Lab Assignment: Finding the First Occurrence of a Number in a Sorted Array

Problem Statement

Given a sorted array of integers and a target number, write a function to find the index of the first occurrence of the target number. If the target number is not present in the array, return -1.

Example 1

Input: arr = [1, 2, 2, 4, 4, 4, 4, 5], target = 4

Output: Index of first occurrence: 3

Example 2

Input: arr = [2, 4, 6, 8, 10], target = 5

Output: Index of first occurrence: -1

Explanation

We must find the first position where the target appears. Even if it occurs multiple times, the answer should be the lowest index.

Logic: Modified Binary Search

To find the first occurrence efficiently:

- Use binary search to locate the target.

- If a match is found, store the index and continue searching in the left half.

- This guarantees the earliest occurrence is captured.

Time Complexity: O(log n)

Function Signature (C Language)

```
int findFirstOccurrence(int arr[], int size, int target);
```

arr[]: The input sorted array

size: Number of elements in the array

target: Element to find

Returns: Index of the first occurrence of target, or -1 if not found

Task

Implement the findFirstOccurrence function in C using binary search.

- Avoid linear scanning. Use an efficient O(log n) method.

- Return the first index where the target is found.

- If the target is not in the array, return -1.