Assignment 6

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Branch: BE-CSE (General) **Section/Group: FL_IOT-602-A**
Semester:6th **Date of Performance: 18-03-25**
Subject Name: Advanced Programming Lab-2 **Subject Code: 22CSP-351**

1. Aim: 108. Convert Sorted Array to Binary Search Tree

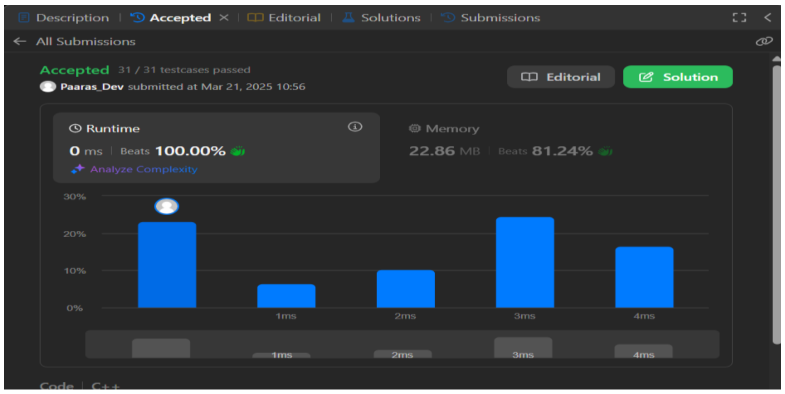
Implementation/ Code:

```
#include <vector>
using namespace std;

class Solution {
public:
    TreeNode* sortedArrayToBST(vector<int>& nums) {
        return helper(nums, 0, nums.size() - 1);
    }

private:
    TreeNode* helper(vector<int>& nums, int left, int right) {
        if (left > right) return nullptr;
        int mid = left + (right - left) / 2;
        TreeNode* root = new TreeNode(nums[mid]);
        root->left = helper(nums, left, mid - 1);
        root->right = helper(nums, mid + 1, right);
        return root;
    }
};
```

Output:



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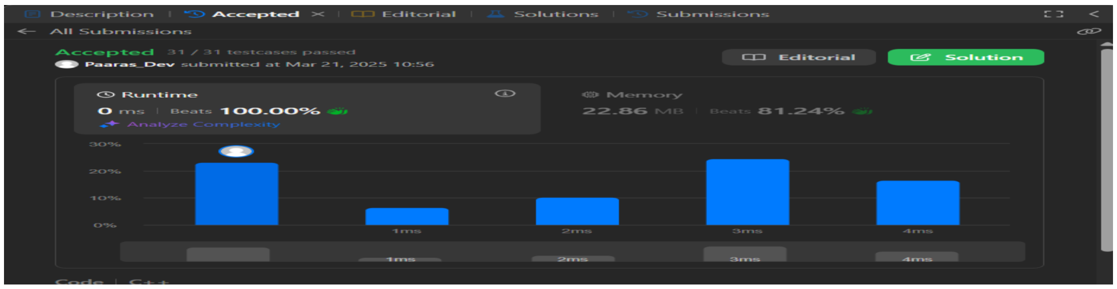
22.86 MB | Beats 81.24%

2. Aim: 191. Number of 1 Bits

Implementation/ Code:

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

Output:



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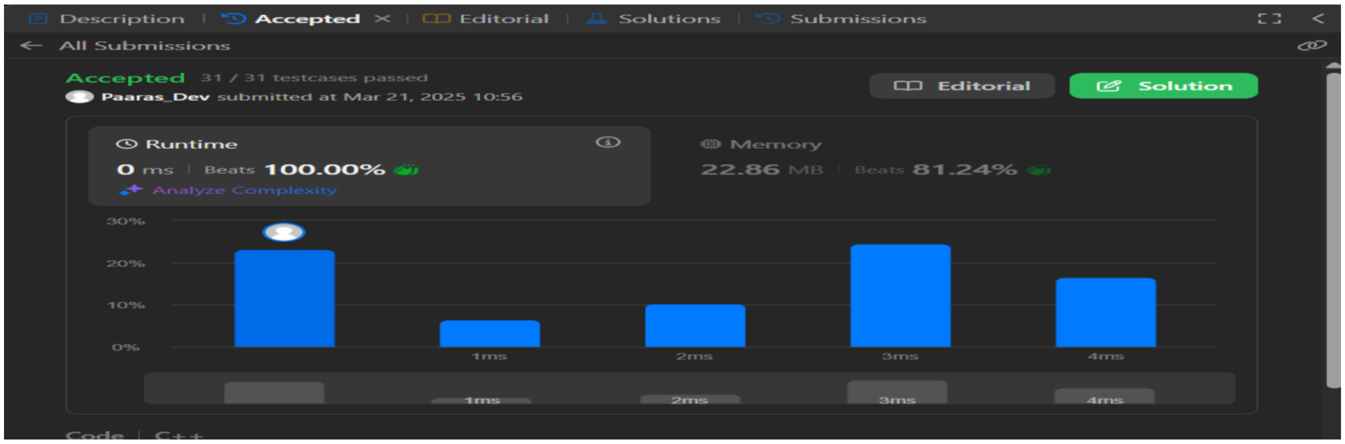
3.Aim: 912. Sort an Array

Implementation/ Code:

```
class Solution {
public:
    void merge(vector<int>& nums,int s, int e){
        int m=(s+e)/2;
        vector<int>first(m-s+1),second(e-m);
        for (int i=0;i<first.size();i++){first[i]=nums[s+i];}
        for (int i=0;i<second.size();i++){second[i]=nums[m+1+i];}
        int i1=0,i2=0,maindex=s;
        while (i1<first.size() && i2<second.size()){
            if (first[i1]<second[i2]){nums[maindex++]=first[i1++];}
            else {nums[maindex++]=second[i2++];}
        }
        while (i1<first.size()){nums[maindex++]=first[i1++];}
        while (i2<second.size()){nums[maindex++]=second[i2++];}
    }
    void mergesort(vector<int>&nums, int s, int e){
        if (s>=e){return ;}
        int m=(s+e)/2;
        mergesort(nums,s,m);
        mergesort(nums,m+1,e);
        merge(nums,s,e);
    }
    vector<int> sortArray(vector<int>& nums) {
        mergesort(nums,0,nums.size()-1);
        return nums;
    }
};
```



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Runtime
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Output:

4.Aim: 53. Maximum Subarray

Implementation/ Code:

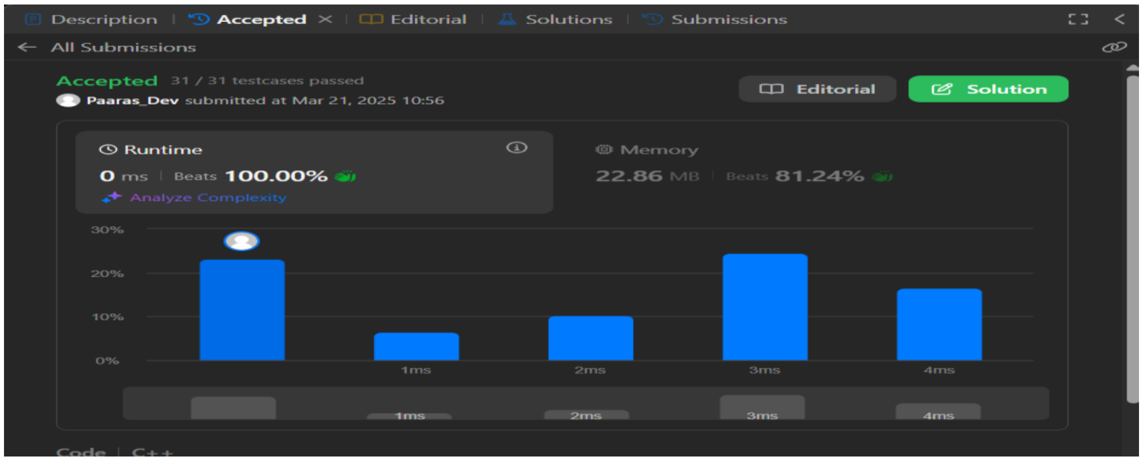
```
class Solution {
public:
    int maxSubArray(vector<int>& nums) {
        int res = nums[0];
        int total = 0;

        for (int n : nums) {
            if (total < 0) {
                total = 0;
            }

            total += n;
            res = max(res, total);
        }

        return res;
    }
};
```

Output:



Description | Accepted | Editorial | Solutions | Submissions

All Submissions

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Analyze Complexity

Memory
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5.Aim:932. Beautiful Array

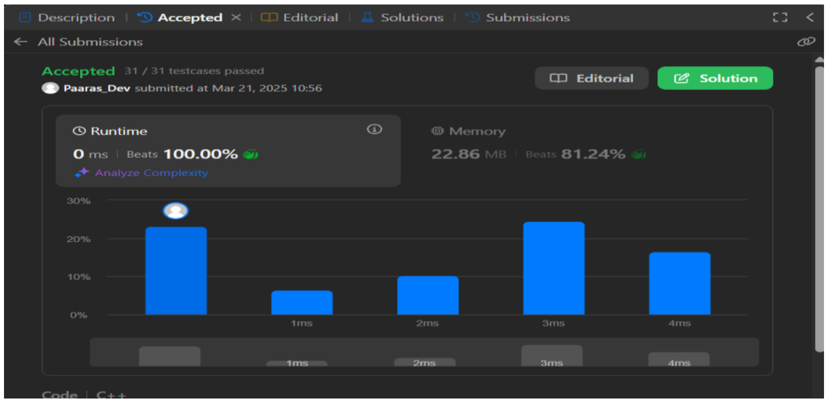
Implementation/ Code:

```
class Solution {
public:
  static bool comp(const int &a, const int &b){
    int mask = 1;
    while(true)
      if((a&mask) == (b&mask)) mask = mask<<1;
      else return (a&mask) > (b&mask);
  }
  vector<int> beautifulArray(int n) {
    vector<int> answer;
    while(n) answer.push_back(n--);

    sort(answer.begin(), answer.end(), comp);

    return answer;
  }
};
```

Output:



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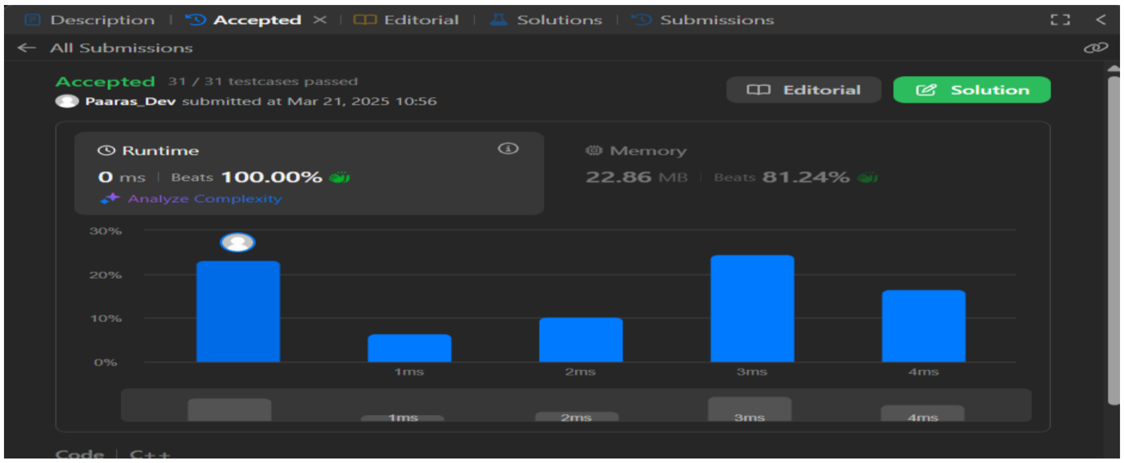
Runtime 0 ms | Beats 100.00%
Memory 22.86 MB | Beats 81.24%

6.Aim: [372. Super Pow]

Implementation/ 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);
    }
};
```

Output:



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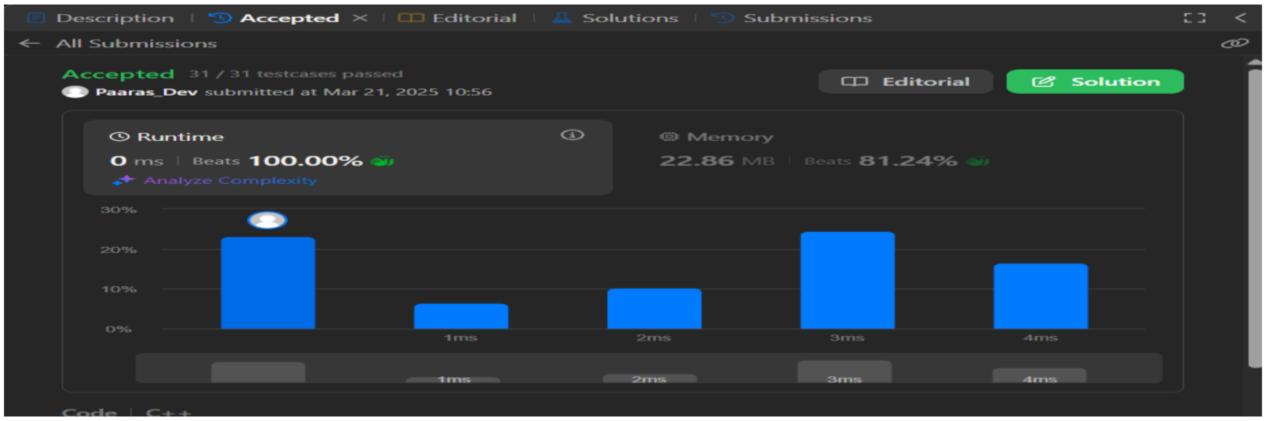
7.Aim: 218. The Skyline Problem

Implementation/ Code:

```
class Solution {
public:
    vector<vector<int>> getSkyline(vector<vector<int>>& buildings) {
        vector<pair<int, int>> h;

        for (auto b : buildings) {
            h.push_back({b[0], -b[2]});
            h.push_back({b[1], b[2]});
        }


        sort(h.begin(), h.end());
        int prev = 0, cur = 0;

        multiset<int> m;
        vector<vector<int>> res;

        m.insert(0);
        for (auto i:h) {


            if (i.second < 0) {
                m.insert(-i.second);
            } else {
                m.erase(m.find(i.second));
            }

            cur = *m.rbegin();

            if (cur != prev) {
                res.push_back({i.first, cur});
                prev = cur;
            }
        }
        return res;
    }
    };
```

Output:



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