Graphics in C

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Unit-V: Graphics Programming

C Header Files for handling graphics and initializing graphics mode, Understand Coordinate system, Function to Draw Lines,Circle, Arc, Ellipse, pieslice, sector, Rectangle, Bar, 3-D Bars & Polygon, Color Spraying: filling Ellipse, polygons and flooding the fills, Filling Styles and Patterns, Understand Animation, Function to create Animation, Traffic Light and Moving Car Simulation.

Introduction

Graphics programming in C involves creating images, animations, and visual effects using code. Graphics programming in C often involves tasks such as drawing shapes, rendering textures, handling user input, and creating complex visual effects. This type of programming is commonly used in video games, simulations, and other applications that require visual elements.

In C graphics, the graphics.h functions are used to draw different shapes like circles, rectangles, etc, display text(any message) in a different format (different fonts and colors). By using the functions in the header graphics.h, programs, animations, and different games can also be made. In this article, let's discuss how to draw a moving cycle in C using graphics. Functions used:

- **line(x1, y1, x2, y2)**: It is a function provided by graphics.h header file to draw a line. Here x1, y1 is the first coordinates of the line, and x2, y2 are the second coordinates of the line respectively.
- **circle(x, y, r):** It is a function provided by graphics.h header file to draw a circle. The x, y are the center points of the circle and r is the radius of the circle.
- **rectangle(X1, Y1, X2, Y2):** It is employed in the creation of a rectangle. The rectangle must be drawn using the coordinates of the left top and right bottom corners. The Xcoordinate and Y-coordinate of the top left corner are X1 and Y1 and the X-coordinate and Y-coordinate of the bottom right corner are X2 and Y2 respectively.
- **delay(n):** It is used to hold the program for a specific time period. Here n is the number of seconds you want to hold the program.
- cleardevice(): It is used to clear the screen in graphic mode. It sets the position of the cursor to its initial position, that is, (0, 0) coordinates.
- **closegraph():** It is used to close the graph.

To start with graphics programming, Turbo C is a good choice. Even though DOS has its own limitations, it is having a large number of useful functions and is easy to program. To implement graphics algorithms, to give graphical display of statistics, To view signals from any source, we can use C graphics.

You should have!!!

1. Graphics.h Header File
2. Graphics.lib library file
3. Graphics driver (BGI file)
4. At least 640×480 VGA monitor
5. Header File : graphics.h
6. All Graphical Functions are Included in Graphics.h
7. After Including graphics.h Header File [You can get access graphical functions]
8. You must Know Following Things before Learning Turbo Graphics
9. InitGraph : Initializes the graphics system.
10. In C Program execution starts with main() similarly Graphics Environment Starts with this function.
11. initgraph() initializes the graphics system by loading a graphics driver from disk then putting the system into graphics mode
12. As this is Our first topic Under Graphics so it is better not to go in details of Parameters.

1. A Simple Program

```
#include<graphics.h>
#include<conio.h>
void main()
{  int gd = DETECT,
gm;   initgraph(&gd,
&gm, "c:\\tc\\bgi");
///Your Code goes Here
getch();  closegraph();
}
```

Output of this simple program

1. Firstly let me tell you what the output of this program is.

2. This program initializes graphics mode and then closes it after a key is pressed.

3. To begin with we have declared two variables of int type gd and gm for graphics driver and graphics mode respectively.

4. DETECT is a macro defined in "graphics.h" header file.

5. Then we have passed three arguments to initgraph function 1st is the address of gd, 2nd is the address of gm and 3rd is the path where your BGI files are present (**you have to adjust this accordingly where you turbo compiler is installed**).

6. getch helps us to wait until a key is pressed, closegraph function closes the graphics mode and finally return statement returns a value 0 to main indicating successful execution of your program

7. After you have understood initgraph function then you can use functions to draw shapes such as circle, line , rectangle etc, then you can learn how to change colors and fonts using suitable functions, then you can go for functions such as getimage, putimage etc for doing animation.

2. Program---Printing Text in Graphics Using Outtextxy Function

```
#include<graphics.h>

#include<stdio.h> int

main(void)

{   int gdriver = DETECT, gmode;

initgraph(&gdriver, &gmode, "c:\\tc\\bgi");

int x = 200, y = 200;

outtextxy(x, y, "Hello World");

closegraph();

}
```

Explanation

outtextxy(x,y,"Hello World");

This Function is Similar to Printf Statement.

Printf Prints Text on Screen in “Text Mode” while outtextxy() function Prints Text onto Screen in “Graphics Mode“.

This Function Accepts 3 Parameters.

Syntax:

outtextxy(x,y,"Hello World");

3. Program --- How to Draw a Cricle

```
#include<graphics.h> #include<conio.h>  void

main() {     int gd=DETECT, gm;

initgraph(&gd, &gm, "c:\\turboc3\\bgi " );

circle(200,100,150);

  getch();

 closegraph();

}
```

More detail on Syntax

1. InitGraph: Initializes the graphics system.
2. Declaration: void far initgraph(int far *graphdriver, int far *graphmode, char far *pathtodriver);
3. Remarks: To start the graphics system, you must first call initgraph.
4. initgraph initializes the graphics system by loading a graphics driver from disk (or validating a registered driver) then putting the system into graphics mode.
5. initgraph also resets all graphics settings (color, palette, current position, viewport, etc.) to their defaults, then resets graphresult to 0.

4. Program --- Draw a Rectangle

```
#include<stdio.h>

#include<conio.h>

#include<graphics.h>

void main()

{    int gd = DETECT, gm;

initgraph(&gd, &gm, "c:\\tc\\bgi");

   line(300, 100, 200, 200); // (from_x,from_y, to_x,to_y)

line(300, 100, 400, 200);    line(200, 200, 400, 200);

getch();    closegraph();

}
```

5. Program --- Setting Styles and More!!!

```
/*Here a sample program to illustrate how to use BARS
which are used for visual statistics */

#include<graphics.h> main() {   int

gd=DETECT,gm,maxx,maxy,x,y,button;

initgraph(&gd,&gm,"");

line(80,150,200,150);

line(80,150,80,50);

settextstyle(1,HORIZ_DIR,1);

outtextxy(100,153,"<-X axis");

settextstyle(1,VERT_DIR,1);

outtextxy(60,50,"<-Y axis");
```

```
  bar(100,100,120,150);

  bar(130,120,150,150);

   getch();

   closegraph();

  }
```

6. Program --- Draw Op-amp Using Graphics Function

```
#include<stdio.h>

#include<conio.h>

#include<graphics.h> void main() {

int gd = DETECT, gm;

initgraph(&gd, &gm, c:\\tc\\bgi");

line(50, 125, 100, 125);   //Horizontal Line -VE erminal

line(50, 175, 100, 175);   //Horizontal Line +VE Terminal

  line(100, 100, 100, 200);  //Vertical Line

  line(100, 100, 150, 150);  //Top to Bottom Slant Line

  line(150, 150, 100, 200);  //Bottom to Top slant Line

  line(125, 100, 125, 125);  //Vertical Line +VCC

  line(125, 175, 125, 200);  //Vertical Line -VCC

  line(150, 150, 200, 150);  //Horizontal line getch();

  closegraph();

  }
```

Important Functions

Clearing the graphics window… cleardevice();

Delay the program, so that users can see what is happening…sending in the number of msec delay(milliseconds); Wait for a keyboard hit:

getch();or,kbhit();

Important functions (Drawing lines)

1. Set Drawing Color (for lines and edges)
2. (colors typically range from 0-15; 0 is usually black and 15 is white)
3. setcolor(color);
4. Set Background Color (usually for text)
5. setbkcolor(color);
6. Set Fill Style and Color (for interiors)
7. Pattern 0-12, 0 = empty, 1 = solid
8. setfillstyle(pattern, color)
9. Set Line Style and Thickness
10. Style: 0 = solid, 1 = dotted, 3 = dashed
11. Thickness is the width in terms of pixels
12. setlinestyle(style, pattern, thickness)

Important Functions(Drawing…Areas)

1. Drawing absolute (from one coordinate to another)

2. linerel(from_x, from_y,
3. Drawing a Circle
4. lGiven center and radius as whole numbers
5. circle (center_x, center_y, radius);
6. lDrawing a filled Rectangle
7. (given upper left and lower right corners)
8. bar(ul_x, ul_y, lr_x,lr_y);
9. lDrawing an unfilled Rectangle
10. (given upper left and lower right corners)
11. rectangle(ul_x, ul_y, lr_x, lr_y); to_x, to_y);

Important Functions(How Text Look)

1. Text Formatting
2. Set the justification
3. Horizontal: (0 = left, 1 = center, 2= right)
4. Vertical: (0 = bottom, 1 = center, 2 = top)
5. settextjustify(horizontal, vertical)
6. Set the text style
7. Font: (0-11)
8. Direction: 0 = left to right direction
9. Character Size: 0 = normal, 6 is really big!

10.settextstyle(font,direction, character size)

BLACK:	0
BLUE:	1
GREEN:	2
CYAN:	3
RED:	4
MAGENTA:	5
BROWN:	6
LIGHTGRAY:	7
DARKGRAY:	8
LIGHTBLUE:	9
LIGHTGREEN:	10
LIGHTCYAN:	11
LIGHTRED:	12
LIGHTMAGENTA:	13
YELLOW:	14
WHITE:	15

Important Functions(Messages)

1. Text Output
2. Set Text color (index ranges 0-15)
3. setcolor(index);
4. Output a message on the graphics window at the current position
5. outtext("messages on graphics window");
6. Output a message on the graphics window at the given x,y coordinate
7. outtextxy(x,y,"message");

Important Functions(Mouse Input)

1. Has there been a mouse click?

2. Right Click is 513
3. Left Click is 516Middle Click is 519 (the wheel…)
4. answer = ismouseclick(kind)
5. Clear the mouse click
6. *(if you don’t do this you can’t get the next mouse click!)*
7. clearmouseclick(kind);
8. What was the coordinate when the mouse click happens…
9. x = mousex(); y = mousey();

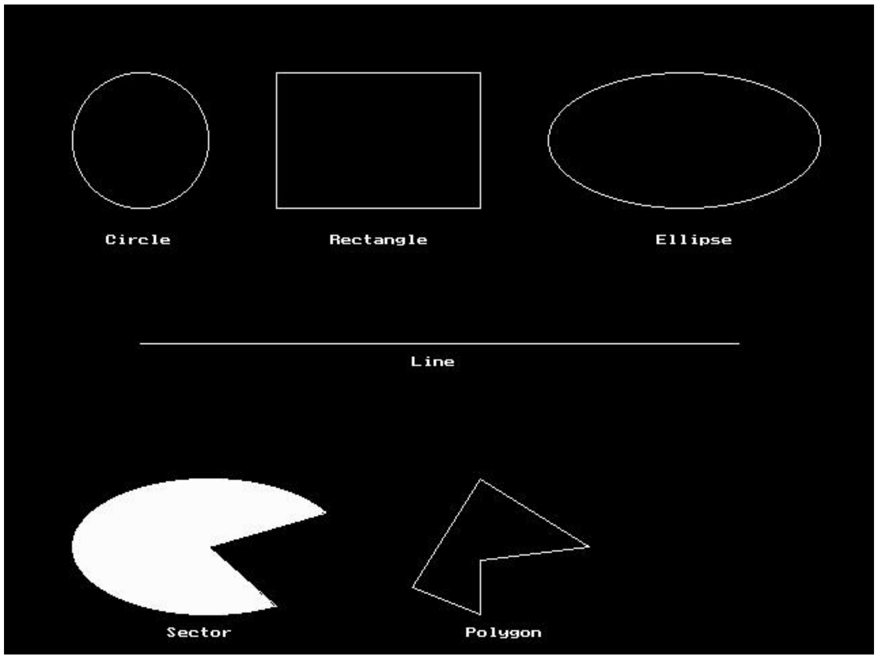
8. Program --- Moving On(concentric circles)

```
#include <graphics.h>

int main()

{  int gd = DETECT, gm; int x = 320, y = 240,

   radius; initgraph(&gd, &gm, "C:\\TC\\BGI");

for ( radius = 25; radius <= 125 ; radius = radius + 20)
   circle(x, y, radius);

   getch();

   closegraph(); return

   0;

}
```

9 . Basic Shapes and Colors

```
#include<graphics.h>

#include<conio.h>

void main() { int

gd=DETECT, gm;

int poly[12]={350,450, 350,410, 430,400, 350,350,
300,430, 350,450 };
initgraph(&gd, &gm, "");

 circle(100,100,50);

outtextxy(75,170, "Circle");

rectangle(200,50,350,150);

outtextxy(240, 170, "Rectangle");

ellipse(500, 100,0,360, 100,50);

outtextxy(480, 170, "Ellipse");

line(100,250,540,250);

outtextxy(300,260,"Line");

sector(150, 400, 30, 300,

100,50); outtextxy(120, 460,

"Sector"); drawpoly(6, poly);

outtextxy(340, 460, "Polygon");

getch(); closegraph();

}
```

Output!!!



10. Program --- Moving Car

```
#include <graphics.h> #include <dos.h>

int main() { int i, j = 0, gd = DETECT,

gm; initgraph(&gd,&gm,"C:\\TC\\BGI");

settextstyle(DEFAULT_FONT,HORIZ_DIR,2);

outtextxy(25,240,"Press any key to view the moving

car"); getch(); for( i = 0 ; i <= 420 ; i = i +

10, j++ )

{ rectangle(50+i,275,150+i,400);

rectangle(150+i,350,200+i,400);

circle(75+i,410,10);

circle(175+i,410,10);

setcolor(j); delay(100); if( i

== 420 ) break; if ( j == 15 ) j
= 2; cleardevice(); // clear
screen
} getch();
closegraph();
return 0;
}
```

11. Some Graphics Effects Using Random Numbers

```
#include "graphics.h"
#include "conio.h"
#include "stdlib.h"
void main() { int
gd,gm; gd=DETECT;
initgraph(&gd, &gm,
""); setcolor(3);
setfillstyle(SOLID_
FILL,RED); bar(50,
50, 590, 430);
setfillstyle(1,
14); bar(100, 100,
540, 380);
while(!kbhit()) {
```

```
putpixel(random(439)+101,
random(279)+101,random(16)); setcolor(random(16));
circle(320,240,random(100));
} getch();
closegraph();
}
```

ellipse(int x, int y, int start_angle, int end_angle, int x_radius, int y_radius)

In this function x, y is the location of the ellipse. x_radius and y_radius decide the radius of form x and y. start_angle is the starting point of angle and end_angle is the ending point of angle. The value of angle can vary from 0 to 360 degree.

```
#include
<graphics.
h>    int
main()
{
    // gm is Graphics mode which is a computer
display

    // mode that generates image using pixels.

    // DETECT is a macro defined in "graphics.h"
header file      int gd = DETECT, gm;


    // location
of ellipse
int x = 250, y
= 200;


    // here is the starting angle

    // and end angle
int start_angle = 0;
int end_angle = 360;
```

```
    initgraph(&gd,      &gm,   "" );

      lineto(250,     100)  ;

    getch();

    closegraph();

    return   0;

}
```

```
        // radius from x
    axis and y axis
    int x_rad = 100;
    int y_rad = 50;

        // initgraph initializes the
    graphics system      // by loading a
    graphics driver from disk
    initgraph(&gd, &gm, "");

        // ellipse
    function
    ellipse(x, y,
    start_angle,
    end_angle, x_rad,
    y_rad);

        getch();
           closegraph();
```

pieslice() draws and fills a pie slice with center at (x, y) and given radius r. The slice travels from s_angle to e_angle which are starting and ending angles for the pie slice. The angles for pie-slice are given in degrees and are measured counterclockwise.

Syntax :

```
void pieslice(int x, int y, int s_angle,
                     int e_angle, int r);
```

```
#include <graphics.h>

/
/
```

```
{
    // gm is Graphics
mode which        // is a
computer display mode
// that generates image
using pixels.

    // DETECT is a
macro defined in
// "graphics.h"
header file      int
gd = DETECT, gm;


    // initgraph initializes the

    // graphics system by
loading a        // graphics
driver from disk
initgraph(&gd, &gm, "");


    // pieslice function
pieslice(300, 300, 0, 120, 150);

    // closegraph function
closes the        // graphics
mode and deallocates all
// memory allocated by
graphics system .


closegraph();
return 0;   }
```

End