**UNDERSTANDING ASYMPTOTIC NOTATION**

**What is Asymptotic Notation?**

Asymptotic notation is used to describe the efficiency of algorithms in terms of time and space as the input size grows. It helps in analyzing and comparing algorithms independent of hardware or language.

**Types of Asymptotic Notations:**

**Big O (O-notation)** – Worst Case

Describes the upper bound.

Shows the maximum time an algorithm can take.

Example: Linear Search → O(n)

**Omega (Ω-notation)** – Best Case

Describes the lower bound.

Shows the minimum time an algorithm can take.

Example: Linear Search (when the first element is the target) → Ω(1)

**Theta (Θ-notation)** – Average Case

Describes the tight bound.

Shows average running time.

Example: Binary Search → Θ(log n)

**Why Asymptotic Notation is Useful:**

Avoids machine-dependent timing.

Helps compare scalability of algorithms.

Helps make better design decisions.

**Real-World Relevance in This Assignment:**

In this assignment, we used Linear Search (O(n)) and Binary Search (O(log n)).

Binary Search is more efficient for large, sorted data — important for real-world e-commerce platforms.