DATA STRUCTURES AND ITS APPLICATIONS UE22CS252A

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DATA STRUCTURES AND ITS APPLICATIONS

BST: Implementation using Arrays

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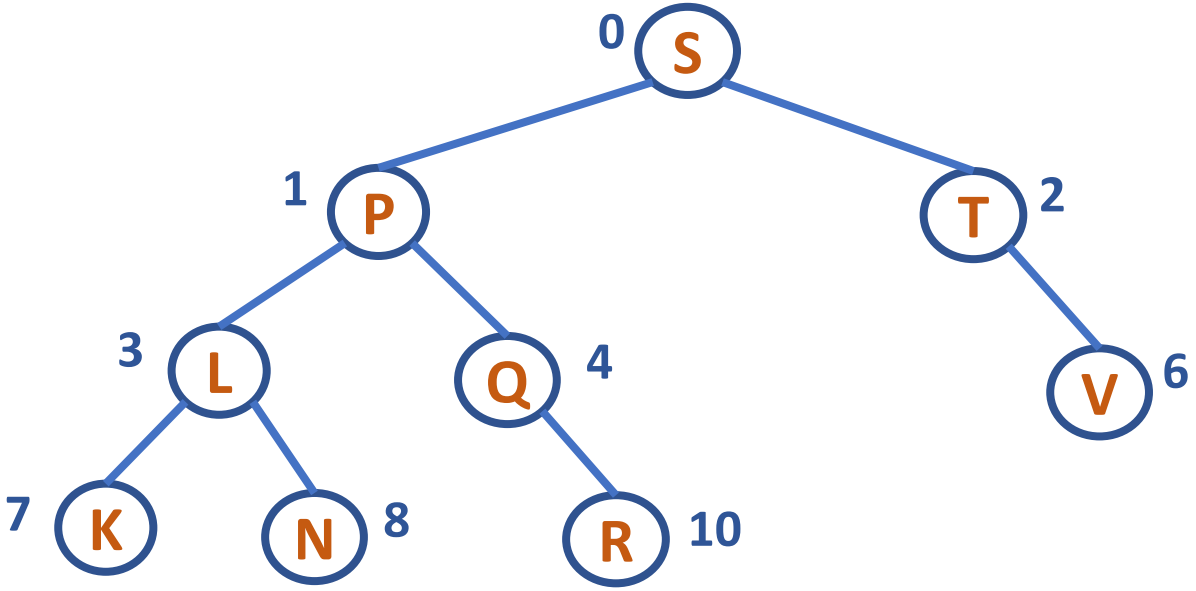
Binary Search Tree - Implementation

Array Implementation (Implicit implementation)



S	P	T	L	Q	...	V	K	N	...	R
0	1	2	3	4	5	6	7	8	9	10

Binary Search Tree - Implementation

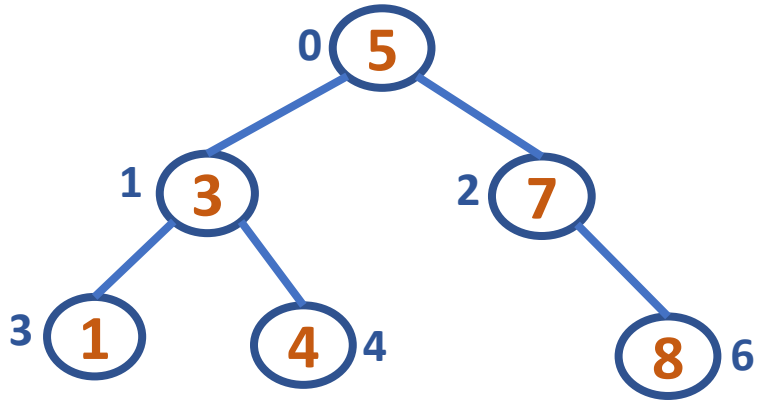
Array Implementation (Implicit implementation)

```
typedef struct tree_array
{
        int info;
        int used;
}NODE;
```

- NODE bst[MAX]; //here bst is an array of nodes
- each node has its data and another field by name used to contain whether it is a valid node or not
- used = 1 or 0

Binary Search Tree - Implementation

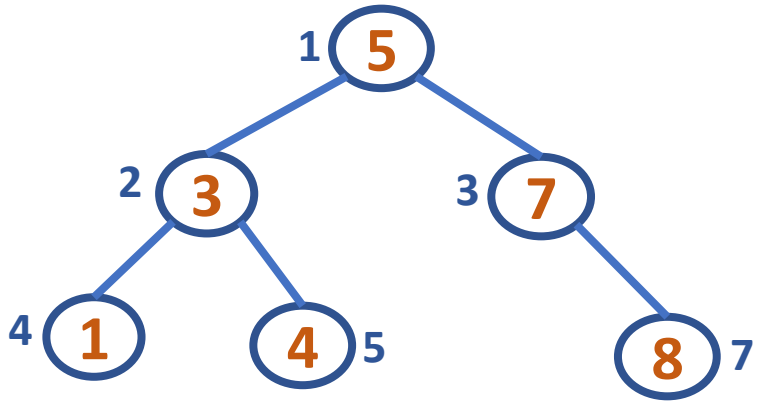
Array Implementation: 5, 3, 7, 8, 1, 4



Root Position: i = 0
Left Child Position: 2i + 1
Right Child Position: 2i + 2

info	5	3	7	1	4		8
used	1	1	1	1	1	0	1
Position: i	0	1	2	3	4	5	6

OR



Root Position: i = 1
Left Child Position: 2i
Right Child Position: 2i + 1

info		5	3	7	1	4		8
used	0	1	1	1	1	1	0	1
Position: i	0	1	2	3	4	5	6	7

1. In an array representation of a BST, if the root is stored at index 1, then the left child and right child of a node at index i is stored at:

A) 2i,2i+1
B) 2i+1,2i
C) i/2,i-1
D) i−1,i/2

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B) 2i+1,2i

C) i/2,i-1

D) i−1,i/2

2.If a node is stored at index i in an array representation of a BST, what is the index of its parent node?

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B) 2i
C) 2i+1
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3. Which of the following is a disadvantage of array implementation of BST compared to linked representation?

A) Harder to implement insertion and deletion
B) Requires dynamic memory allocation
C) Cannot traverse in O(n) time
D) Array indices are not unique

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4. In array implementation of BST, why can space be wasted?

A) Because arrays are not ordered
B) Because BST is always balanced
C) Because skewed trees leave many unused array indices
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5. If the height of a BST is h (root at height 0), what is the maximum size of the array required to store it?

A) h

B) 2h

C) $2^{h+1}-1$

D) h^2

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THANK YOU

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