Comparison of Time complexities of linear and binary search algorithms

* When comparing linear and binary search algorithms, the key difference lies in their **time complexity and performance as data size increases**. Linear search has a time complexity of **O(n)** in the worst and average cases, meaning it may need to check every item in the list to find a match which is acceptable only for small datasets.
* On the other hand, binary search offers a significantly better time complexity of **O(log n)** in both average and worst cases, as it continuously halves the search space, making it highly efficient for large, sorted datasets. However, binary search requires the data to be **pre-sorted**, while linear search works on **unsorted data**.
* In the context of an e-commerce platform, where the product database is typically large and fast search performance is critical for user satisfaction, **binary search is more suitable**. E-commerce systems can easily maintain sorted product lists or indexes in the background, allowing binary search (or even more advanced techniques) to provide instant search results. Thus, although linear search is simpler, binary search is the better choice for scalability, speed, and overall user experience in real-world e-commerce applications.