E-commerce Platform Search Function

1. **Explain Big O notation and how it helps in analyzing algorithms**.
   Big O notation describes how the runtime of an algorithm grows with input size (n). It helps analyze efficiency and scalability of algorithms.
   For example:
   O(1) → Constant time (best)
   O(log n) → Logarithmic time
   O(n) → Linear time
   O(n log n) → Linearithmic time
   $O(n^2)$ → Quadratic time (inefficient for large inputs)

2. **Describe the best, average, and worst-case scenarios for search operations**
   Linear Search:
   Best case: O(1)
   Average case : O(n)
   Worst case: O(n)

   Binary Search:
   Best case: O(1)
   Average case : O(log n)
   Worst case: O(log n)

3. **Compare the time complexity of linear and binary search algorithms.**
   Linear Search:
   Best case: O(1)
   Average case : O(n)
   Worst case: O(n)

   Binary Search:
   Best case: O(1)
   Average case : O(log n)
   Worst case: O(log n)

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

- For small datasets or unsorted data, linear search is simpler and sufficient.
- For large and frequently queried datasets, binary search is better:
  Requires one-time sorting O(n log n)
  After that, search is fast O(log n)