

Name-Chahat

Uid-22BCS15005

Section-608/B

AP ASSIGNMENT

1. Longest Nice substring :

```
class Solution {  
public:  
    string longestNiceSubstring(string s) {  
        int n = s.length();  
        string ans="";  
        for(int i=0;i<n;i++) {  
            int lower = 0 , upper = 0;  
            for(int j=i;j<n;j++) {  
                if(s[j]>='a' && s[j]<='z')  
                    lower |= (1<< (s[j]-'a'));  
                else  
                    upper |= (1<< (s[j]-'A'));  
                if(!(lower^upper)) {  
                    if(j-i+1>ans.size())  
                        ans = s.substr(i,j-i+1);  
                }  
            }  
        }  
        return ans;  
    }  
}
```

};

The screenshot shows a LeetCode submission for the problem "Longest Nice Substring". The submission is accepted, with a runtime of 0ms and memory usage of 8.19 MB. The code is in C++ and implements a two-pointer approach to find the longest substring where the number of vowels equals the number of consonants.

```
class Solution {
public:
    string longestNiceSubstring(string s) {
        int n = s.length();
        string ans="";
        for(int i=0;i<n;i++) {
            int lower = 0, upper = 0;
            for(int j=i;j<n;j++) {
                if(s[j]>='a' && s[j]<='z')
                    lower += (1<< (s[j]-'a'));
                else
                    upper += (1<< (s[j]-'A'));
                if((lower==upper)) {
                    if(j-i+1>ans.size())
                        ans = s.substr(i,j-i+1);
                }
            }
        }
        return ans;
    }
};
```

2. Reverse bits :

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;

}

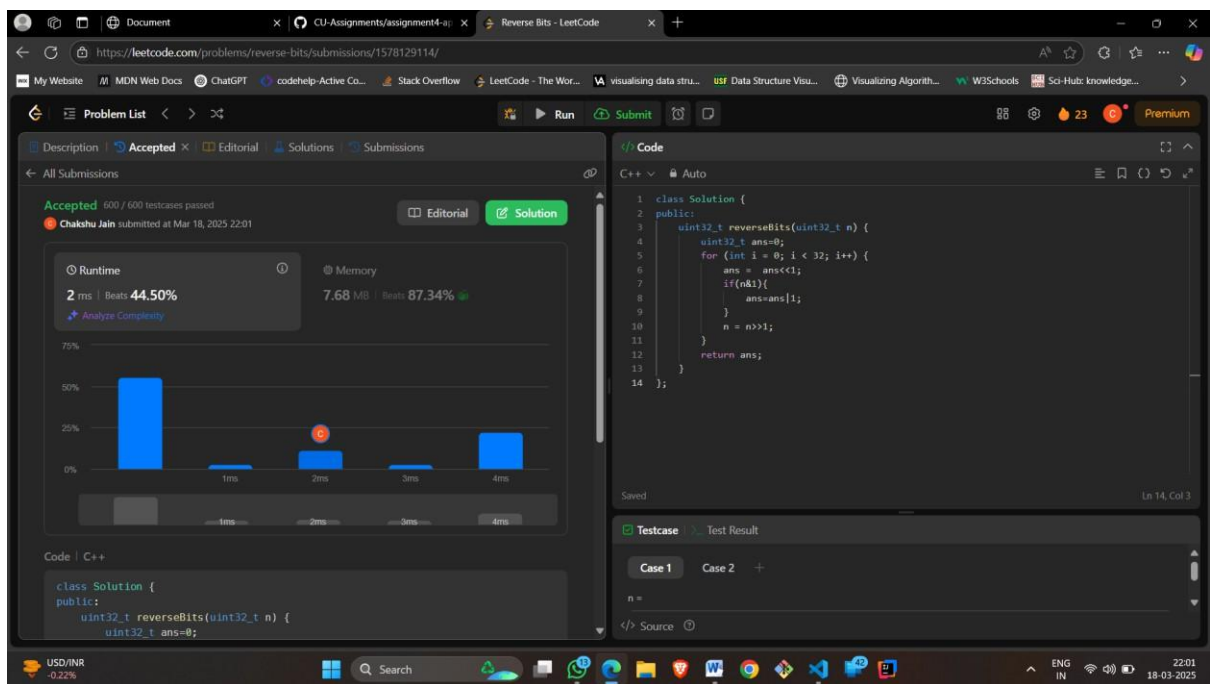
n = n>>1;

}

return ans;

}

};



3. Number of 1-bits:

```
class Solution {
```

```
public:
```

```
    int hammingWeight(uint32_t n) {
```

```
        int res = 0;
```

```
        for (int i = 0; i < 32; i++) {
```

```
            if ((n >> i) & 1) {
```

```
                res += 1;
```

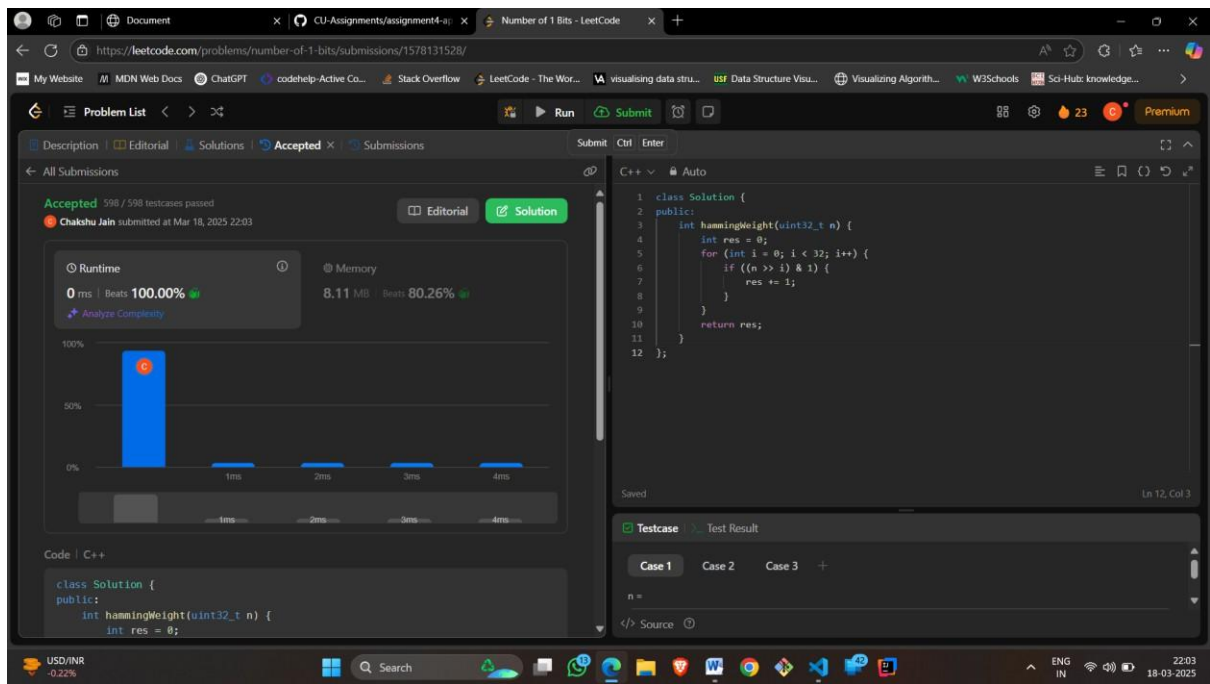
```
            }
```

```
        }
```

```
        return res;
```

```
    }
```

```
};
```



4. maximum of subarray:

```
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);
```

```
        }
```

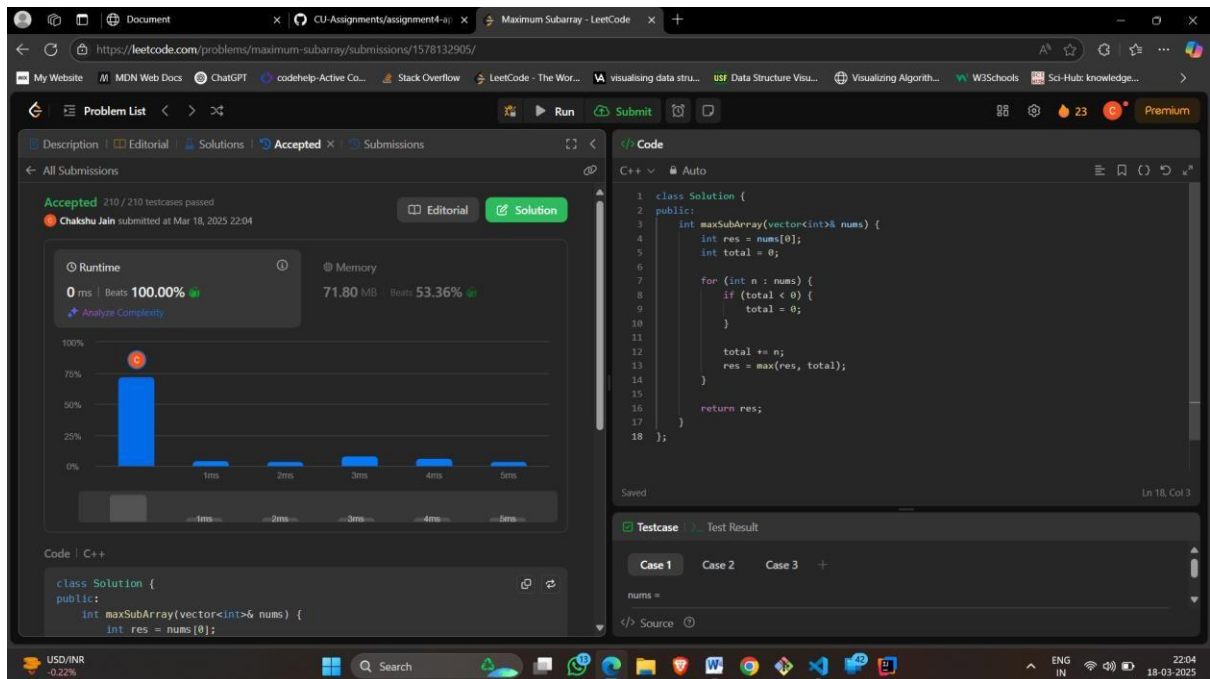
```
        return res;
```

```

}

};

```

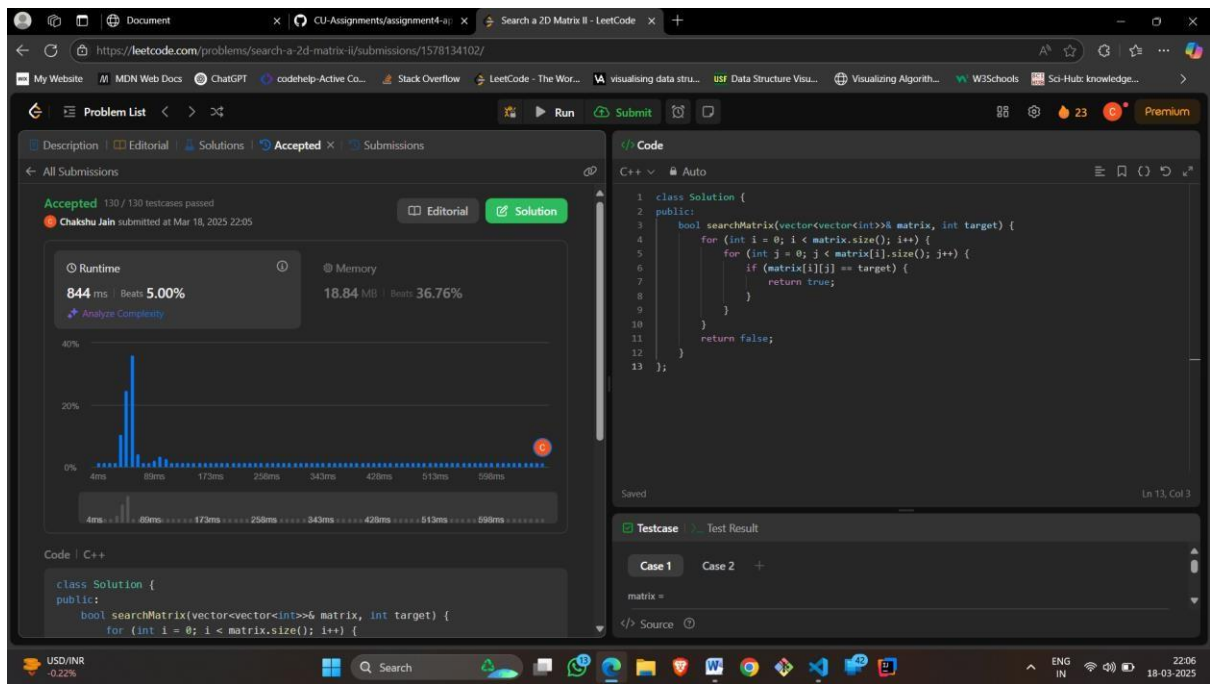


5. Search a 2D matrix :

```

class Solution {
public:
    bool searchMatrix(vector<vector<int>>& matrix, int target) {
        for (int i = 0; i < matrix.size(); i++) {
            for (int j = 0; j < matrix[i].size(); j++) {
                if (matrix[i][j] == target) {
                    return true;
                }
            }
        }
        return false;
    }
};

```



6. super pow:

class Solution {

const int base = 1337;

int powmod(int a, int k) //a^k mod 1337 where 0 <= k <= 10

{

a %= base;

int result = 1;

for (int i = 0; i < k; ++i)

result = (result * a) % base;

return result;

}

public:

int superPow(int a, vector<int>& b) {

if (b.empty()) return 1;

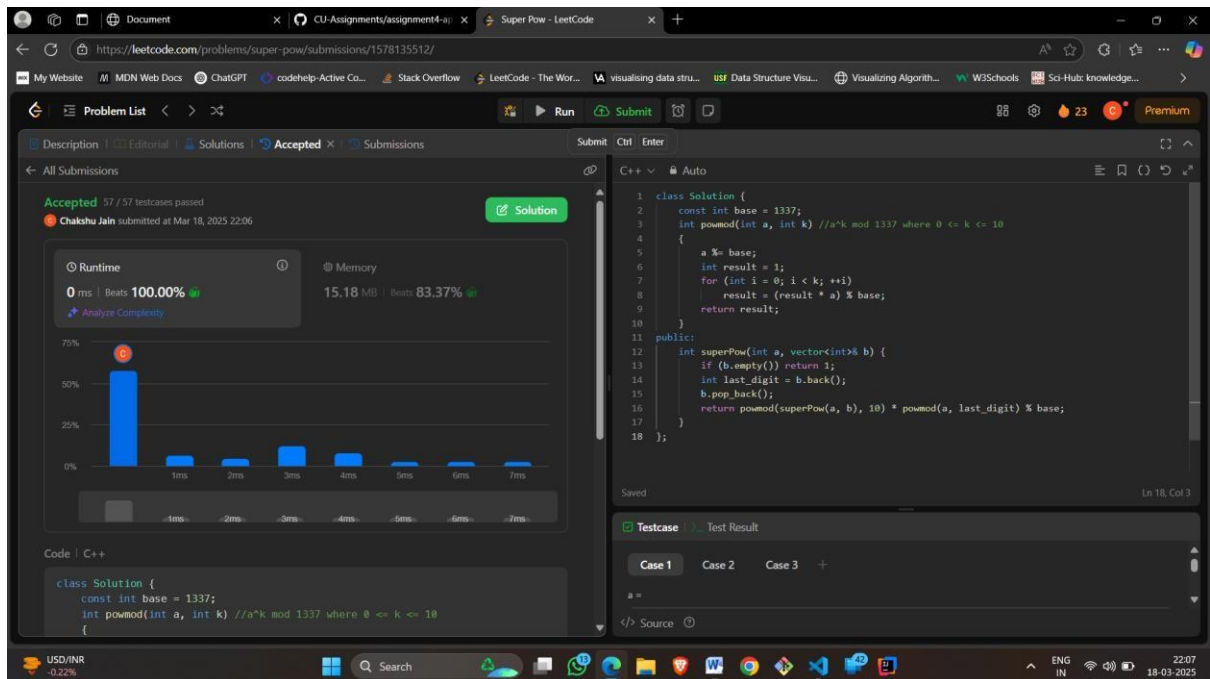
int last_digit = b.back();

b.pop_back();

return powmod(superPow(a, b), 10) * powmod(a, last_digit) % base;

}

};



7.beautiful array :

```
class Solution {
```

```
public:
```

```
int partition(vector<int> &v, int start, int end, int mask)
```

```
{
```

```
int j = start;
```

```
for(int i = start; i <= end; i++)
```

```
{
```

```
if((v[i] & mask) != 0)
```

```
{
```

```
swap(v[i], v[j]);
```

```
j++;
```

```
}
```

```
}
```

```
return j;
```

```
}
```

```
void sort(vector<int> &v, int start, int end, int mask)
```

```
{
```

```
    if(start >= end) return;
```

```
    int mid = partition(v, start, end, mask);
```

```
    sort(v, start, mid - 1, mask << 1);
```

```
    sort(v, mid, end, mask << 1);
```

```
}
```

```
vector<int> beautifulArray(int N) {
```

```
    vector<int> ans;
```

```
    for(int i = 0; i < N; i++) ans.push_back(i + 1);
```

```
    sort(ans, 0, N - 1, 1);
```

```
    return ans;
```

```
}
```

```
};
```

The screenshot shows a LeetCode submission for the 'Beautiful Array' problem. The submission is by Chakshu Jain, submitted on Mar 18, 2025, at 22:07. The submission is marked as 'Accepted' and shows a performance graph with a runtime of 0 ms and memory usage of 9.42 MB. The code is written in C++ and uses a recursive sort function.

```
class Solution {
public:
    int partition(vector<int> &v, int start, int end, int mask)
    {
        if(start >= end) return;
        int mid = partition(v, start, end, mask);
        sort(v, start, mid - 1, mask << 1);
        sort(v, mid, end, mask << 1);
    }

    vector<int> beautifulArray(int N) {
        vector<int> ans;
        for(int i = 0; i < N; i++) ans.push_back(i + 1);
        sort(ans, 0, N - 1, 1);
        return ans;
    }
};
```


8. the skyline problem:

```
class Solution {
public:
    vector<vector<int>> getSkyline(vector<vector<int>>& buildings) {
        vector<vector<int>> ans;
        multiset<int> pq{0};

        vector<pair<int, int>> points;

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

        sort(points.begin(), points.end());

        int ongoingHeight = 0;

        // points.first = x coordinate, points.second = height
        for(int i = 0; i < points.size(); i++){
            int currentPoint = points[i].first;
            int heightAtCurrentPoint = points[i].second;

            if(heightAtCurrentPoint < 0){
                pq.insert(-heightAtCurrentPoint);
            } else {
                pq.erase(pq.find(heightAtCurrentPoint));
            }
        }
    }
};
```

```

    }

    // after inserting/removing heightAtI, if there's a change
    auto pqTop = *pq.rbegin();

    if(ongoingHeight != pqTop){

        ongoingHeight = pqTop;

        ans.push_back({currentPoint, ongoingHeight});

    }

}

return ans;

}

};

```

The screenshot shows a LeetCode submission for the problem 'The Skyline Problem' (ID 1578). The submission is accepted, with 44/44 test cases passed. The user, Chakshu Jain, submitted it on Mar 18, 2025, at 22:09. The performance metrics are: Runtime 15 ms (Beats 65.98%) and Memory 28.85 MB (Beats 44.41%). A bar chart shows the runtime distribution across various time ranges. The code is written in C++ and uses a priority queue to maintain the current height and its corresponding point. The code is as follows:

```

class Solution {
public:
    vector<vector<int>> getSkyline(vector<vector<int>>& buildings) {
        vector<vector<int>> ans;

        // ... (code continues) ...

        return ans;
    }
};

```

9. Reverse pairs :

class Solution

```

{

    int get_pairs(vector<int>& vct , long long int x)

```

```

{
    //sort(vct.begin() , vct.end());

    int size = vct.size();

    int low = 0;

    int high = size - 1;

    int ans = -1;

    while(low <= high)
    {
        int mid = high - (high - low) / 2;

        int ele = vct[mid];

        if(ele > x)
        {
            ans = mid;

            high = mid - 1;
        }

        else
        {
            low = mid + 1;
        }
    }

    if(ans == -1) return 0;

    return vct.size() - ans;
}

```

```

// void print_vector(vector<int>& nums)

// {

//     cout<<endl;

```

```

//  for(auto it : nums)

//  {

//      cout<<" "<<it;

//  }

//  cout<<endl;

//}

```

public:

```

int reversePairs(vector<int>& nums)
{
    vector<int> vct;

    int counter = 0;

    for(auto it : nums)
    {
        long long int x = 1LL * 2 * it;

        counter += get_pairs(vct , x);

        int low = 0;

        int high = vct.size();

        int ans = vct.size();

        while(low < high)
        {
            int mid = low + (high - low) / 2;

            if(vct[mid] >= it)
            {
                ans = mid;

                high = mid;
            }
        }
    }
}

```

```

else

{

    low = mid + 1;

}

}

vct.insert(vct.begin() + ans , it);

//print_vector(vct);

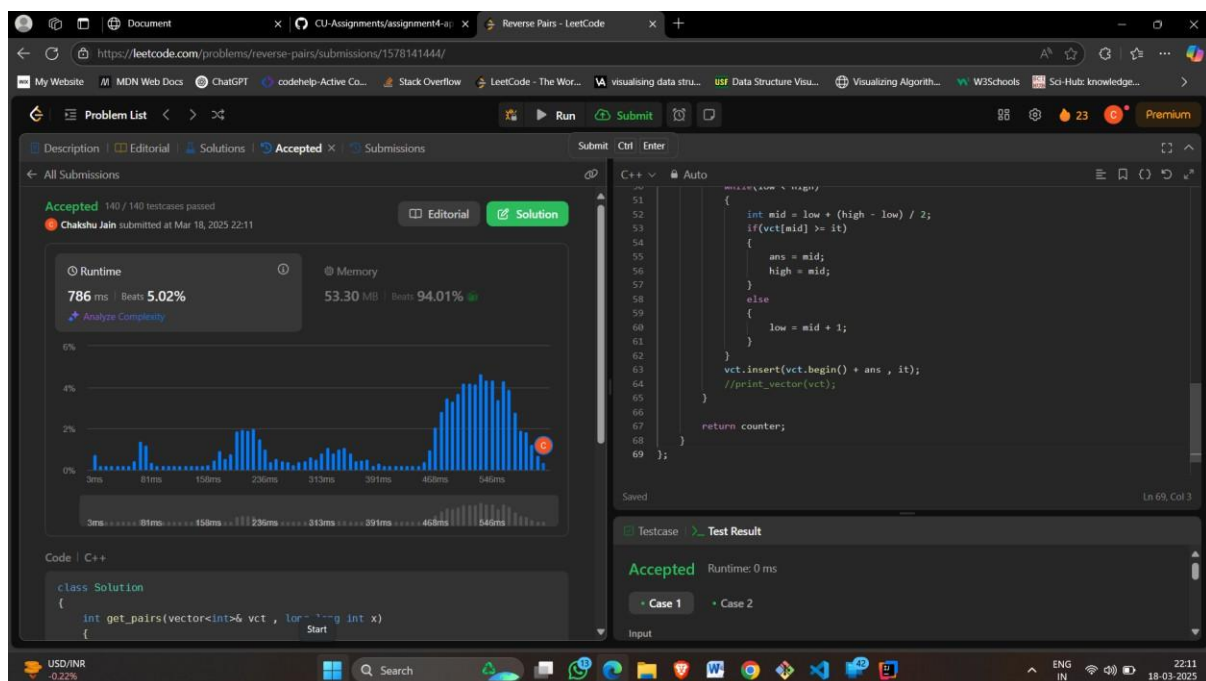
}

return counter;

}

};

```



10. longest increasing substring :

```
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];

}

};

```

Accepted 84 / 84 testcases passed
Chakshu Jain submitted at Mar 18, 2025 22:12

Runtime 71 ms | Best: 76.13%
Memory 59.67 MB | Best: 81.69%

10%
5%
0%
11ms 72ms 133ms 195ms 256ms 317ms 379ms

```

class Solution {
public:
    vector<int> tree;
    void update(int node, int st, int end, int i, int val){

```

```

23 int left_query(2*node, st, mid, x, y);
24 int right_query(2*node+1, mid+1, end, x, y);
25 return max(left, right);
26 }
27 int lengthOfLIS(vector<int>& nums, int k) {
28     int n=nums.size();
29     if(n==1) return 1;
30     int m=*max_element(nums.begin(), nums.end());
31     tree.clear();
32     tree.resize(4*m+10);
33     for(int i=n-1; i>=0; i--){
34         int l=nums[i]+1, r=min(nums[i]+k, m);
35         int x=query(1, 0, m, l, r);
36         if(x==-1e9) x=0;
37         update(1, 0, m, nums[i], x+1);
38     }
39     return tree[1];
40 }
41 };

```

Testcase Case 1 Case 2 Case 3 +

nums =

Source

USD/INR -0.22%

22:13 18-03-2025