**E-commerce Platform Search Function – Analysis**

1. **Understanding Asymptotic Notation:**

**Big O Notation**: Big O notation is a mathematical notation used to describe the upper bound of an algorithm's time complexity. It provides a way to express how the runtime of an algorithm increases with the size of the input.

* **Best-Case**: The scenario where the algorithm performs the least number of operations. For example, in linear search, the best case occurs when the target element is the first element of the array.
* **Average-Case**: Represents the expected performance of the algorithm over all possible inputs. For linear search, this is typically the middle element of the array.
* **Worst-Case**: The scenario where the algorithm performs the maximum number of operations. For linear search, the worst case occurs when the target element is the last element or not present in the array.

**2) Comparing Time Complexity of Linear and Binary Search Algorithms:**

* **Linear Search:** Time Complexity - O(n), where n is the number of elements in the array.
* **Explanation**: In linear search, each element is checked one by one until the target is found or the end of the array is reached. This results in a time complexity that grows linearly with the size of the dataset.
* **Binary Search:** Time Complexity is O (log n), where n is the number of elements in the sorted array.
* **Explanation**: Binary search repeatedly divides the search interval in half. It requires the data to be sorted. This logarithmic approach significantly reduces the number of comparisons needed compared to linear search, making it more efficient for large datasets.

**3) Which Algorithm is More Suitable?**

* **Linear Search**: Suitable for small or unsorted datasets. It is simple to implement and does not require the data to be sorted. However, its performance degrades as the size of the dataset grows.
* **Binary Search**: More suitable for large datasets where the data is already sorted or can be sorted efficiently. It provides faster search times compared to linear search due to its logarithmic complexity.
* For platforms where search operations are frequent and the data is large, binary search is generally preferred due to its better performance in larger datasets. If the data is unsorted and the cost of sorting is high, linear search might be more practical for smaller datasets.