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

import java.util.Arrays;

import java.util.Comparator;

public class Main {

static class Product {

int productId;

String productName;

String category;

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

this.productId = productId;

this.productName = productName;

this.category = category;

}

public String toString() {

return "ProductID: " + productId + ", Name: " + productName + ", Category: " + category;

}

}

public static Product linearSearch(Product[] products, String productName) {

for (Product product : products) {

if (product.productName.equalsIgnoreCase(productName)) {

return product;

}

}

return null;

}

public static Product binarySearch(Product[] products, String productName) {

Arrays.sort(products, Comparator.comparing(p -> p.productName.toLowerCase()));

int left = 0, right = products.length - 1;

while (left <= right) {

int mid = left + (right - left) / 2;

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

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

else if (cmp < 0) right = mid - 1;

else left = mid + 1;

}

return null;

}

public static void main(String[] args) {

Product[] products = {

new Product(101, "Laptop", "Electronics"),

new Product(102, "Phone", "Electronics"),

new Product(103, "Shoes", "Fashion"),

new Product(104, "Watch", "Accessories"),

new Product(105, "Tablet", "Electronics")

};

String searchTerm = "Phone";

Product resultLinear = linearSearch(products, searchTerm);

System.out.println("Linear Search Result: " + (resultLinear != null ? resultLinear : "Not Found"));

Product resultBinary = binarySearch(products, searchTerm);

System.out.println("Binary Search Result: " + (resultBinary != null ? resultBinary : "Not Found"));

}

}

Output:

