E-commerce Platform Search Function

- Big O Notation:

Big O notation describes the upper bound of the time complexity of an algorithm, giving an estimate of the worst-case scenario in terms of the input size n. It helps analyse and compare the efficiency of algorithms by focusing on their growth rates as the input size increases.

- Best, Average, and Worst-Case Scenarios:

Best Case: The scenario where the algorithm performs the minimum number of operations (e.g., finding an element in the first position during a search).

Average Case: The expected number of operations considering all possible inputs.

Worst Case: The scenario where the algorithm performs the maximum number of operations (e.g., searching through the entire list without finding the element).

- Time Complexity Comparison:

Linear Search:

- Best Case: $O(1)$ (element is at the first position)
- Average Case: $O(n)$
- Worst Case: $O(n)$ (element is at the last position or not present)

Binary Search:

- Best Case: $O(1)$ (element is at the middle)
- Average Case: $O(\log n)$
- Worst Case: $O(\log n)$

- Suitability for the Platform:

Linear Search: Suitable for small datasets where the overhead of sorting is not justified, or for unsorted datasets.

Binary Search: More suitable for large datasets where the array is already sorted or can be sorted. It provides significantly faster search times compared to linear search, especially as the size of the dataset grows.