Experiment -8

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Semester: 5th **Date of Performance:**
Subject Name: Advanced Programming Lab **Subject Code: 22CSP-351**

Ques1. Maximum Units on a Truck

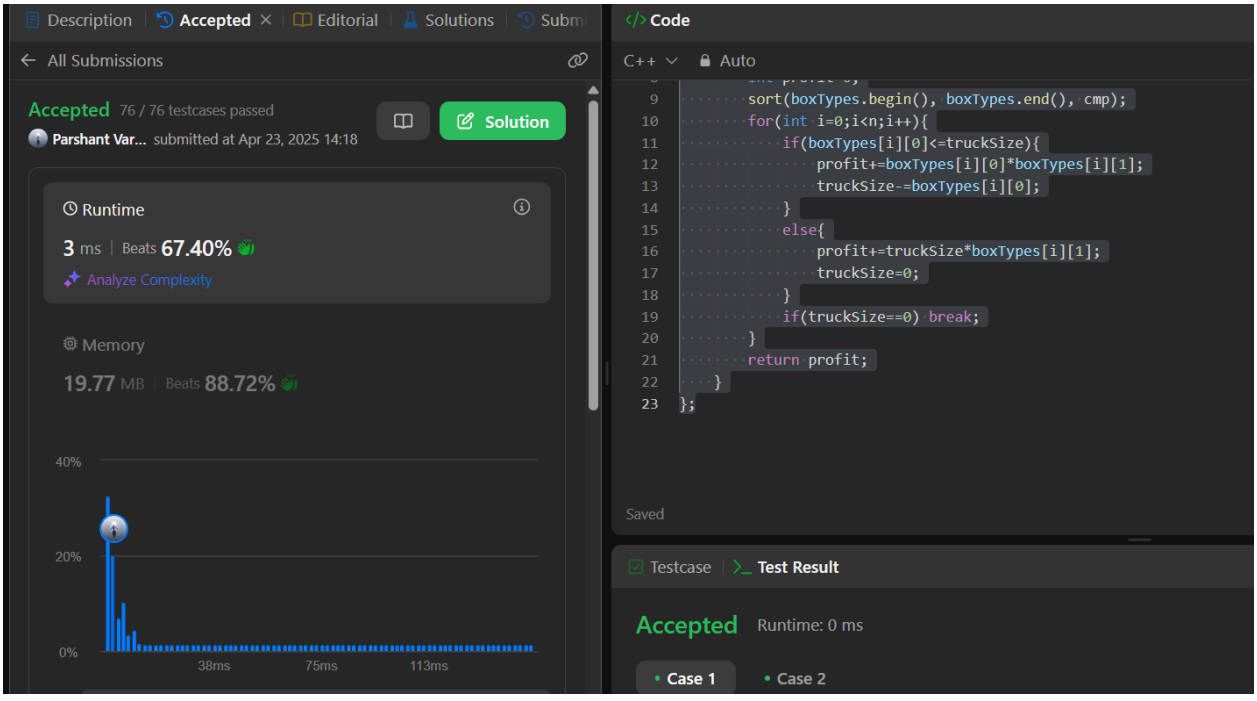
You are assigned to put some amount of boxes onto one truck. You are given a 2D array boxTypes, where boxTypes[i] = [numberOfBoxesi, numberOfUnitsPerBoxi]:

numberOfBoxesi is the number of boxes of type i.

numberOfUnitsPerBoxi is the number of units in each box of the type i.

```
 class Solution
{ public:
    unordered_map<int, int> inorderMap;
int preorderIndex = 0;

    TreeNode* Helper(vector<int>& preorder, vector<int>& inorder, int left, int
right) {         if (left > right) return NULL;

        int rootValue = preorder[preorderIndex++];
        TreeNode* root = new TreeNode(rootValue);

        int inorderIndex = inorderMap[rootValue];
         root->left = Helper(preorder, inorder, left, inorderIndex - 1);
root->right = Helper(preorder, inorder, inorderIndex + 1, right);

        return root;
    }

    TreeNode* buildTree(vector<int>& preorder, vector<int>& inorder) {
for (int i = 0; i < inorder.size(); i++) {
inorderMap[inorder[i]] = i;
        }         return Helper(preorder, inorder, 0,
inorder.size() - 1);     }
};
```


Testcase
Test Result
Accepted
Runtime: 0 ms
Case 1
Case 2
Input
boxTypes =
[[1,3],[2,2],[3,1]]
truckSize =
4
Output
8
Expected
8

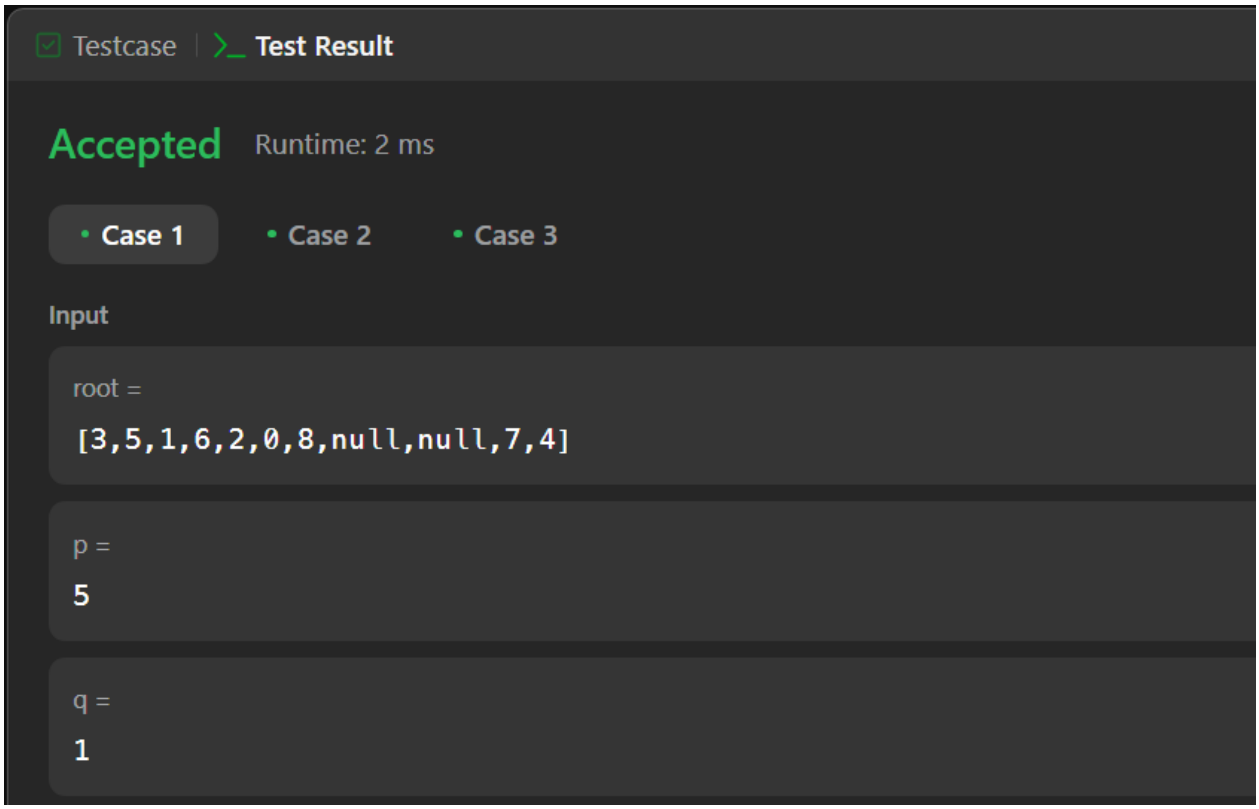

Description
Accepted
Editorial
Solutions
All Submissions
Accepted 76 / 76 testcases passed
Parshant Var... submitted at Apr 23, 2025 14:18
Solution
Runtime
3 ms | Beats 67.40%
Analyze Complexity
Memory
19.77 MB | Beats 88.72%
40%
20%
0%
38ms
75ms
113ms
Code
C++
Auto
sort(boxTypes.begin(), boxTypes.end(), cmp);
for(int i=0;i<n;i++){
if(boxTypes[i][0]<=truckSize){
profit+=boxTypes[i][0]*boxTypes[i][1];
truckSize-=boxTypes[i][0];
}
else{
profit+=truckSize*boxTypes[i][1];
truckSize=0;
}
if(truckSize==0) break;
}
return profit;
}
};
Saved
Testcase
Test Result
Accepted
Runtime: 0 ms
Case 1
Case 2

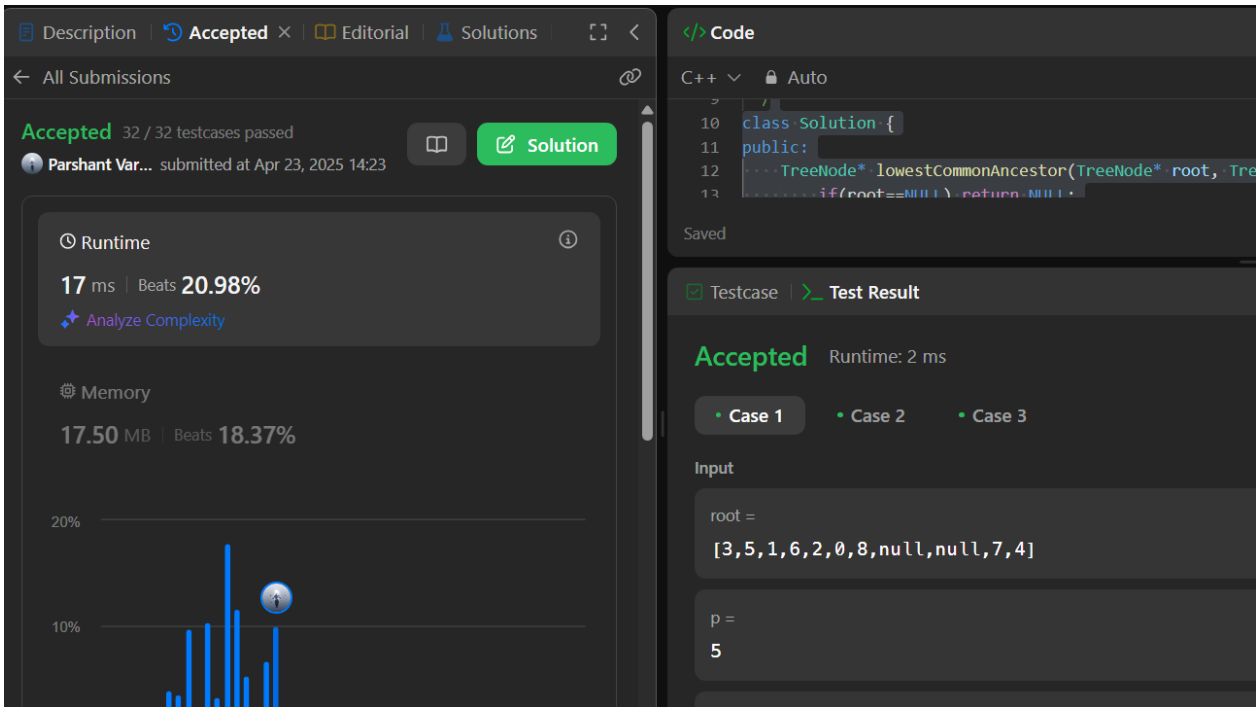
Ques2. Lowest Common Ancestor of a Binary Tree

Given a binary tree, find the lowest common ancestor (LCA) of two given nodes in the tree.

According to the definition of LCA on Wikipedia: "The lowest common ancestor is defined between two nodes and as the lowest node in that has both and as descendants (where we allow **a node to be a descendant of itself**)."

```
class Solution {
public:
    TreeNode* lowestCommonAncestor(TreeNode* root, TreeNode* p, TreeNode* q) {
        if(root==NULL) return NULL;
        if(root->val==p->val)return p;
        if(root->val==q->val)return q;

        TreeNode* left=lowestCommonAncestor(root->left,p,q);
        TreeNode* right=lowestCommonAncestor(root->right,p,q);

        if(left==NULL && right==NULL) return NULL;
        else if(left==NULL && right!=NULL) return right;
        else if(left!=NULL && right==NULL) return left;
        else   return root;

    }
};
```


Testcase
Test Result
Accepted
Runtime: 2 ms
Case 1
Case 2
Case 3
Input
root =
[3,5,1,6,2,0,8,null,null,7,4]
p =
5
q =
1


Description
Accepted
Editorial
Solutions
All Submissions
Accepted 32 / 32 testcases passed
Parshant Var... submitted at Apr 23, 2025 14:23
Solution
Runtime
17 ms | Beats 20.98%
Analyze Complexity
Memory
17.50 MB | Beats 18.37%
20%
10%
Code
C++
Auto
class Solution {
public:
TreeNode* lowestCommonAncestor(TreeNode* root, Tre
Saved
Testcase
Test Result
Accepted
Runtime: 2 ms
Case 1
Case 2
Case 3
Input
root =
[3,5,1,6,2,0,8,null,null,7,4]
p =
5

Ques 3: Maximum Score From Removing Substrings

You are given a string `s` and two integers `x` and `y`. You can perform two types of operations any number of times.

- Remove substring `"ab"` and gain `x` points.
- For example, when removing `"ab"` from `"cabxbae"` it becomes `"cxbae"`.
- Remove substring `"ba"` and gain `y` points.
- For example, when removing `"ba"` from `"cabxbae"` it becomes `"cabxe"`.

Return *the maximum points you can gain after applying the above operations on* `s`.

CODE:

```
 class Solution {
public:
    int removeSubstring(string& s, string sub, int score) {
    stack<char> st;
    int points = 0;

    for (char c : s) {
        if (!st.empty() && st.top() == sub[0] && c == sub[1]) {
            st.pop();
            points += score;
        } else {
            st.push(c);
        }
    }

    s = "";
    while (!st.empty()) {
        s += st.top();
        st.pop();
    }
    reverse(s.begin(), s.end());

    return points;
}

int maximumGain(string s, int x, int y) {
    int totalPoints = 0;
    if (x > y) {
        totalPoints += removeSubstring(s, "ab", x);
        totalPoints += removeSubstring(s, "ba", y);
    } else {
        totalPoints += removeSubstring(s, "ba", y);
```

```
        totalPoints += removeSubstring(s, "ab", x);
    }

    return totalPoints;
}

};
```