



## Experiment-5

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**Date of Performance:** 18/01/25

**Subject Name:** Advanced Programming Lab - 2

**Subject Code:** 22CSP-351

### 1. Aim: Tree.

1. Problem: 104. Maximum Depth of Binary Tree.
2. Problem: 108. Convert Sorted Array to Binary Search Tree.

### 2. Objective:

1. Maximum Depth of Binary Tree: Determine the longest path from the root to the farthest leaf node in a binary tree.
2. Convert Sorted Array to BST: Convert a sorted array into a height-balanced binary search tree (BST).

### 3. Implementation/Code:

1.)

```
class Solution {
public:
    int maxDepth(TreeNode* root) {
        if (!root) return 0;
        return 1 + max(maxDepth(root->left), maxDepth(root->right));
    }
};
```

2.)

```
class Solution {
public:
    TreeNode* sortedArrayToBST(vector<int>& nums) {
```

```
    return helper(nums, 0, nums.size() - 1);
}
```

private:

```
TreeNode* helper(vector<int>& nums, int left, int right) {
    if (left > right) return nullptr;
    int mid = left + (right - left) / 2;
    TreeNode* root = new TreeNode(nums[mid]);
    root->left = helper(nums, left, mid - 1);
    root->right = helper(nums, mid + 1, right);
    return root;
}
};
```

## 4. Output:

1.



Testcase | Test Result

**Accepted** Runtime: 0 ms

- Case 1
- Case 2

Input

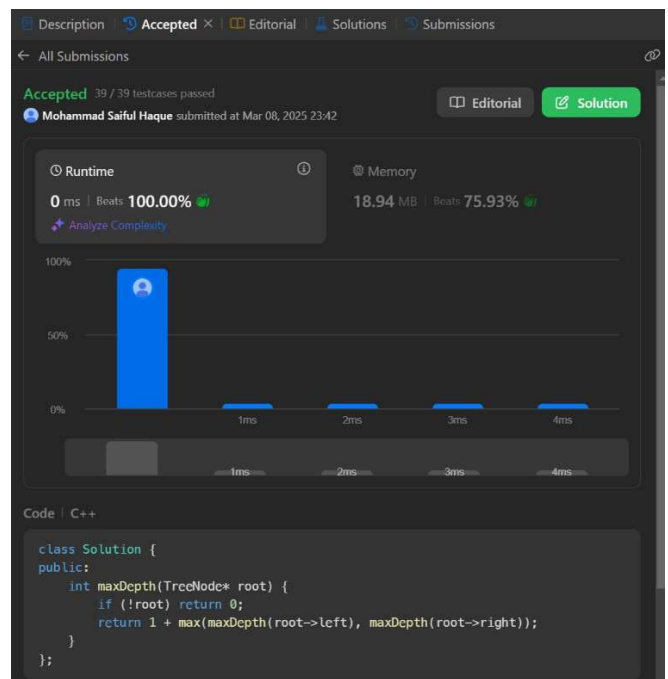
root =  
[3,9,20,null,null,15,7]

Output

3

Expected

3



Description | Accepted | Editorial | Solutions | Submissions

All Submissions

**Accepted** 39 / 39 testcases passed

Mohammad Saiful Haque submitted at Mar 08, 2025 23:42

Editorial | Solution

Runtime: 0 ms | Beats: 100.00%

Memory: 18.94 MB | Beats: 75.93%

Analyze Complexity

100%  
50%  
0%

1ms 2ms 3ms 4ms

Code | C++

```
class Solution {
public:
    int maxDepth(TreeNode* root) {
        if (!root) return 0;
        return 1 + max(maxDepth(root->left), maxDepth(root->right));
    }
};
```

2.

Testcase | Test Result

**Accepted** Runtime: 0 ms

• Case 1 • Case 2

Input

nums =  
[-10,-3,0,5,9]

Output

[0,-10,5,null,-3,null,9]

Expected

[0,-3,9,-10,null,5]

Description Accepted Editorial Solutions Submissions

← All Submissions

Accepted 31 / 31 testcases passed

Mohammad Saiful Haque submitted at Mar 08, 2025 23:47

Editorial Solution

Runtime: 4 ms | Beats 35.41%

Memory: 22.76 MB | Beats 95.55%

Analyze Complexity

Code | C++

```
class Solution {
public:
    TreeNode* sortedArrayToBST(vector<int>& nums) {
        return helper(nums, 0, nums.size() - 1);
    }
private:
    TreeNode* helper(vector<int>& nums, int left, int right) {
```

View more

## 5. Time Complexity:

1.  $O(n)$
2.  $O(n)$

## 6. Space Complexity:

1.  $O(h)$
2.  $O(\log(n))$

## 7. Learning Outcome:

1. Understand recursion and depth-first search (DFS) in trees.
2. Learn how to calculate tree depth efficiently.
3. Apply the divide and conquer approach to construct a balanced BST.
4. Gain insight into binary search and its application in tree construction.