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

**Problem Overview:**

In an e-commerce platform, we need a way for users to **search for products** by their **name** or **category**. The faster the search works, the better the user experience. That’s why it’s important to choose the right algorithm depending on the size and structure of the data.

**Two Search Algorithms Used:**

**1. Linear Search**

* This is the most basic search method.
* It goes through **each item one by one** in the array or list.
* It doesn’t need the data to be sorted.

**2. Binary Search**

* This is a faster search method but **only works on sorted data**.
* It divides the list in half and keeps narrowing the search.

**Time Complexity Comparison**

| **Search Type** | **Best Case** | **Average Case** | **Worst Case** |
| --- | --- | --- | --- |
| Linear Search | O(1) | O(n) | O(n) |
| Binary Search | O(1) | O(log n) | O(log n) |

* O(1) means it finds the result immediately.
* O(n) means it might go through every element.
* O(log n) is very efficient — divides the work each time.

**When to Use Which?**

| **Condition** | **Best Search** |
| --- | --- |
| Small data, unsorted | Linear |
| Large data, already sorted | Binary |
| Real-time updates (changing often) | Linear (or hash map) |