

Exercise 2: E-commerce Platform Search Function

Scenario:

You are working on the search functionality of an e-commerce platform. The search needs to be optimized for fast performance.

ANSWERS:

Product Class:

Product.java:

```
Product.java × SearchEngine.java SearchTest.java
1 public class Product {
2     int productId;
3     String productName;
4     String category;
5     public Product(int productId, String productName, String category) {
6         this.productId = productId;
7         this.productName = productName;
8         this.category = category;
9     }
10    public String toString() {
11        return productId + " - " + productName + " (" + category + ")";
12    }
13 }
14 |
```

Search Engine Class:

SearchEngine.java:

```
Product.java SearchEngine.java × SearchTest.java
1 import java.util.*;
2 public class SearchEngine {
3     public static Product linearSearch(Product[] products, String name) {
4         for (Product p : products) {
5             if (p.productName.equalsIgnoreCase(name)) {
6                 return p;
7             }
8         }
9         return null;
10    }
11    public static Product binarySearch(Product[] products, String name) {
12        Arrays.sort(products, Comparator.comparing(p -> p.productName.toLowerCase()));
13        int low = 0, high = products.length - 1;
14        while (low <= high) {
15            int mid = (low + high) / 2;
16            int cmp = products[mid].productName.compareToIgnoreCase(name);
17            if (cmp == 0) return products[mid];
18            else if (cmp < 0) low = mid + 1;
19            else high = mid - 1;
20        }
21        return null;
22    }
23 }
```

Search Tester class:

SearchTest.java:

```
Product.java × SearchEngine.java *SearchTest.java ×
1 public class SearchTest {
2     public static void main(String[] args) {
3         Product[] products = {
4             new Product(101, "HeadPhones", "Electronics"),
5             new Product(102, "Crocs", "Footwear"),
6             new Product(103, "Moisturizer", "Skincare"),
7             new Product(104, "T-Shirt", "Clothing"),
8             new Product(105, "Air Conditioner", "Appliances")
9         };
10        Product foundLinear = SearchEngine.LinearSearch(products, "Air Conditioner");
11        System.out.println("Linear Search Result: " + (foundLinear != null ? foundLinear : "Product not found"));
12        Product foundBinary = SearchEngine.binarySearch(products, "Air Conditioner");
13        System.out.println("Binary Search Result: " + (foundBinary != null ? foundBinary : "Product not found"));
14    }
15 }
16
```

Output:

```
Linear Search Result: 105 - Air Conditioner (Appliances)
Binary Search Result: 105 - Air Conditioner (Appliances)
```