

22/07/2020

Intensity of each driver
None are integer number
eg. 1, 2, 3, 5, ... 0

| + |
Read many graphics
written in capital letters
by each driver

drives in {
EGA

VGA

CGA

EGA VGA

CGA VGA

Detect (Default Driver)

C either name of or number
can be passed

Resolution → the maximum no. of pixels that can be plotted on a screen is called as resolution.

Pixel → it is the smallest picture element

640 x 480 — smallest resolution

C:\tc\bin

C:\tc\bgi → graphics path

❶ (+) - escape character

Now compiler understand it as escape character or part of some path

we use double slash (\ \) to denote path

Two part → Application
 Computer Graphics → practical

#include <Graphics.h>

void main ()

{ int gd=DETECT, gm=0;

initgraph(Graphics driver, → &gd

Graphics mode, → & gm)

(path of graphics files);

"C:\\tc\\bgi");

→ code

Graphics Mode

→ to plot a pixel or point)

#include <Graphics.h>

void main ()

{

int gd=DETECT, gm=0;

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

pointpixel(100, 200, WHITE);

getch();

closegraph();

}

Prototypes of point
pixel

pointpixel(

int x, int y,

color of pixel);

Date: / /
Page No.: / /

c Subroutines total 16 colours

Black, , white

grey, blue, red, green,

yellow, cyan, magenta,

light green, light green,

light blue, ^

find the order

getch() → \$ To input some character

Better to close the graphics at last.

23/07/2020

Default colour (white)

Page No.:

Date: / /

How to float a line

In CG we do not have concept of infinite line

Starting point = x_1, y_1

Ending point = x_2, y_2

Line (int x_1 , int y_1 , int x_2 , int y_2)

After饱patched in previous code,

line (150, 100, 300, 400);

circle (100, 150, 5);

rectangle (100, 200, 200, 300);

triangle

circle (int x , int y , int r)

(x, y) \rightarrow center of circle

$r = \text{radius}$

rectangle ((x_1, y_1), (x_2, y_2))

left top corner

right bottom corner

Ellips

to draw the Arc

center of circle,

radius, starting angle

arc (int x , int y , int r , 30, 40)

ending angle.

ellipse

(center major axis & minor axis
elliptical arc)

ellipse (intensity, intr1, intr2, int-s-angle,
 int-t-angle);

Ellipse

(200, 180, 100, 125, 30, 270);

Angle [0, 360)

$x_0, y_0 = \text{center}$
 $r_1 = \text{major axis}$
 radius in x direction
 $r_2 =$
 radius in y direction

Assignment ①

Draw the following in 'c':

- i) pixel
- ii) line
- iii) Rectangle
- iv) Square
- v) triangle
- vi) Circle
- vii) arc
- viii) ellipse
- ix) elliptical arc

set colour (green);

In put part it is compulsory to
put where.

Page No.:

Date: / /

Assignment - 2

try following in C

i) Set colour

ii) Set bkcolour

iii) outfittext

Set bkcolour (MAGENTA);

To plot character,

outtext (int x, int y, "Hi");



go to text → to save the cursor location

Q:- which function is used to change
cursor location?

Q: change in text styling by using some
suitable function?

24/07/2020

Assignment - 3

- ① Plot a rectangle & fill it with some colour.
- ② Plot a circle & fill it with some colour.

* floodfill

floodfill (int x, int y, int colour)

pointed within the object

(x, y) = seed point

→ Blocking circle

- ③ Increasing & decreasing circle until you hit some boundary

- ④ Increasing & decreasing distance b/w circle → collision of balls

Assignment - 4

- ⑤ A person with signature in the mouth, इन्हें बाते हुए

Assignment 5

- ① Earth is moving in circular path around the sun.
- ② elliptical path

(Assignment)

Electrical orbit

- ⑥ Display devices,

Cathode ray tube

- ⑥ Frame buffer,

frame buffer stores picture definition which is required to display one screen

- ⑥ Picture definition:-

it defines that which pixel need to glow to see the picture on screen

- ⑥ Persistence is defined as the time that it takes the emitted light from the screen to decay to one-tenth of its original intensity. Phosphorus has persistence 10-60 microseconds

- ⑥ Refresh Rate - the no. of frames drawn per second on the screen is refresh rate.

- ⑥ Low persistence + Refresh is low flicker on the screen.

Standard refresh rate - 60 frame/second.

→ max no. of pixels plotted on a screen.

★ 2-D display technique

→ RASTER scan display (Scan line conversion)

→ 1. Horizontal retrace for scan line conversion.
vertical retrace to begin the next frame.

2. Interlacing techniques to avoid flickers.

→ ~~e.g.~~ resolution - 40×20

How many horizontal retrace -

→ 19 $\left(\frac{1}{2}\right)$ & 1 \checkmark retrace

→ Row 1. \rightarrow

Row 2. $\bullet \rightarrow$

Row 3. \rightarrow

Row 4. $\bullet \rightarrow$

Row 5. \rightarrow

:

Second last Row. \rightarrow

Last Row. $\bullet \rightarrow$

vertical
Retrace

di

first scan all the odd rows. (Start row 1)
then

second last Row vertical retrace Happened
then

Scan all even rows
then

in last Row a vertical retrace Happened
then

again back to Row 1

Raster Scan display

$M \times N$ (N rows & M columns)

Horizontal retrace = no. of rows - 1

Vertical retrace = 1.

In case of Interlacing technique

vertical retrace = 2

Horizontal retraces = $N-2$

Advantage of Interlacing technique

After Horizontal retrace (odd)

Blur picture available

after ~~Horizontal~~ Vertical retrace

whole picture is clearly visible

- Horizontal retrace take less time
- vertical retrace take more time

2nd method

RANDOM scan method (fastest method)

electron beam focus on only those pixel where

How navigation happens

Random pixel

Raster Scan

500/600/1000

Random Scan

Conclusion

- | | |
|--|--|
| <ol style="list-style-type: none"> 1. Picture definition is stored as set of pixel 2. Picture give realistic view
eg- tree, animals etc 3. Long range of colours can be used in picture 4. Slower method 5. Not so smooth (due to high diversity) | <ol style="list-style-type: none"> 1. Picture definition is a set of line commands. 2. Method is good for live based application
eg - Architecture drawing
Machine drawing
Engineering drawing 3. Lines are of one colour only. 4. fast method 5. smooth lines / sharp pictures |
|--|--|

★

How colour is given to the pixels

Page No.:

Date: / /

1st method

Colour CRT Monitor

1. Beam penetration method
2. Shadow - mask method

Definition :-

(In reference to raster Scan system)

① Scan line :— In raster scan system, electron beam is swept across the screen, one row at a time from top to bottom. Each row is referred as scan line.

② Refresh buffer / frame buffer: Picture definition is stored in the memory area called refresh buffer / frame buffer, where frame refers to the total screen area.

or Screen point

③ Pixel :— Each screen spot can be illuminated by electron beam is referred as pixel / Pel.

④ Colour buffer :— Since the refresh buffer is used to store the set of screen colour values, it is also sometimes colour buffer.

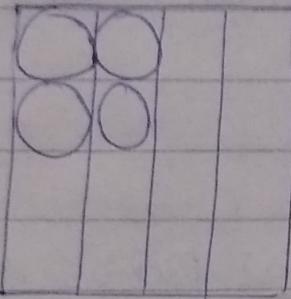
Eg- Normal TV, colour printer.

Aspect Ratio:

No. of pixel columns divided by the no. of scan lines is aspect ratio or vice-versa.

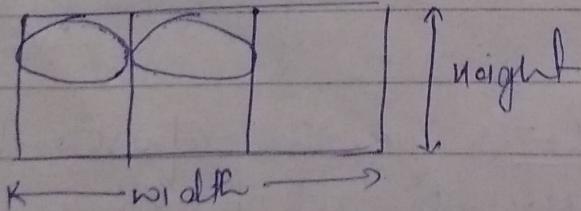
640 x 480

$$\text{Aspect ratio} = \frac{12}{16} \frac{3}{4} = \frac{3}{4} = 0.75$$



Square *format* \Rightarrow Aspect ratio = height / width (of pixel/Grid)
or vice versa. $= \underline{\underline{1}}$

\Rightarrow If Grid is not in square format



Aspect ratio < 1

Colour Buffer

Eg)- 640×480

X-coordinates = 10 bits.

Y-coordinates = 9 bits

19 bits for fixed position.

In Black & white monitor = 1 bit.

Colour monitors = 4 bits, 5 bits,

23 bits per pixel, 24 bits per pixel.

Size of frame buffer

$$23 \times 640 \times 480 = \text{bits} = 18 \text{ bytes}$$

Depth

The no. of bits per pixel in frame buffer is called as depth.

Bit maps:- A frame buffer with a bit per pixel for colour is called as bit maps.

Pix maps:- A frame buffer with multiple bits per pixel for colour is called as pix maps.