Roll No : 21446
Batch : G-4

Assignment - 10

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- Problem statement :-
  Write a C++ / Java program to generate Hilbert curve using concept of Fractals.

- Objective :- To implement the concept of Hilbert curve in a C++ program

: Outcome :-
  Student will learn to implement Hilbert curve in a java program using concept of Fractals.

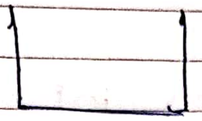
- H/W & S/W :- 64 bit Linux, Fedora, Qt - creator

- Theory :-

Fractals :

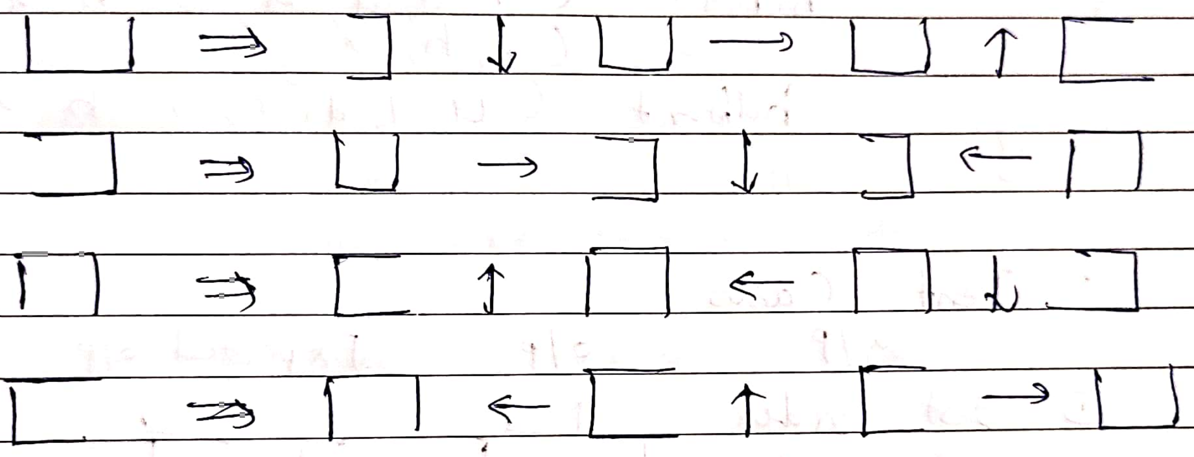
- They are complex, pictures generated by a computer from a single formula
- They created using recursion meaning one formula is repeated with slightly different values over & over again taking into account the result from previous interations

Hilbert Curve :
Continous Fractal space filling curve first described by mathematician Hilbert. The basic model of Hilbert is given by,



The hilbert curve is also a special version of any image processing function that benefits from the use of quadtree may also use Hilbert curve.

Cup sub-division rule :



- Algorithm :-

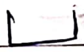
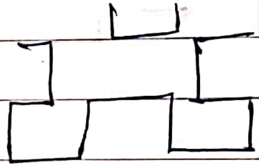
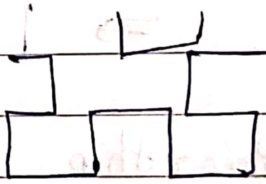
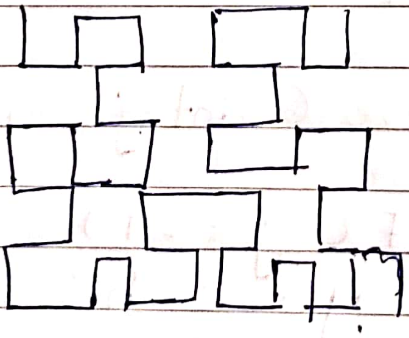
① MOVE

```
void move ( int j, int h, int x, int y)
{
        if ( j == 1)
            y -= h;
        else if (j == 2)
            x += h
        else if ( j == 3)
            y += h
        else if ( j == 4)
            x -= h;
}
```

② Hilbert :

```
void   Hilbert ( int r, int d, int i, int h,
                 int x, int y, int l, int u)
{
        if ( i > 0 )
         i - - ;
        hilbert ( d, r, u, l, i, h, x, y ) ;
        move    ( r, h, x, y ) ;
        hilbert ( r, d, l, u, i, h, x, y ) ;
        move    ( d, h, x, y ) ;
        hibert  ( r, d, l, u, i, h, x, y ) ;
        move    ( l, h, x, y ) ;
        hulbert ( u, l, d, r, i, h, x, y ) ;
}
```

- Test Cases :

	i/p	o/p	Expected o/p	Result
①	1st order			Success
②	2nd order			Success
③	3rd order		Same as o/p	Succes

- Conclusion :-

We have successfully implemented & studied Hilbert Curve.