**E-commerce Platform Search Function**

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

Big O notation is a mathematical concept used in computer science to describe the efficiency of an algorithm in terms of time and space complexity. It provides a high-level understanding of how an algorithm's performance scales with the size of the input data.

* Big O notation helps in comparing algorithms based on their **scalability**.
* It helps in choosing the most efficient algorithm for a given problem with large inputs. **Quicksort** has an average-case time complexity of O(n log n) which is better than **Bubblesort** which has average time complexity of O(n2).
* Space **complexity (memory usage)** alongside **time complexity** helps in managing system resources effectively.

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

* **Linear Search:**
  + **Best Case:** O(1), if the target element is the first element.
  + **Average Case:** O(n), when the target element is in halfway.
  + **Worst Case:** O(n), when the target element is at the last.
* **Binary Search:**
  + **Best Case:** O(1), if the target element is right at the middle.
  + **Average Case:** O(log(n)), because binary search halves the search space in every iteration.
  + **Worst Case:** O(log(n)), if the element is not there, then also it holds O(log(n)) time complexity.

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

* As the **Linear Search** algorithm iterate over every element to search the target element. It holds **O(n)** time complexity in average-cases.
  + **Space Complexity:** O(1), no extra space is required for linear search.
* **Binary Search** algorithm halves the search space in every iteration, so in worst case also it has a time complexity of O(log(n)).
  + **Space Complexity:** O(1), no extra space is required for binary search.

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

* Generally, products are searched with their names. If we store the products in sorted manner with respect to their names, then we can search the products using **Binary Search.**
* If we don’t store the products in sorted order with respect to their names, then we don’t have choice but go for **Linear Search.**