

# Assignment - 10

Title :- Hilbert Curve.

Problem Statement :-

Write a c++ 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.

S/H requirements :- C++ creator, 64 bit linux OS.

Theory :-

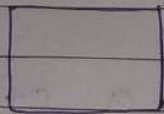
Fractals :

- They are complex pictures generated by a computer from single formula.
- They are created using recursion i.e. one formula is repeated with slightly different values over & over again taking into account the results from previous values.

Hilbert curve :-

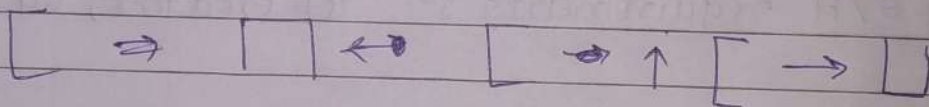
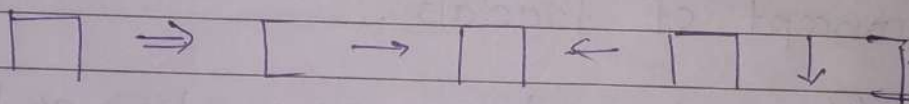
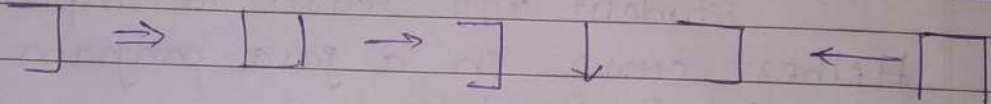
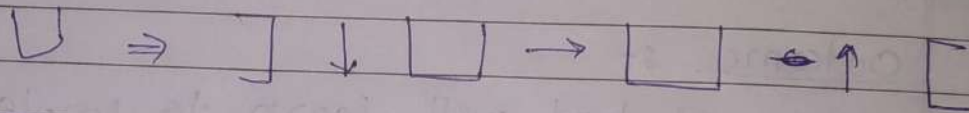
continuous ~~point~~ fractal space filling curve first describe by German mathematician H. Hilbert.

The base model for Hilbert curve is,



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

cup subdivision 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);
    Hilbert(r, d, l, u, i, h, x, y);
    move(l, h, x, y);
    Hilbert(u, l, d, r, i, h, x, y);
}
```

### Test Case :-

	I/p	O/p	Expected o/p	Result
1] 1st order				Success
2] 2nd order				Success
3] 3rd order				Success

### Conclusion :-

We have successfully implemented & studied Hilbert curve.