DSA PRACTICE - 9

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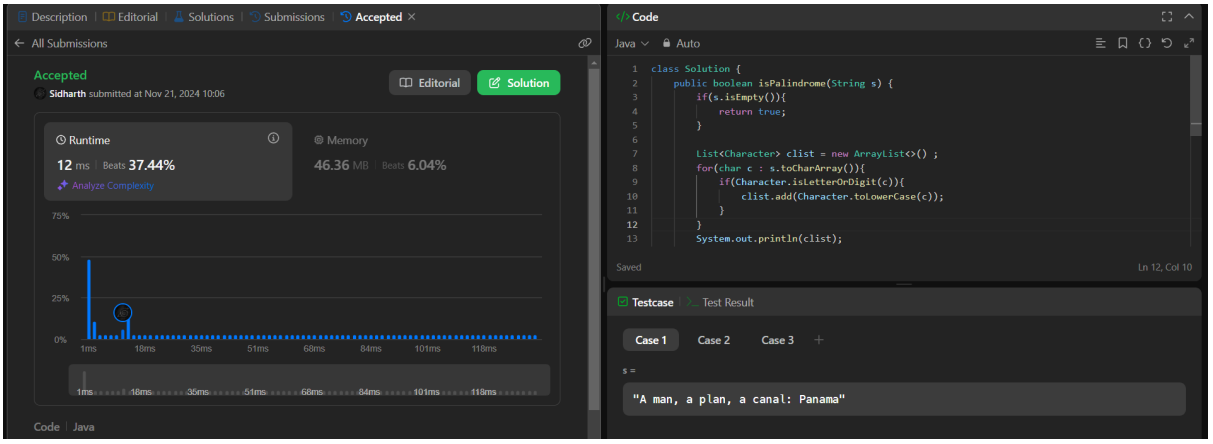
Two Pointers

1.Valid Palindrome

```java
class Solution {
    public boolean isPalindrome(String s) {
        if(s.isEmpty()){
            return true;
        }

        List<Character> clist = new ArrayList<>() ;
        for(char c : s.toCharArray()){
            if(Character.isLetterOrDigit(c)){
                clist.add(Character.toLowerCase(c));
            }
        }
        System.out.println(s.get(0));

        int i = 0;
        int j = clist.size()-1;

        while (i<j){
            if(clist.get(i) != clist.get(j)){
                return false;
            }
            i++;
            j--;
        }
        return true;
    }
}
```

Time Complexity : O(n)

Output:

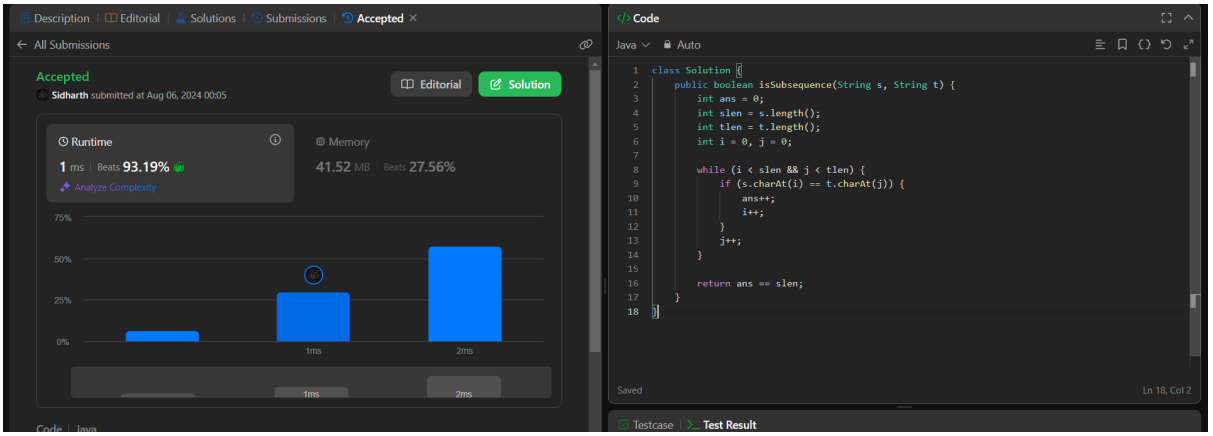


2. Is Subsequence

```java
class Solution {
    public boolean isSubsequence(String s, String t) {
        int ans = 0;
        int slen = s.length();
        int tlen = t.length();
        int i = 0, j = 0;

        while (i < slen && j < tlen) {
            if (s.charAt(i) == t.charAt(j)) {
                ans++;
                i++;
            }
            j++;
        }

        return ans == slen;
    }
}
```

Time Complexity : O(n)

Output:

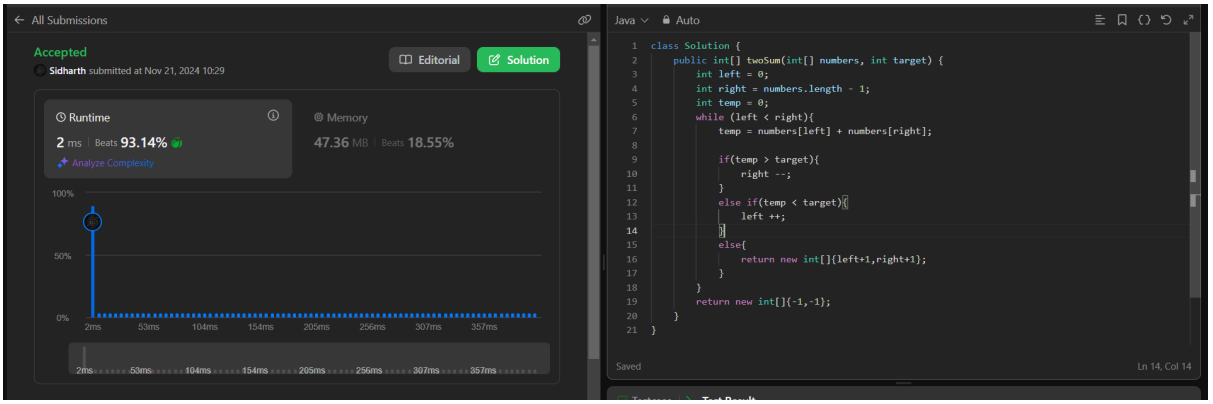


3.Two Sum - ||

```
class Solution {
    public int[] twoSum(int[] numbers, int target) {
        int left = 0;
        int right = numbers.length - 1;
        int temp = 0;
        while (left < right){
            temp = numbers[left] + numbers[right];

            if(temp > target){
                right --;
            }
            else if(temp < target){
                left ++;
            }
            else{
                return new int[]{left+1,right+1};
            }
        }
        return new int[]{-1,-1};
    }
}
```

Time Complexity : O(n)

Output:

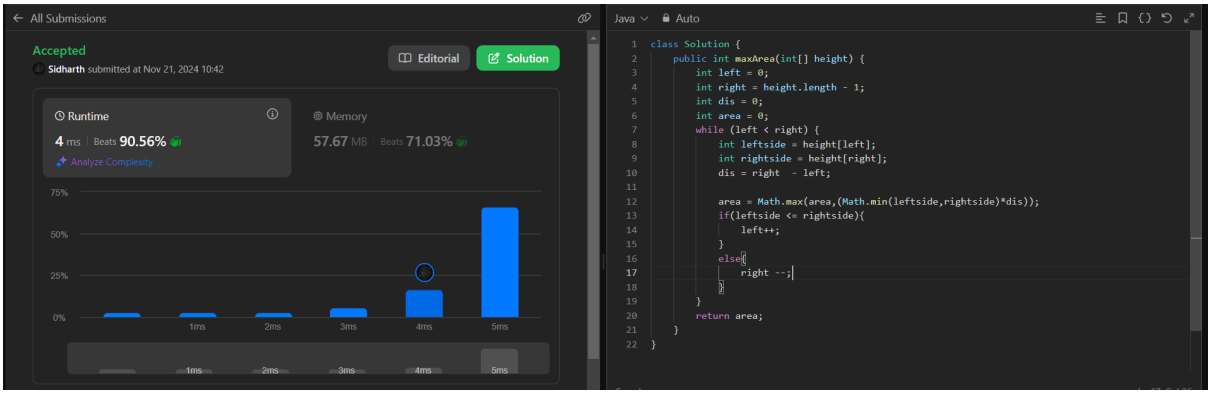


4.Container with most water

```
class Solution {
    public int maxArea(int[] height) {
        int left = 0;
        int right = height.length - 1;
        int dis = 0;
        int area = 0;
        while (left < right) {
            int leftside = height[left];
            int rightside = height[right];
            dis = right  - left;

            area = Math.max(area,(Math.min(leftside,rightside)*dis));
            if(leftside <= rightside){
                left++;
            }
            else{
                right --;
            }
        }
        return area;
    }
}
```

Time Complexity : O(n)

Output:

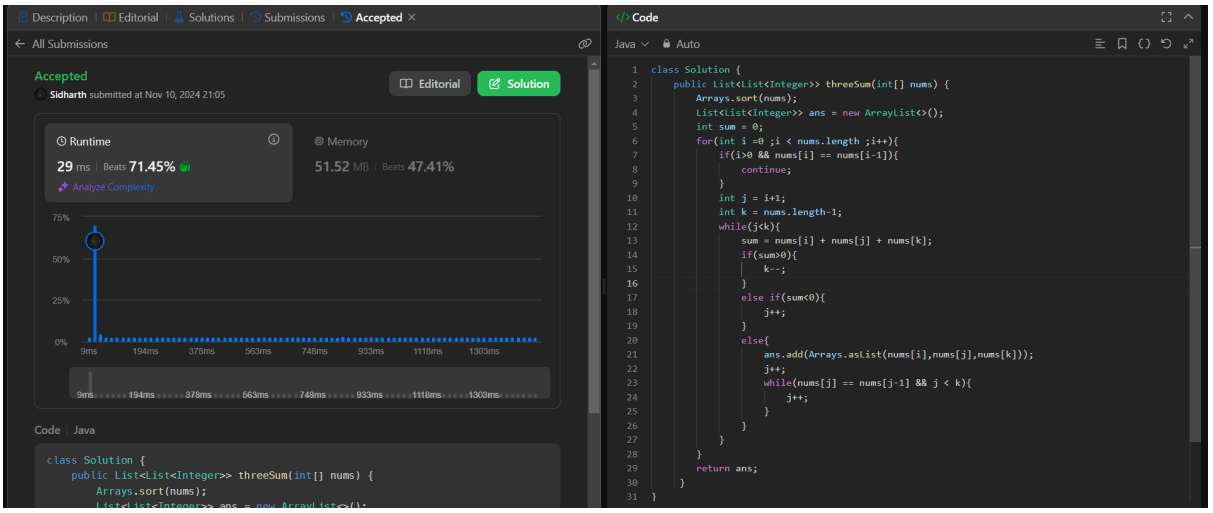


5. 3Sum

```java
class Solution {
    public List<List<Integer>> threeSum(int[] nums) {
        Arrays.sort(nums);
        List<List<Integer>> ans = new ArrayList<>();
        int sum = 0;
        for(int i =0 ;i < nums.length ;i++){
            if(i>0 && nums[i] == nums[i-1]){
                continue;
            }
            int j = i+1;
            int k = nums.length-1;
            while(j<k){
                sum = nums[i] + nums[j] + nums[k];
                if(sum>0){
                    k--;
                }
                else if(sum<0){
                    j++;
                }
                else{
                    ans.add(Arrays.asList(nums[i],nums[j],nums[k]));
                    j++;
                    while(nums[j] == nums[j-1] && j < k){
                        j++;
                    }
                }
            }
        }
        return ans;
    }
}
```

Time Complexity : O(n^2)

Output:



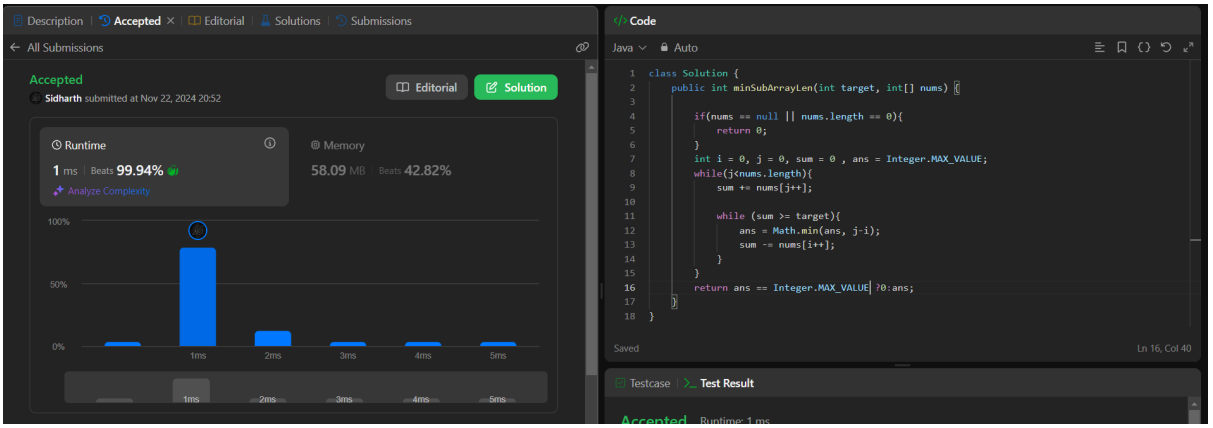
Sliding Window

1.Minimum size subarray

```java
class Solution {
    public int minSubArrayLen(int target, int[] nums) {

        if(nums == null || nums.length == 0){
            return 0;
        }
        int i = 0, j = 0, sum = 0 , ans = Integer.MAX_VALUE;
        while(j<nums.length){
            sum += nums[j++];

            while (sum >= target){
                ans = Math.min(ans, j-i);
                sum -= nums[i++];
            }
        }
        return ans == Integer.MAX_VALUE ?0:ans;
    }
}
```

Time Complexity : O(n)

Output:

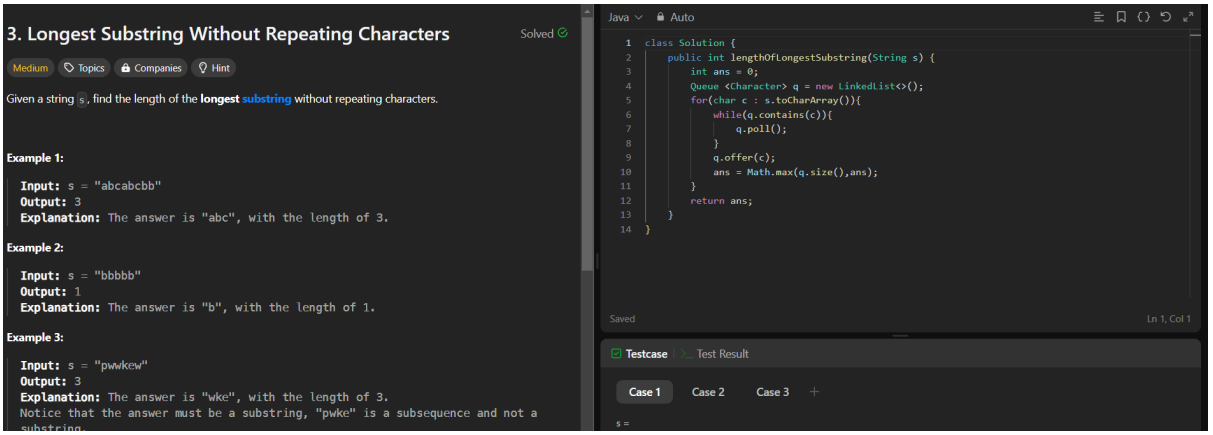


2. Longest Substring Without Repeating Characters

```java
class Solution {
    public int lengthOfLongestSubstring(String s) {
        int ans = 0;
        Queue <Character> q = new LinkedList<>();
        for(char c : s.toCharArray()){
            while(q.contains(c)){
                q.poll();
            }
            q.offer(c);
            ans = Math.max(q.size(),ans);
        }
        return ans;
    }
}
```

Time Complexity : O(n)

Output:



3.

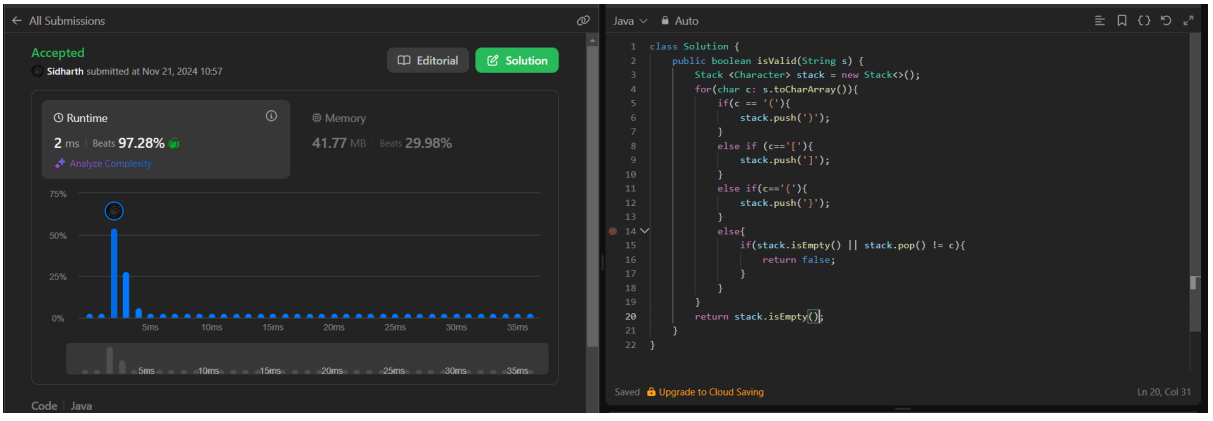
Stack

1.Valid Parentheses

```java
class Solution {
    public boolean isValid(String s) {
        Stack <Character> stack = new Stack<>();
        for(char c: s.toCharArray()){
            if(c == '('){
                stack.push(')');
            }
            else if (c=='['){
                stack.push(']');
            }
            else if(c=='{'){
                stack.push('}');
            }
            else{
                if(stack.isEmpty() || stack.pop() != c){
                    return false;
                }
            }
        }
        return stack.isEmpty();
    }
}
```

Time Complexity : O(n)

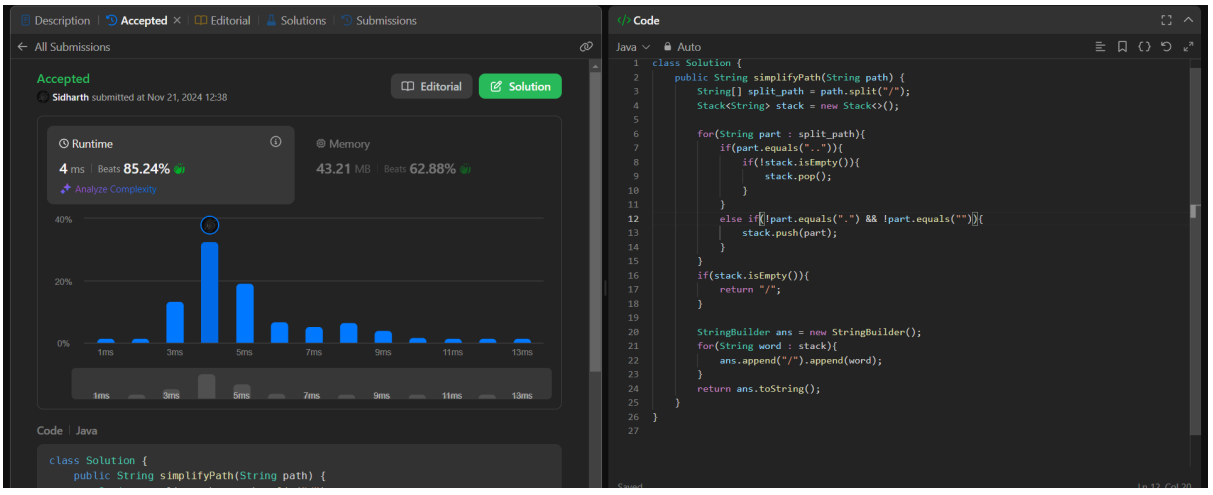
Output:



2.Simplify Path

```java
class Solution {
    public String simplifyPath(String path) {
        String[] split_path = path.split("/");
        Stack<String> stack = new Stack<>();

        for(String part : split_path){
            if(part.equals("..")){
                if(!stack.isEmpty()){
                    stack.pop();
                }
            }
            else if(!part.equals(".") && !part.equals("")){
                stack.push(part);
            }
        }
        if(stack.isEmpty()){
            return "/";
        }

        StringBuilder ans = new StringBuilder();
        for(String word : stack){
            ans.append("/").append(word);
        }
        return ans.toString();
    }
}
```

Time Complexity : O(n)



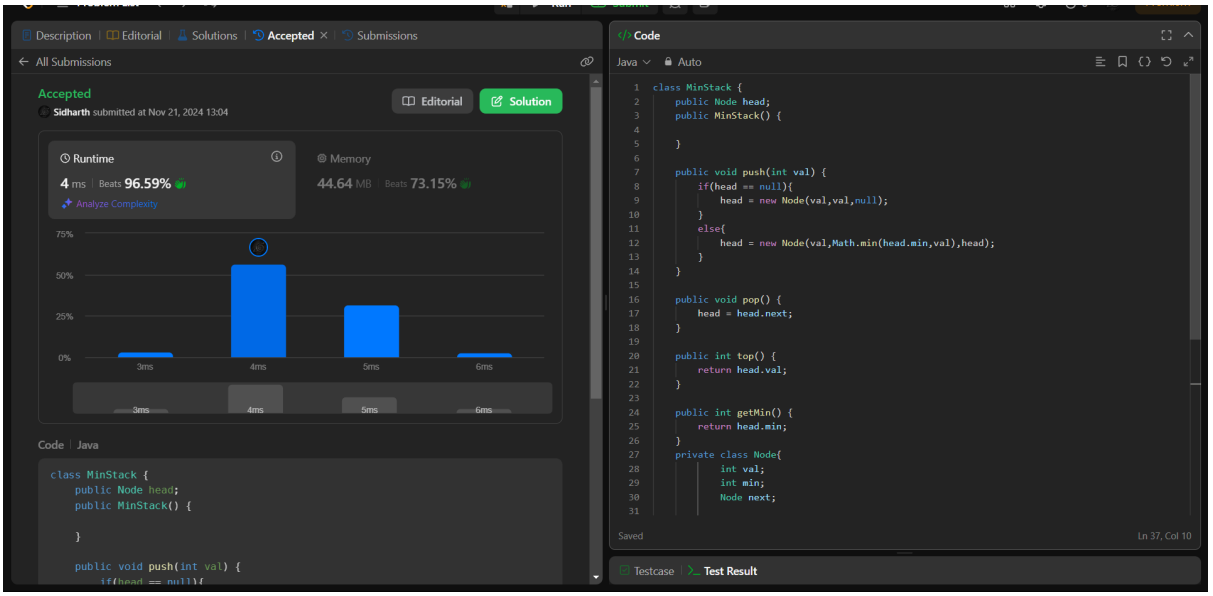
3.Min Stack

```
class MinStack {
    public Node head;
    public MinStack() {

    }

    public void push(int val) {
        if(head == null){
            head = new Node(val,val,null);
        }
        else{
            head = new Node(val,Math.min(head.min,val),head);
        }
    }

    public void pop() {
        head = head.next;
    }

    public int top() {
        return head.val;
    }

    public int getMin() {
        return head.min;
    }
    private class Node{
            int val;
            int min;
            Node next;

            Node(int val , int min , Node next){
                this.val = val;
                this.min = min;
                this.next = next;
            }
        }
}

/**
 * Your MinStack object will be instantiated and called as such:
 * MinStack obj = new MinStack();
 * obj.push(val);
```

```
* obj.pop();
* int param_3 = obj.top();
* int param_4 = obj.getMin();
*/
```

Time Complexity : O(1)

Output:



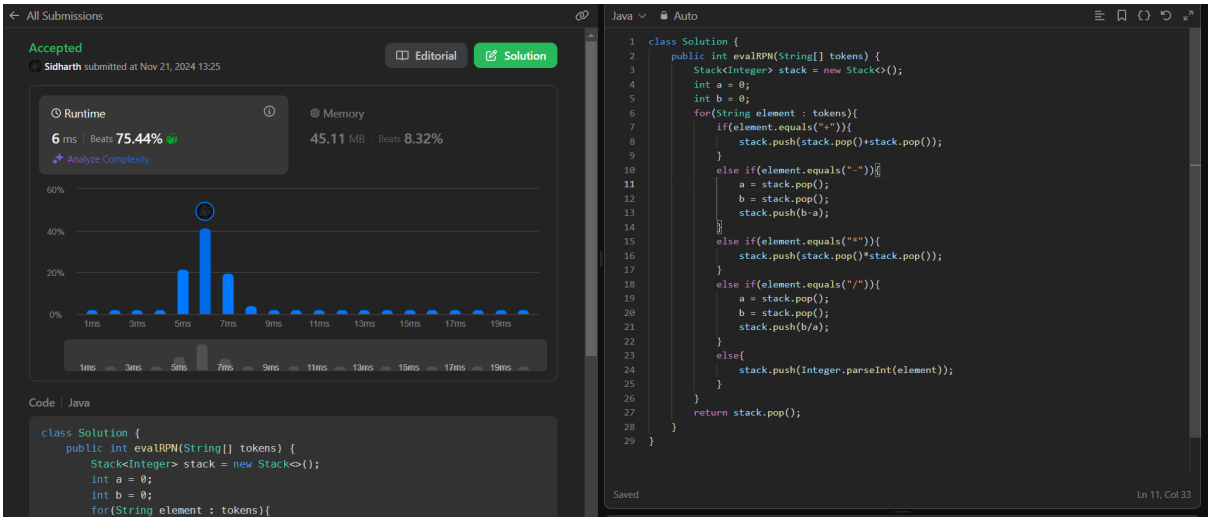
4.Evaluate reverse polish notation

```
class Solution {
    public int evalRPN(String[] tokens) {
        Stack<Integer> stack = new Stack<>();
        int a = 0;
        int b = 0;
        for(String element : tokens){
            if(element.equals("+")){
                stack.push(stack.pop()+stack.pop());
            }
            else if(element.equals("-")){
                a = stack.pop();
                b = stack.pop();
                stack.push(b-a);
            }
            else if(element.equals("*")){
                stack.push(stack.pop()*stack.pop());
```

```
            }
            else if(element.equals("/")){
                a = stack.pop();
                b = stack.pop();
                stack.push(b/a);
            }
            else{
                stack.push(Integer.parseInt(element));
            }
        }
        return stack.pop();
    }
}
```

Time Complexity : O(n)

Output:



5. Basic Calculator

```
public int calculate(String s) {
    Stack<Integer> stack = new Stack<Integer>();
    int result = 0;
    int number = 0;
    int sign = 1;
    for(int i = 0; i < s.length(); i++){
        char c = s.charAt(i);
        if(Character.isDigit(c)){
            number = 10 * number + (int)(c - '0');
        }else if(c == '+'){
            result += sign * number;
            number = 0;
```

```
            sign = 1;
        }else if(c == '-'){
            result += sign * number;
            number = 0;
            sign = -1;
        }else if(c == '('){
            stack.push(result);
            stack.push(sign);
            sign = 1;
            result = 0;
        }else if(c == ')'){
            result += sign * number;
            number = 0;
            result *= stack.pop();
            result += stack.pop();

        }
    }
    if(number != 0) result += sign * number;
    return result;
}
```

Time Complexity : O(n)

Binary Search

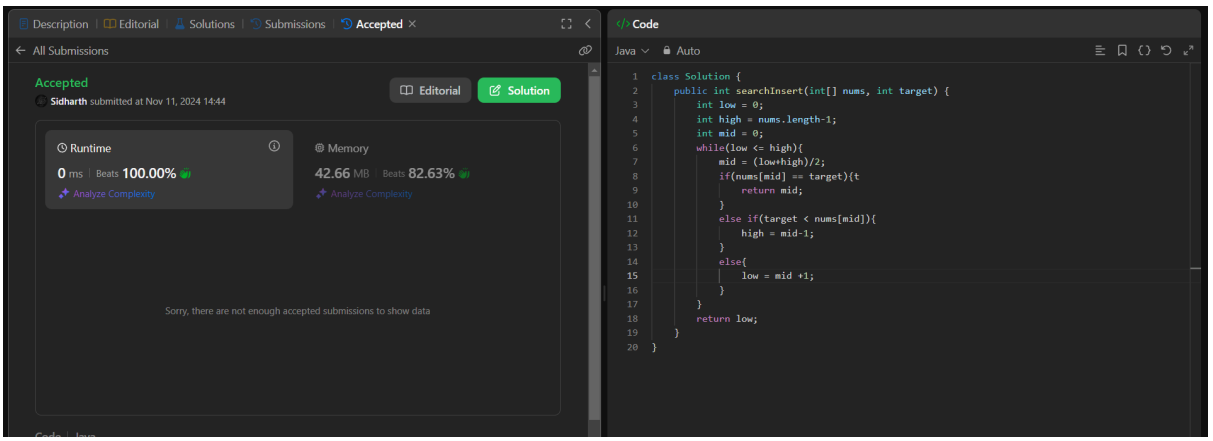
1. Search Insert Position

```
class Solution {
    public int searchInsert(int[] nums, int target) {
        int low = 0;
        int high = nums.length-1;
        int mid = 0;
        while(low <= high){
            mid = (low+high)/2;
            if(nums[mid] == target){t
                return mid;
            }
            else if(target < nums[mid]){
                high = mid-1;
            }
            else{
```

```
                low = mid +1;
            }
        }
        return low;
    }
}
```

Time Complexity : O(n)

Output:



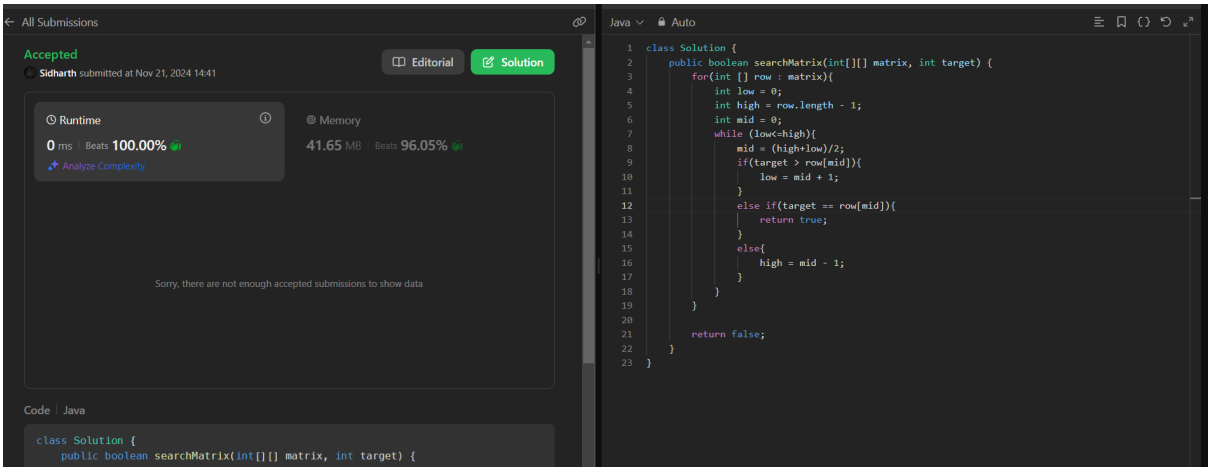
2. Search a 2D Matrix

```
class Solution {
    public boolean searchMatrix(int[][] matrix, int target) {
        for(int [] row : matrix){
            int low = 0;
            int high = row.length - 1;
            int mid = 0;
            while (low<=high){
                mid = (high+low)/2;
                if(target > row[mid]){
                    low = mid + 1;
                }
                else if(target == row[mid]){
                    return true;
                }
```

```
                else{
                    high = mid - 1;
                }
            }
        }

        return false;
    }
}
```

Time Complexity : O(mlogn)

Output:



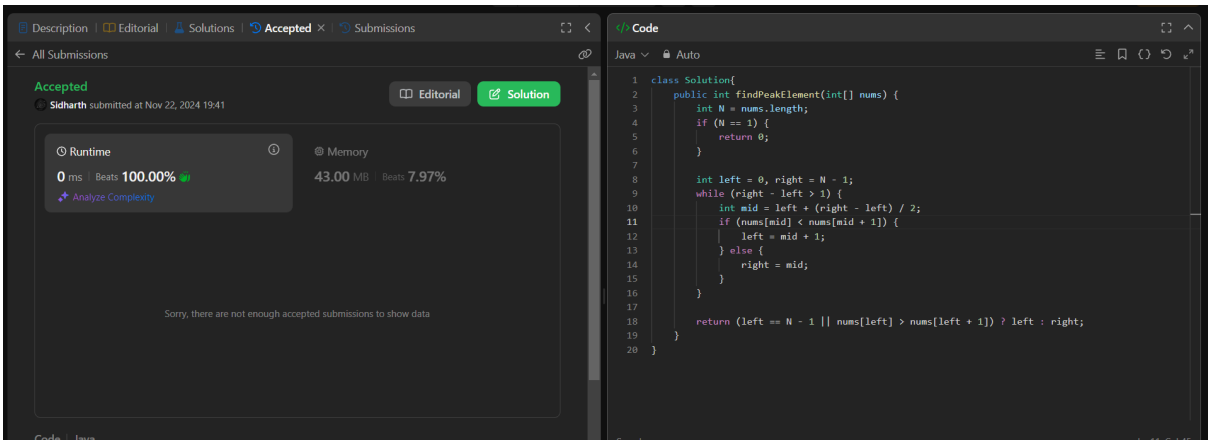
3.Find Peak Element

```
class Solution{
    public int findPeakElement(int[] nums) {
        int N = nums.length;
        if (N == 1) {
            return 0;
        }

        int left = 0, right = N - 1;
        while (right - left > 1) {
            int mid = left + (right - left) / 2;
            if (nums[mid] < nums[mid + 1]) {
                left = mid + 1;
```

```
            } else {
                right = mid;
            }
        }

        return (left == N - 1 || nums[left] > nums[left + 1]) ? left : right;
    }
}
```

Time Complexity : O(logn)

Output:



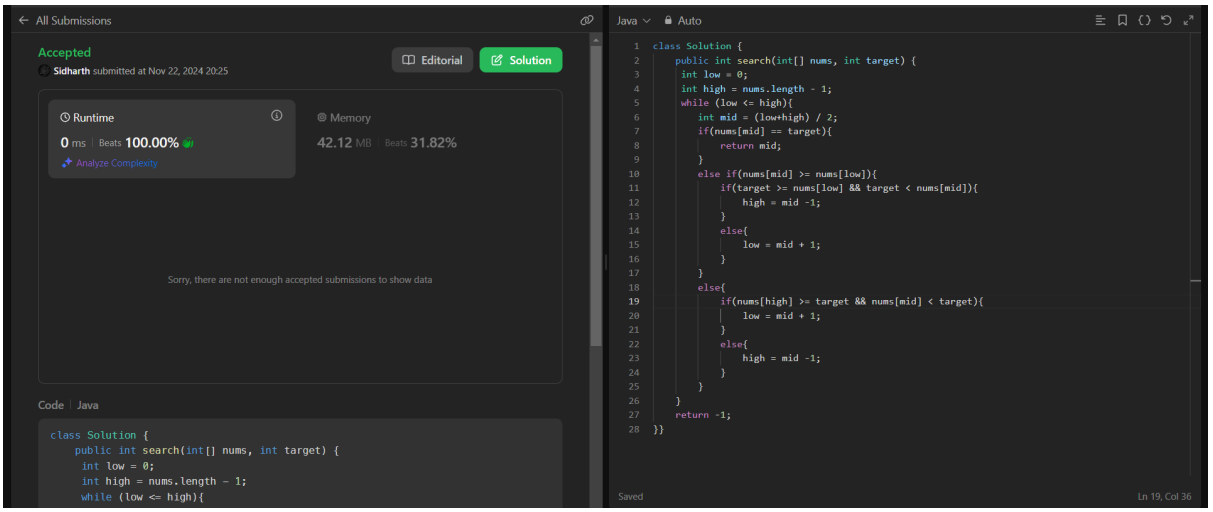
4. Search in a sorted array

```
class Solution {
    public int search(int[] nums, int target) {
     int low = 0;
     int high = nums.length - 1;
     while (low <= high){
        int mid = (low+high) / 2;
        if(nums[mid] == target){
            return mid;
        }
        else if(nums[mid] >= nums[low]){
            if(target >= nums[low] && target < nums[mid]){
                high = mid -1;
            }
            else{
```

```
                low = mid + 1;
            }
        }
        else{
            if(nums[high] >= target && nums[mid] < target){
                low = mid + 1;
            }
            else{
                high = mid -1;
            }
        }
    }
    return -1;
}}
```

Time Complexity : O(logn)

Output:



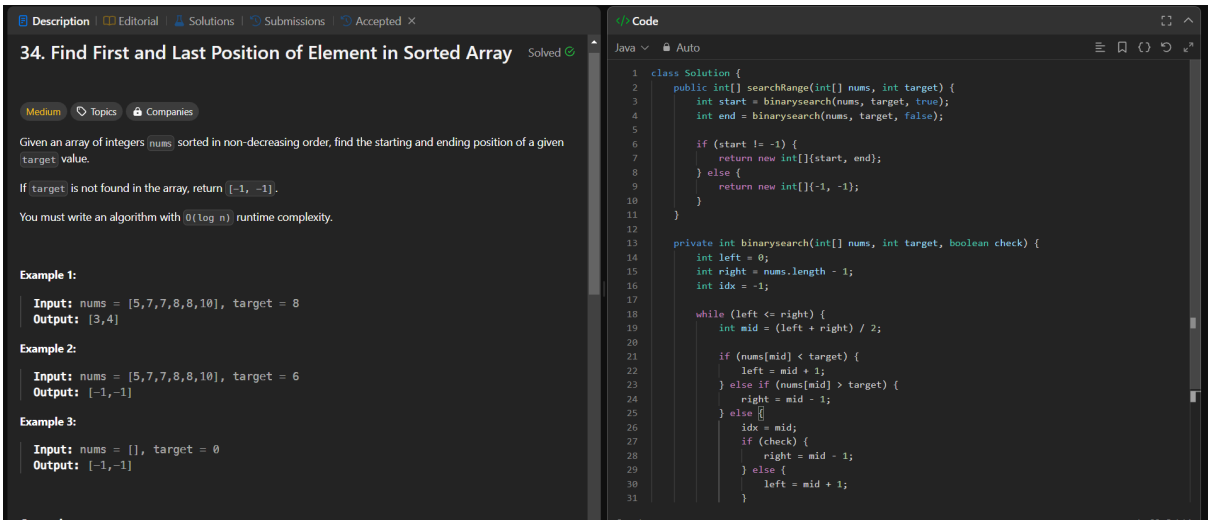
5. Find First and Last Position of Element in Sorted Array

```
class Solution {
    public int[] searchRange(int[] nums, int target) {
        int start = binarysearch(nums, target, true);
        int end = binarysearch(nums, target, false);

        if (start != -1) {
            return new int[]{start, end};
        } else {
            return new int[]{-1, -1};
        }
    }
```

```java
    private int binarysearch(int[] nums, int target, boolean check) {
        int left = 0;
        int right = nums.length - 1;
        int idx = -1;

        while (left <= right) {
            int mid = (left + right) / 2;

            if (nums[mid] < target) {
                left = mid + 1;
            } else if (nums[mid] > target) {
                right = mid - 1;
            } else {
                idx = mid;
                if (check) {
                    right = mid - 1;
                } else {
                    left = mid + 1;
                }
            }
        }
        return idx;
    }
}
```

Time Complexity : O(logn)

Output:



6. Find Minimum in Rotated Sorted Array

```java
class Solution {
    public int findMin(int[] nums) {
        int low = 0;
        int high = nums.length - 1;
        while (low < high){
            int mid = (low + high)/2;
            if(nums[mid] > nums[high]){
                low = mid + 1;
            }
            else {
                high = mid;
            }
        }
        return nums[low];
    }
}
```

Time Complexity : O(logn)

Output: