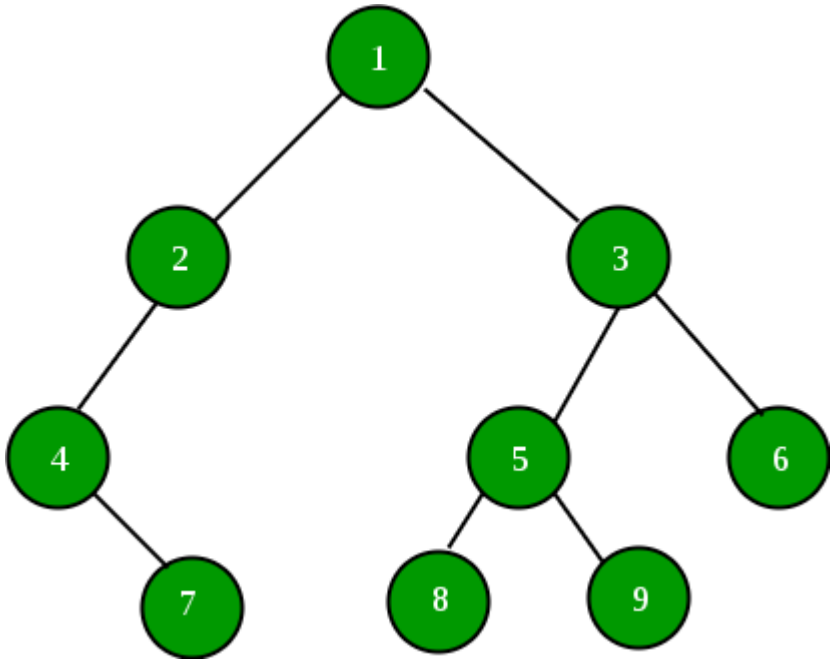
Maximum in Binary Tree

Given a Binary Tree, find the maximum(or minimum) element in it. For example, maximum in the following Binary Tree is 9.



In Binary Search Tree, we can find maximum by traversing right pointers until we reach the rightmost node. But in Binary Tree, we must visit every node to figure out maximum. So the idea is to traverse the given tree and for every node return maximum of 3 values.

1. Node's data.
2. Maximum in node's left subtree.

3. Maximum in node's right subtree.

Below is the implementation of above approach.

C++ Java

```
// Java code to Find maximum (or minimum) in
// Binary Tree

// A binary tree node
class Node {
    int data;
    Node left, right;
```



```
    {
        this.data = data;
        left = right = null;
    }
}

class BinaryTree {
    Node root;

    // Returns the max value in a binary tree
    static int findMax(Node node)
    {
        if (node == null)
            return Integer.MIN_VALUE;
```

```
        int res = node.data;
        int lres = findMax(node.left);
        int rres = findMax(node.right);

        if (lres > res)
            res = lres;
        if (rres > res)
            res = rres;
        return res;
    }

    /* Driver code */
    public static void main(String args[])
    {
        BinaryTree tree = new BinaryTree();
        tree.root = new Node(2);
        tree.root.left = new Node(7);
        tree.root.right = new Node(5);
        tree.root.left.right = new Node(6);
        tree.root.left.right.left = new Node(1);
        tree.root.left.right.right = new Node(11);
        tree.root.right.right = new Node(9);
        tree.root.right.right.left = new Node(4);

        // Function call
        System.out.println("Maximum element is "
                        + tree.findMax(tree.root));
    }
```

```
}

// This code is contributed by Kamal Rawal
```


Output

```
Maximum element is 11
```

Complexity Analysis:

Time Complexity: O(N).
In the recursive function calls, every node of the tree is processed once and hence the complexity due to the function is O(N) if there are total N nodes in the tree. Therefore, the time complexity is O(N).

Space Complexity: O(N).
Recursive call is happening. The every node is processed once and considering the stack space, the space complexity will be O(N).