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Aim: To implement Bresenham's algorithms for drawing a line segment between two given end points.

Objective:

Draw a line using Bresenham's line algorithm that determines the points of an n-dimensional raster that should be selected to form a close approximation to a straight line between two points

Theory:

In Bresenham's line algorithm pixel positions along the line path are obtained by determining the pixels i.e. nearer the line path at each step.

Algorithm:

```
x=x1;
y=y1;
dx=x2-x1;
dy=y2-y1;
p=2dy-2dx;

while(x<=x2)
{
    putpixel(x,y);
    x++;
    if(p<0)
    {
        p=p+2dy;
    }
    else
```



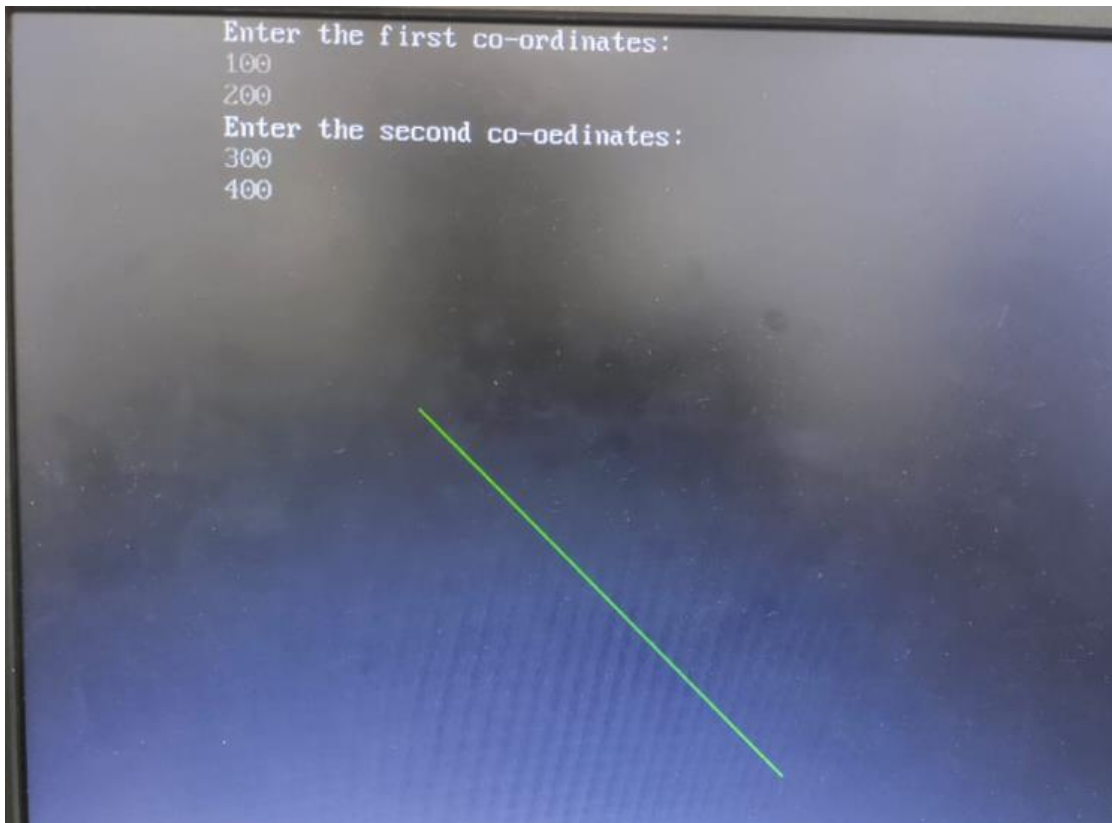
```
{  
    y=y+1;  
    p=p+2dy-2dx;  
}  
}  
}
```

Program –

```
#include<stdio.h>  
#include<conio.h>  
#include<graphics.h>  
#include<math.h>  
#include<dos.h>  
void main()  
{  
    int gd=DETECT, gm;  
    int x1,y1,x2,y2,dx,dy,p;  
    clrscr();  
    initgraph(&gd,&gm,"c:\\\\turbo3\\\\bgi");  
    printf("Enter the first co-ordinates:\n");  
    scanf("%d %d",&x1,&y1);  
    printf("Enter the second co-oedimates:\n");  
    scanf("%d %d",&x2,&y2);  
    dx=x2-x1;  
    dy=y2-y1;  
    p=2*dy-dx;  
    while(x1<=x2){  
        putpixel(x1,y1,50);  
        x1++;  
        if(p<0){  
            p=p+2*dy;  
        }  
        else  
        {  
            p=p+2*dy-2*dx;  
            y1++;  
        }  
    }  
    getch();  
    closegraph();  
}
```



Output –



Conclusion: Comment on -

1. Pixel:
A pixel, short for "picture element," is the smallest unit of a digital image. It represents a single point in a raster graphics system, such as a computer screen, and is usually displayed as a square of a specific color.
2. Equation for line:
The equation for a straight line in 2D can be represented as $y = mx + b$, where 'm' is the slope of the line, 'x' is the x-coordinate of a point on the line, 'y' is the corresponding y-coordinate, and 'b' is the y-intercept (the point where the line crosses the y-axis).
3. Need of line drawing algorithm:



The need for a line drawing algorithm arises from the fact that most display devices, such as computer screens, work on a pixel-based raster grid. To display a line on such a grid, the graphics system must determine which pixels to turn on or off to form the desired line segment between the given endpoints.

4. Slow or fast: Fast