1. Understand Asymptotic Notation

Big O Notation

Big O notation is used to describe the time or space complexity of an algorithm as a function of input size (n). It provides an upper bound on the time an algorithm takes to run, helping developers analyze algorithm performance, especially for large data sets.

It abstracts away hardware, programming language, or system details, and focuses purely on the growth rate of the algorithm's runtime or space usage.

Best, Average, and Worst-Case Scenarios for Search Operations

1. Linear Search:

- Best Case: O(1) - The target element is the first element.

- Average Case: O(n) - The target is somewhere in the middle.

- Worst Case: O(n) - The target is the last or not present at all.

2. Binary Search (on sorted data):

- Best Case: O(1) - The target element is in the middle.

- Average Case: O(log n) - Half the elements are eliminated in each step.

- Worst Case: O(log n) - The target is not found or at a leaf level.