



DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

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Experiment-2

Student Name: Ankit Debnath

Branch: BE-CSE

Semester: 6

Subject Name: Computer Graphics Lab

UID: 22BCS13258

Section/Group: 605/A

Date of Performance: 23/01/25

Subject Code: 22CSH-352

1. Aim:

Implement and compare the performance of Simple DDA, Symmetrical DDA, and Bresenham's algorithm for positive and negative line slope.

2. Objective:

The objective of this practical is to implement and compare the performance of Simple DDA, Symmetrical DDA, and Bresenham's line-drawing algorithms for lines with both positive and negative slopes. The comparison focuses on computational efficiency, accuracy, and their ability to render lines on a raster display.

3. Algorithm:

- I. Initialize Graphics: Start graphics mode using `initgraph()` and set the background to white.
- II. Draw Line Using Simple DDA.
- III. Draw Line using Symmetrical DDA.
- IV. Draw Line Using Bresenham's Line Algorithm.
- V. Wait and Exit: Pause with `getch()` and close graphics using `closegraph()`.

4. Implementation/Code:

SIMPLE DDA:

```
#include<iostream.h>
#include<dos.h>
#include<conio.h>
#include<math.h>
#include<graphics.h>
#define round(a) ((int)(a+0.5))
void dda_line(int x1,int y1,int x2,int y2)
{
    int dx=(x2-x1);
    int dy=(y2-y1);
    int length;
    if(abs(dy)>abs(dx))
        length=abs(dy);
```



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```
        else
            length=abs(dx);
            float xinc,yinc,x=x1,y=y1;
            xinc=dx/(float)length;
            yinc=dy/(float)length;
            putpixel(round(x),round(y),15);
            for(int k=1;k<=length;k++)
            {
                x=x+xinc;
                y=y+yinc;
                putpixel(round(x),round(y),15);
                delay(50);
            }
    }
void main()
{
    clrscr();
    int x1,x2,y1,y2;
    int gd=DETECT,gm;
    cout<<"Enter the x1 : ";
    cin>>x1;
    cout<<"Enter the y1 : ";
    cin>>y1;
    cout<<endl;
    cout<<"Enter the x2 : ";
    cin>>x2;
    cout<<"Enter the y2 : ";
    cin>>y2;
    getch();
    initgraph(&gd,&gm,"c:\\turbo3\\bgi");
    dda_line(x1,y1,x2,y2);
    setcolor(7);
    outtextxy(150,150,"ANKIT DEBNATH");
    outtextxy(200,250,"22BCS13258");
    getch();
    closegraph();
}
```

SYMMETRICAL DDA:

```
#include<conio.h>
#include<iostream.h>
#include<graphics.h>
#include<dos.h>
#include<math.h>
#define ROUND(a)((int)(a+0.5))
void symDDA(int xa,int ya,int xb,int yb)
{
    int dx=xb-xa,dy=yb-ya;
    float length;
    float xinc,yinc,x=xa,y=ya;
    if(abs(dx)>abs(dy))
        length=abs(dx);
```



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```
else
    length=abs(dy);
float n=log10(length)/log10(2);
xinc=dx/(pow(2,n));
yinc=dy/(pow(2,n));
putpixel(ROUND(x),ROUNDYes,15);
delay(50);
for(int i=0;i<length;i++)
{
    x=x+xinc;
    y=y+yinc;
    putpixel(ROUND(x),ROUNDYes,15);
    delay(50);
}
}
void main()
{
    int gd=DETECT,gm;
    initgraph(&gd,&gm,"");
    int xa,xb,ya,yb;
    cout<<"enter the points";
    cin>>xa>>xb>>ya>>yb;
    cleardevice();
    symDDA(xa,xb,ya,yb);
    getch();
    closegraph();
}
```

BRESENHAM'S LINE-DRAWING ALGORITHM

```
#include<iostream.h>
#include<conio.h>
#include<graphics.h>
#include<math.h>
#include<dos.h>
int sign(int x)
{
    if(x<0)
        return(-1);
    if(x>0)
        return(1);
    else
        return(0);
}
void lineBres(int xa,int ya,int xb,int yb)
{
    int sx,sy,t,length,flag;
    int x=xa;
    int y=ya;
    int dx=abs(xa-xb),dy=abs(ya-yb);
    sx=sign(xb-xa);
    sy=sign(yb-ya);
    if(dy>dx)
```



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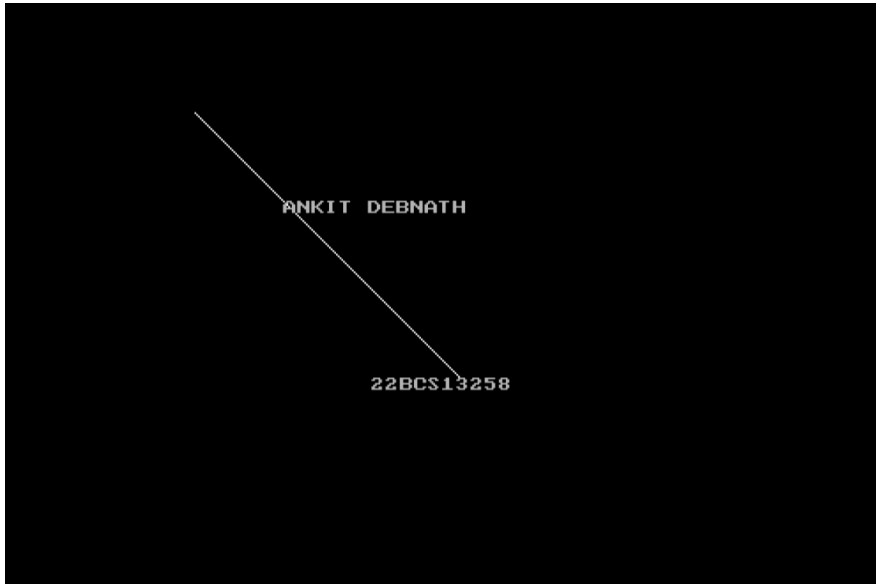
```
{
    t=dx;
    dx=dy;
    dy=t;
    length=dy;
    flag=1;
}
else
{
    length=dx;
    flag=0;
}
int p=(2*dy)-dx;
int twoDx=2*dx,twoDy=2*dy;
putpixel(x,y,15);
delay(50);
for(int i=0;i<length;i++)
{
    while(p>0)
    {
        if(flag==1)
            x=x+sx;
        else
            y=y+sy;
        p=p-twoDx;
    }
    if(flag==1)
        y=y+sy;
    else
    {
        x=x+sx;
        p=p+twoDy;
        putpixel(x,y,15);
        delay(50);
    }
}
}

void main()
{
    int gd=DETECT,gm;
    initgraph(&gd,&gm,"c://turboc3//bgi");
    int xa,ya,xb,yb;
    cout<<"Enter the starting point of x :";
    cin>>xa;
    cout<<"Enter the starting point of y :";
    cin>>ya;
    cout<<"Enter the ending point of x :";
    cin>>xb;
    cout<<"Enter the ending point of y :";
    cin>>yb;
    cleardevice();
    lineBres(xa,ya,xb,yb);
    getch();
    closegraph();
}
```

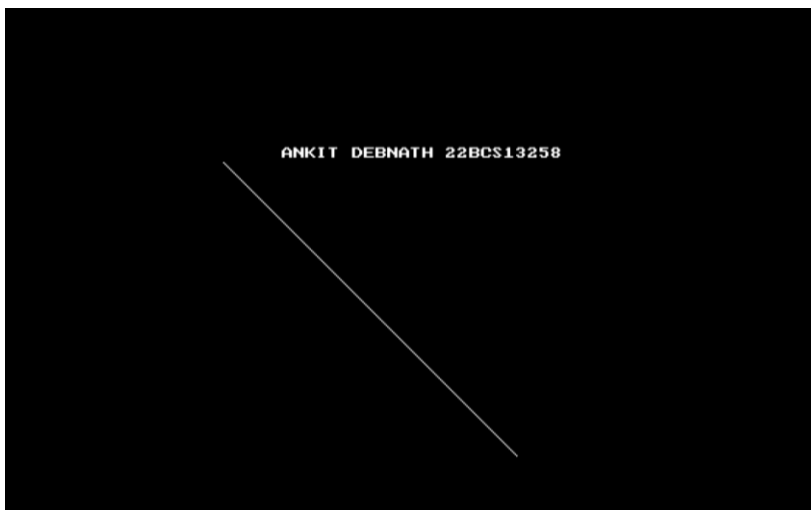
}

5. Output

SIMPLE DDA:



SYMMETRICAL DDA:



BRESENHAM'S ALGORITHM:



6. Learning Outcome:

- i. Understand basic graphics programming using the graphics.h library.
- ii. Understanding Line-Drawing Algorithms
- iii. Display text on the graphics screen using the outtextxy() function.
- iv. Initialize graphics mode and set the background color in a program.
- v. Handle user input and control program flow using getch().