# Experiment-2.1

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**Subject Code:** 22CSP-351

1. **Aim:** Sort colors

2. **Objective:**

The objective of the **Sort Colors** problem is to **sort an array of integers** representing colors (0 for Red, 1 for White, 2 for Blue) **in-place** such that all occurrences of:

- 0s (Red) come first
- Followed by 1s (White)
- Followed by 2s (Blue)

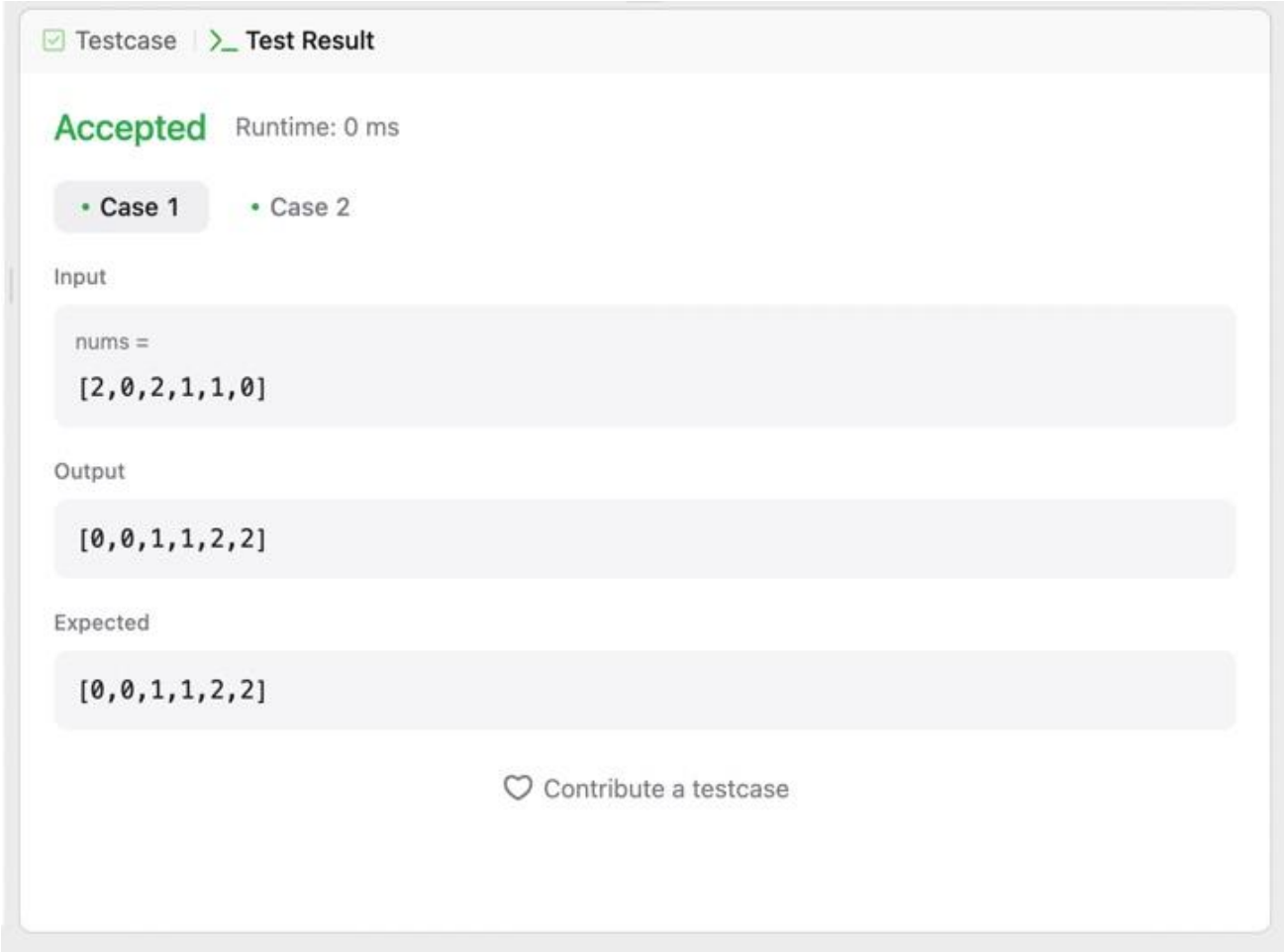
3. **Implementation/Code:**

```
void sortColors(vector<int>& nums) {
    int low = 0, mid = 0, high = nums.size() - 1;

    while (mid <= high) {
        if (nums[mid] == 0) {
            swap(nums[low], nums[mid]);
            low++;
            mid++;
        }
        else if (nums[mid] == 1) {
            mid++;
        }
        else { // nums[mid] == 2
            swap(nums[mid], nums[high]);
```

```
            high--;
        }
    }
}
```

4. **Output:**



## 5. Learning Outcomes:

- Understanding the Dutch National Flag Algorithm
- Understand **swap-based sorting** techniques.
- Understand **swap-based sorting** techniques.

## QUESTION 2

1. **Aim:** Top K Frequent Elements.

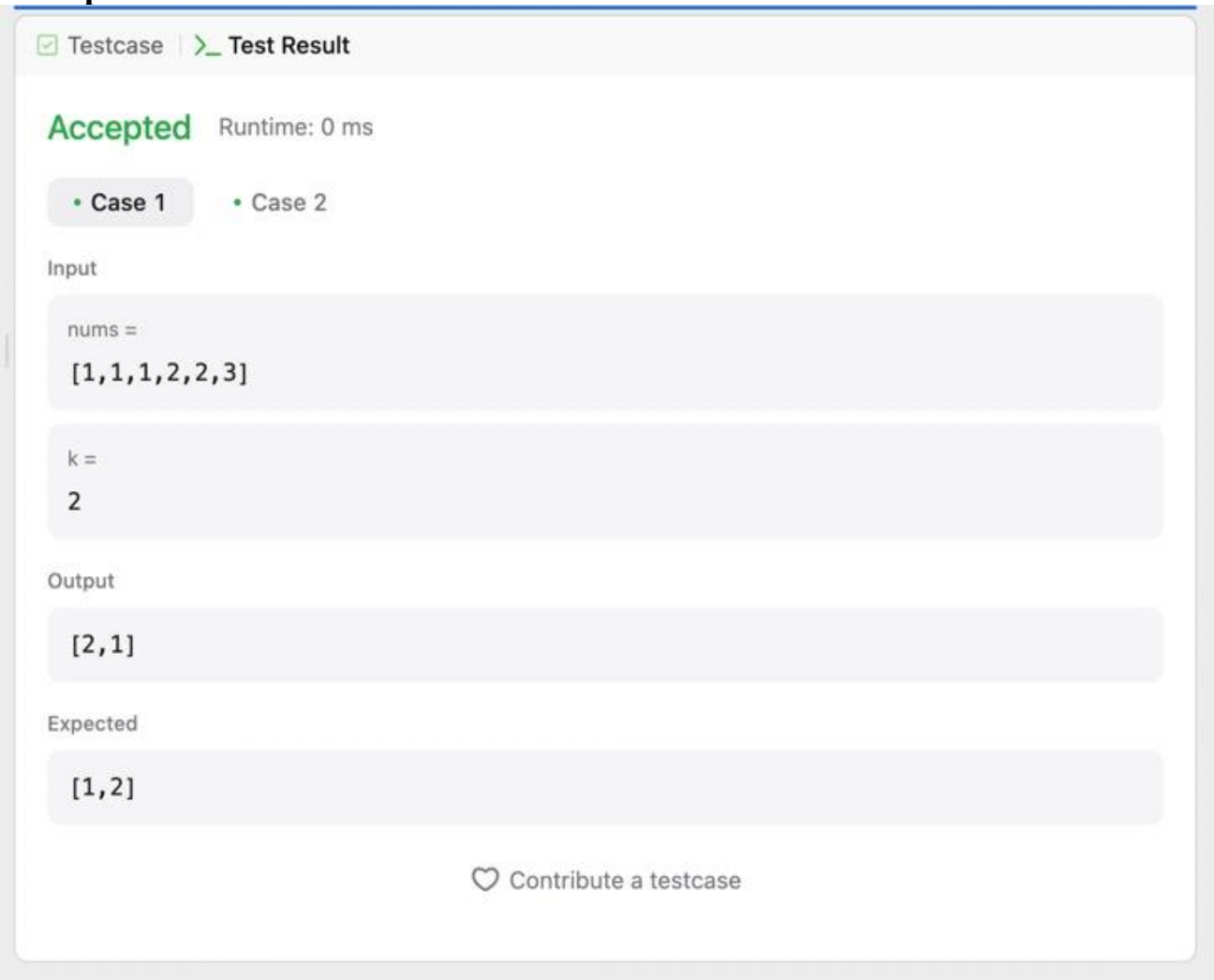
2. **Objective:** Given an integer array nums and an integer k, the objective of this problem is to **return the k most frequent elements** in the array. This problem tests your ability to manipulate and process data efficiently, specifically focusing on how to manage frequency counting and extract top elements in an optimized manner.

3. **Implementation/Code:**

```
vector<int> topKFrequent(vector<int>& nums, int k) {
unordered_map<int, int> freq;
for (int num : nums) {
freq[num]++;
}
priority_queue<pair<int, int>, vector<pair<int, int>>, greater<pair<int, int>>>
minHeap;

for (auto& pair : freq) {
minHeap.push({pair.second, pair.first});
if (minHeap.size() > k) {
minHeap.pop();
}
}
vector<int> result;
while (!minHeap.empty()) {
result.push_back(minHeap.top().second);
minHeap.pop();
}
return result;
}
```

**4. Output:**




**5. Learning Outcome:**

I. Learn the Basic Concept of Frequency-Based Searching
II. Learn to Use Built-in Methods for Efficient Processing
III. Understanding Data Structures for Efficient Retrival