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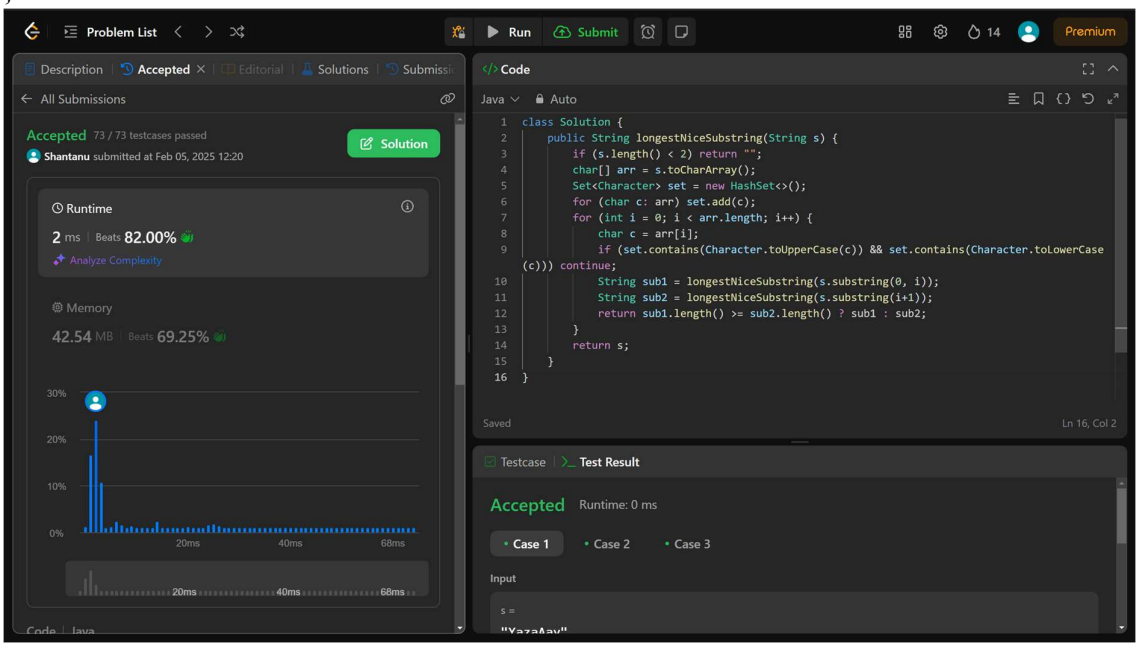
Branch: BE-CSE Section: 602/A

Q1. 1763. Longest Nice Substring

Solution:

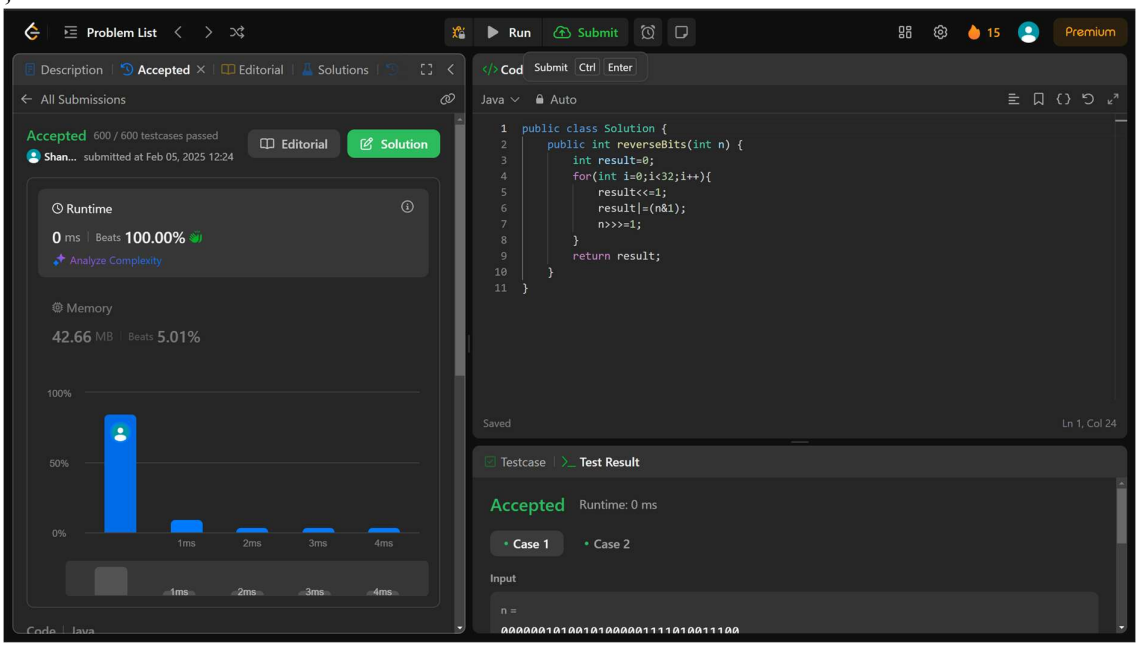
```
class Solution {
    public String longestNiceSubstring(String s) {
        if (s.length() < 2) return "";
        char[] arr = s.toCharArray();
        Set<Character> set = new HashSet<>();
        for (char c: arr) set.add(c);
        for (int i = 0; i < arr.length; i++) {
            char c = arr[i];
            if (set.contains(Character.toUpperCase(c)) && set.contains(Character.toLowerCase(c))) continue;
            String sub1 = longestNiceSubstring(s.substring(0, i));
            String sub2 = longestNiceSubstring(s.substring(i+1));
            return sub1.length() >= sub2.length() ? sub1 : sub2;
        }
        return s;
    }
}
```



Q2. 190. Reverse Bits

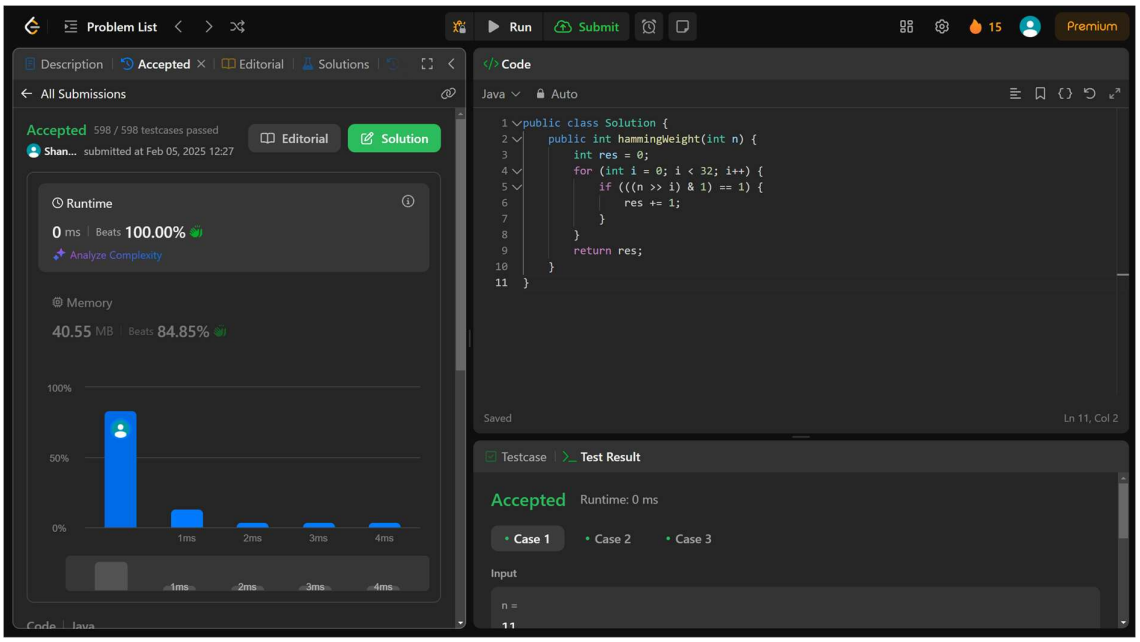
```
public class Solution {
    public int reverseBits(int n) {
        int result=0;
```

```
        for(int i=0;i<32;i++){
            result<<=1;
            result|=(n&1);
            n>>>=1;
        }
        return result;
    }
}
```



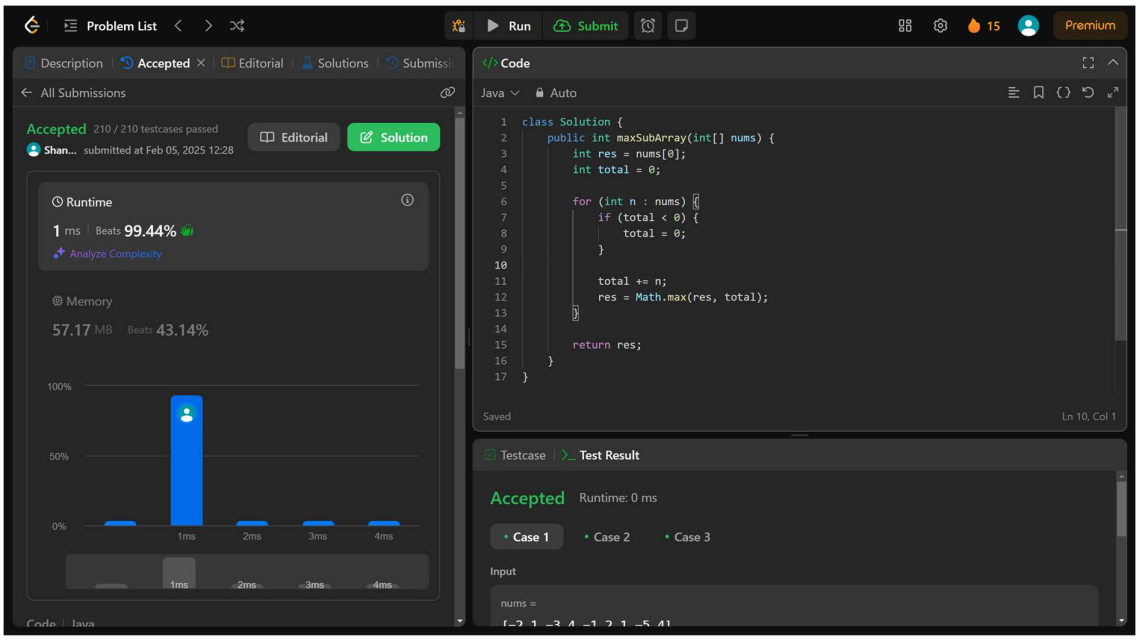
Q3. [191. Number of 1 Bits]

```
public class Solution {
    public int hammingWeight(int n) {
        int res = 0;
        for (int i = 0; i < 32; i++) {
            if (((n >> i) & 1) == 1) {
                res += 1;
            }
        }
        return res;
    }
}
```



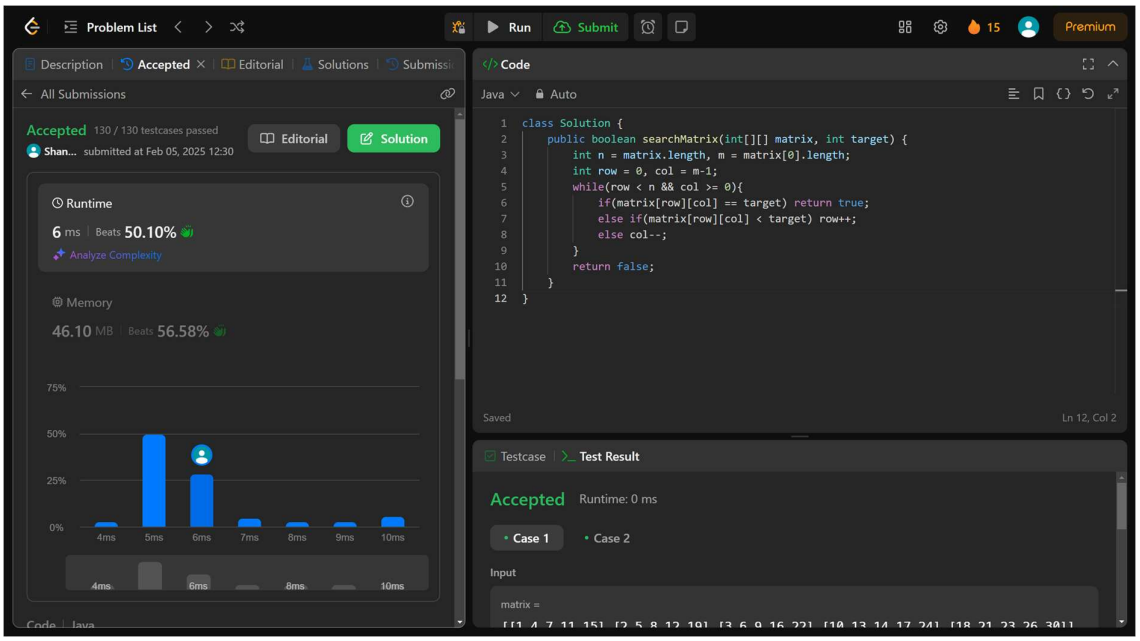
Q4. [53. Maximum Subarray]

```
class Solution {
    public int maxSubArray(int[] nums) {
        int res = nums[0];
        int total = 0;
        for (int n : nums) {
            if (total < 0) {
                total = 0;
            }
            total += n;
            res = Math.max(res, total);
        }
        return res;
    }
}
```



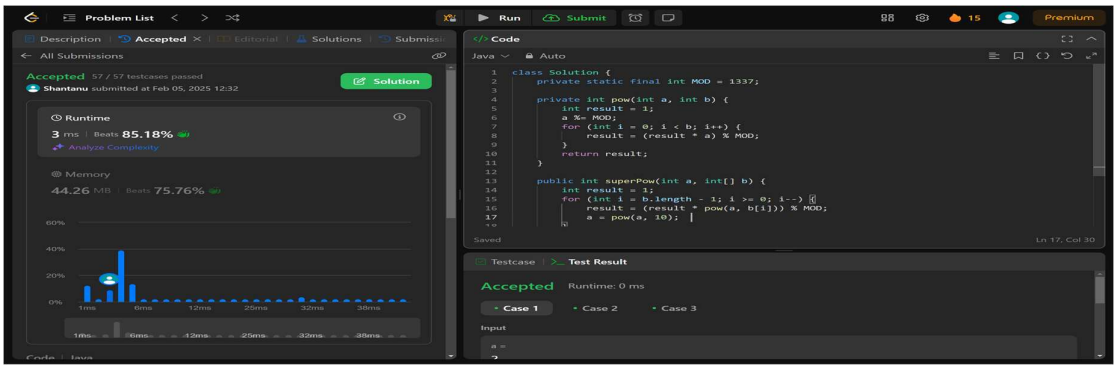
Q5. [240. Search a 2D Matrix II]

```
class Solution {
    public boolean searchMatrix(int[][] matrix, int target) {
        int n = matrix.length, m = matrix[0].length;
        int row = 0, col = m-1;
        while(row < n && col >= 0){
            if(matrix[row][col] == target) return true;
            else if(matrix[row][col] < target) row++;
            else col--;
        }
        return false;
    }
}
```



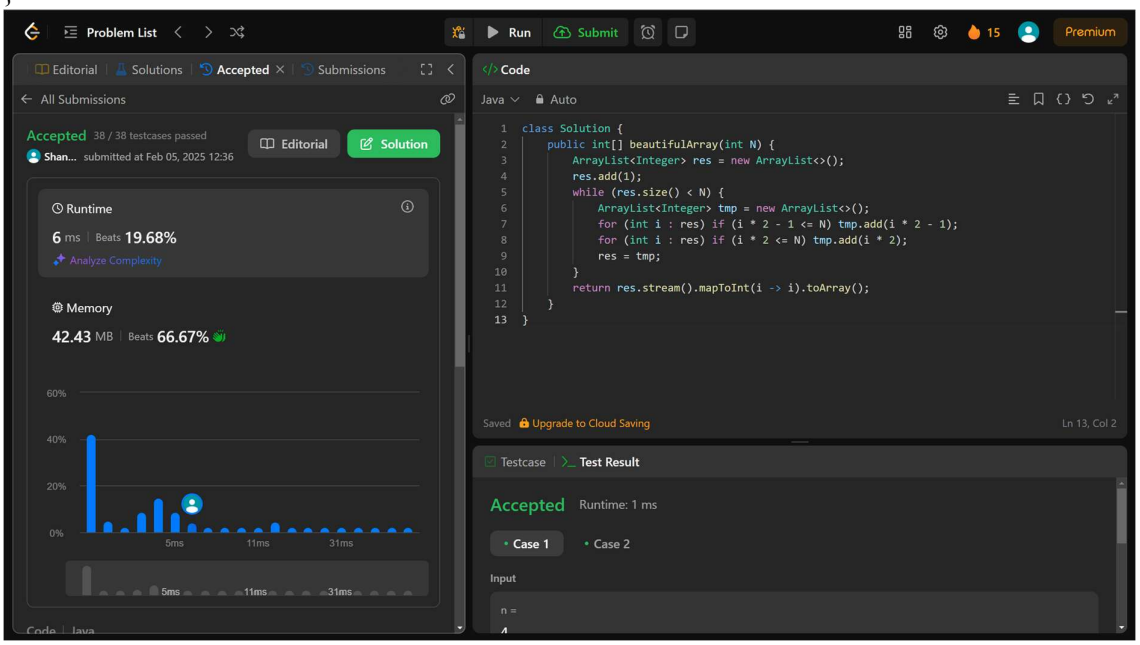
Q6. [372. Super Pow]

```
class Solution {
    private static final int MOD = 1337;

    private int pow(int a, int b) {
        int result = 1;
        a %= MOD;  // Taking mod to prevent overflow
        for (int i = 0; i < b; i++) {
            result = (result * a) % MOD;
        }
        return result;
    }
    public int superPow(int a, int[] b) {
        int result = 1;
        for (int i = b.length - 1; i >= 0; i--) {
            result = (result * pow(a, b[i])) % MOD;
            a = pow(a, 10);  // Power up for the next iteration
        }
        return result;
    }
}
```



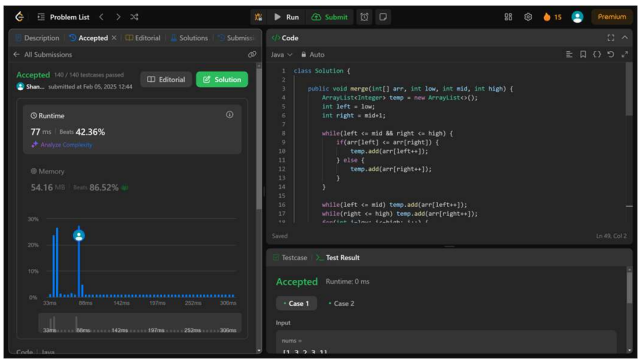
Q7. [932. Beautiful Array]

```
class Solution {
    public int[] beautifulArray(int N) {
        ArrayList<Integer> res = new ArrayList<>();
        res.add(1);
        while (res.size() < N) {
            ArrayList<Integer> tmp = new ArrayList<>();
            for (int i : res) if (i * 2 - 1 <= N) tmp.add(i * 2 - 1);
            for (int i : res) if (i * 2 <= N) tmp.add(i * 2);
            res = tmp;
        }
        return res.stream().mapToInt(i -> i).toArray();
    }
}
```



Q8. [493. Reverse Pairs]

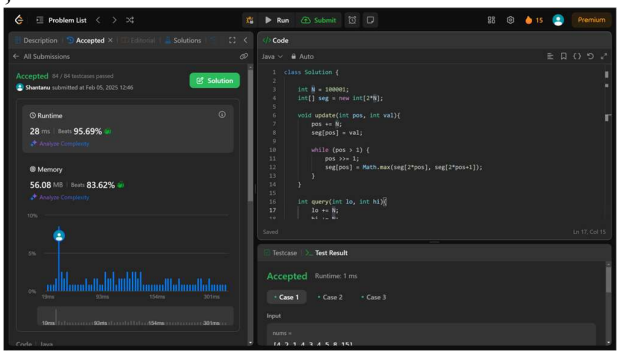
```
class Solution {
    public void merge(int[] arr, int low, int mid, int high) {
        ArrayList<Integer> temp = new ArrayList<>();
        int left = low;
        int right = mid+1;

        while(left <= mid && right <= high) {
            if(arr[left] <= arr[right]) {
                temp.add(arr[left++]);
            } else {
                temp.add(arr[right++]);
            }
        }
        while(left <= mid) temp.add(arr[left++]);
        while(right <= high) temp.add(arr[right++]);
        for(int i=low; i<=high; i++) {
            arr[i] = temp.get(i-low);
        }
    }
    public int countPairs(int[] arr, int low, int mid, int high) {
        int right = mid + 1;
        int cnt = 0;
        for(int i=low; i<=mid; i++) {
            while(right <= high && (long) arr[i] > 2L * arr[right])
            right++;
            cnt += (right - (mid + 1));
        }
        return cnt;
    }
    public int mergeSort(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(int[] nums) {
        int n = nums.length;
        return mergeSort(nums, 0, n-1);
    }
}
```



Q9. [2407. Longest Increasing Subsequence II]

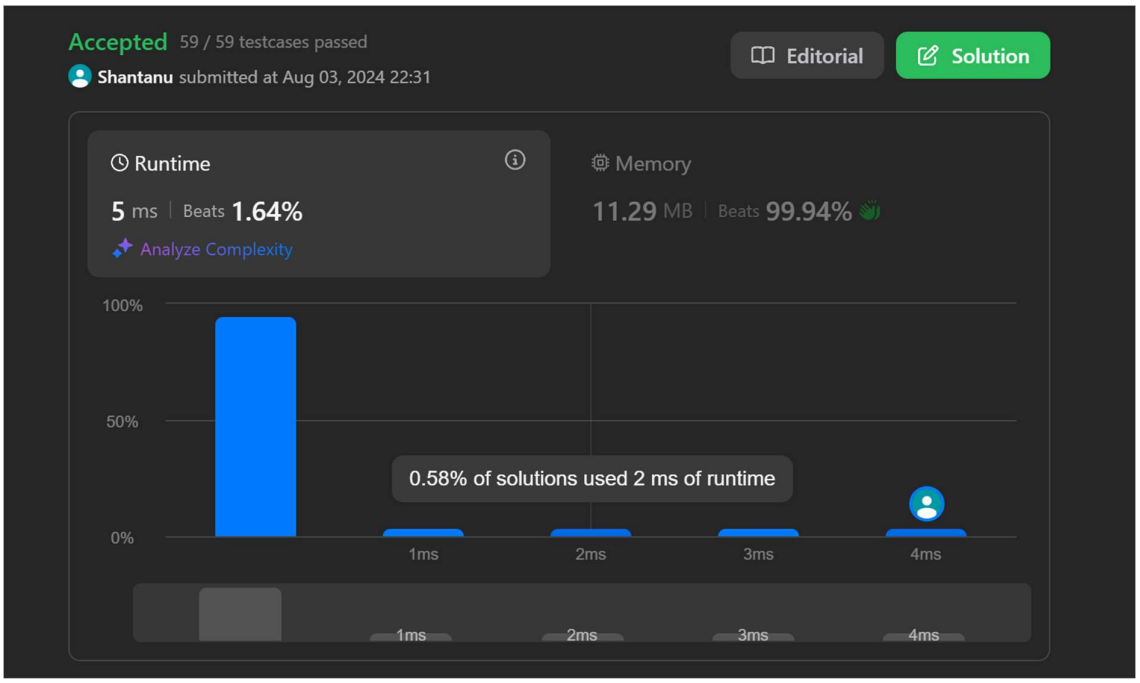
```
class Solution {
    int N = 100001;
    int[] seg = new int[2*N];
    void update(int pos, int val){
        pos += N;
        seg[pos] = val;

        while (pos > 1) {
            pos >>= 1;
            seg[pos] = Math.max(seg[2*pos], seg[2*pos+1]);
        }
    }
    int query(int lo, int hi){
        lo += N;
        hi += N;
        int res = 0;

        while (lo < hi) {
            if ((lo & 1)==1) {
                res = Math.max(res, seg[lo++]);
            }
            if ((hi & 1)==1) {
                res = Math.max(res, seg[--hi]);
            }
            lo >>= 1;
            hi >>= 1;
        }
        return res;
    }
    public int lengthOfLIS(int[] A, int k) {
        int ans = 0;
        for (int i = 0; i < A.length; ++i){
            int l = Math.max(0, A[i]-k);
            int r = A[i];
```

```
            int res = query(l, r) + 1;
            ans = Math.max(res, ans);
            update(A[i], res);
        }
        return ans;
    }
}
```



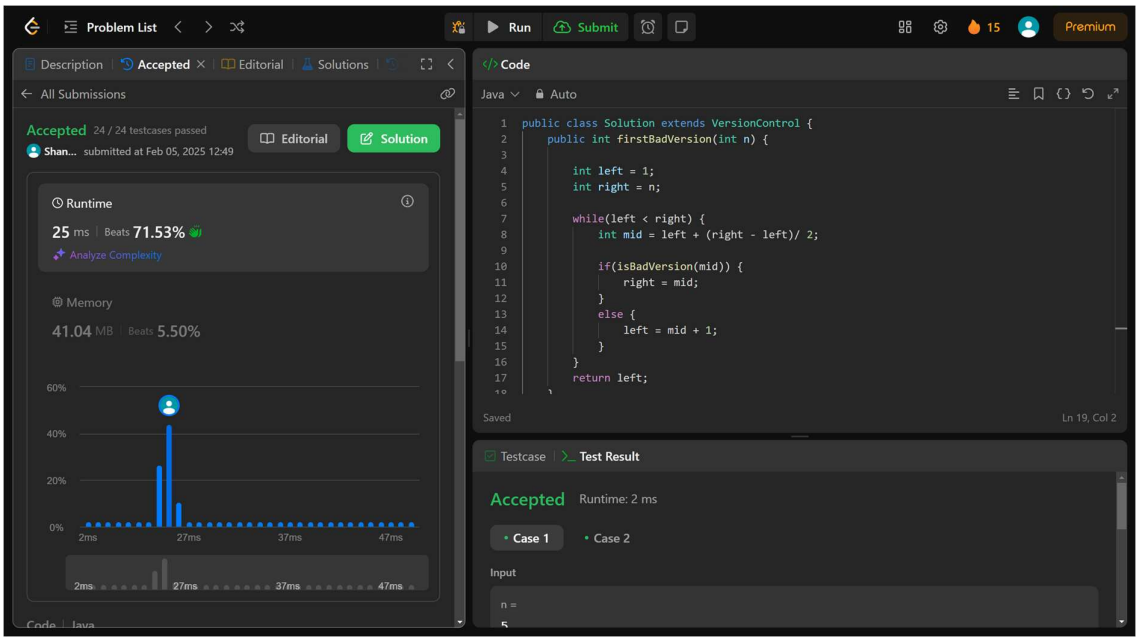
Q10. **Merge Sorted Array**

```
class Solution {
public:
    void merge(vector<int>& nums1, int m, vector<int>& nums2, int n) {
        int i = m-1;
        int j = n-1;
        int k = (m+n-1);
        while (i>=0&&j>=0){
            if (nums1[i]>nums2[j]){
                nums1[k--]=nums1[i--];
            }
            else {
                nums1[k--]=nums2[j--];
            }
        }
        while (i>=0){
            nums1[k--]=nums1[i--];
        }
        while (j>=0){
            nums1[k--]=nums2[j--];
        }
    }
};
```



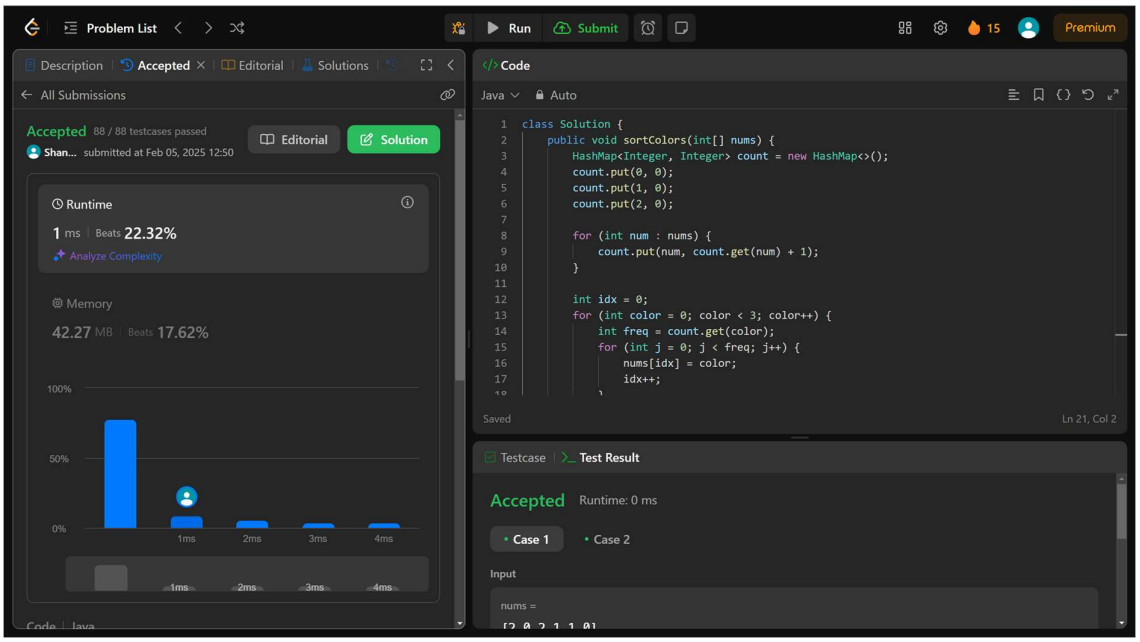
Q11. [278. First Bad Version]

```
public class Solution extends VersionControl {
    public int firstBadVersion(int n)
        int left = 1;
        int right = n;
        while(left < right) {
            int mid = left + (right - left)/ 2;
            if(isBadVersion(mid)) {
                right = mid;
            }
            else {
                left = mid + 1;
            }
        }
        return left;
    }
}
```



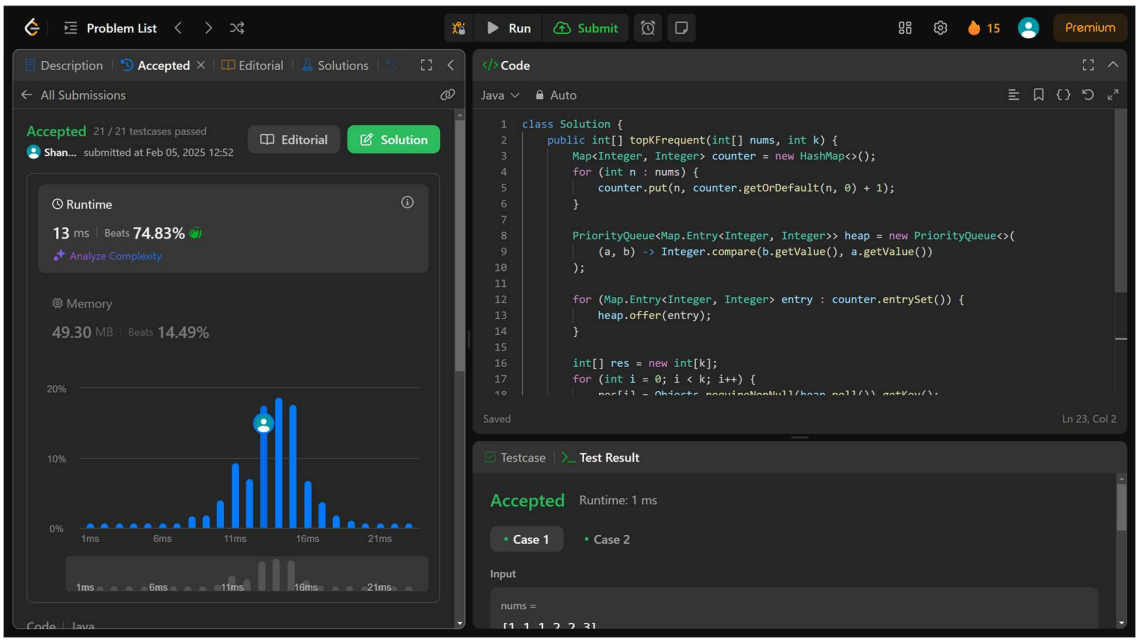
Q12. [75. Sort Colors]

```
class Solution {
    public void sortColors(int[] nums) {
        HashMap<Integer, Integer> count = new HashMap<>();
        count.put(0, 0);
        count.put(1, 0);
        count.put(2, 0);
        for (int num : nums) {
            count.put(num, count.get(num) + 1);
        }

        int idx = 0;
        for (int color = 0; color < 3; color++) {
            int freq = count.get(color);
            for (int j = 0; j < freq; j++) {
                nums[idx] = color;
                idx++;
            }
        }
    }
}
```



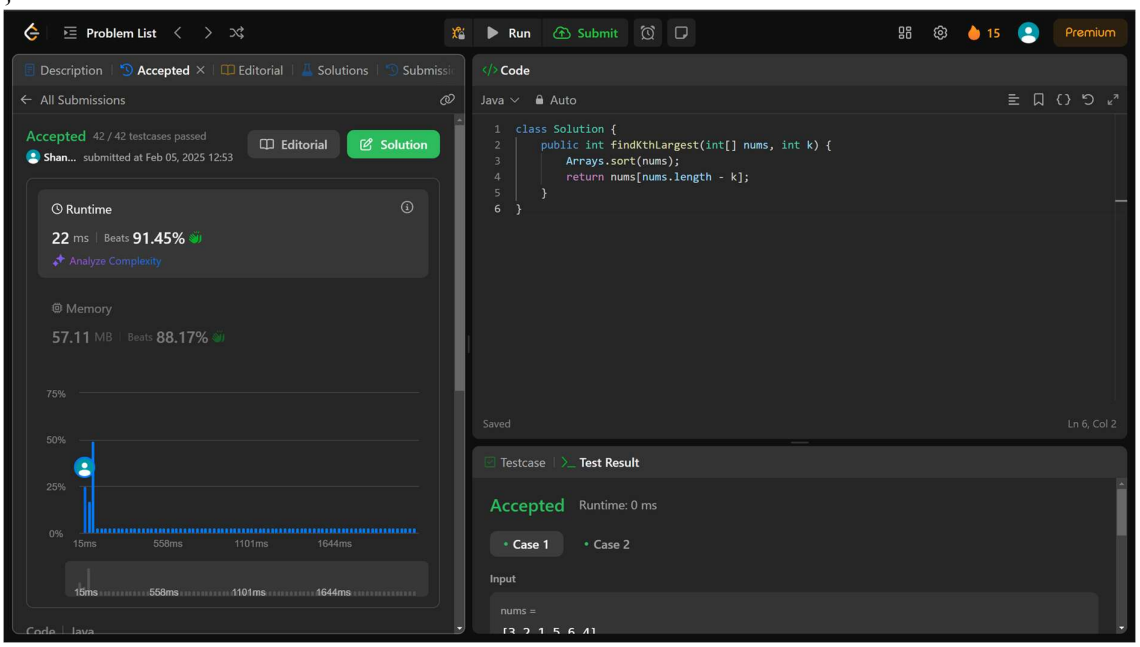
Q13. [347. Top K Frequent Elements]

```
class Solution {
    public int[] topKFrequent(int[] nums, int k) {
        Map<Integer, Integer> counter = new HashMap<>();
        for (int n : nums) {
            counter.put(n, counter.getOrDefault(n, 0) + 1);
        }
        PriorityQueue<Map.Entry<Integer, Integer>> heap = new PriorityQueue<>(
            (a, b) -> Integer.compare(b.getValue(), a.getValue())
        );
        for (Map.Entry<Integer, Integer> entry : counter.entrySet()) {
            heap.offer(entry);
        }
        int[] res = new int[k];
        for (int i = 0; i < k; i++) {
            res[i] = Objects.requireNonNull(heap.poll()).getKey();
        }

        return res;
    }
}
```



Q14. [215. Kth Largest Element in an Array]

```
class Solution {
    public int findKthLargest(int[] nums, int k) {
        Arrays.sort(nums);
        return nums[nums.length - k];
    }
}
```



Q15. [162. Find Peak Element]

```
class Solution {
    public int findPeakElement(int[] nums) {
        int left = 0;
        int right = nums.length - 1;

        while (left < right) {
            int mid = (left + right) / 2;
            if (nums[mid] > nums[mid + 1]) {
                right = mid;
            } else {
                left = mid + 1;
            }
        }

        return left;
    }
}
```