Understand Asymptotic Notation

1. Explain Big O notation and how it helps in analyzing algorithms.

Big O is a mathematical notation used for measuring the performance and complexity of a program. It is used to measure Time complexity (How fast our programs run) and Space complexity (How much memory our program consumes). Big O is written using the letter "O", followed by a function like O(n), O(1).

2. Best Average Worst cases scenarios for searching

Linear Search

Best Case – O(1) In this case the target is in index 0 so only one comparison is needed.

Worst Case – O(n) in this case the target is not in the array or it lies in last position so we need to check all the elements before stopping.

Average Case – O(n) in this case the target is somewhere in middle array so on average we check n/2 elements but in Big O notation we drop the constants so O(n/2) = O(n).

Binary Search (Only for sorted arrays)

Best Case – O(1) In this case the target is in middle of the array So only one comparison is needed.

Worst Case – O(log n) in this case the target is not in the array or it lies somewhere in array since we cut off the search space in half so we take about log n comparisons.

Average Case – O(log n) in this case the target is somewhere in array so on average we cut off the search space in half so we take about log n comparisons.

Analysis

1. Compare the time complexity of linear and binary search algorithms.

In worst case the linear search implementation may search all the elements in products array and may not find the product so it will take 'n' comparisons hence the time complexity of O(n).

In worst the binary search implementation may split all the products in the product array such that only 1 product remains in this case we are reducing the search space by n/2 every time so time complexity will be O(log n).

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

Since we are designing a search function for e commerce speed plays a vital role so it is better to use Binary search. To use Binary search, store the products in a sorted order.