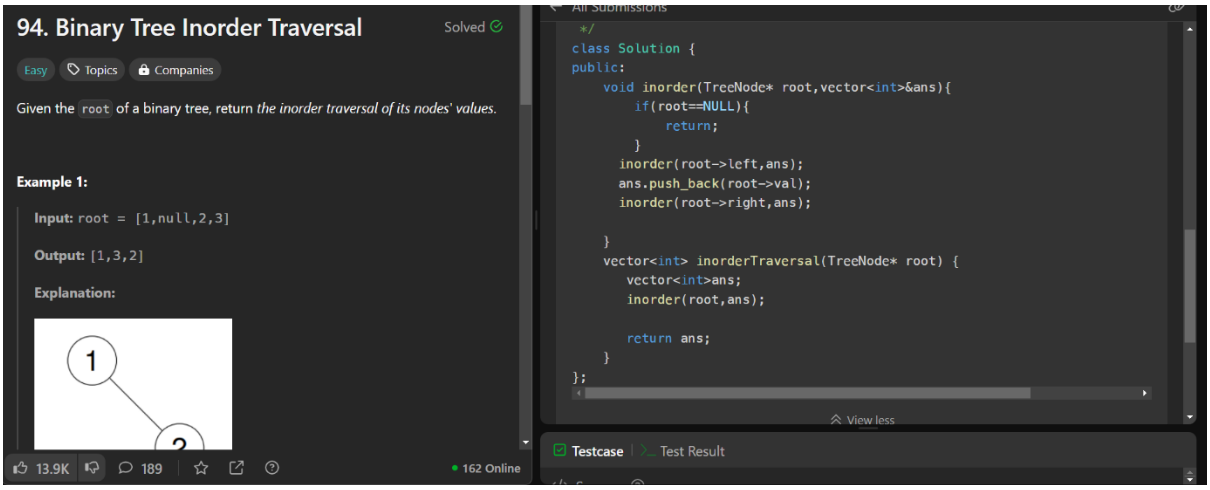
Ap assignment 3(22bcs50181)

1) binary-tree-inorder-traversal

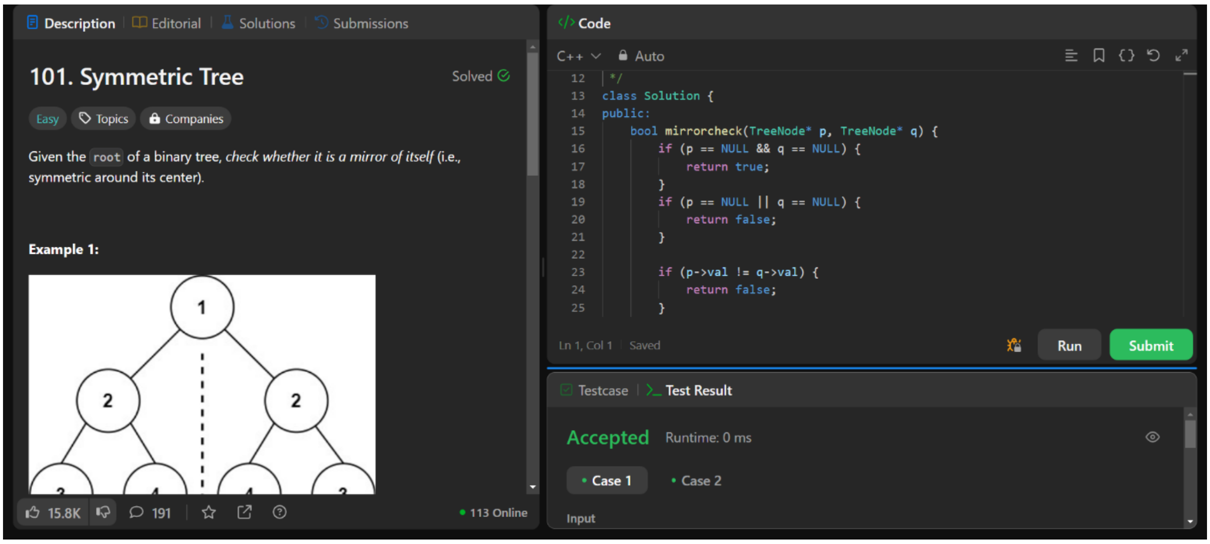
```
void inorder(TreeNode* root,vector<int>&ans){
        if(root==NULL){
            return;
        }
      inorder(root->left,ans);
      ans.push_back(root->val);
      inorder(root->right,ans);

    }
    vector<int> inorderTraversal(TreeNode* root) {
       vector<int>ans;
       inorder(root,ans);

       return ans;
    }
```



2) symmetric-tree

```
bool mirrorcheck(TreeNode* p, TreeNode* q) {
        if (p == NULL && q == NULL) {
            return true;
        }
```

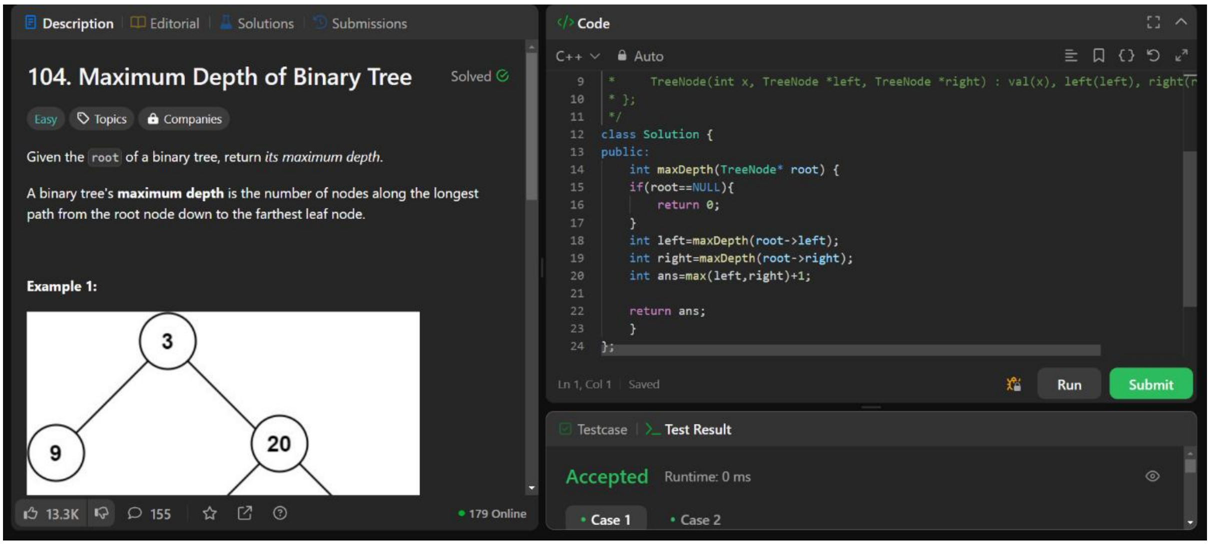
```
        if (p == NULL || q == NULL) {
            return false;
        }

        if (p->val != q->val) {
            return false;
        }
        return mirrorcheck(p->left, q->right) && mirrorcheck(p->right, q->left);
    }
    bool isSymmetric(TreeNode* root) {
        if (mirrorcheck(root->left, root->right) == true) {
            return true;
        } else {
            return false;
        }
    }
```



3) maximum-depth-of-binary-tree

```
int maxDepth(TreeNode* root) {
    if(root==NULL){
        return 0;
```

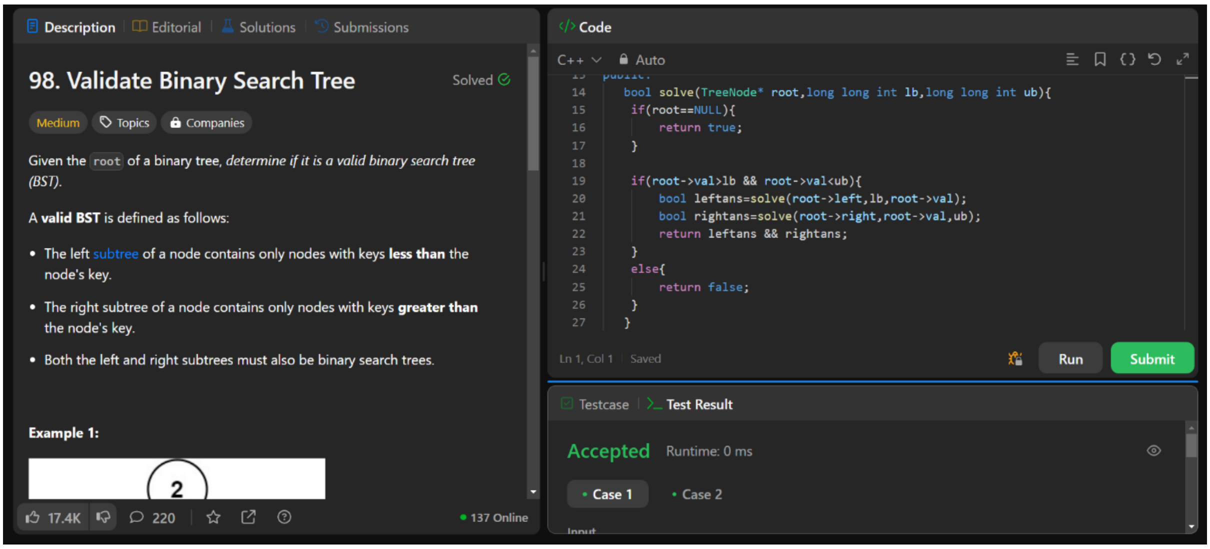
```
    }
    int left=maxDepth(root->left);
    int right=maxDepth(root->right);
    int ans=max(left,right)+1;

    return ans;
    }
```



4) validate-binary-search-tree

```
bool solve(TreeNode* root,long long int lb,long long int ub){
    if(root==NULL){
        return true;
    }

    if(root->val>lb && root->val<ub){
        bool leftans=solve(root->left,lb,root->val);
        bool rightans=solve(root->right,root->val,ub);
        return leftans && rightans;
```

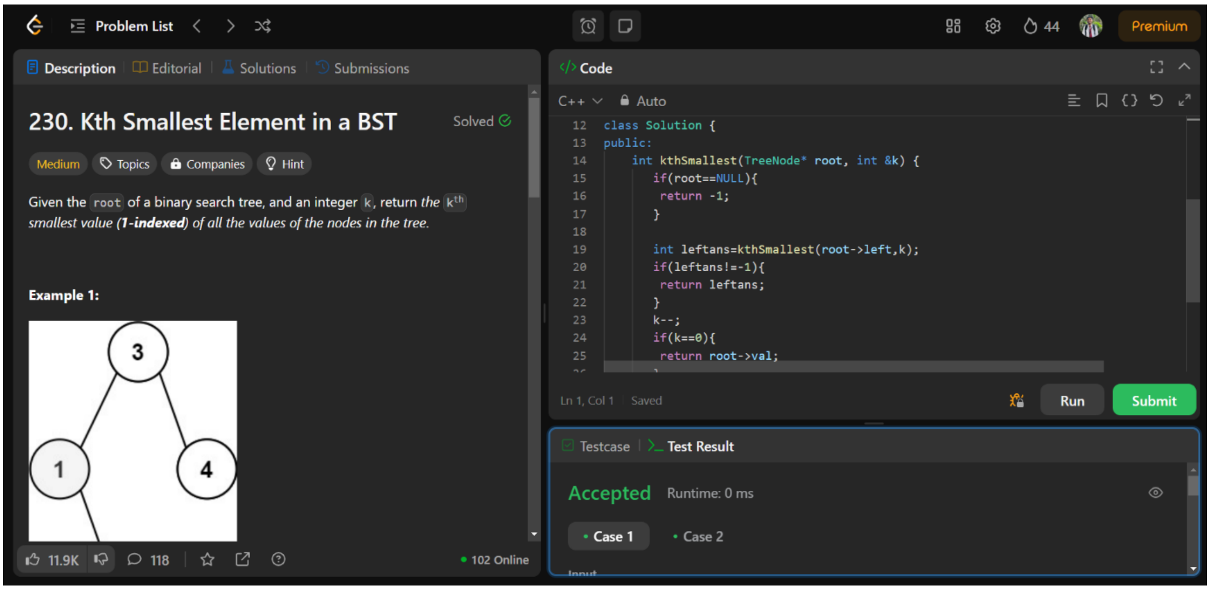
```
    }
    else{
        return false;
    }
   }
    bool isValidBST(TreeNode* root) {
     long long int lowerbound=-4294967296;
     long long int upperbound=4294967296;
     bool ans= solve(root,lowerbound,upperbound);
     return ans;
    }
```



5) kth-smallest-element-in-a-bst

```
int kthSmallest(TreeNode* root, int &k) {
      if(root==NULL){
       return -1;
      }

      int leftans=kthSmallest(root->left,k);
```

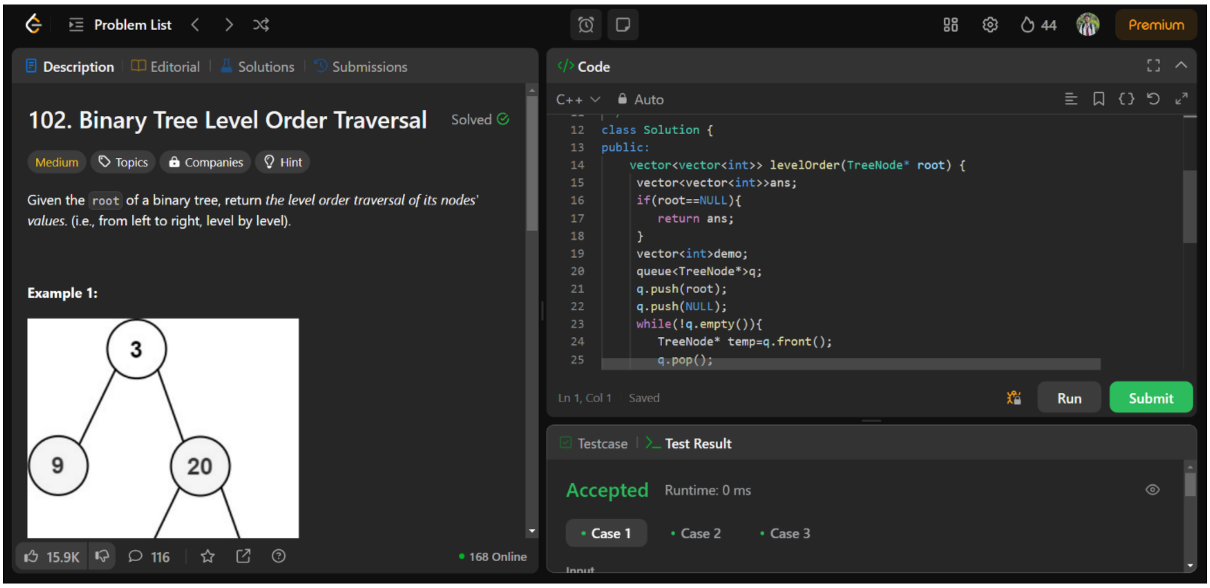
```
    if(leftans!=-1){
     return leftans;
    }
    k--;
    if(k==0){
     return root->val;
    }
    int rightans=kthSmallest(root->right,k);
    return rightans;
  }
```



6) binary-tree-level-order-traversal

```
 vector<vector<int>> levelOrder(TreeNode* root) {
    vector<vector<int>>ans;
    if(root==NULL){
      return ans;
    }
    vector<int>demo;
    queue<TreeNode*>q;
    q.push(root);
```

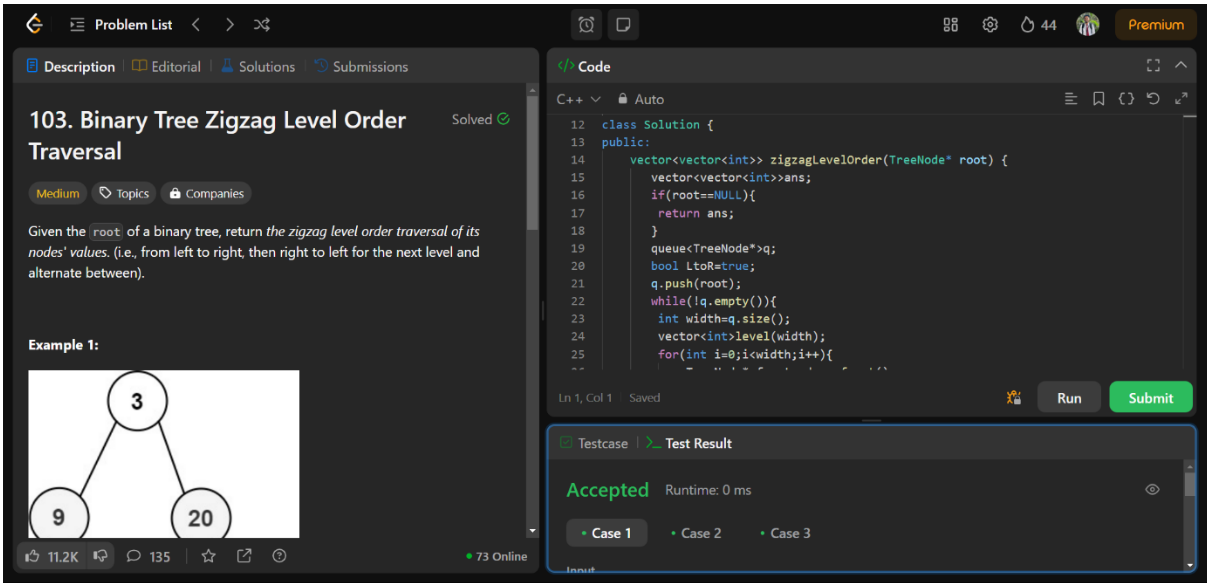
```
 q.push(NULL);
 while(!q.empty()){
   TreeNode* temp=q.front();
   q.pop();
   if(temp==NULL){
     ans.push_back(demo);
     demo.clear();
    if(!q.empty()){
       q.push(NULL);
    }
   }
  else{
   demo.push_back(temp->val);
       if(temp->left){
           q.push(temp->left);
       }
       if(temp->right){
           q.push(temp->right);
 }
  }
 }
 return ans;
}
```



7) binary-tree-zigzag-level-order-traversal

```
vector<vector<int>> zigzagLevelOrder(TreeNode* root) {
    vector<vector<int>>ans;
    if(root==NULL){
     return ans;
    }
    queue<TreeNode*>q;
    bool LtoR=true;
    q.push(root);
    while(!q.empty()){
     int width=q.size();
     vector<int>level(width);
     for(int i=0;i<width;i++){
         TreeNode* frontnode=q.front();
         q.pop();
         int index= LtoR? i: width-i-1;
```

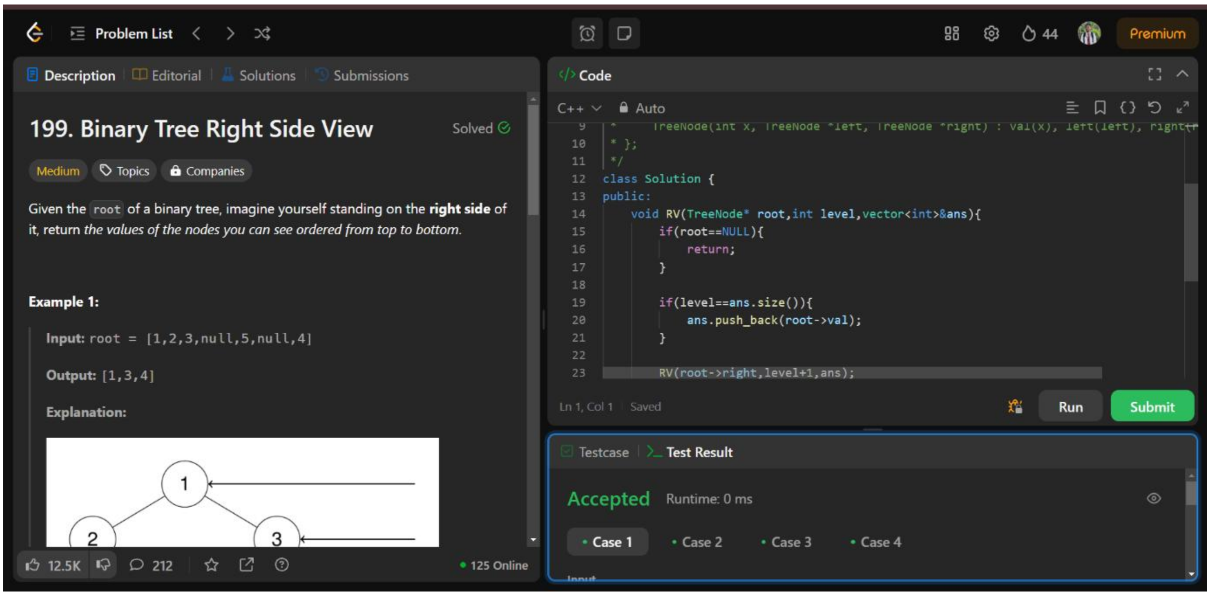
```
        level[index]=frontnode->val;
        if(frontnode->left){
            q.push(frontnode->left);
        }
        if(frontnode->right){
            q.push(frontnode->right);
        }
    }
    LtoR=!LtoR;
    ans.push_back(level);
   }
  return ans;
}
```



8) binary-tree-right-side-view

```
void RV(TreeNode* root,int level,vector<int>&ans){
    if(root==NULL){
        return;
    }
```

```
        if(level==ans.size()){
            ans.push_back(root->val);
        }

        RV(root->right,level+1,ans);
        RV(root->left,level+1,ans);
    }
    vector<int> rightSideView(TreeNode* root) {
        vector<int>ans;
        int level=0;
        RV(root,level,ans);
        return ans;
    }
```

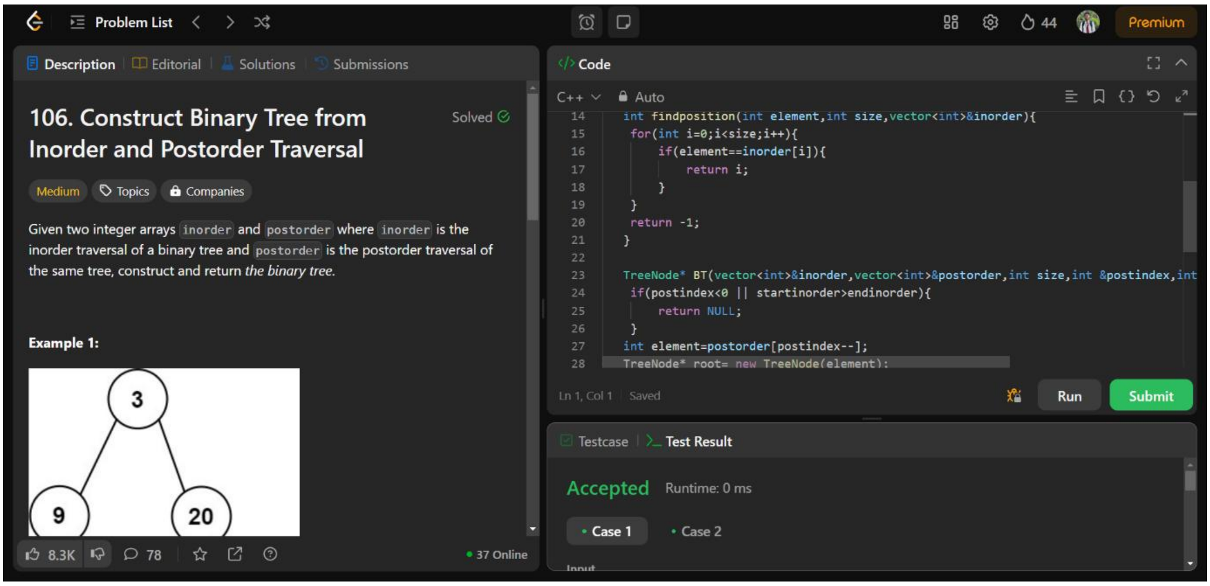


9) construct-binary-tree-from-inorder-and-postorder-traversal

```
int findposition(int element,int size,vector<int>&inorder){
```

```
 for(int i=0;i<size;i++){
     if(element==inorder[i]){
         return i;
     }
 }
 return -1;
}

TreeNode* BT(vector<int>&inorder,vector<int>&postorder,int size,int
&postindex,int startinorder,int endinorder){
 if(postindex<0 || startinorder>endinorder){
     return NULL;
 }
int element=postorder[postindex--];
TreeNode* root= new TreeNode(element);
int position =findposition(element,size,inorder);

root->right=BT(inorder,postorder,size,postindex,position+1,endinorder);
root->left=BT(inorder,postorder,size,postindex,startinorder,position-1);

return root;

}
 TreeNode* buildTree(vector<int>& inorder, vector<int>& postorder) {
   int size=inorder.size();
   int postindex=size-1;
```

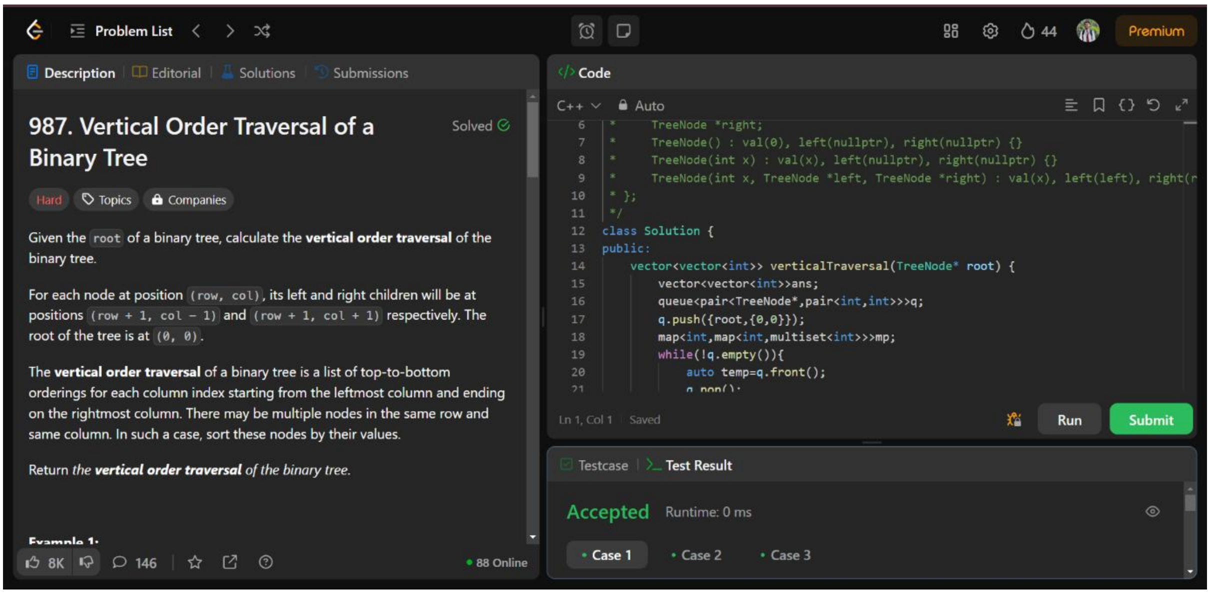
```
        int startinorder=0;

        int endinorder=size-1;

        TreeNode* root=
BT(inorder,postorder,size,postindex,startinorder,endinorder);


        return root;

    }
```



10) vertical-order-traversal-of-a-binary-tree

```
vector<vector<int>> verticalTraversal(TreeNode* root) {

        vector<vector<int>>ans;

        queue<pair<TreeNode*,pair<int,int>>>q;

        q.push({root,{0,0}});

        map<int,map<int,multiset<int>>>mp;

        while(!q.empty()){

            auto temp=q.front();

            q.pop();

            TreeNode* node=temp.first;
```

```
        auto coordinate=temp.second;
        int row=coordinate.first;
        int col=coordinate.second;
        mp[col][row].insert(node->val);
        if(node->left){
            q.push({node->left,{row+1,col-1}});
        }
        if(node->right){
            q.push({node->right,{row+1,col+1}});
        }
    }

    for(auto i:mp){
        auto &map=i.second;
        vector<int>vline;
        for(auto j:map){
            auto &multiset=j.second;
            vline.insert(vline.end(),multiset.begin(),multiset.end());
        }
        ans.push_back(vline);
    }
    return ans;
}
```


Problem List
Description
Editorial
Solutions
Submissions
987. Vertical Order Traversal of a Binary Tree
Solved
Hard
Topics
Companies
Given the root of a binary tree, calculate the vertical order traversal of the binary tree.
For each node at position (row, col), its left and right children will be at positions (row + 1, col - 1) and (row + 1, col + 1) respectively. The root of the tree is at (0, 0).
The vertical order traversal of a binary tree is a list of top-to-bottom orderings for each column index starting from the leftmost column and ending on the rightmost column. There may be multiple nodes in the same row and same column. In such a case, sort these nodes by their values.
Return the vertical order traversal of the binary tree.
8K
146
88 Online
44
Premium
Code
C++
Auto
*   TreeNode *right;
*   TreeNode() : val(0), left(nullptr), right(nullptr) {}
*   TreeNode(int x) : val(x), left(nullptr), right(nullptr) {}
*   TreeNode(int x, TreeNode *left, TreeNode *right) : val(x), left(left), right(r
* };
*/
class Solution {
public:
    vector<vector<int>> verticalTraversal(TreeNode* root) {
        vector<vector<int>>ans;
        queue<pair<TreeNode*,pair<int,int>>>q;
        q.push({root,{0,0}});
        map<int,map<int,multiset<int>>>mp;
        while(!q.empty()){
            auto temp=q.front();
Ln 1, Col 1
Saved
Run
Submit
Testcase
Test Result
Accepted
Runtime: 0 ms
Case 1
Case 2
Case 3