287. Find the Duplicate Number

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Difficulty	Medium
LC Url	https://leetcode.com/problems/find-the-duplicate-number/
Importance	
Tag	LinkedList NEET
Video	

Given an array of integers `nums` containing `n + 1` integers where each integer is in the range `[1, n]` inclusive.

There is only **one repeated number** in `nums`, return *this repeated number*.

You must solve the problem **without** modifying the array `nums` and uses only constant extra space.

Example 1:

```
Input: nums = [1,3,4,2,2]
Output: 2
```

Example 2:

```
Input: nums = [3,1,3,4,2]
Output: 3
```

Constraints:

- `1 <= n <= 10 5`
- `nums.length == n + 1`
- `1 <= nums[i] <= n`

- All the integers in `nums` appear only **once** except for **precisely one integer** which appears **two or more** times.

Follow up:

- How can we prove that at least one duplicate number must exist in `nums`?
- Can you solve the problem in linear runtime complexity?

Solution

```
class Solution:
    def findDuplicate(self, nums: List[int]) -> int:
        slow, fast = 0, 0
        while True:
            slow = nums[slow]
            fast = nums[nums[fast]]
            if slow == fast:
                break

        slow2 = 0
        while True:
            slow = nums[slow]
            slow2 = nums[slow2]
            if slow == slow2:
                return slow
```

Code: https://github.com/neetcode-gh/leetcode/blob/main/python/287-Find-The-Duplicate-Number.py

解释推荐：https://leetcode.cn/problems/find-the-duplicate-number/solution/kuai-man-zhi-zhen-tu-jie-by-lin-lin-lu-o8vd/