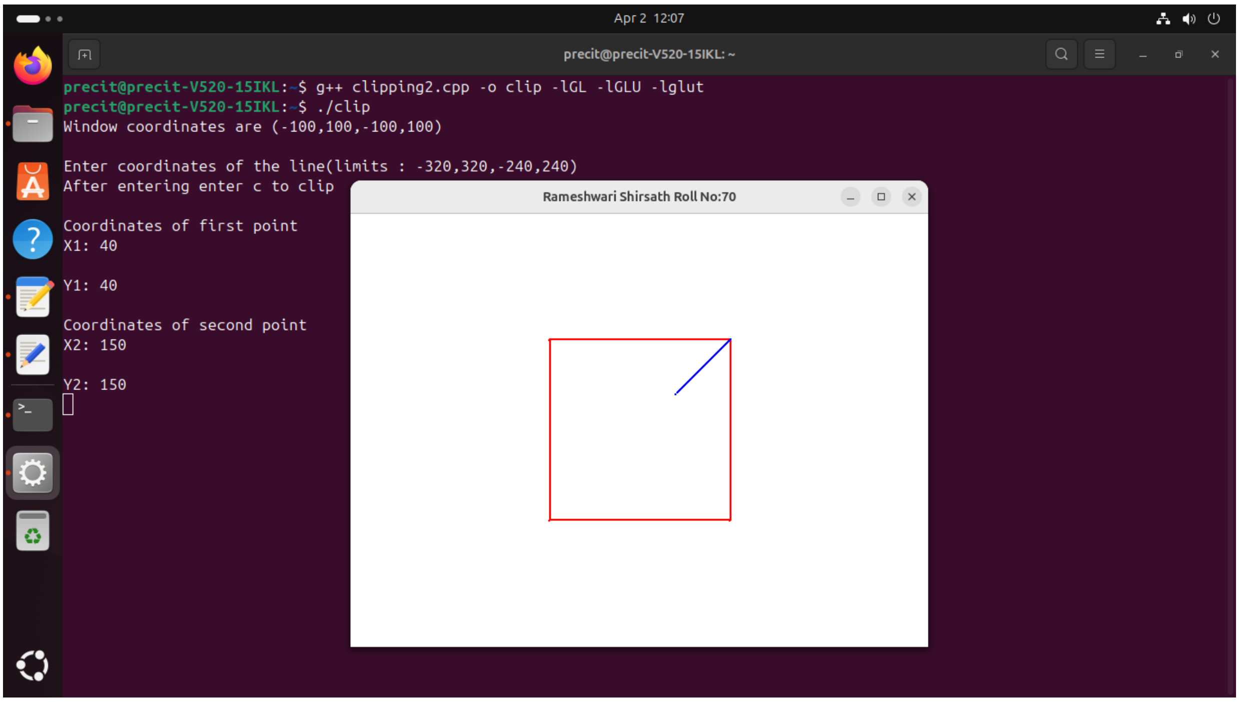
Enter coordinates of the line(limits : -320,320,-240,240)
After entering enter c to clip

Coordinates of first point
X1: 40

Y1: 40

Coordinates of second point
X2: 150

Y2: 150
```



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Coordinates of first point
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Coordinates of second point
X2: 150

Y2: 150
```