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

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## **Understand Asymptotic Notation**

### **What is Big O Notation?**

* Big O notation describes how the **runtime** of an algorithm grows relative to the **input size**.
* It helps us **analyze algorithm efficiency**, especially with large datasets.

| **Search Type** | **Best Case** | **Average Case** | **Worst Case** |
| --- | --- | --- | --- |
| Linear Search | O(1) | O(n) | O(n) |
| Binary Search | O(1) | O(log n) | O(log n) |

* **Linear Search** checks every element → no need for sorting.
* **Binary Search** divides and conquers → requires a **sorted array**.

## **Time Complexity Analysis**

### **Linear Search:**

* **Best Case**: O(1) → first item is the match
* **Worst Case**: O(n) → must search entire array
* **Use when**: Data is unsorted or small

### **🔹 Binary Search:**

* **Best Case**: O(1) → middle item is the match
* **Worst Case**: O(log n)
* **Use when**: Data is sorted and large

## **Output**

