Exercise 2: E-commerce Platform Search Function

# 1. Understand Asymptotic Notation

Big O notation is a mathematical representation that describes the performance or complexity of an algorithm in terms of input size. It helps in evaluating the scalability and efficiency of algorithms.  
  
- Best Case: The scenario where the algorithm performs the minimum number of steps (e.g., first element match).  
- Average Case: Expected performance across typical inputs.  
- Worst Case: The scenario with the maximum steps (e.g., element not found or last element match).

# 2. Setup

Create a class `Product` with the following attributes:  
- productId (int)  
- productName (String)  
- category (String)

# 3. Implementation

Refer to the code in the repository for full implementation of:  
- Linear Search: Iterate through the array to find a match by productName.  
- Binary Search: Search in a sorted array by repeatedly dividing the search interval in half.

# 4. Analysis

Time Complexity Comparison:  
  
Algorithm | Best Case | Average Case | Worst Case | Requires Sorted Data  
----------------|-----------|---------------|-------------|----------------------  
Linear Search | O(1) | O(n) | O(n) | No  
Binary Search | O(1) | O(log n) | O(log n) | Yes  
  
Use linear search for small or unsorted datasets.  
Binary search is more suitable for large datasets that are already sorted, as it provides faster lookup.