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

**Product.java**

public class Product {

private String productId;

private String productName;

private String category;

public Product(String productId, String productName, String category) {

this.productId = productId;

this.productName = productName;

this.category = category;

}

public String getProductName() {

return productName;

}

public String toString() {

return "[" + productId + "] " + productName + " (" + category + ")";

}

}

**LinearSearch.java**

public class LinearSearch {

public static Product search(Product[] products, String name) {

for (Product p : products) {

if (p.getProductName().equalsIgnoreCase(name)) {

return p;

}

}

return null;

}

}

**BinarySearch.java**

import java.util.Arrays;

import java.util.Comparator;

public class BinarySearch {

public static Product search(Product[] products, String name) {

int low = 0, high = products.length - 1;

while (low <= high) {

int mid = (low + high) / 2;

int cmp = products[mid].getProductName().compareToIgnoreCase(name);

if (cmp == 0) return products[mid];

else if (cmp < 0) low = mid + 1;

else high = mid - 1;

}

return null;

}

public static void sortByName(Product[] products) {

Arrays.*sort*(products, Comparator.*comparing*(Product::getProductName, String.***CASE\_INSENSITIVE\_ORDER***));

}

}

**Main.java**

public class Main {

public static void main(String[] args) {

Product[] inventory = {

new Product("P001", "Laptop", "Electronics"),

new Product("P002", "Shoes", "Fashion"),

new Product("P003", "Smartphone", "Electronics"),

new Product("P004", "Book", "Education")

};

System.***out***.println(" Linear Search for 'Shoes':");

Product result1 = LinearSearch.*search*(inventory, "Shoes");

System.***out***.println(result1 != null ? "Found: " + result1 : "Product not found.");

System.***out***.println("\n Sorting for Binary Search...");

BinarySearch.*sortByName*(inventory);

System.***out***.println(" Binary Search for 'Book':");

Product result2 = BinarySearch.*search*(inventory, "Book");

System.***out***.println(result2 != null ? "Found: " + result2 : "Product not found.");

}

}

Output:

