

43. Remove Duplicates from Sorted Array Given an integer array `nums` sorted in non-decreasing order, remove the duplicates in-place such that each unique element appears only once. The relative order of the elements should be kept the same. Since it is impossible to change the length of the array in some languages, you must instead have the result be placed in the first part of the array `nums`. More formally, if there are `k` elements after removing the duplicates, then the first `k` elements of `nums` should hold the final result. It does not matter what you leave beyond the first `k` elements. Return `k` after placing the final result in the first `k` slots of `nums`. Do not allocate extra space for another array. You must do this by modifying the input array in-place with $O(1)$ extra memory.

Custom Judge: The judge will test your solution with the following code: `int[] nums = [...]; // Input array`
`int[] expectedNums = [...]; // The expected answer with correct length`
`int k = removeDuplicates(nums); // Calls your implementation`
`assert k == expectedNums.length;`
`for (int i = 0; i < k; i++) { assert nums[i] == expectedNums[i]; }`
If all assertions pass, then your solution will be accepted.

Example 1: Input: `nums = [1,1,2]` Output: 2, `nums = [1,2,_]` Explanation: Your function should return `k = 2`, with the first two elements of `nums` being 1 and 2 respectively. It does not matter what you leave beyond the returned `k` (hence they are underscores)

PROGRAM:-

```
def removeDuplicates(nums):
    if not nums:
        return 0

    # Initialize the slow pointer to the first position
    slow = 0

    # Use the fast pointer to iterate through the array
    for fast in range(1, len(nums)):
        if nums[fast] != nums[slow]:
            # Move the slow pointer one step forward
            slow += 1
            # Copy the unique element to the slow pointer's position
            nums[slow] = nums[fast]

    # Return the length of the array with unique elements
    return slow + 1

# Example usage:
nums = [1, 1, 2]
k = removeDuplicates(nums)
print(k) # Output: 2
print(nums[:k]) # Output: [1, 2]

# Another example:
nums = [0,0,1,1,1,2,2,3,3,4]
k = removeDuplicates(nums)
print(k) # Output: 5
print(nums[:k]) # Output: [0, 1, 2, 3, 4]
```

OUTPUT:-

```
2
[1, 2]
5
[0, 1, 2, 3, 4]

=== Code Execution Successful ===
```

TIME COMPLEXITY:- $O(n)$