Assignment-4

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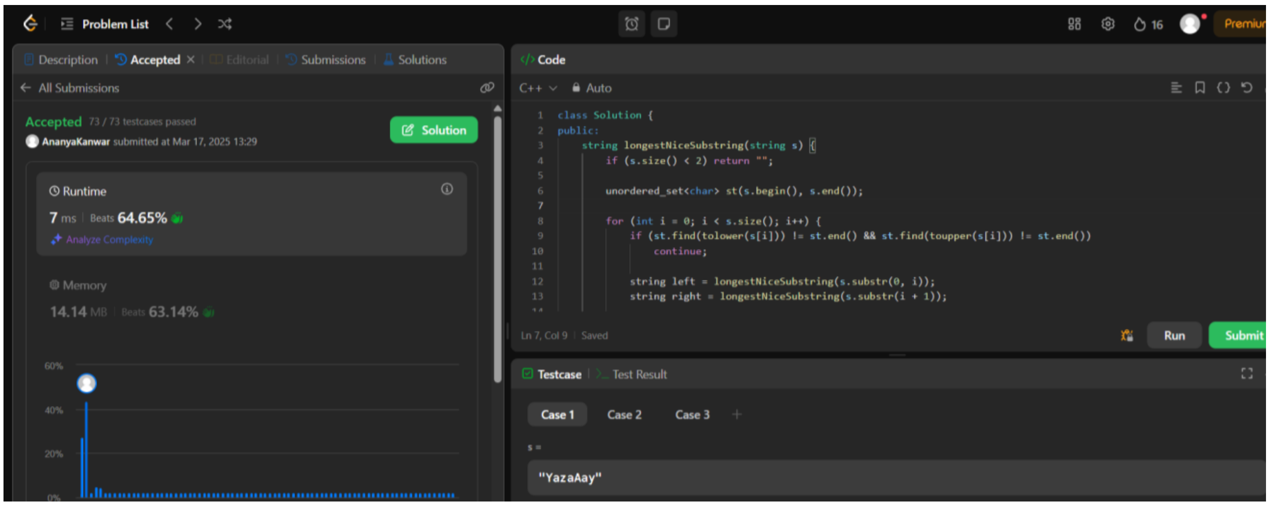
Branch: CSE **Section/Group: IOT-609-B**
Semester: 6th **Date: 17-03-2025**
Subject Name: AP Lab **Subject Code: 22CSP-351**

Ques 1: Longest Nice Substring

Code: -

```
class Solution {
public:
    string longestNiceSubstring(string s) {
        if (s.size() < 2) return "";
        unordered_set<char> st(s.begin(), s.end());
        for (int i = 0; i < s.size(); i++) {
         if (st.find(tolower(s[i])) != st.end() && st.find(toupper(s[i])) != st.end()) continue;
         string left = longestNiceSubstring(s.substr(0, i));
          string right = longestNiceSubstring(s.substr(i + 1));
           if (left.size() >= right.size()) return left;
           else  return right; }
           return s; }};
```

Submission: -



Accepted 73 / 73 testcases passed
AnanyaKanwar submitted at Mar 17, 2025 13:29

Runtime
7 ms | Beats 64.65%
Analyze Complexity

Memory
14.14 MB | Beats 63.14%

```
class Solution {
public:
    string longestNiceSubstring(string s) {
        if (s.size() < 2) return "";

        unordered_set<char> st(s.begin(), s.end());

        for (int i = 0; i < s.size(); i++) {
            if (st.find(tolower(s[i])) != st.end() && st.find(toupper(s[i])) != st.end())
                continue;

            string left = longestNiceSubstring(s.substr(0, i));
            string right = longestNiceSubstring(s.substr(i + 1));
```

Ln 7, Col 9 | Saved

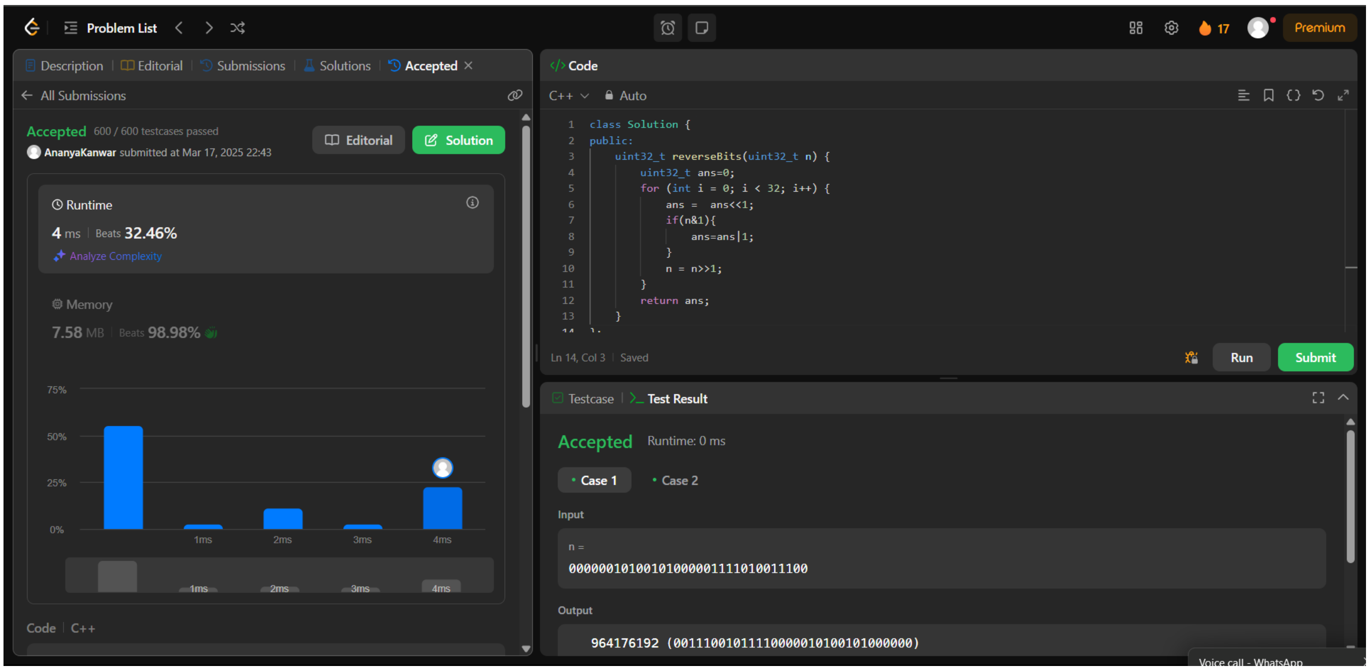
s =
"YazaAay"

Ques 2: Reverse Bits

Code: -

```
class Solution {
public:
    uint32_t reverseBits(uint32_t n) {
        uint32_t ans=0;
        for (int i = 0; i < 32; i++) {
            ans =  ans<<1;
            if(n&1){
                ans=ans|1;
            }
            n = n>>1;
        }
        return ans;
    }
};
```

Submission: -



Accepted 600 / 600 testcases passed
AnanyaKanwar submitted at Mar 17, 2025 22:43

Runtime
4 ms | Beats 32.46%

Memory
7.58 MB | Beats 98.98%

```
class Solution {
public:
    uint32_t reverseBits(uint32_t n) {
        uint32_t ans=0;
        for (int i = 0; i < 32; i++) {
            ans =  ans<<1;
            if(n&1){
                ans=ans|1;
            }
            n = n>>1;
        }
        return ans;
    }
```

Ln 14, Col 3 | Saved

Accepted Runtime: 0 ms

Input

```
n =
00000010100101000001111010011100
```

Output

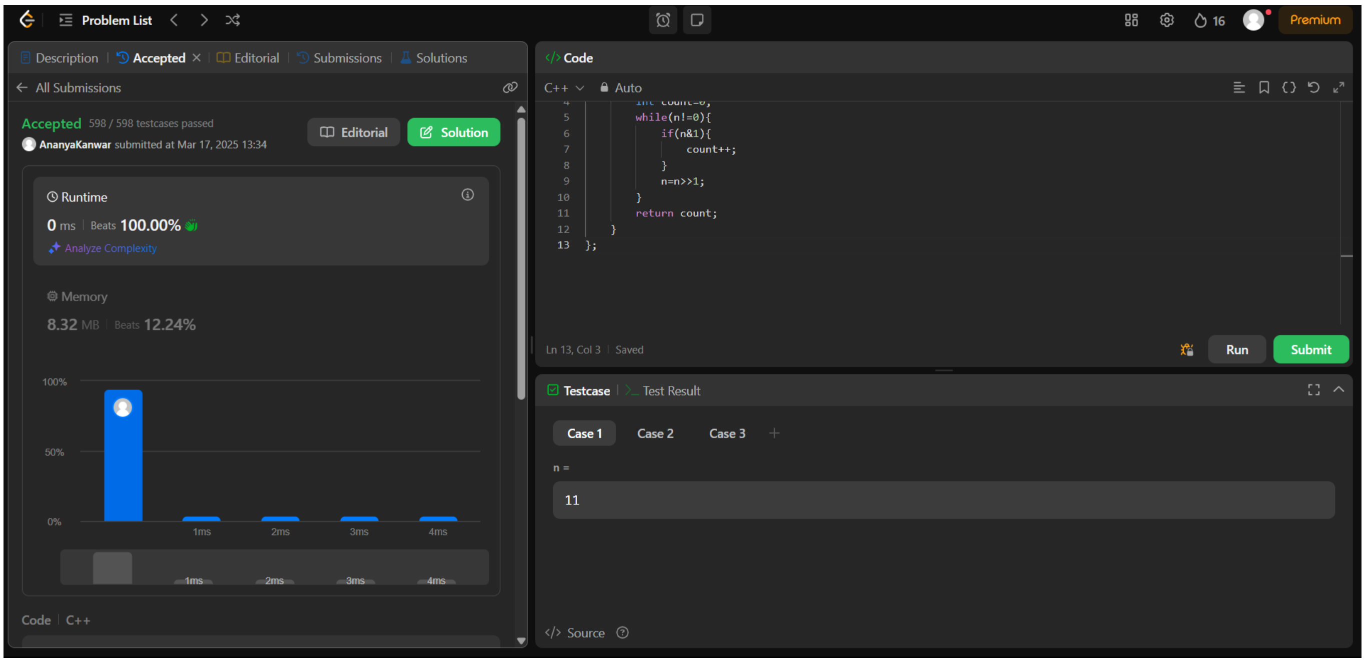
```
964176192 (00111001011110000010100101000000)
```

Ques 3: Number of 1 Bits

Code: -

```
class Solution {
public:
    int hammingWeight(int n) {
        int count=0;
        while(n!=0){
            if(n&1){
                count++;
            }
            n=n>>1;
        }
        return count;
    }
};
```

Submission: -



Accepted 598 / 598 testcases passed
AnanyaKanwar submitted at Mar 17, 2025 13:34

Runtime
0 ms | Beats 100.00%

Memory
8.32 MB | Beats 12.24%

```
        int count=0;
        while(n!=0){
            if(n&1){
                count++;
            }
            n=n>>1;
        }
        return count;
    }
};
```

Ln 13, Col 3 | Saved

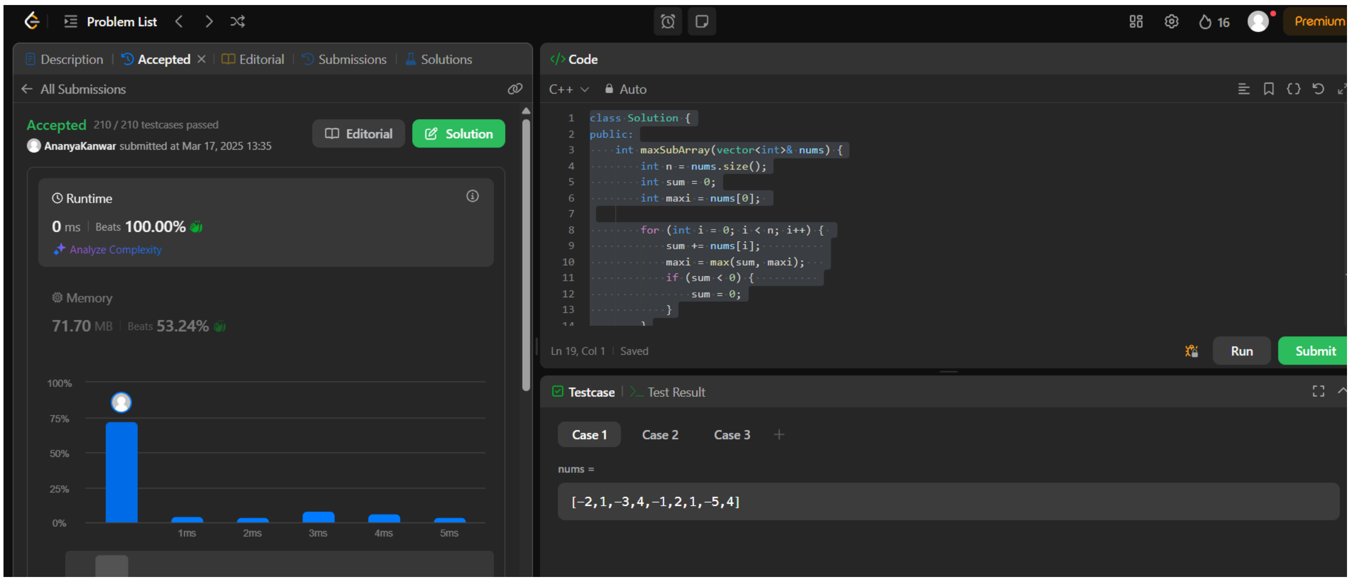
n =
11

Ques 4: Maximum Subarray

Code: -

```
class Solution {
public:
    int maxSubArray(vector<int>& nums) {
        int n = nums.size();
        int sum = 0;
        int maxi = nums[0];

        for (int i = 0; i < n; i++) {
            sum += nums[i];
            maxi = max(sum, maxi);
            if (sum < 0) {
                sum = 0;
            }
        }

        return maxi;
    }
};
```

Submission: -



Accepted 210 / 210 testcases passed
AnanyaKanwar submitted at Mar 17, 2025 13:35

Runtime
0 ms | Beats 100.00%

Memory
71.70 MB | Beats 53.24%

```
class Solution {
public:
    int maxSubArray(vector<int>& nums) {
        int n = nums.size();
        int sum = 0;
        int maxi = nums[0];

        for (int i = 0; i < n; i++) {
            sum += nums[i];
            maxi = max(sum, maxi);
            if (sum < 0) {
                sum = 0;
            }
```

C++ Auto

Ln 19, Col 1 | Saved

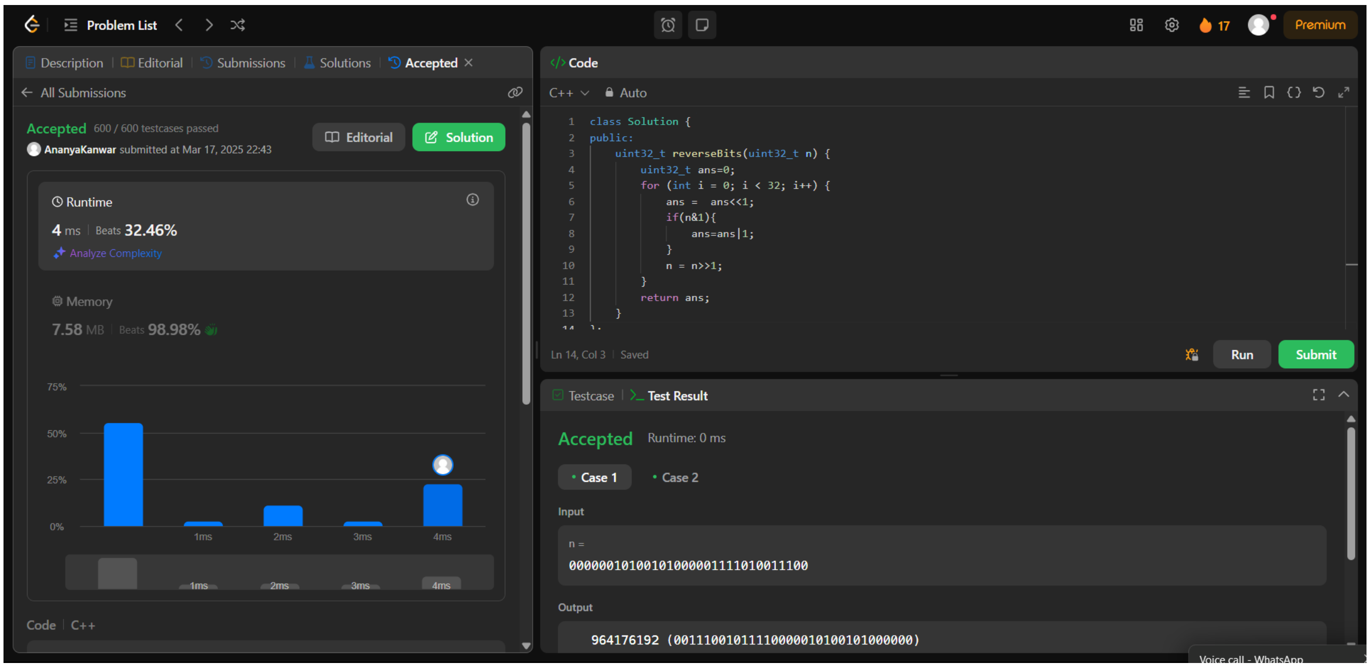
nums =
[-2,1,-3,4,-1,2,1,-5,4]

Ques 5: Search a 2D Matrix II

Code: -

```
class Solution {
public:
    bool searchMatrix(vector<vector<int>>& matrix, int target) {
        int r=0,c=matrix[0].size()-1;
        while (r<matrix.size() && c>=0){
            if (matrix[r][c]==target){return true;}
            else if (matrix[r][c]<target){r++;}
            else {c--;}
        }
        return false;
    }
};
```

Submission: -



Accepted 600 / 600 testcases passed
AnanyaKanwar submitted at Mar 17, 2025 22:43

Runtime
4 ms | Beats 32.46%

Memory
7.58 MB | Beats 98.98%

Code | C++

```
class Solution {
public:
    uint32_t reverseBits(uint32_t n) {
        uint32_t ans=0;
        for (int i = 0; i < 32; i++) {
            ans =  ans<<1;
            if(n&1){
                ans=ans|1;
            }
            n = n>>1;
        }
        return ans;
    }
```

Ln 14, Col 3 | Saved

Accepted Runtime: 0 ms

Input

```
n =
00000010100101000001111010011100
```

Output

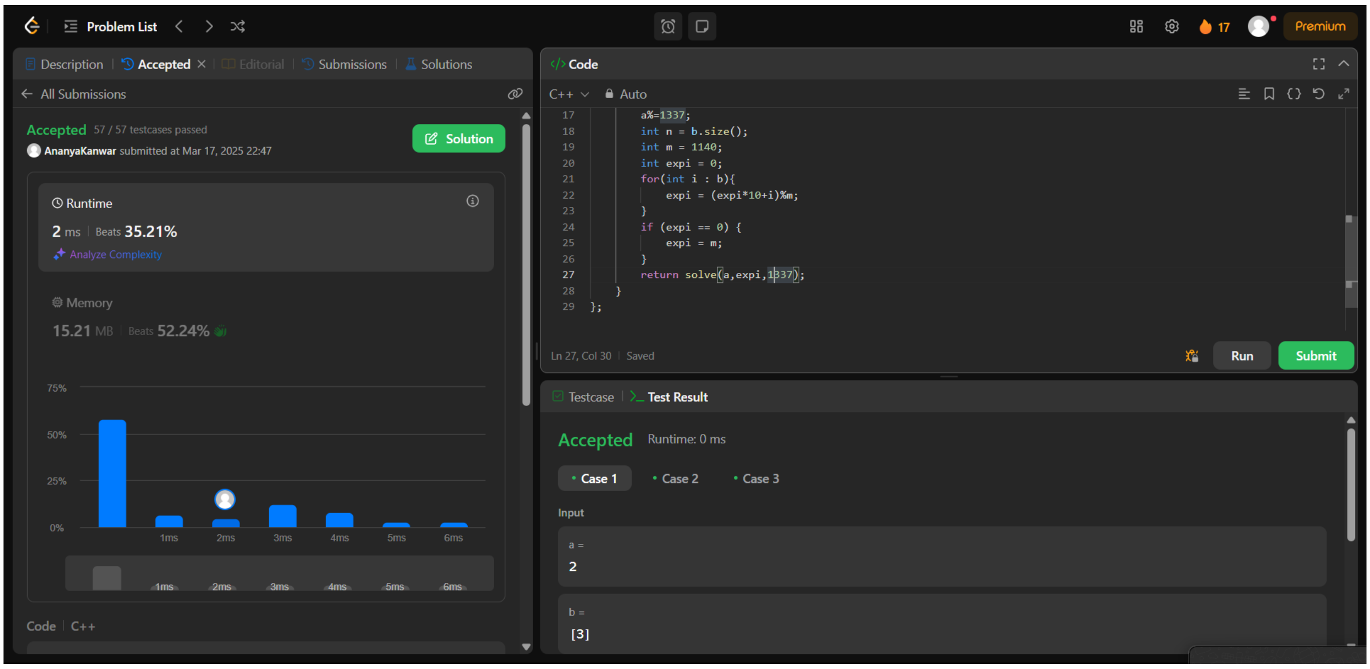
```
964176192 (00111001011110000010100101000000)
```

Ques 6: Super Pow

Code: -

```
class Solution {
private:
    int solve(int base, int power, int mod) {
        int ans = 1;
        while (power > 0) {
            if (power & 1) {
                ans = (ans * base) % mod;}
            base = (base * base) % mod;
            power >>= 1;} return ans;}
public:
    int superPow(int a, vector<int>& b) {
        a%=1337;
        int n = b.size();
        int m = 1140;
        int expi = 0;
        for(int i : b){
            expi = (expi*10+i)%m;}
        if (expi == 0) { expi = m; }
        return solve(a,expi,1337); } };
```

Submission: -



Accepted 57 / 57 testcases passed
AnanyaKanwar submitted at Mar 17, 2025 22:47

Runtime
2 ms | Beats 35.21%
Analyze Complexity

Memory
15.21 MB | Beats 52.24%

Code | C++

```
        a%=1337;
        int n = b.size();
        int m = 1140;
        int expi = 0;
        for(int i : b){
            expi = (expi*10+i)%m;
        }
        if (expi == 0) {
            expi = m;
        }
        return solve(a,expi,1337);
    }
};
```

Ln 27, Col 30 | Saved

Accepted Runtime: 0 ms

Case 1 Case 2 Case 3

Input

a =
2

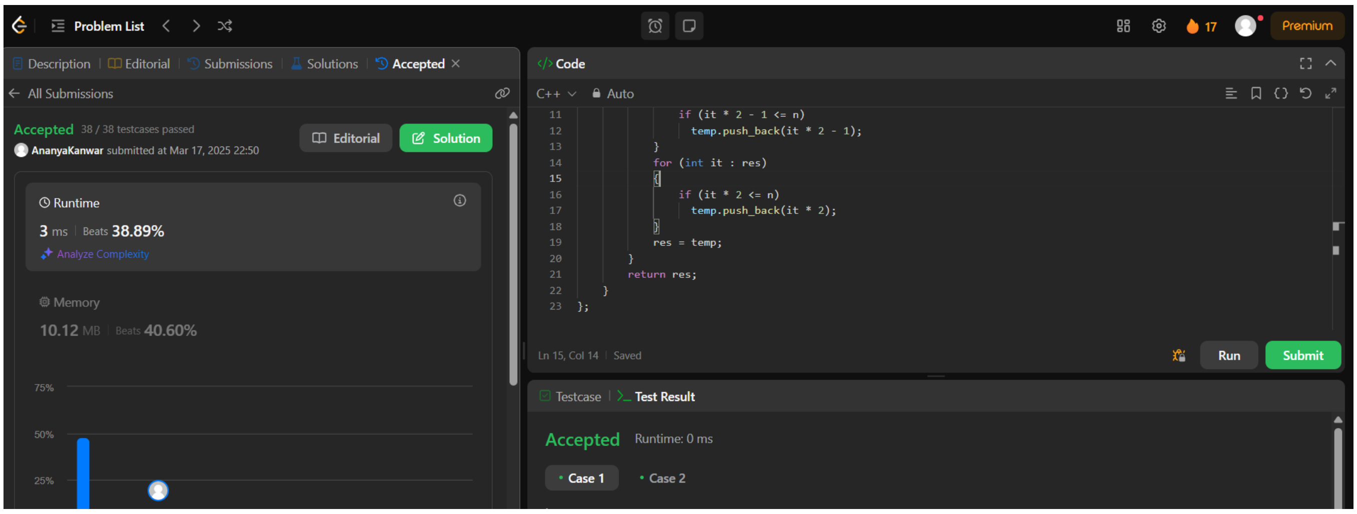
b =
[3]

Ques 7: Beautiful Array

Code: -

```
class Solution {
public:
    vector<int> beautifulArray(int n)
    {
        vector<int> res = {1};
        while (res.size() < n)
        {
            vector<int> temp;
            for (int it : res)
            {
                if (it * 2 - 1 <= n)
                  temp.push_back(it * 2 - 1);
            }
            for (int it : res)
            {
                if (it * 2 <= n)
                  temp.push_back(it * 2);
            }
            res = temp;
        }
        return res; }};
```

Submission: -



Accepted 38 / 38 testcases passed
AnanyaKanwar submitted at Mar 17, 2025 22:50

Runtime
3 ms | Beats 38.89%
Analyze Complexity

Memory
10.12 MB | Beats 40.60%

75%
50%
25%

```
                if (it * 2 - 1 <= n)
                  temp.push_back(it * 2 - 1);
            }
            for (int it : res)
            {
                if (it * 2 <= n)
                  temp.push_back(it * 2);
            }
            res = temp;
        }
        return res;
    }
};
```

Ln 15, Col 14 | Saved

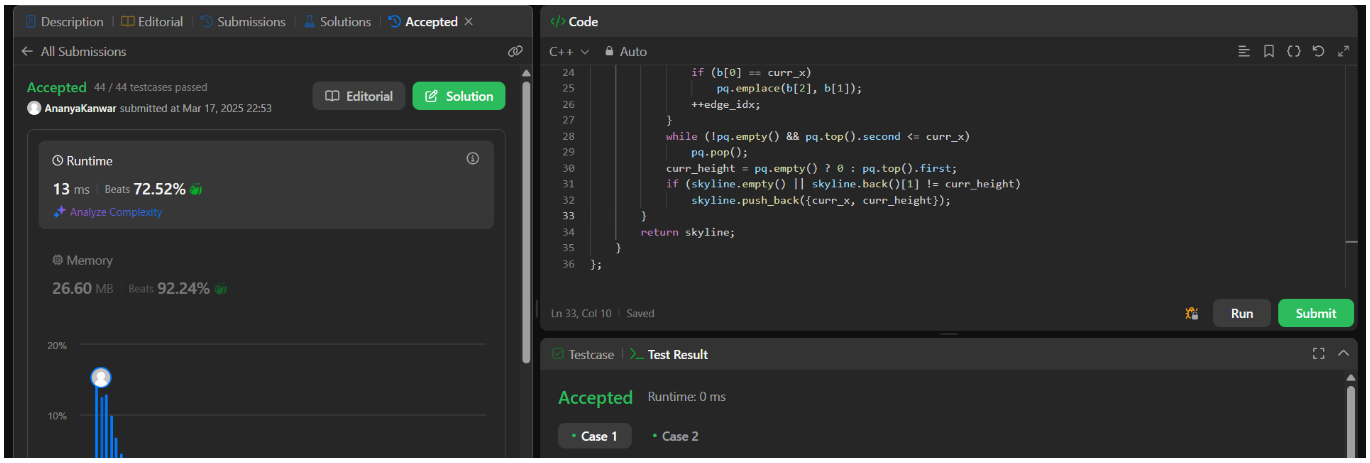
Accepted Runtime: 0 ms
Case 1 Case 2

Ques 8: The Skyline Problem

Code: -

```
    class Solution {
public:
    vector<vector<int>> getSkyline(vector<vector<int>>& buildings) {
        int edge_idx = 0;  vector<pair<int, int>> edges;
        priority_queue<pair<int, int>> pq;
        vector<vector<int>> skyline;
        for (int i = 0; i < buildings.size(); ++i) {
            const auto &b = buildings[i]; edges.emplace_back(b[0], i);
            edges.emplace_back(b[1], i); }
        std::sort(edges.begin(), edges.end());
        while (edge_idx < edges.size()) {
            int curr_height;
            const auto &[curr_x, _] = edges[edge_idx];
            while (edge_idx < edges.size() &&
                    curr_x == edges[edge_idx].first) {
                const auto &[_, building_idx] = edges[edge_idx];
                const auto &b = buildings[building_idx];
                if (b[0] == curr_x)
                    pq.emplace(b[2], b[1]);
                ++edge_idx; }
            while (!pq.empty() && pq.top().second <= curr_x)
                pq.pop();
            curr_height = pq.empty() ? 0 : pq.top().first;
            if (skyline.empty() || skyline.back()[1] != curr_height)
                skyline.push_back({curr_x, curr_height}); }
        return skyline;
       }
     };
```

Submission: -



Accepted 44 / 44 testcases passed
AnanyaKanwar submitted at Mar 17, 2025 22:53

Runtime: 13 ms | Beats 72.52%

Memory: 26.60 MB | Beats 92.24%

```
                if (b[0] == curr_x)
                    pq.emplace(b[2], b[1]);
                ++edge_idx;
            }
            while (!pq.empty() && pq.top().second <= curr_x)
                pq.pop();
            curr_height = pq.empty() ? 0 : pq.top().first;
            if (skyline.empty() || skyline.back()[1] != curr_height)
                skyline.push_back({curr_x, curr_height});
        }
        return skyline;
    }
};
```

Ln 33, Col 10 | Saved

Accepted Runtime: 0 ms

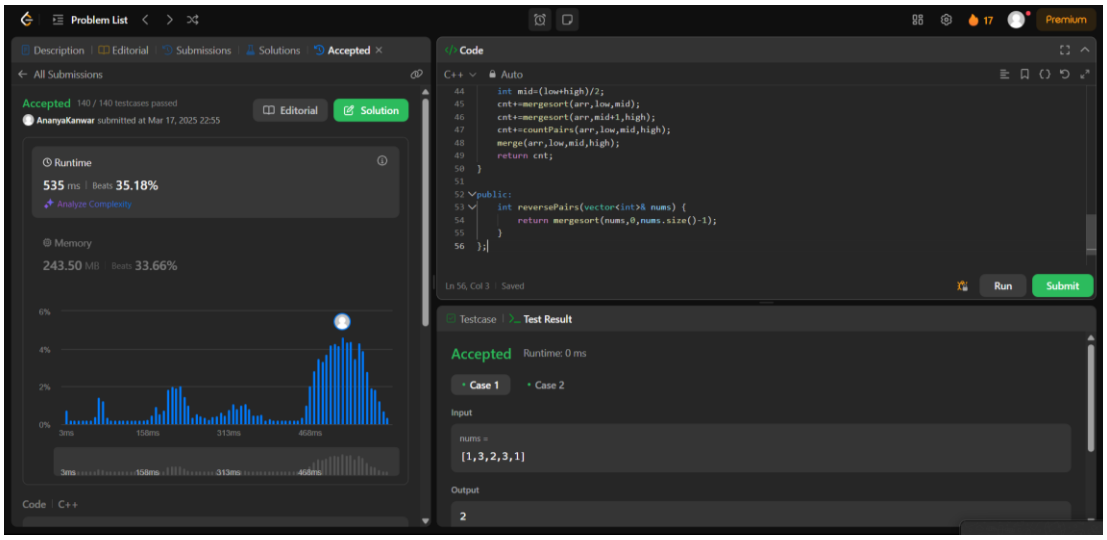
Ques 9: Reverse Pairs

Code: -

```
class Solution {
private:

int countPairs(vector<int>& arr,int low,int mid,int high){
        int cnt=0;
        int right=mid+1;
        for(int i=low;i<=mid;i++){
                while(right<=high && 0.5*arr[i]>arr[right]) right++;
                cnt+=right-(mid+1);
        }
        return cnt;
}

void merge(vector<int>& arr,int low,int mid,int high){
        int left=low;
        int right=mid+1;
        vector<int> temp;
        while(left<=mid && right<=high){
                if(arr[left]<=arr[right]){
                        temp.push_back(arr[left]);
                        left++;
                }
                else{
                        temp.push_back(arr[right]);
                        right++;
                }
        }
        while(left<=mid){
                temp.push_back(arr[left]);
                left++;
        }
        while(right<=high){
                temp.push_back(arr[right]);
```

```
                        right++;
                }
                for(int i=low;i<=high;i++){
                        arr[i]=temp[i-low];
                }
        }

        int mergesort(vector<int>& arr,int low,int high){
                int cnt=0;
                if(low>=high) return cnt;
                int mid=(low+high)/2;
                cnt+=mergesort(arr,low,mid);
                cnt+=mergesort(arr,mid+1,high);
                cnt+=countPairs(arr,low,mid,high);
                merge(arr,low,mid,high);
                return cnt;
        }

        public:
          int reversePairs(vector<int>& nums) {
            return mergesort(nums,0,nums.size()-1);
          }
        };
```

Submission: -



Accepted 140 / 140 testcases passed
AnanyaKanwar submitted at Mar 17, 2025 22:55

Runtime
535 ms | Beats 35.18%
Analyze Complexity

Memory
243.50 MB | Beats 33.66%

```
    int mid=(low+high)/2;
    cnt+=mergesort(arr,low,mid);
    cnt+=mergesort(arr,mid+1,high);
    cnt+=countPairs(arr,low,mid,high);
    merge(arr,low,mid,high);
    return cnt;
}

public:
    int reversePairs(vector<int>& nums) {
        return mergesort(nums,0,nums.size()-1);
    }
};
```

Ln 56, Col 3 | Saved

Accepted Runtime: 0 ms

Input
nums =
[1,3,2,3,1]

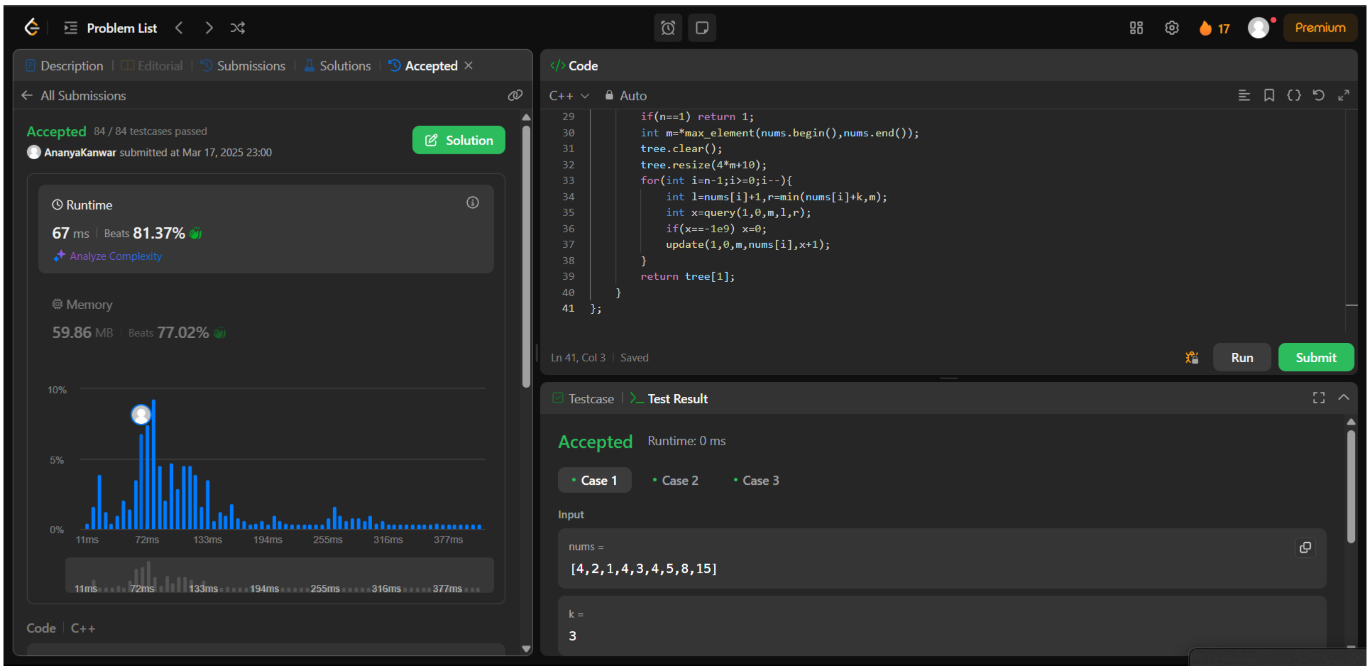
Output
2

Ques 10: Longest Increasing Subsequence II

Code: -

```
class Solution {
public:
    vector<int>tree;
    void update(int node,int st,int end,int i,int val){
        if(st==end){
            tree[node]=max(tree[node],val);
            return;
        }
        int mid=(st+end)/2;
        if(i<=mid){
            update(node*2,st,mid,i,val);
        }else{
            update(node*2+1,mid+1,end,i,val);
        }
        tree[node]=max(tree[node*2],tree[node*2+1]);
    }
    int query(int node,int st,int end,int x,int y){
        if(x>end || y<st) return -1e9;
        if(st>=x && end<=y){
            return tree[node];
        }
        int mid=(st+end)/2;
        int left=query(2*node,st,mid,x,y);
        int right=query(2*node+1,mid+1,end,x,y);
        return max(left,right);
    }
    int lengthOfLIS(vector<int>& nums, int k) {
        int n=nums.size();
        if(n==1) return 1;
        int m=*max_element(nums.begin(),nums.end());
        tree.clear();
        tree.resize(4*m+10);
        for(int i=n-1;i>=0;i--){
            int l=nums[i]+1,r=min(nums[i]+k,m);
            int x=query(1,0,m,l,r);
            if(x==-1e9) x=0;
            update(1,0,m,nums[i],x+1);
        }
        return tree[1];
    }
};
```

Submission: -



Accepted 84 / 84 testcases passed
AnanyaKanwar submitted at Mar 17, 2025 23:00

Runtime
67 ms | Beats 81.37%

Memory
59.86 MB | Beats 77.02%

```
        if(n==1) return 1;
        int m=*max_element(nums.begin(),nums.end());
        tree.clear();
        tree.resize(4*m+10);
        for(int i=n-1;i>=0;i--){
            int l=nums[i]+1,r=min(nums[i]+k,m);
            int x=query(1,0,m,l,r);
            if(x==-1e9) x=0;
            update(1,0,m,nums[i],x+1);
        }
        return tree[1];
    }
};
```

Ln 41, Col 3 | Saved

Accepted Runtime: 0 ms

Case 1 · Case 2 · Case 3

Input

nums =
[4,2,1,4,3,4,5,8,15]

k =
3