PRACTICAL NO 2

~ ARYA RAUL

COMPS 3 20

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

Objective: Draw a line using Bresenham&#39;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 -

Step 1: Except the two end points of Line from User.

Step 2: Calculate the slope(m) of the required Line.

Step 3: Identify the value of slope(m).

If slope(m) is Less than 1 i.e: m &lt; 1 Calculate the constants dx, dy, 2dy, and (2dy – 2dx) and get the first value for the decision parameter as - p0 = 2dy − dx

Step 4: At each Xk along the line, starting at k = 0, perform the following test −

If pk &lt; 0, the next point to plot is (xk + 1, yk) and pk+1 = pk + 2dy

Else plot (xk + 1, yk + 1) pk+1 = pk + 2dy − 2dx

Repeat step 4 (dx - 1) times.

If slope(m) is greater than or equal to 1 i.e: m &gt;= 1

Calculate the constants dx, dy, 2dy, and (2dy – 2dx) and get the first value for the

decision parameter as -

p0 = 2dx − dy

step 5: At each Yk along the line, starting at k = 0, perform the following test −

If pk &lt; 0, the next point to plot is (xk, yk + 1) and

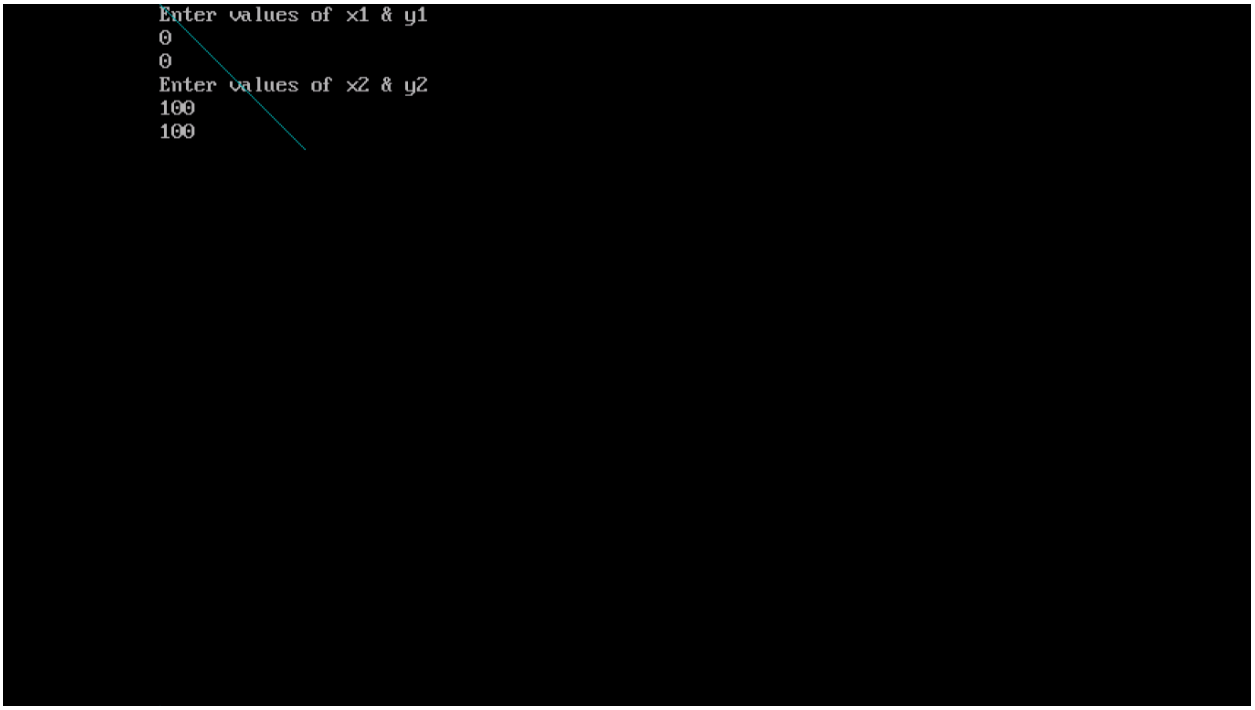
pk+1 = pk + 2dx else plot (xk + 1, yk + 1) pk+1 = pk + 2dx − 2dy

Repeat step 5 (dy - 1) times. Exit.

Program –

```
#include<iostream.h>
#include<conio.h>
#include<graphics.h>
#include<dos.h>
void bsline(int x,int y,int x2,int y2)
{
int dx,dy,p;
dx=x2-x;
dy=y2-x);
p=2*(dy)-(dx);
while(x<=x2)
{
if(p<0)
{
x=x+1;
y=y;
p=p+2*(dy);
}
else
{
x=x+1;
y=y+1;
p=p+2*(dy-dx);
}
putpixel(x,y,RED);
delay(10);
}
}
void main()
{
int gd=DETECT,gm;
initgraph(&gd,&gm,"C:\\turboc3\\bgi");
int x1,x2,y1,y2;
cout<<"Enter the x1,y1,x2,y2 values: ";
cin>>x1>>y1>>x2>>y2;
bsline(x1,y1,x2,y2);
getch();
closegraph();
}
```

Output –



```
Enter values of x1 & y1
0
0
Enter values of x2 & y2
100
100
```

Conclusion:

Comment on –

Pixel : Each pixel is chosen based on integer calculations, which makes it highly efficient for drawing lines on digital displays.

Equation for line : Y = mx+ c

Need of line drawing algorithm : Bresenham's line algorithm is needed primarily for its efficiency and accuracy in drawing straight lines on digital displays.

Slow or fast : fast