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SECTION : IOT 607 B **DATE : 06/03/2025**

SUBJECT : ADVANCED PROGRAMMING – 2

1 Print Linked List:

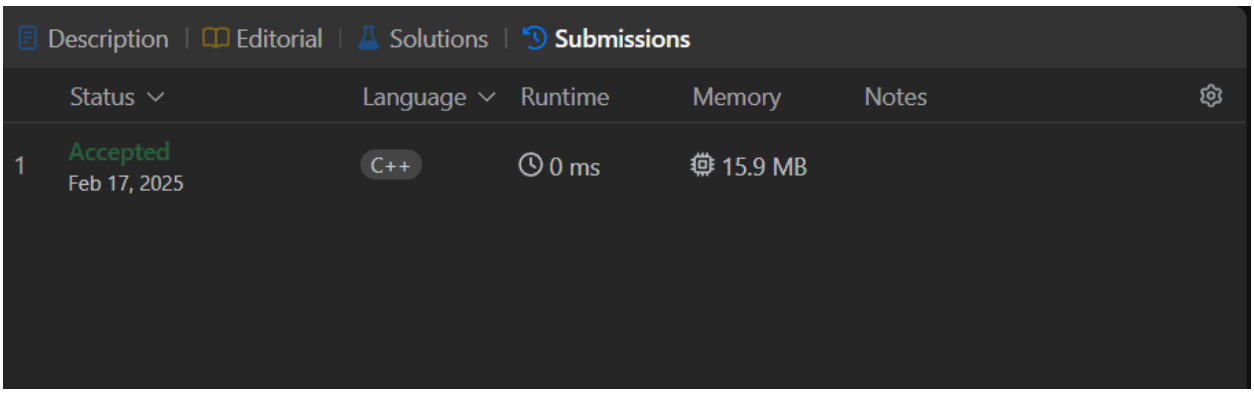
```
class Solution {
  public:
    // Function to display the elements of a linked list in same line
    void printList(Node *head) {
        Node* temp = head;
        while (temp) {
            cout << temp->data<<" ";
            temp = temp->next;
        }

    }
};
```

```
1  // } Driver Code Ends
19 /*
20 struct Node {
21     int data;
22     struct Node* next;
23
24     Node(int x) {
25         data = x;
26         next = nullptr;
27     }
28 };
29 */
30 /*
31     Print elements of a linked list on console
32     Head pointer input could be NULL as well for empty list
33 */
34
35 class Solution {
36   public:
37     // Function to display the elements of a linked list in same line
38     void printList(Node *head) {
39         Node* temp = head;
40         while (temp) {
41             cout << temp->data<<" ";
42             temp = temp->next;
43         }
44
45     }
```

2 Remove duplicates from a sorted list:

```
class Solution {
public:
    ListNode* deleteDuplicates(ListNode* head) {

        if (head == nullptr) {
            return head;
        }


        ListNode* current = head;

        while (current != nullptr && current->next != nullptr) {
```

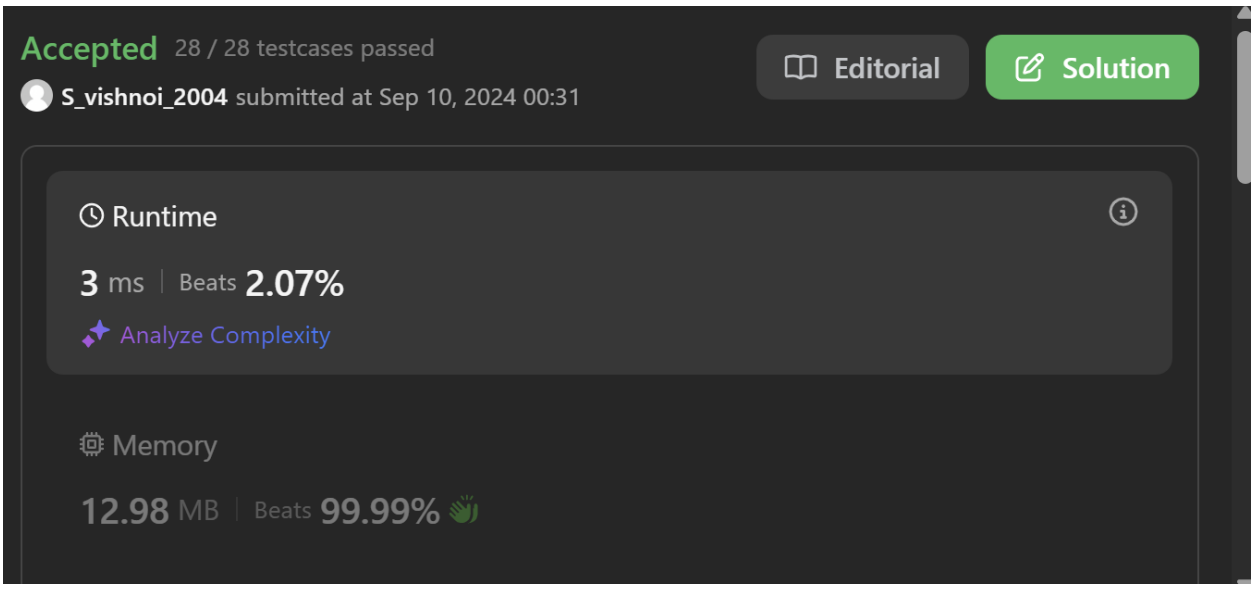
```
            if (current->val == current->next->val) {
                current->next = current->next->next;
            } else {
                current = current->next;
            }
        }


        return head;
    }
};
```



3 Reverse a linked list:

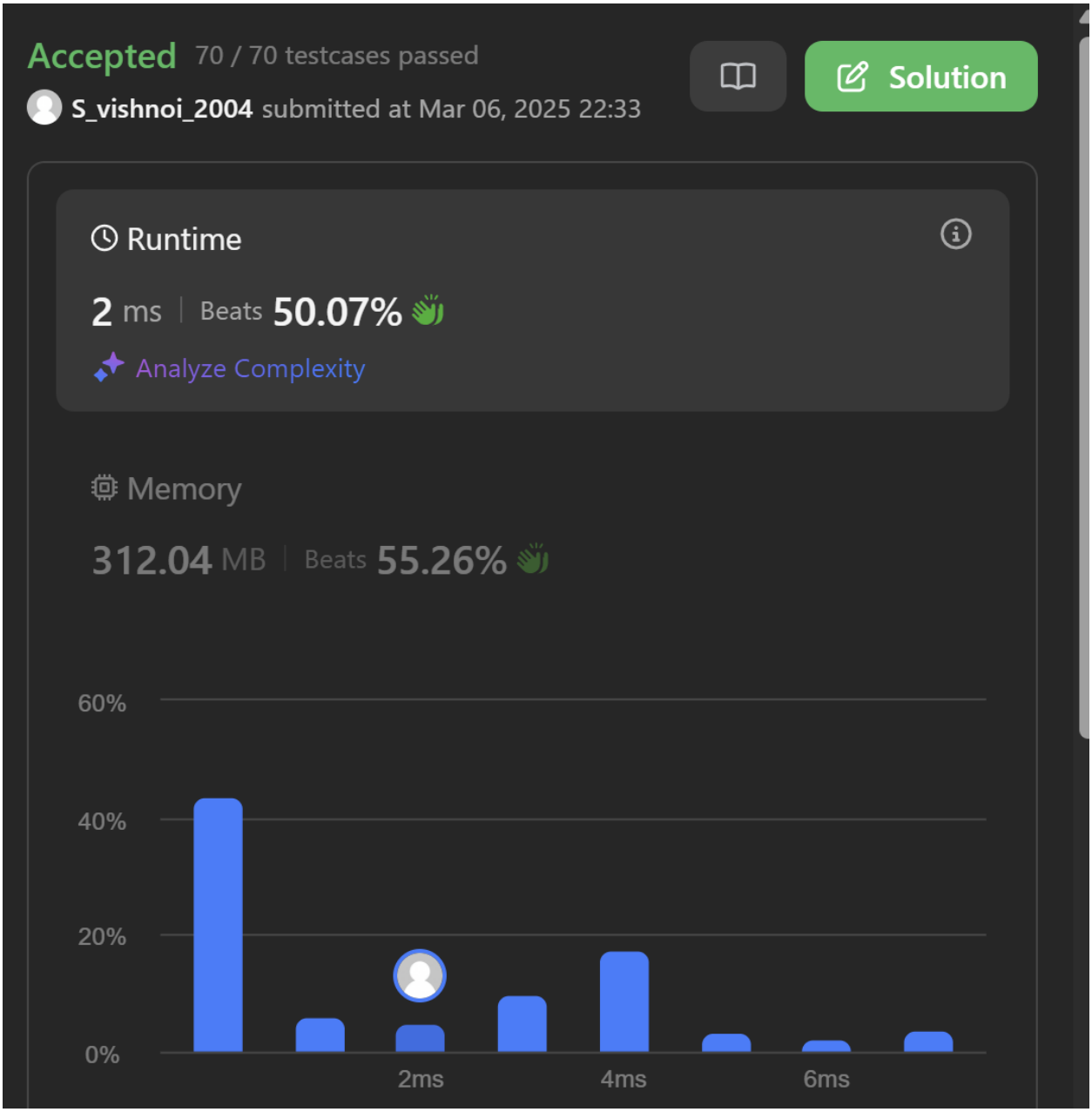
```
class Solution {
public:
    ListNode* reverseList(ListNode* head) {
        // Initialize pointers
        ListNode* prev = nullptr; // Previous node starts as NULL
        ListNode* next = nullptr; // Next node
        ListNode* curr = head;    // Current node starts at the head
```

```
        // Traverse the list
        while (curr != nullptr) {
            // Save the next node
            next = curr->next;

            // Reverse the link
            curr->next = prev;

            // Move pointers forward
            prev = curr; // Move prev to the current node
            curr = next; // Move curr to the next node
        }

        // prev is now the new head of the reversed list
        return prev;
    }
};
```



4 Delete middle node of a list:

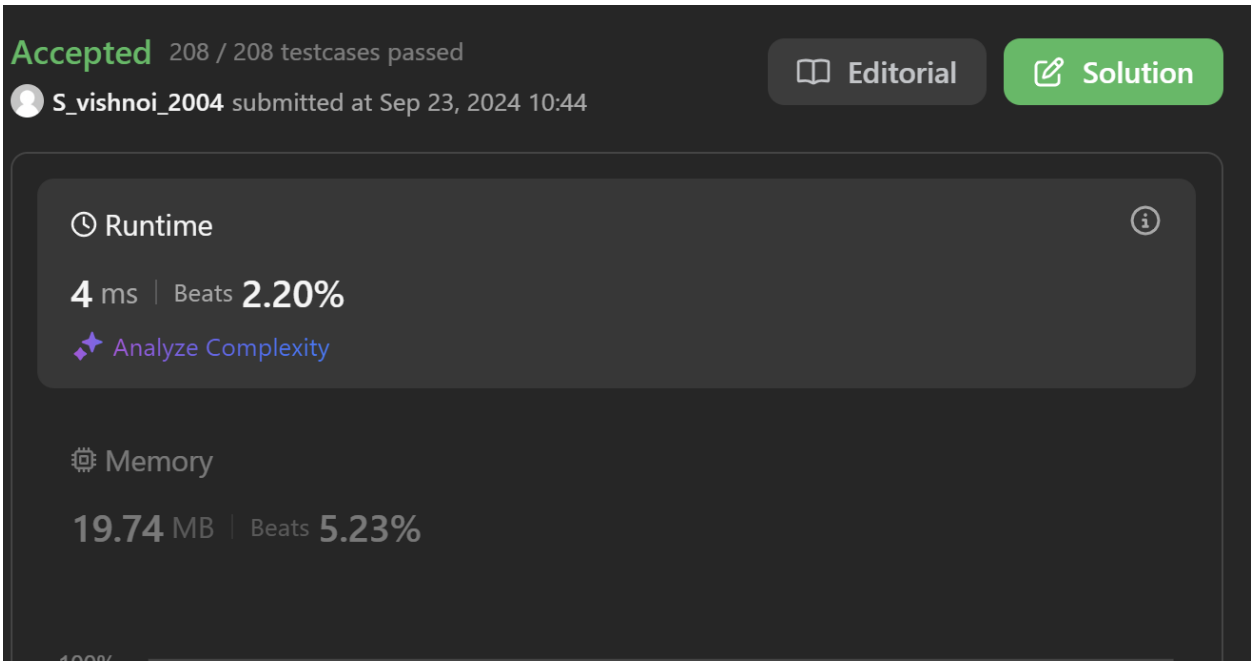
```
/**
 * Definition for singly-linked list.
 * struct ListNode {
 *     int val;
 *     ListNode *next;
 *     ListNode() : val(0), next(nullptr) {}
 *     ListNode(int x) : val(x), next(nullptr) {}
 *     ListNode(int x, ListNode *next) : val(x), next(next) {}
 * };
 */
class Solution {
public:
    ListNode* deleteMiddle(ListNode* head) {
    if(head==NULL || head->next==NULL) return NULL;
     ListNode* slow=head;
     ListNode* fast=head->next;
     while(fast->next!=NULL && fast->next->next!=NULL)
     {
       slow=slow->next;
       fast=fast->next->next;
     }
     slow->next=slow->next->next;
     return head;
    }
};
```



5 Merge two sorted linked lists:

```
class Solution {
public:
    ListNode* mergeTwoLists(ListNode* list1, ListNode* list2) {
```

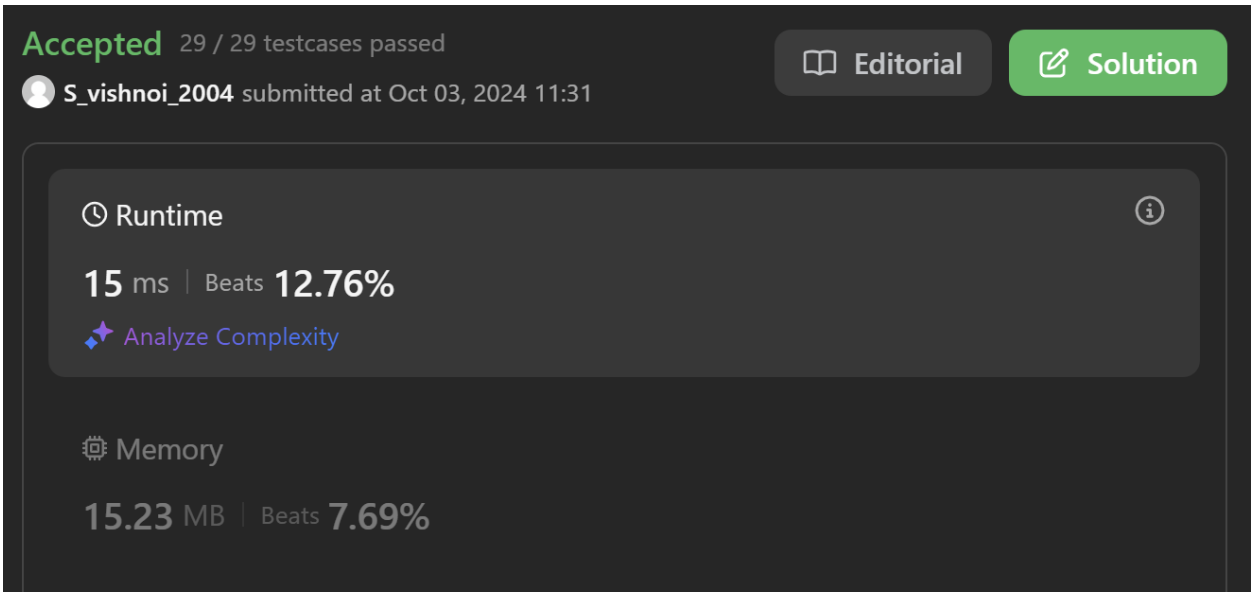
```
        if(list1 == NULL || list2 == NULL){
            return list1 == NULL ? list2 : list1;
        }

        if(list1->val <= list2->val){
            list1->next =  mergeTwoLists(list1->next, list2);
            return list1;
        }
        else{
            list2->next =  mergeTwoLists(list1, list2->next);
            return list2;
        }
    }
};
```



6 Detect a cycle in a linked list:

```
class Solution {
```

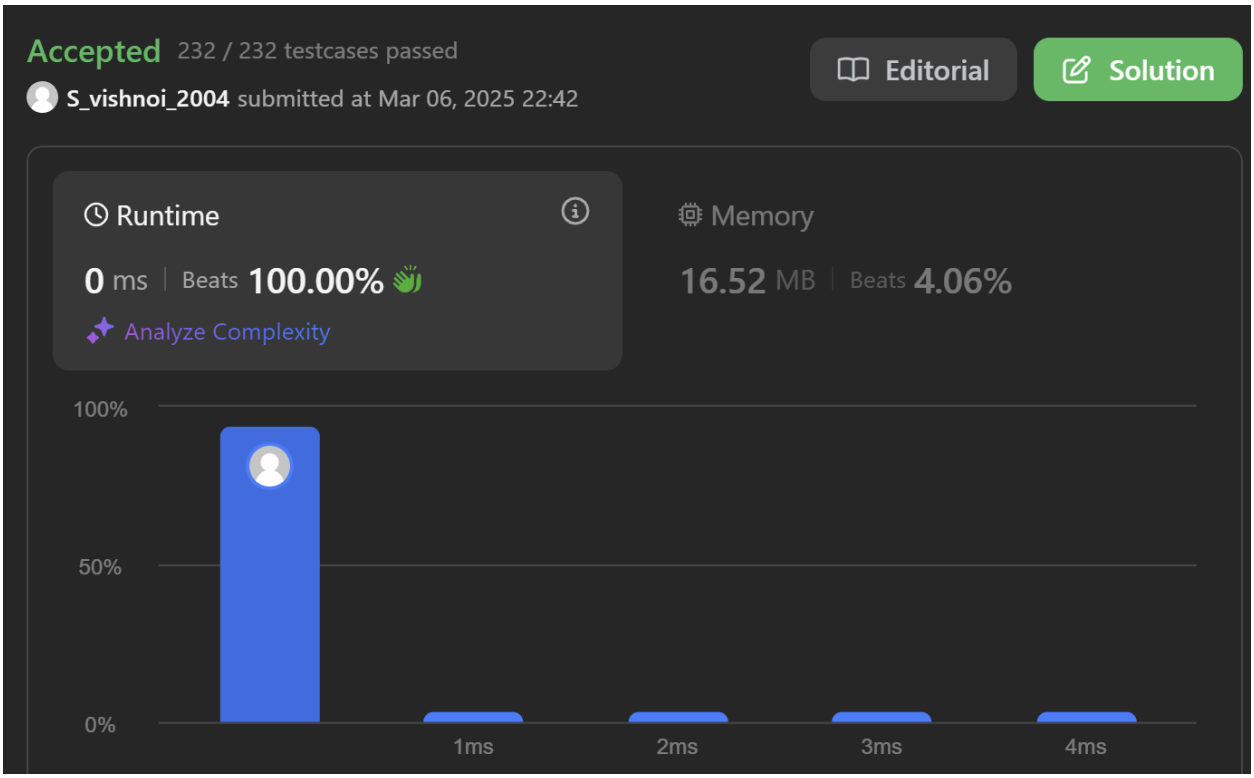
```
public:
    bool hasCycle(ListNode *head) {
        ListNode* fast = head;
        ListNode* slow = head;

        while (fast != nullptr && fast->next != nullptr) {
            fast = fast->next->next;
            slow = slow->next;

            if (fast == slow) {
                return true;
            }
        }

        return false;
    }
};
```



7 Rotate a list:

```
/**
 * Definition for singly-linked list.
 * struct ListNode {
 *     int val;
 *     ListNode *next;
 *     ListNode() : val(0), next(nullptr) {}
 *     ListNode(int x) : val(x), next(nullptr) {}
 *     ListNode(int x, ListNode *next) : val(x), next(next) {}
 * };
 */
class Solution {
public:
    ListNode* rotateRight(ListNode* head, int k) {
        // base condition
        if(head==NULL || head->next==NULL || k==0) return head;

        ListNode* curr=head;
        int count=1;
        while(curr->next!=NULL){
            curr=curr->next;
            count++;
        }
        curr->next=head;
        k=count-(k%count);
        while(k-->0){
            curr=curr->next;
        }
```

```
        head=curr->next;
        curr->next=NULL;  // curr points to tail node sorta

        return head;

    }
};
```

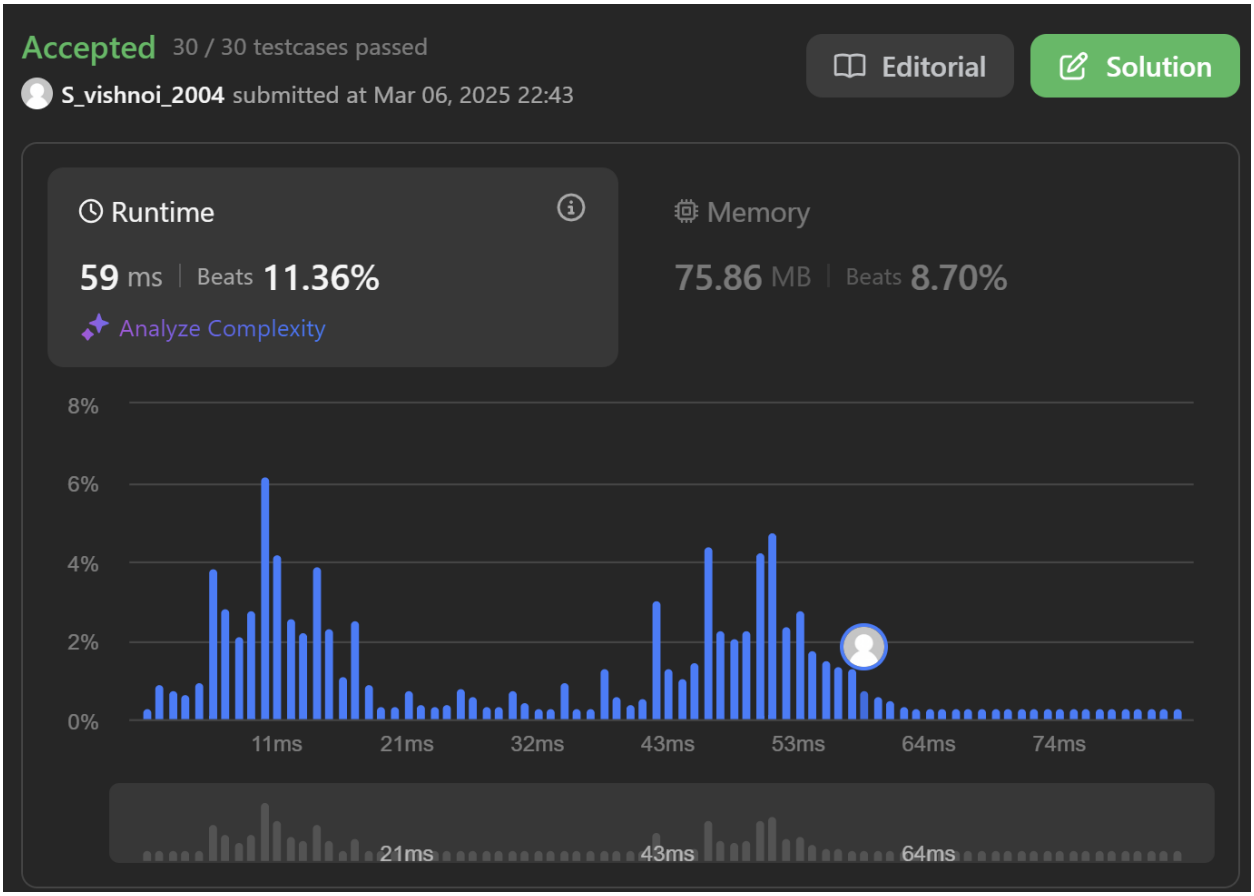


8 Sort List:

```
/**
 * Definition for singly-linked list.
 * struct ListNode {
 *     int val;
 *     ListNode *next;
 *     ListNode() : val(0), next(nullptr) {}
```

```
 *     ListNode(int x) : val(x), next(nullptr) {}
 *     ListNode(int x, ListNode *next) : val(x), next(next) {}
 * };
 */
class Solution {
public:
    ListNode* sortList(ListNode* head) {
        if(head==NULL) return NULL;
        ListNode *damy=NULL,*current=NULL;
        vector<int>v;
        while(head){
            v.push_back(head->val);
            head=head->next;
        }
        sort(v.begin(),v.end());
        for(auto u:v){
            ListNode *tem = new ListNode(u);
            if(damy==NULL){
                damy=tem;
                current=tem;
            }
            else{
                current->next=tem;
                current=current->next;
            }
        }
        return damy;
    }
```

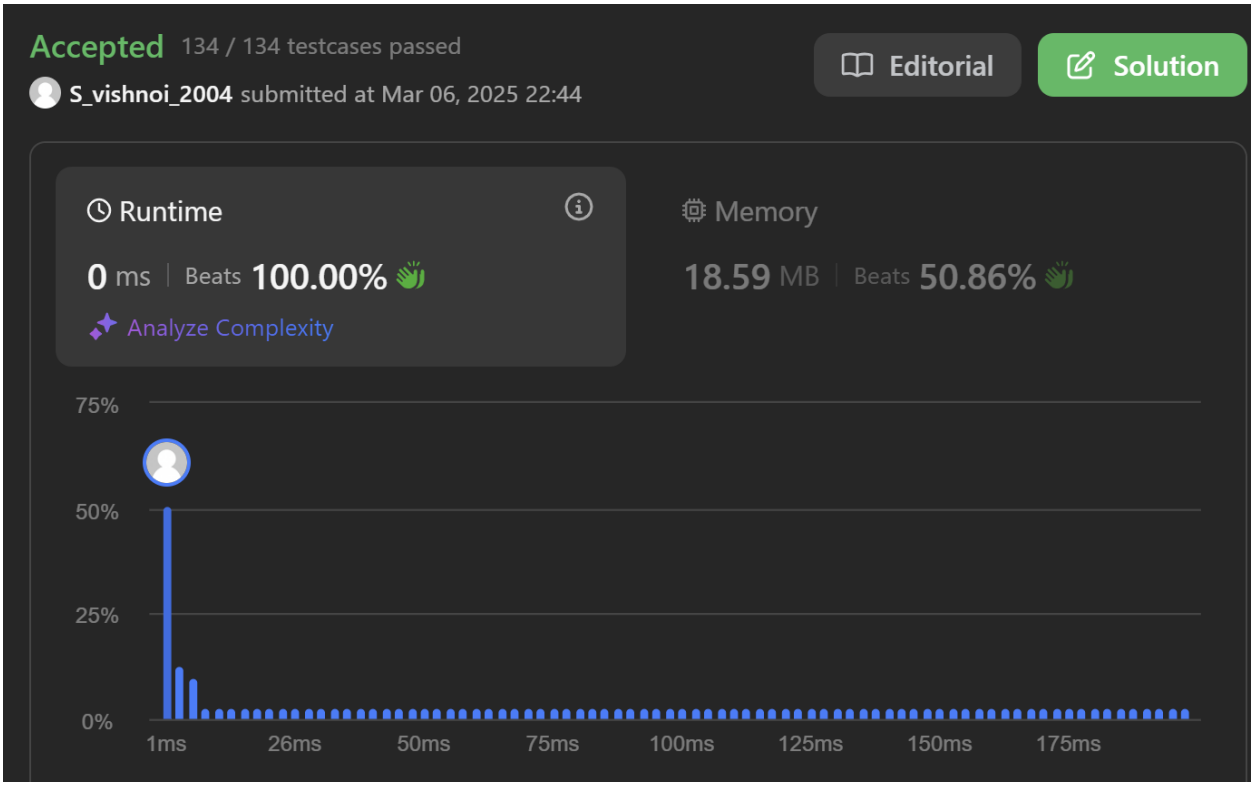
};



9 Merge k sorted lists

```
/**
 * Definition for singly-linked list.
 * struct ListNode {
 *     int val;
 *     ListNode *next;
 *     ListNode() : val(0), next(nullptr) {}
 *     ListNode(int x) : val(x), next(nullptr) {}
 *     ListNode(int x, ListNode *next) : val(x), next(next) {}
 * };
 */
```

```
class Solution {
public:
    ListNode* mergeKLists(vector<ListNode*>& lists) {
        priority_queue<pair<int,ListNode*>, vector<pair<int, ListNode*>> ,
greater<pair<int,ListNode*>>> pq;
        //Pushing all the head of linked lists in priority queue.
        for(int i=0;i<lists.size();i++){
            if(lists[i])    pq.push({lists[i]->val , lists[i]});
        }
        ListNode* dummy = new ListNode(-1);
        ListNode* temp = dummy;

        while(!pq.empty()){
            auto it = pq.top();
            if(it.second->next){
                pq.push({it.second->next->val,it.second->next});
            }
            pq.pop();
            temp->next = it.second;
            temp=temp->next;
        }
       return dummy->next;
    }
};
```


Accepted 134 / 134 testcases passed
S_vishnoi_2004 submitted at Mar 06, 2025 22:44
Editorial
Solution
Runtime
0 ms | Beats 100.00%
Analyze Complexity
Memory
18.59 MB | Beats 50.86%
75%
50%
25%
0%
1ms
26ms
50ms
75ms
100ms
125ms
150ms
175ms