

Problem 3011: Find if Array Can Be Sorted

Problem Information

Difficulty: Medium

Acceptance Rate: 66.50%

Paid Only: No

Tags: Array, Bit Manipulation, Sorting

Problem Description

You are given a **0-indexed** array of **positive** integers `nums`.

In one **operation**, you can swap any two **adjacent** elements if they have the **same** number of set bits. You are allowed to do this operation **any** number of times (**including zero**).

Return `true` if you can sort the array in ascending order, else return `false`.

Example 1:

Input: `nums = [8,4,2,30,15]` **Output:** `true` **Explanation:** Let's look at the binary representation of every element. The numbers 2, 4, and 8 have one set bit each with binary representation "10", "100", and "1000" respectively. The numbers 15 and 30 have four set bits each with binary representation "1111" and "11110". We can sort the array using 4 operations: - Swap `nums[0]` with `nums[1]`. This operation is valid because 8 and 4 have one set bit each. The array becomes `[4,8,2,30,15]`. - Swap `nums[1]` with `nums[2]`. This operation is valid because 8 and 2 have one set bit each. The array becomes `[4,2,8,30,15]`. - Swap `nums[0]` with `nums[1]`. This operation is valid because 4 and 2 have one set bit each. The array becomes `[2,4,8,30,15]`. - Swap `nums[3]` with `nums[4]`. This operation is valid because 30 and 15 have four set bits each. The array becomes `[2,4,8,15,30]`. The array has become sorted, hence we return `true`. Note that there may be other sequences of operations which also sort the array.

Example 2:

Input: nums = [1,2,3,4,5] **Output:** true **Explanation:** The array is already sorted, hence we return true.

Example 3:

Input: nums = [3,16,8,4,2] **Output:** false **Explanation:** It can be shown that it is not possible to sort the input array using any number of operations.

Constraints:

$1 \leq \text{nums.length} \leq 100$ $1 \leq \text{nums}[i] \leq 28$

Code Snippets

C++:

```
class Solution {
public:
    bool canSortArray(vector<int>& nums) {

    }
};
```

Java:

```
class Solution {
    public boolean canSortArray(int[] nums) {

    }
}
```

Python3:

```
class Solution:
    def canSortArray(self, nums: List[int]) -> bool:
```