**DATA STRUCTURES AND ALGORITHMS**

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

**package** sf;

**import** java.util.Arrays;

**class** Product **implements** Comparable<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** **int** compareTo(Product other) {

**return** Integer.*compare*(**this**.productId, other.productId);

}

**public** String toString() {

**return** "ID: " + productId + ", Name: " + productName + ", Category: " + category;

}

}

**public** **class** ECommerceSearchExample {

**public** **static** Product linearSearch(Product[] products, **int** targetId) {

**for** (Product product : products) {

**if** (product.productId == targetId) {

**return** product;

}

}

**return** **null**;

}

**public** **static** Product binarySearch(Product[] products, **int** targetId) {

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

**while** (left <= right) {

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

**if** (products[mid].productId == targetId) {

**return** products[mid];

} **else** **if** (products[mid].productId < targetId) {

left = mid + 1;

} **else** {

right = mid - 1;

}

}

**return** **null**;

}

**public** **static** **void** main(String[] args) {

Product[] products = {

**new** Product(103, "Mobile", "Electronics"),

**new** Product(101, "Shoes", "Footwear"),

**new** Product(105, "Laptop", "Electronics"),

**new** Product(102, "T-shirt", "Clothing"),

**new** Product(104, "Book", "Education")

};

**int** searchId = 104;

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

Product result1 = *linearSearch*(products, searchId);

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

Arrays.*sort*(products);

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

Product result2 = *binarySearch*(products, searchId);

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

}

}

**OUTPUT:**

