

Exercise 2: E-commerce Platform Search Function

Scenario:

You are working on the search functionality of an e-commerce platform. The search needs to be optimized for fast performance.

Solution:

Asymptotic Notation Overview:

Big O Notation:

It describes the upper limit to an algorithm's execution time growth rate in relation to a problem size. It helps to compare algorithms to determine which algorithm is more efficient in the context of time and space complexities.

Best Case:

This occurs when the search target is found on the first attempt ($O(1)$).

Average Case:

This is the expected time for finding an element on an average case (Linear Search: $O(n)$, Binary Search: $O(\log n)$).

Worst Case:

This is the maximum time it takes to find the element or determine that it is not in the list (Linear Search: $O(n)$, Binary Search: $O(\log n)$).

Analysis:

Linear Search Time Complexity:

Best Case: $O(1)$

Average/Worst Case: $O(n)$

Binary Search Time Complexity:

Best Case: $O(1)$

Average/Worst Case: $O(\log n)$

Conclusion:

For the platform, binary search seems to be best suited due to its faster execution time when searching a sorted array of data. For larger product inventories, binary search can dramatically reduce the lookup times of inventory, compared to linear search.