**🔹 What is Big O Notation?**

Big O notation describes the **upper bound** of an algorithm's running time as input size increases. It helps in understanding **how well an algorithm scales**.

**Best, Average, and Worst-Case Scenarios**

| **Search Type** | **Best Case** | **Average Case** | **Worst Case** |
| --- | --- | --- | --- |
| Linear Search | O(1) – match first | O(n/2) → O(n) | O(n) – match last/not found |
| Binary Search | O(1) – match mid | O(log n) | O(log n) |

**ANALYSIS:**

🔹 Time Complexity:

* Linear Search: O(n) – slower on large datasets
* Binary Search: O(log n) – much faster but requires sorted data

🔹 Which is Better for E-Commerce?

* Binary Search is more suitable if:
  + The product list is static or infrequently updated
  + You want fast search speeds for large datasets
* Linear Search is suitable when:
  + The dataset is small or unsorted
  + You need flexibility and minimal setup

For **optimized e-commerce search**, **binary search** with a sorted product list is preferred especially when performance matters.