K-D TREE

Binary Search Tree

- Consider the following data :
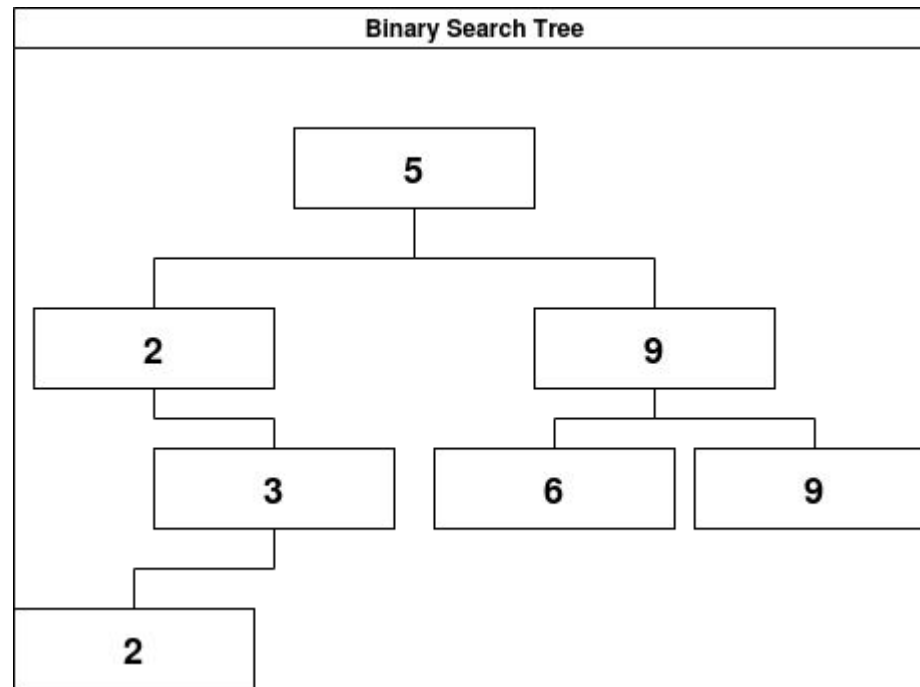
Binary search Tree Construction

- Consider the following data :

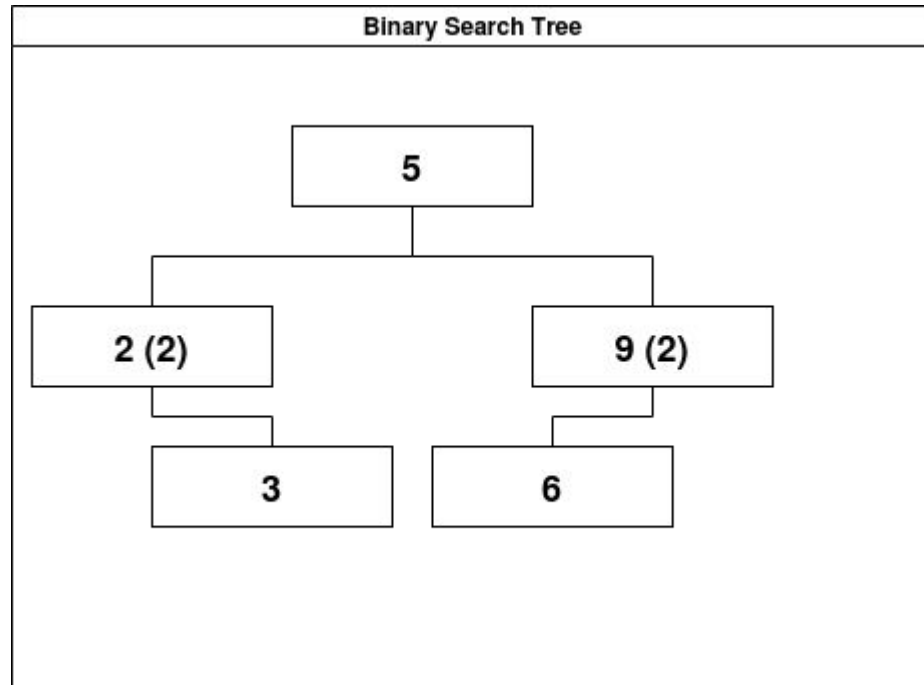| Object	Position in X
A	5
B	2
C	3
D	2
E	9
F	6
G	9

Binary search Tree Construction
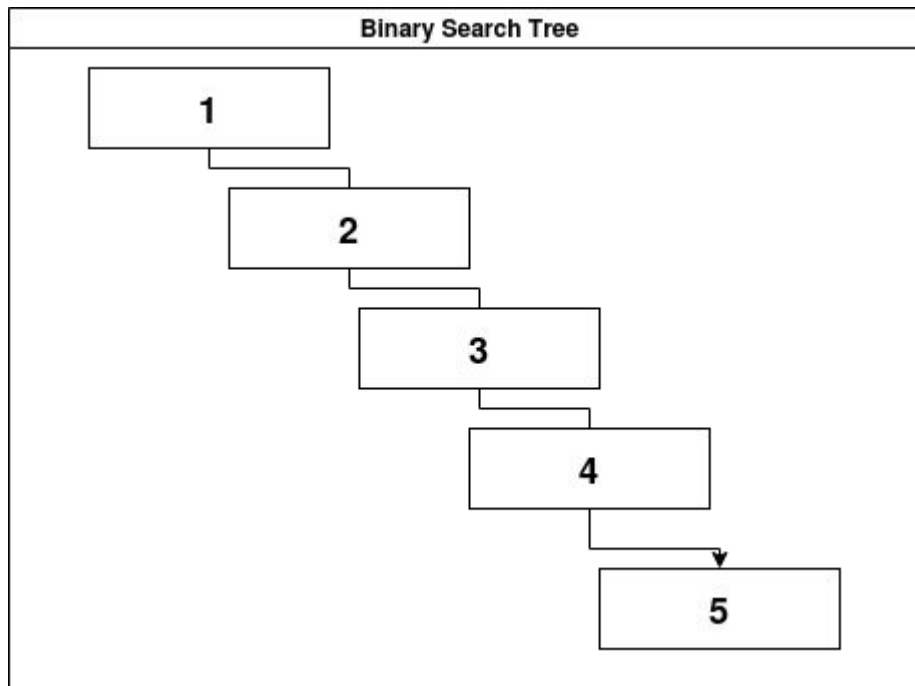
- Data points: 5, 2, 3, 2, 9, 6, 9

Binary search Tree Construction

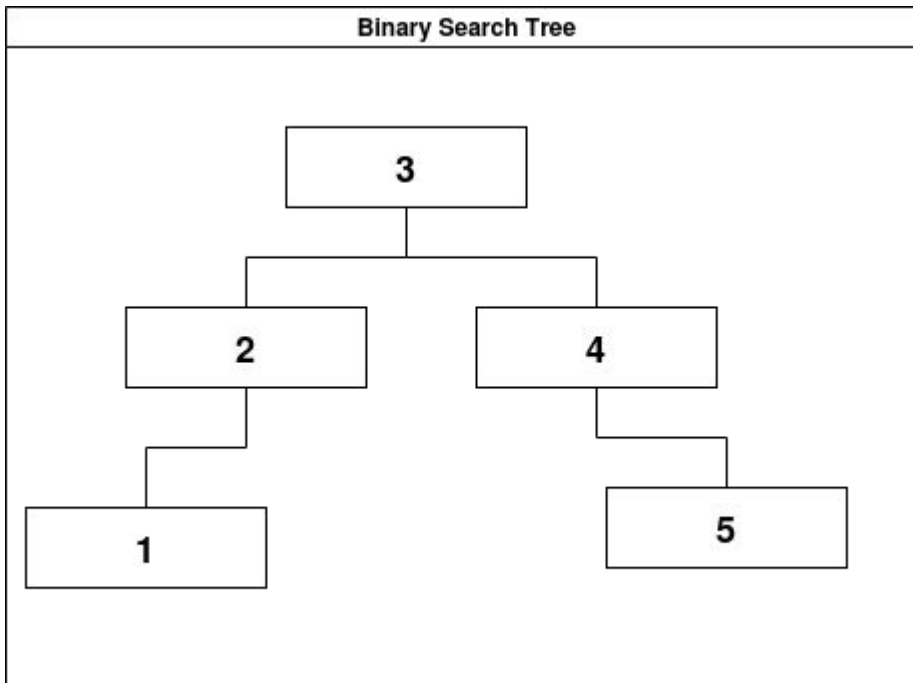- Data points: 5, 2, 3, 2, 9, 6, 9

Binary search Tree Construction

- Consider the following data:

  1, 2, 3, 4, 5

Binary Search Tree

Similar to linear search!

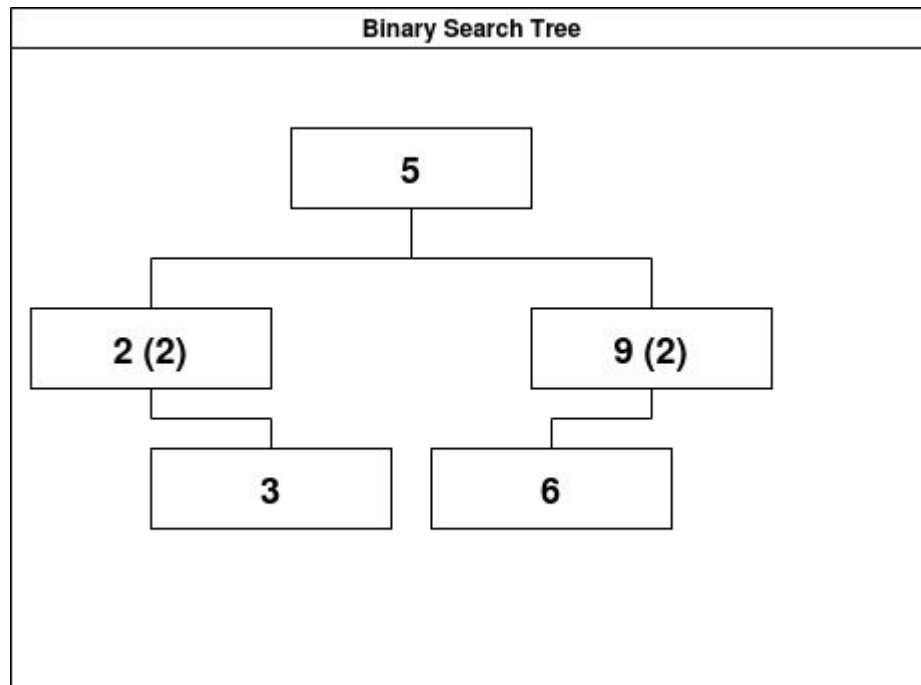# Binary search Tree Construction

- Consider the following data:

  1, 2, *3*, 4, 5

Solution: Take medians and build balanced tree

Range Search using BST

- Query -
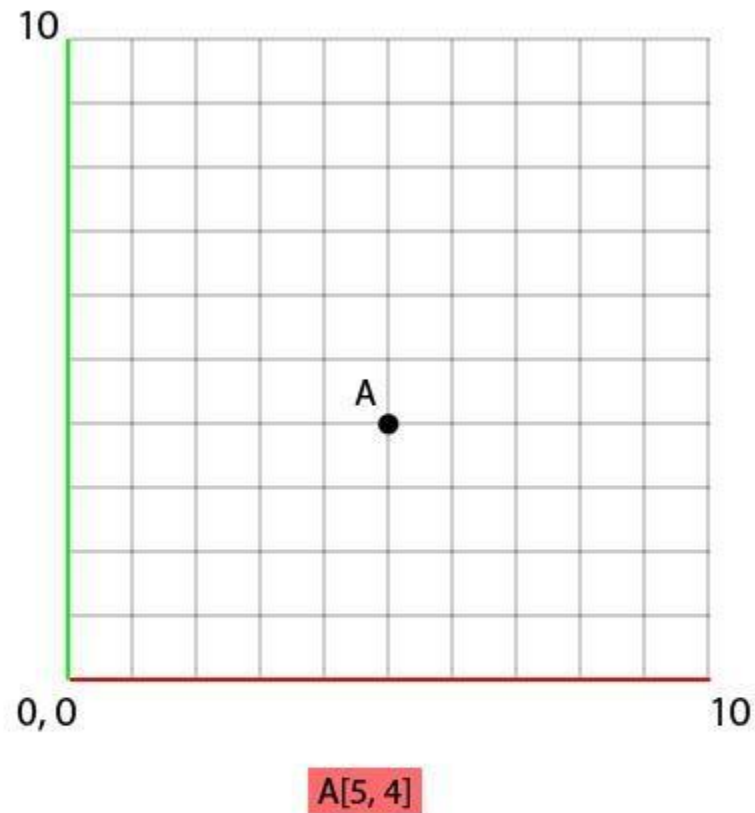 - Select * from table where position_in_X > 2 and position_in_X < 5

Binary Search Tree

```
                  5
          ┌───────┴───────┐
        2 (2)           9 (2)
          └──┐           ┌──┘
             3           6
```

K-D Tree

- What if -

Object	Position in X (A)	Position in Y (B)
A	5	4
B	2	9
C	3	5
D	2	2
E	9	2
F	6	1
G	9	9

K-D Tree

- And Range Query -
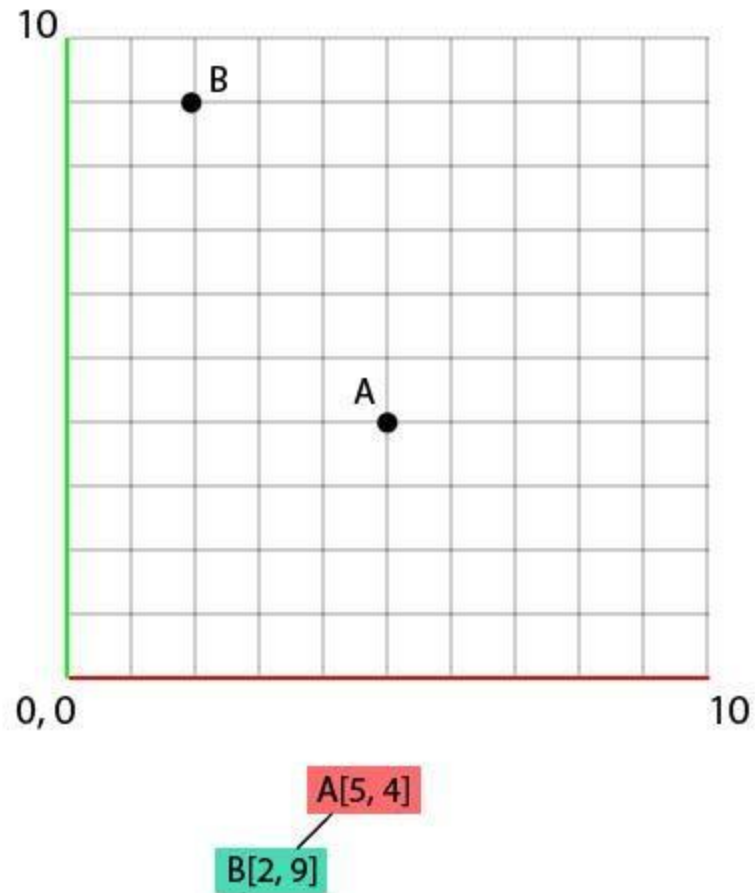   - Select * from table where position_in_X > 2 and position_in_Y<5
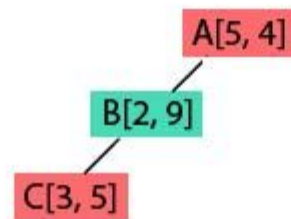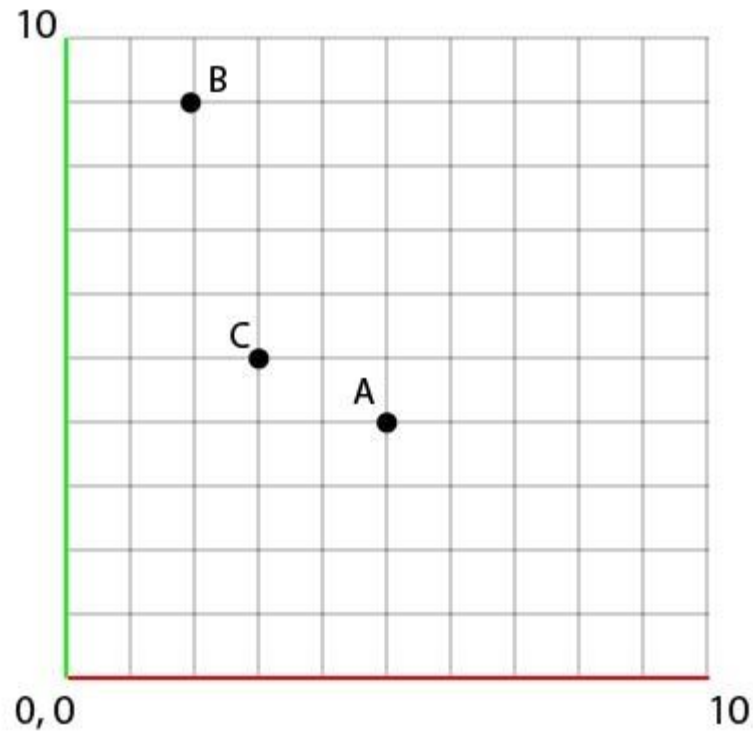
K-D Tree Construction

A[5, 4]

K-D Tree Construction

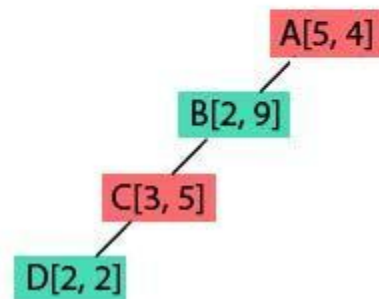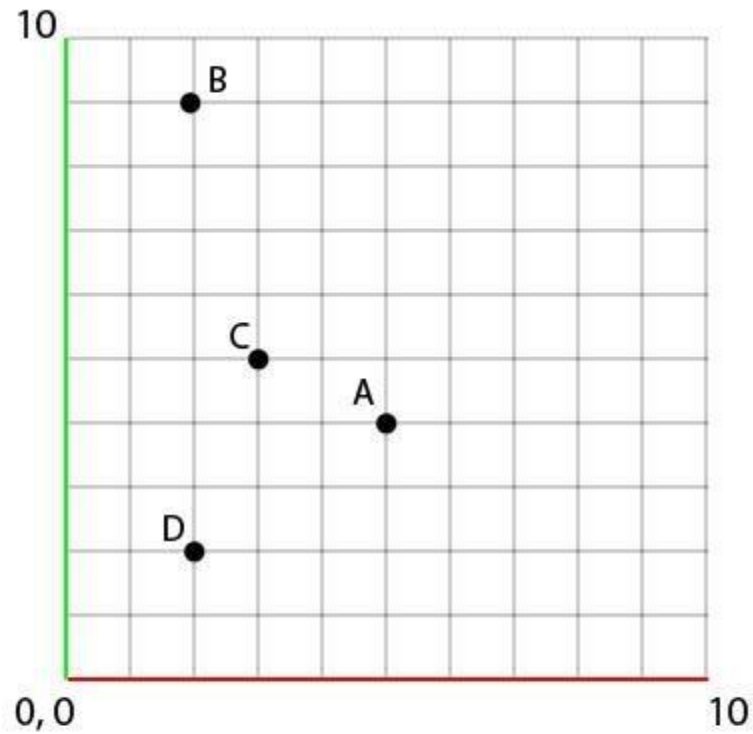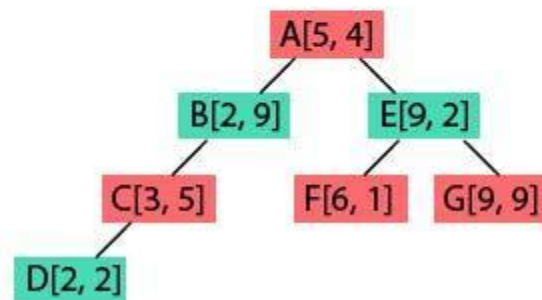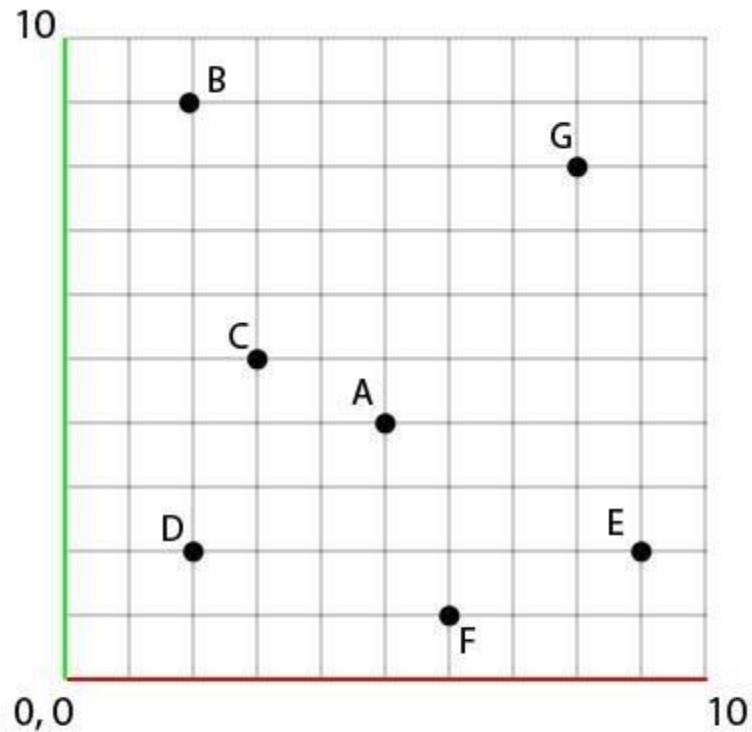- To set B, we'll compare his x value with the x value of A, like so :
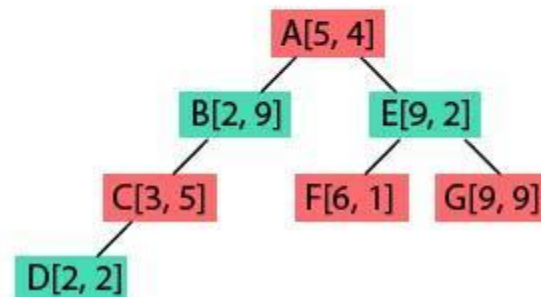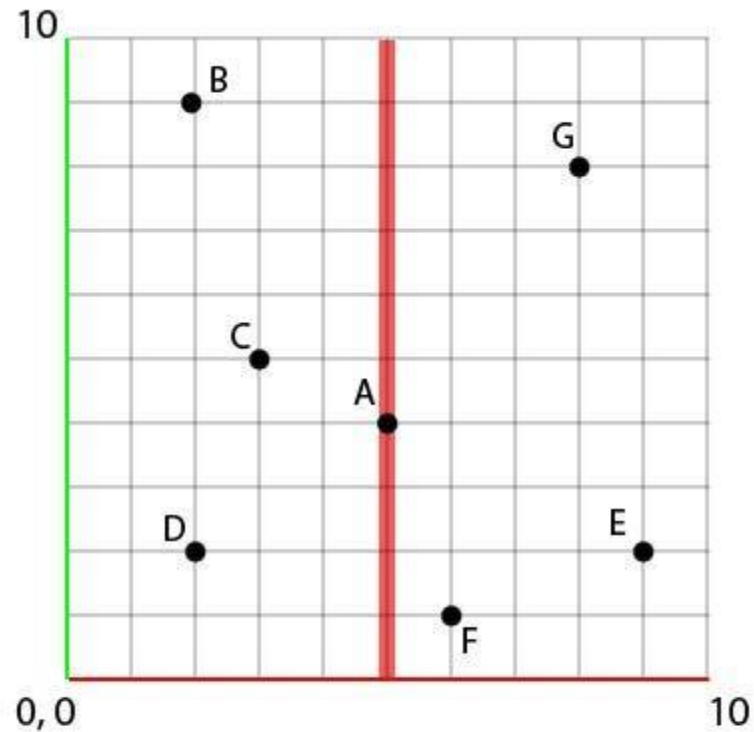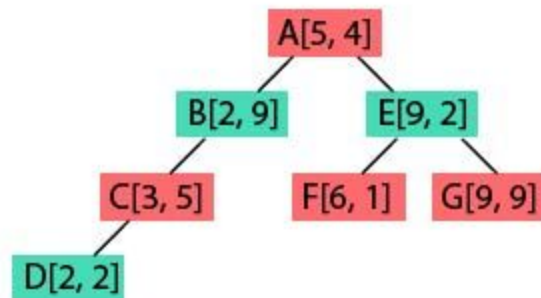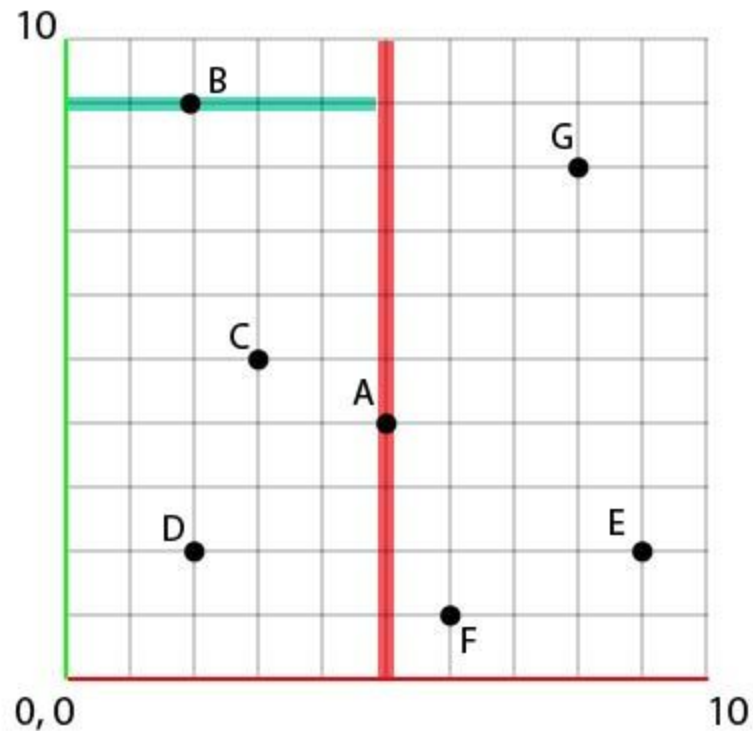   - B.x < A.x => 2 < 5

K-D Tree Construction

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