# Experiment-10

**Student Name: Pranjal Deep** **UID: 20BCS9286**
**Branch: CSE** **Section/Group: WM_619 B**
**Semester: 5th** **Subject Code: 20CSP-314**
**Subject Name: Competitive Coding**

## PROBLEM STATEMENT 10.1

Marc loves cupcakes, but he also likes to stay fit. Each cupcake has a calorie count, and Marc can walk a distance to expend those calories. If Marc has eaten  cupcakes so far, after eating a cupcake with  calories he must walk *at least*  miles to maintain his weight.

**Example**

If he eats the cupcakes in the order shown, the miles he will need to walk are . This is not the minimum, though, so we need to test other orders of consumption. In this case, our minimum miles is calculated as .

Given the individual calorie counts for each of the cupcakes, determine the minimum number of miles Marc must walk to maintain his weight. Note that he can eat the cupcakes *in any order*.

**Function Description**

Complete the *marcsCakewalk* function in the editor below. marcsCakewalk has the following parameter(s):

- *int calorie[n]:* the calorie counts for each cupcake **Returns**
- *long:* the minimum miles necessary

**Input Format**

The first line contains an integer , the number of cupcakes in .

The second line contains  space-separated integers, .

**Constraints**

- 
- 

**Sample Input 0**

```
3
1 3 2
```

**Sample Output 0**

```
11
```

**Explanation 0**

Let's say the number of miles Marc must walk to maintain his weight is . He can minimize  by eating the  cupcakes in the following order:

1. Eat the cupcake with  calories, so .
2. Eat the cupcake with  calories, so .
3. Eat the cupcake with  calories, so .

We then print the final value of , which is , as our answer.

**Sample Input 1**

```
4
7 4 9 6
```

**Sample Output 1**

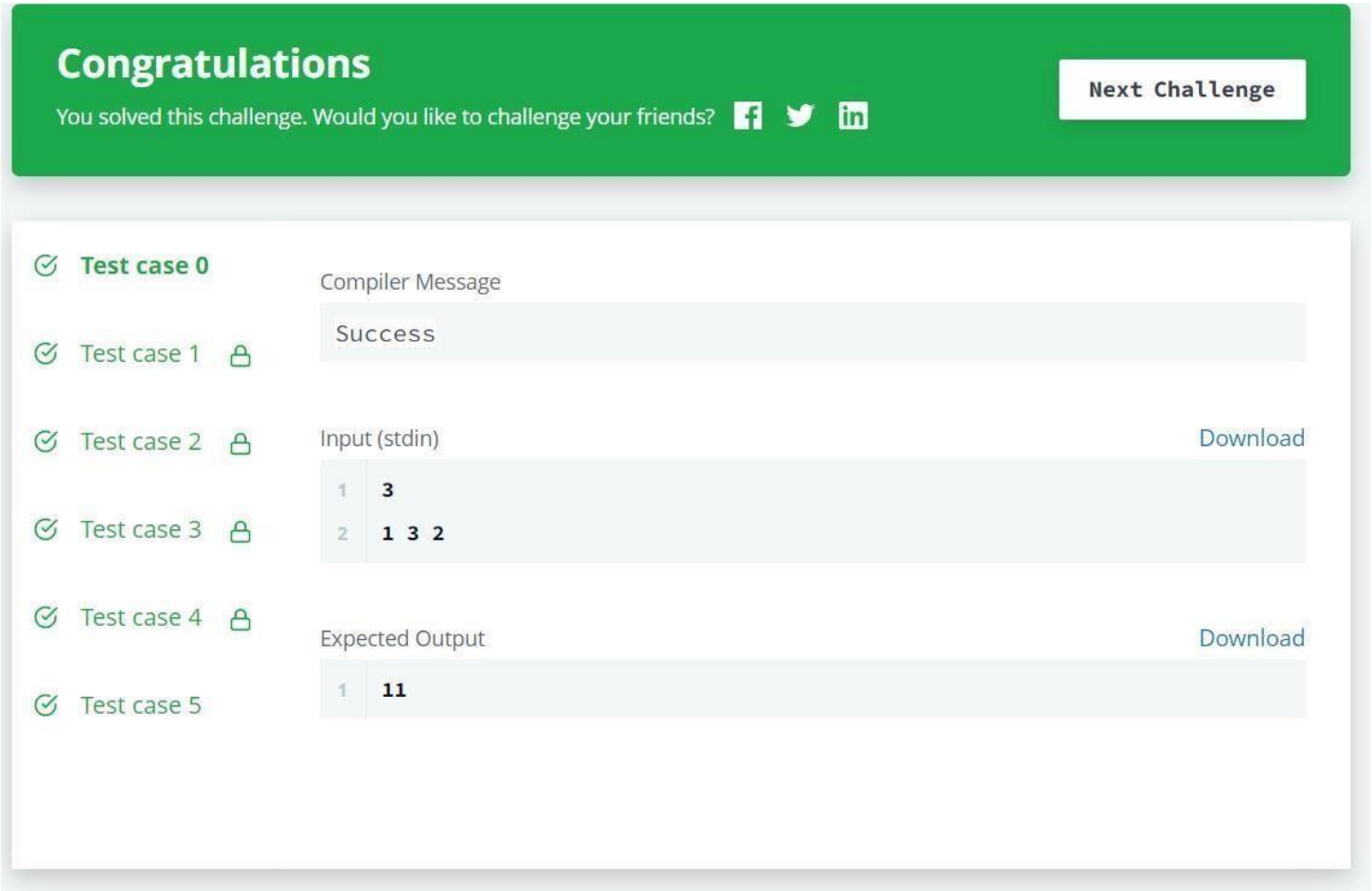
79

# Solution:

```
#include <bits/stdc++.h> using namespace std; typedef
signed long long ll;

#undef _P #define _P(...) (void)printf(__VA_ARGS__) #define FOR(x,to) for(x=0;x<(to);x++) #define
FORR(x,arr) for(auto& x:arr) #define ITR(x,c) for(__typeof(c.begin()) x=c.begin();x!=c.end();x++) #define
ALL(a) (a.begin()),(a.end()) #define ZERO(a) memset(a,0,sizeof(a)) #define MINUS(a) memset(a,0xff,sizeof(a))

int N; ll
C[1010];

void solve() {   int i,j,k,l,r,x,y; string s;

        cin>>N;         FOR(i,N) cin>>C[i];   sort(C,C+N);   reverse(C,C+N);

        ll ret=0;         FOR(i,N) ret +=
C[i]<<i;         cout<<ret<<endl;
}


int main(int argc,char** argv){         string s;int i;
```

```
if(argc==1) ios::sync_with_stdio(false), cin.tie(0);  FOR(i,argc-1) s+=argv[i+1],s+='\n';  FOR(i,s.size())
ungetc(s[s.size()-1-i],stdin);  solve(); return 0;
}
```

## OUTPUT:



# PROBLEM STATEMENT 10.2

Given a square grid of characters in the range ascii[a-z], rearrange elements of each row alphabetically, ascending.

Determine if the columns are also in ascending alphabetical order, top to bottom. Return YES if they are or NO if they are not.

**Example**

The grid is illustrated below.

a b c a d
e e f g
The rows are already in alphabetical order. The columns a a e, b d f and c e g are also in alphabetical order, so the answer would be YES. Only elements within the same row can be rearranged. They cannot be moved to a different row.

**Function Description**

Complete the *gridChallenge* function in the editor below.

gridChallenge has the following parameter(s):

- *string grid[n]:* an array of strings

**Returns**

- *string:* either YES or NO

**Input Format**

The first line contains , the number of testcases.
Each of the next sets of lines are described as follows:

- The first line contains , the number of rows and columns in the grid.
- The next lines contains a string of length

**Constraints**

*Each string consists of lowercase letters in the range ascii[a-z]*

**Output Format**

For each test case, on a separate line print YES if it is possible to rearrange the grid alphabetically ascending in both its rows and columns, or NO otherwise.

**Sample Input**

STDIN Function

----- --------

1 t = 1 5 n = 5 ebacd grid = ['ebacd', 'fghij',

'olmkn', 'trpqs', 'xywuv'] fghij olmkn

trpqs xywuv

**Sample Output**

YES

**Explanation**

The x grid in the test case can be reordered to

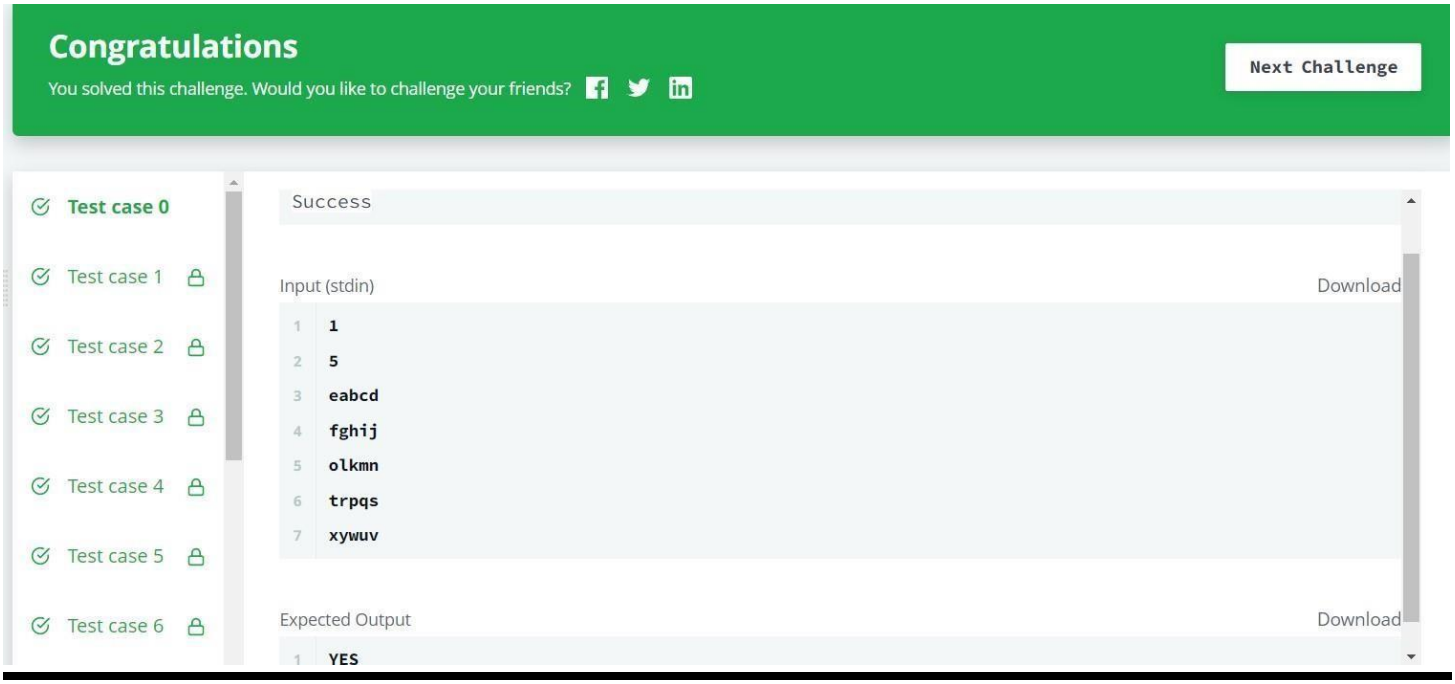
abcde fghij
klmno pqrst uvwxy
This fulfills the condition since the rows 1, 2, ..., 5 and the columns 1, 2, ..., 5 are all alphabetically sorted.

# Solution:

```
#include <bits/stdc++.h>

using namespace std;

string ltrim(const string &); string
rtrim(const string &);


string gridChallenge(vector<string> grid) {
for(int
i=0;i<grid.size();i++){         sort (grid[i].begin(),
grid[i].end() );     }      for(int
i=0;i<grid.size();i++){          vector<char> v;
for(int j=0;j<grid.size();j++){
v.push_back(grid[j][i]);
}         if(!is_sorted(v.begin(),v.end()
))             return
"NO";
    }     return
"YES";
}


int main() {
    ofstream fout(getenv("OUTPUT_PATH"));
string t_temp;
getline(cin, t_temp);

    int t = stoi(ltrim(rtrim(t_temp)));
```

```
    for (int t_itr = 0; t_itr < t; t_itr++) {          string
n_temp;          getline(cin, n_temp);

        int n = stoi(ltrim(rtrim(n_temp)));

        vector<string> grid(n);

        for (int i = 0; i < n; i++) {
string grid_item;              getline(cin, grid_item);

            grid[i] = grid_item;
        }

        string result = gridChallenge(grid);

        fout << result << "\n";
    }
fout.close();

    return 0;  }
string ltrim(const string &str) {     string
s(str);

    s.erase(
        s.begin(),          find_if(s.begin(), s.end(),  not1(ptr_fun<int,
int>(isspace)))
    );       return
s;
}
string rtrim(const string &str) {     string
s(str);

    s.erase(          find_if(s.rbegin(), s.rend(), not1(ptr_fun<int,
int>(isspace))).base(),          s.end()      );
    return s;
}
```

# OUTPUT:




# PROBLEM STATEMENT-10.3

You are given two arrays,  and , both containing  integers.

A pair of indices  is *beautiful* if the  element of array  is equal to the  element of array . In other words, pair  is *beautiful* if and only if . A set containing beautiful pairs is called a *beautiful set*.

A beautiful set is called *pairwise disjoint* if for every pair  belonging to the set there is no repetition of either  or  values.

For instance, if  and  the beautiful set  is not pairwise disjoint as there is a repetition of , that is .

Your task is to change **exactly**  element in  so that the size of the pairwise disjoint beautiful set is maximum.

**Function Description**

Complete the *beautifulPairs* function in the editor below. It should return an integer that represents the maximum number of pairwise disjoint beautiful pairs that can be formed.

beautifulPairs has the following parameters:

- *A*: an array of integers
- *B*: an array of integers

**Input Format**

The first line contains a single integer , the number of elements in  and .

The second line contains  space-separated integers .

The third line contains  space-separated integers .

**Constraints**

- 
- 

**Output Format**

Determine and print the maximum possible number of pairwise disjoint beautiful pairs.

**Note:** You must first change  element in , and your choice of element must be optimal.

**Sample Input 0**

4

1 2 3 4
1 2 3 3

**Sample Output 0**

4

**Explanation 0**

You are given  and .

The beautiful set is  and maximum sized pairwise disjoint beautiful set is either  or .

We can do better. We change the  element of array  from  to . Now new B array is:  and the pairwise disjoint beautiful set is . So, the answer is 4.

Note that we could have also selected index 3 instead of index 2 but it would have yeilded the same result. Any other choice of index is not optimal.

**Sample Input 1**

6
3 5 7 11 5 8
5 7 11 10 5 8

**Sample Output 1**

6

# SOLUTION:

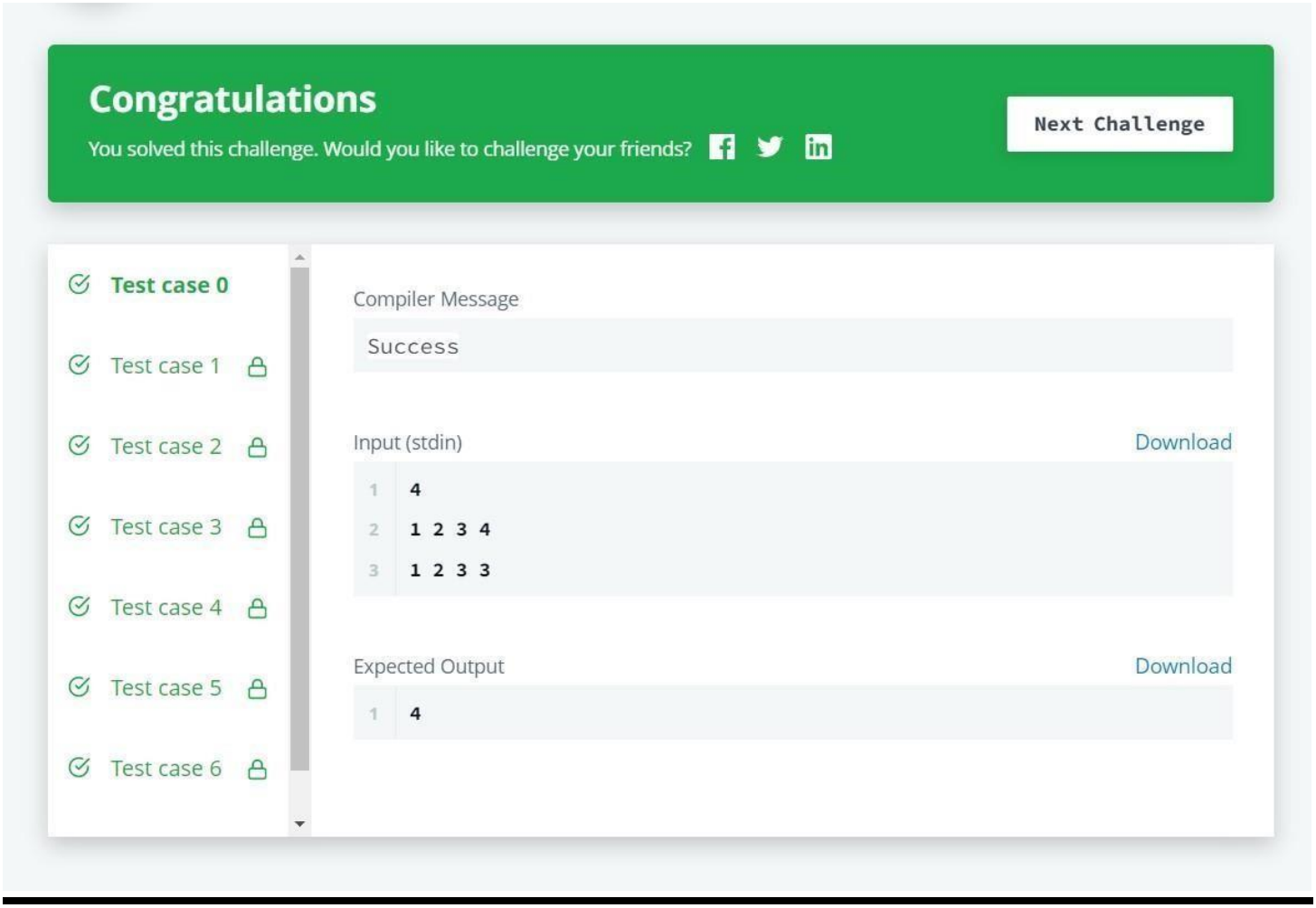
```
#include <bits/stdc++.h>

using namespace std;

string ltrim(const string &); string rtrim(const string
&); vector<string> split(const string &);
```

```
int beautifulPairs(vector<int> a, vector<int> b) {     unordered_multiset<int> set;
          for(int e: a)
set.insert(e);           int res = 0;
for(int e:
b) {          if(set.find(e) != set.end()) {
res++;               set.erase(set.find(e));
        }
}
    if(set.size()) return res + 1;     else
return res - 1;
} int main()
{
    ofstream fout(getenv("OUTPUT_PATH"));
string n_temp;     getline(cin, n_temp);
int n =
stoi(ltrim(rtrim(n_temp))
);

    string A_temp_temp;
getline(cin, A_temp_temp);

    vector<string> A_temp = split(rtrim(A_temp_temp));

    vector<int> A(n);

    for (int i = 0; i < n; i++) {
int A_item = stoi(A_temp[i]);

        A[i] = A_item;
    }
    string B_temp_temp;
getline(cin, B_temp_temp);

    vector<string> B_temp = split(rtrim(B_temp_temp));

    vector<int> B(n);
```

```
    for (int i = 0; i < n; i++) {
int B_item = stoi(B_temp[i]);

        B[i] = B_item;
    }
    int result = beautifulPairs(A, B);

    fout << result << "\n";

    fout.close();
return 0;
}
string ltrim(const string &str) {      string
s(str);

    s.erase(
        s.begin(),          find_if(s.begin(), s.end(),  not1(ptr_fun<int,
int>(isspace)))
    );       return
s;
}
string rtrim(const string &str) {      string
s(str);

    s.erase(          find_if(s.rbegin(), s.rend(), not1(ptr_fun<int,
int>(isspace))).base(),          s.end()
    );       return
s;  }
vector<string> split(const string &str) {      vector<string> tokens;

    string::size_type start = 0;
string::size_type end = 0;

    while ((end = str.find(" ", start)) != string::npos) {
tokens.push_back(str.substr(start, end - start));
```

```
        start = end + 1;
    }
    tokens.push_back(str.substr(start));
return tokens;
}
```

# OUTPUT:


Congratulations
You solved this challenge. Would you like to challenge your friends?
Next Challenge
Test case 0
Test case 1
Test case 2
Test case 3
Test case 4
Test case 5
Test case 6
Compiler Message
Success
Input (stdin)
Download
1 4
2 1 2 3 4
3 1 2 3 3
Expected Output
Download
1 4

# PROBLEM STATEMENT- 10.4

Alice is a kindergarten teacher. She wants to give some candies to the children in her class. All the children sit in a line and each of them has a rating score according to his or her performance in the class. Alice wants to give at least 1 candy to each child. If two children sit next to each other, then the one with the higher rating must get more candies. Alice wants to minimize the total number of candies she must buy.

**Example**

She gives the students candy in the following minimal amounts: . She must buy a minimum of *10* candies.

**Function Description**

Complete the *candies* function in the editor below. candies has the

following parameter(s):

- *int n:* the number of children in the class
- *int arr[n]:* the ratings of each student

**Returns**

- *int:* the minimum number of candies Alice must buy **Input**

**Format**

The first line contains an integer, , the size of .

Each of the next lines contains an integer indicating the rating of the student at position . **Constraints**

-
-

**Sample Input 0**

3
1
2
2

**Sample Output 0**

4

**Explanation 0**

Here 1, 2, 2 is the rating. Note that when two children have equal rating, they are allowed to have different number of candies. Hence optimal distribution will be 1, 2, 1.

**Sample Input 1**

10
2
4
2
6
1
7
8
9
2
1

**Sample Output 1**

19

**Explanation 1**

Optimal distribution will be

**Sample Input 2**

8
2
4
3
5
2

6
4
5

**Sample Output 2**

12

**Explanation 2**

Optimal distribution will be .

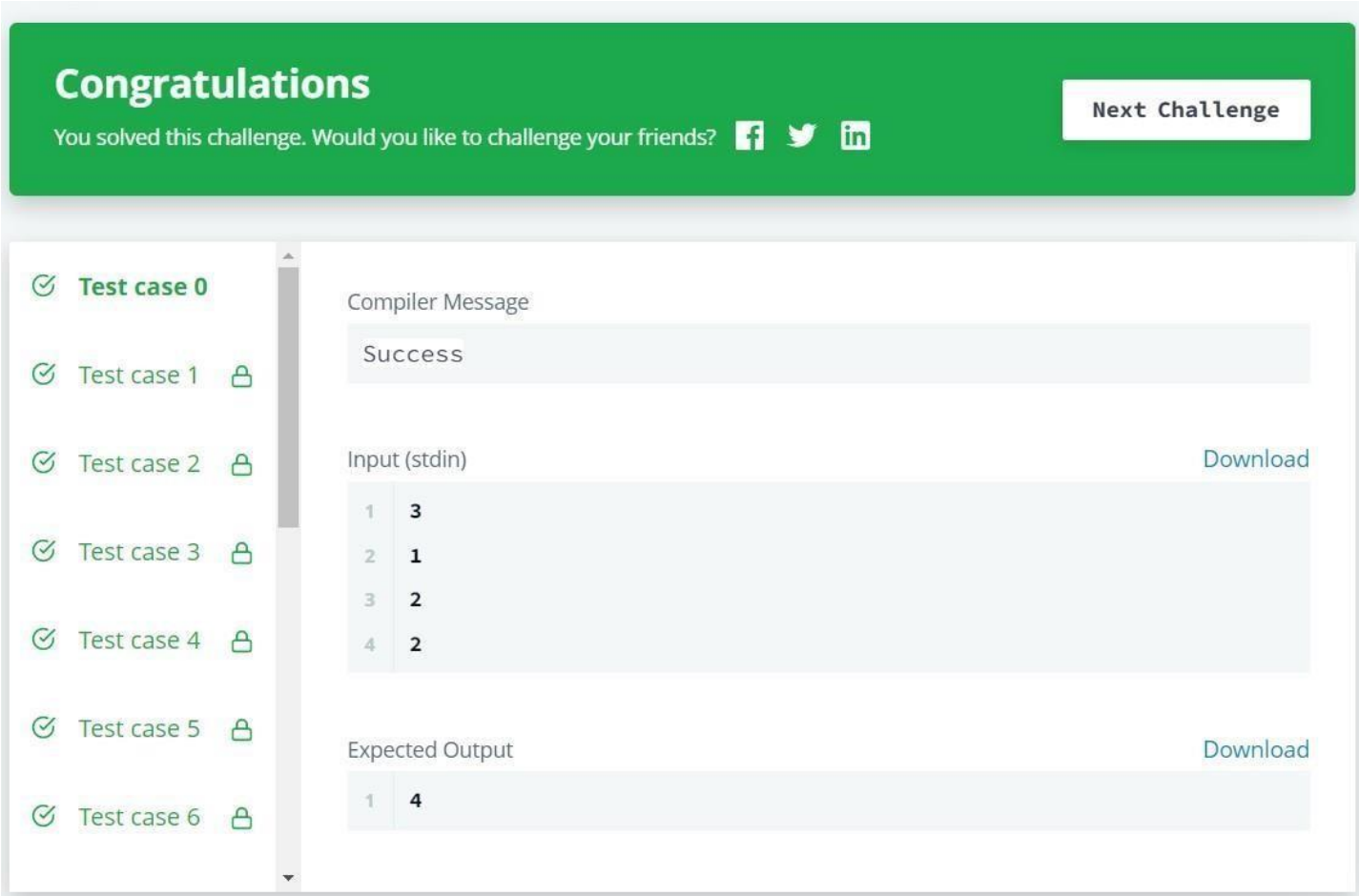
# SOLUTION:

```
#include <bits/stdc++.h>
using namespace std; string
ltrim(const string
&); string
rtrim(const string &);


long candies(int n, vector<int> arr) {
vector<int>candies(n,1);
vector<int>candies_rev(n,1);     for (int
i=0, j=n-1; i<n-1; i++, j--){
if(arr[i] < arr[i+1]){
candies[i+1] += candies[i];          }
if(arr[j] < arr[j-1]){
            candies_rev[j-1] += candies_rev[j];          }
}
    for(int      i=0;  i<n;  i++){
if(candies[i]<candies_rev[i]){
candies[i] = candies_rev[i];         }     }
long  count  =  0;           for(int  i=0;
```

```
i<candies.size();                    i++){
count+=candies[i];      }     return
count;  }  int main() {
    ofstream fout(getenv("OUTPUT_PATH"));
string n_temp;
getline(cin, n_temp);

    int n = stoi(ltrim(rtrim(n_temp)));     vector<int> arr(n);

    for (int i = 0; i < n; i++) {         string arr_item_temp;
getline(cin, arr_item_temp);

        int arr_item = stoi(ltrim(rtrim(arr_item_temp)));

        arr[i] = arr_item;
    }
    long result = candies(n, arr);

    fout << result << "\n";

    fout.close();

    return 0;
}
string ltrim(const string &str) {     string
s(str);

    s.erase(
        s.begin(),         find_if(s.begin(), s.end(),  not1(ptr_fun<int,
int>(isspace)))
    );       return
s;
}
string rtrim(const string &str) {     string
s(str);
```

```
    s.erase(         find_if(s.rbegin(), s.rend(), not1(ptr_fun<int,
int>(isspace))).base(),         s.end()
    );      return s;
}
```

# OUTPUT:


Congratulations
You solved this challenge. Would you like to challenge your friends?
Next Challenge
Test case 0
Test case 1
Test case 2
Test case 3
Test case 4
Test case 5
Test case 6
Compiler Message
Success
Input (stdin)
Download
1 3
2 1
3 2
4 2
Expected Output
Download
1 4