

## **Exercise 2: E-commerce Platform Search Function**

### **a. Understand Asymptotic Notation:**

#### **1. Explain Big O notation and how it helps in analyzing algorithms.**

Big O notation is a mathematical notation used in computer science to represent the worst-case scenario of the runtime complexity of an algorithm in terms of the input size.

Big O notation helps us to compare the efficiency and scalability of different algorithms. It measures how the running time or space requirements of an algorithm change as the input size grows.

#### **2. Describe the best, average, and worst-case scenarios for search operations.**

The best, average, and worst-case scenarios for search operations are the following:

Linear Search:

The Best Case scenario for linear search is that the target element is at the first position of the list and its time complexity is  $O(1)$ .

The Average Case scenario for linear search is that the target element is located somewhere in the middle of the list and its time complexity is always  $O(n)$

The Worst Case Scenario for linear search is that the target element is at the last position of the list or is not in the list at all and its time complexity is  $O(n)$

Binary Search:

The best case scenario for binary search is that the target element is at the middle position of the list on the first comparison and its time complexity is  $O(1)$

The average Case scenario for binary search is that the target element is somewhere in the sorted list and its time complexity is  $O(\log n)$

The worst case scenario for binary search is that the target element is not in the list, or the search requires maximum depth and its time complexity is  $O(\log n)$ .

### **b. Analysis:**

#### **1. Compare the time complexity of linear and binary search algorithms.**

Both binary search and linear search have a time complexity of  $O(n)$

Binary search is vastly more efficient than linear search for large datasets, provided the data is sorted. Linear search is straightforward and works on unsorted data but scales poorly with increasing data size.

#### **2. Discuss which algorithm is more suitable for your platform and why.**

For an e-commerce platform, both linear and binary search can be used

Linear Search: It is more suitable for small datasets or unsorted lists. It is simple to implement but inefficient for large datasets.

Binary Search: It is more suitable for large datasets and requires the data to be sorted. It is much more efficient for searching in large datasets due to its logarithmic time complexity.

overall, we can say that or conclude that Binary search can be more suitable for an e-commerce platform because it handles large datasets more efficiently.