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

1. **Understand Asymptotic Notation:**
   1. Big O Notation:

Big O notation is a mathematical representation used to describe the efficiency of an algorithm in terms of time complexity (how the run time of an algorithm grows relative to the input size) or space complexity (how the memory usage of an algorithm grows relative to the input size).

* 1. best, average, and worst-case scenarios for search operations.

For search operations, the best, average, and worst-case scenarios depend on the algorithm used to perform such operations,

* **Best Case:** The situation where the search takes the least number of steps possible.
* **Average Case:** The situation that shows the typical number of steps the search usually takes.
* **Worst Case:** The situation where the search takes the most number of steps possible.

**4. Analysis:**

**Time Complexity Comparison:**

1. **Linear Search**: O(n),In linear search, we may need to check each element in the array to find the target. In the worst case, if the target is at the last position or not present in the array, we will have to check all n elements.
2. **Binary Search**: O(log n), Binary search divides the search interval in half with each step. This logarithmic time complexity is much faster than linear search, especially for large arrays. However, it requires the array to be sorted beforehand.

**Suitability:**

1. **Linear Search**: **Linear search is suitable for unsorted or frequently changing data and small datasets due to its simplicity and lack of preprocessing requirements. It is straightforward to implement but may be less efficient for large, sorted datasets compared to binary search.**
2. **Binary Search**: **Binary search shines with sorted data and is perfect for static lists you’ll search often, as it’s much faster on large datasets. Its efficiency comes from reducing the search range quickly, unlike linear search.**