

## **E-commerce Platform Search Function**

### **Understand Asymptotic Notation:**

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

Big O notation defines the upper limit of an algorithm's running time. It indicates how the time (or space) increases with input size (n). It helps us compare the efficiency of algorithms.

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

### **Best, Average, Worst Case:**

#### **Linear Search:**

Best:  $O(1)$  (first element match)

Average:  $O(n/2) \Rightarrow O(n)$

Worst:  $O(n)$

#### **Binary Search (on sorted array):**

Best:  $O(1)$  (middle element match)

Average:  $O(\log n)$

Worst:  $O(\log n)$

### **Analysis:**

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

Time Complexity Comparison:

Linear Search: Slower for large data sets —  $O(n)$

Binary Search: Much faster on sorted arrays —  $O(\log n)$

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

Binary search is more efficient and best when products are in sorted order (e.g., by productId or name). It does faster lookups as the number of products increases. Linear search is appropriate only for small or unsorted datasets.