TASK REPORT
ALGORITHMS AND DATA STRUCTURE
Search Algorithms

Created by:
Onic Agustino
L200234275
X
Date : April 29, 2025

INFORMATICS ENGINEERING
FACULTY OF COMMUNICATION AND INFORMATICS
UNIVERSITAS MUHAMMADIYAH SURAKARTA
2024/2025

Leetcode

1. **Problem 1: Kth Missing Positive Number**

- **Problem Explanation**

  You are given a sorted array arr of positive integers and an integer k.

  You need to find the k-th positive integer that is missing from the array.

  Input:

  - arr (list of positive integers, sorted)
  - k (positive integer)

` **Output:**

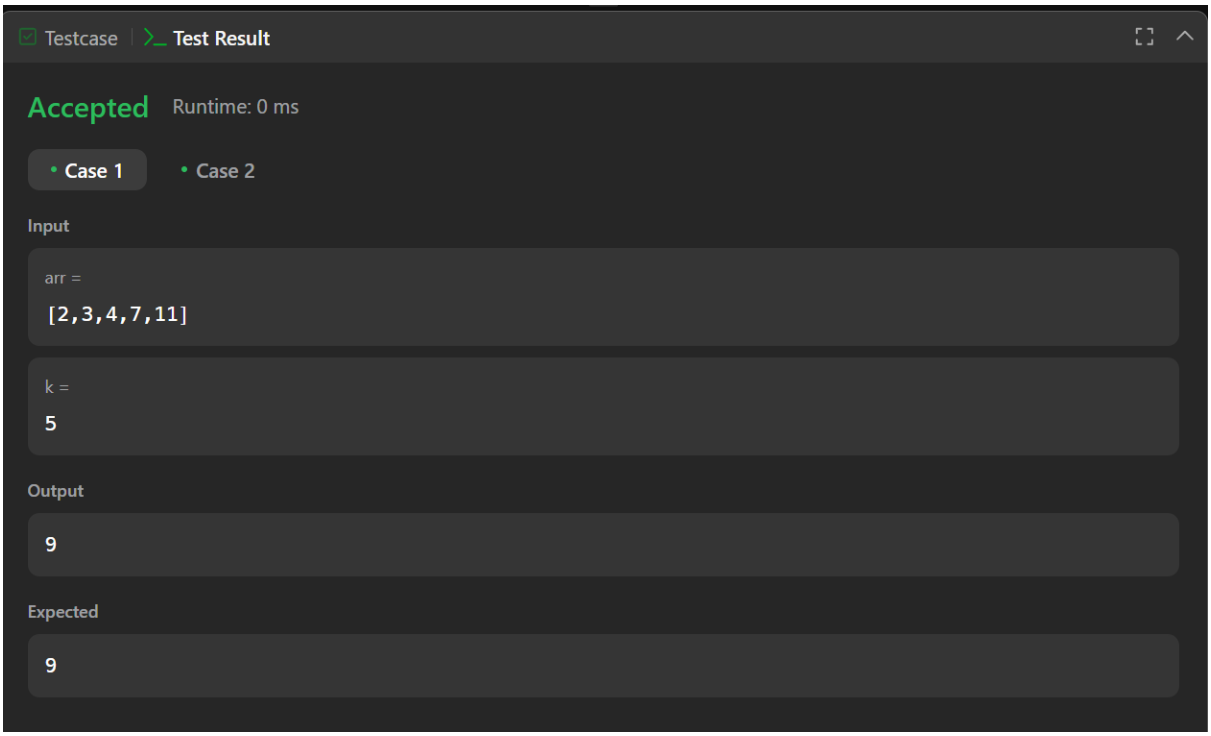
  - Return the k-th missing positive number.

- **Solution Approach**

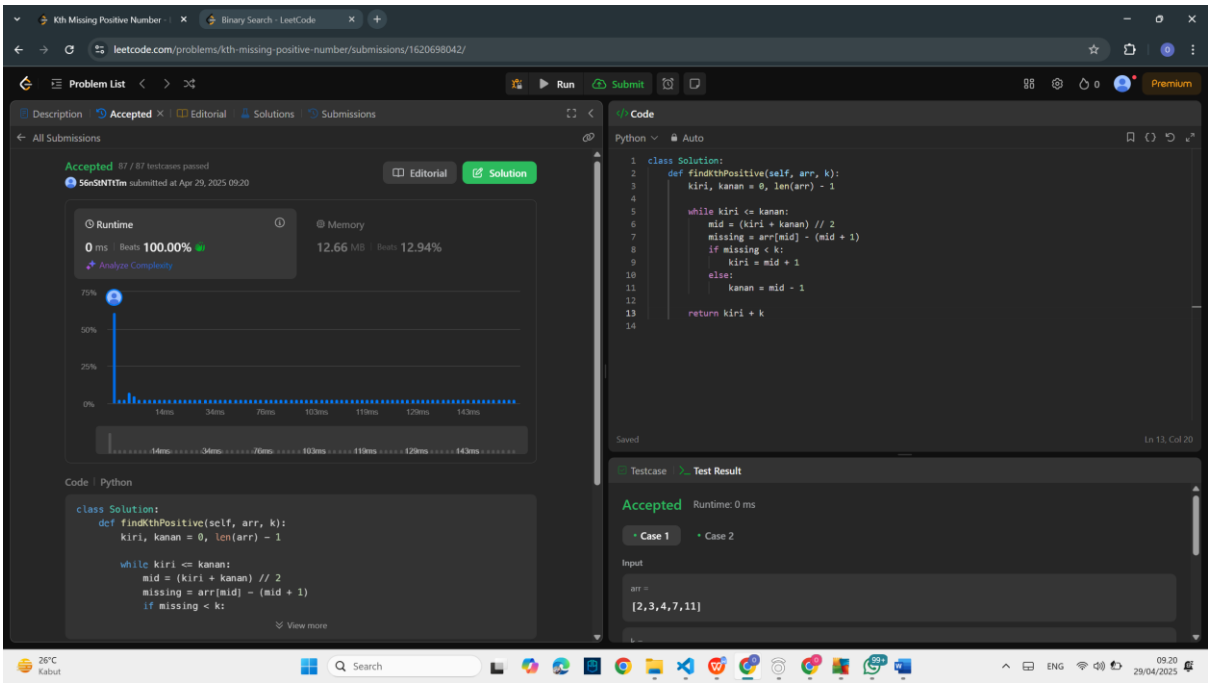
  We use **binary search** to optimize the search.
  For each `arr[mid]`, the number of missing numbers before it is `arr[mid] - (mid + 1)`.
  We perform binary search to locate the smallest index where the number of missing integers is at least `k`.
  If not found directly, the final answer will be `left + k`.

- **Code Implementation**

- **Output**



- **Screenshot Submission**



\

2. **Problem 2: Binary Search**
    - **Problem Explanation**

      You are given a sorted array nums and a target value.

      You must return the index where the target value is found. If not found, return -1.

      Input:

        - nums (list of integers, sorted in ascending order)
        - target (integer)

      Output:

        - Index of the target if found, else -1.

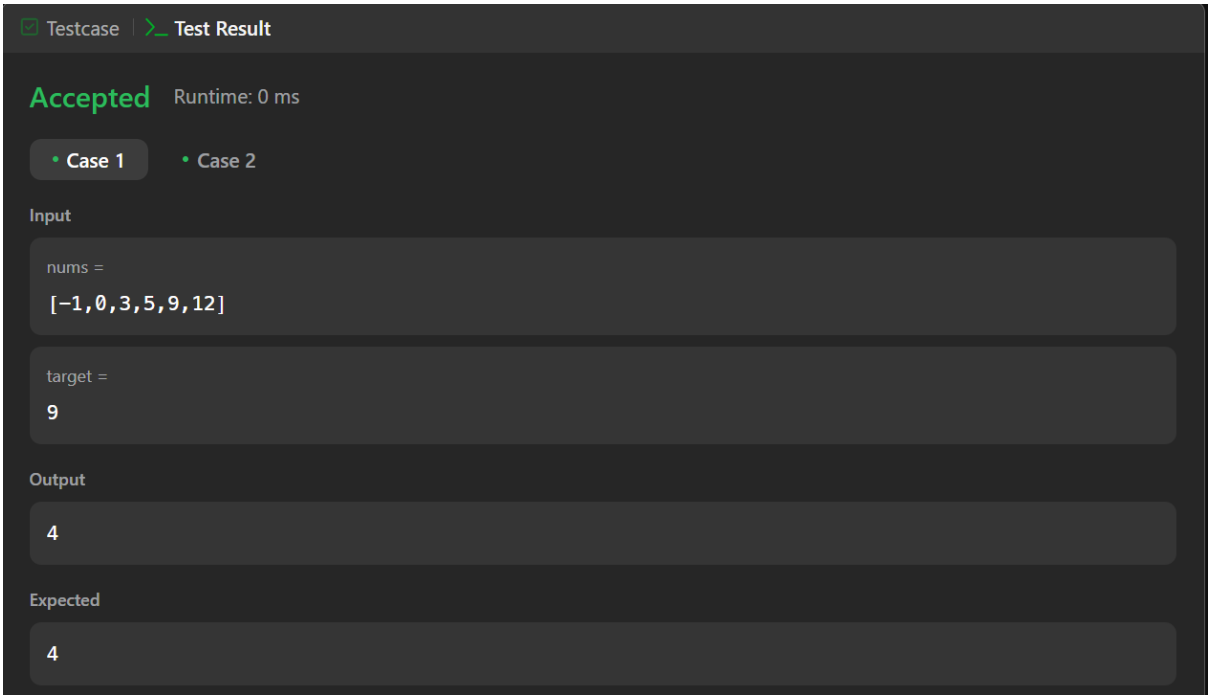
    - **Solution Approach**

      We use **binary search** which has a time complexity of **O(log n)**.

      At each step, compare the target with the middle element and adjust the search boundaries (left and right) accordingly.

    - **Code Implementation**

- **Output**



- **Screenshot Submission**