**Exercise 2: E-commerce Platform Search Function**

**Understand Asymptotic Notation**

**Big O Notation**

Big O notation is a mathematical notation used to describe the upper bound of an algorithm's runtime or space requirements in terms of the size of the input. It helps in analyzing the efficiency of algorithms by focusing on their behavior as the input size grows.

* O(1): Constant time - The algorithm's runtime does not depend on the input size.
* O(n): Linear time - The algorithm's runtime grows linearly with the input size.
* O(log n): Logarithmic time - The algorithm's runtime grows logarithmically with the input size.
* O(n^2): Quadratic time - The algorithm's runtime grows quadratically with the input size.
* O(2^n): Exponential time - The algorithm's runtime grows exponentially with the input size.

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

* Best Case: The scenario where the search operation performs the minimum number of steps. For example, in a linear search, this happens when the target element is the first element of the array.
* Average Case: The scenario that represents the expected number of steps for a search operation considering all possible cases.
* Worst Case: The scenario where the search operation performs the maximum number of steps. For example, in a linear search, this happens when the target element is the last element or not present in the array.

**Class Diagram Description**

* Product Class: Represents the product with attributes such as product Id, product Name, and category.
* Search Interface: Defines the contract for search methods.
* Linear Search Class: Implements the linear search algorithm.
* Binary Search Class: Implements the binary search algorithm.

**Class Diagram**

<<Binary Search>>

+search Target(name, String): Product

<<Binary Search>>

+search Target(name, String): Product

<<Linear Search>>

+search Target(name, String): Product

<<Interface>>

Search

+search Target(name, String): Product