**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.

**package** dataStructures;

**import** java.util.Arrays;

**import** java.util.Comparator;

**public** **class** ECommerceaSearch

{

**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** **void** display()

{

System.***out***.println("ID: " + productId + ", Name: " + productName + ", Category: " + category);

}

}

**public** **static** Product linearSearch(Product[] products, String targetName)

{

**for** (Product product : products)

{

**if** (product.productName.equalsIgnoreCase(targetName))

{

**return** product;

}

}

**return** **null**;

}

**public** **static** Product binarySearch(Product[] products, String targetName)

{

**int** low = 0;

**int** high = products.length - 1;

**while** (low <= high)

{

**int** mid = (low + high) / 2;

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

**if** (cmp == 0)

{

**return** products[mid];

}

**else** **if** (cmp < 0)

{

low = mid + 1;

}

**else**

{

high = mid - 1;

}

}

**return** **null**;

}

**public** **static** **void** sortProducts(Product[] products)

{

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

}

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

{

Product[] products =

{

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

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

**new** Product(103, "Book", "Education"),

**new** Product(104, "Phone", "Electronics"),

**new** Product(105, "Shoes", "Footwear")

};

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

Product result1 = *linearSearch*(products, "Phone");

**if** (result1 != **null**)

{

result1.display();

}

**else**

{

System.***out***.println("Product not found.");

}

System.***out***.println("\nBinary Search");

*sortProducts*(products);

Product result2 = *binarySearch*(products, "Phone");

**if** (result2 != **null**)

{

result2.display();

}

**else**

{

System.***out***.println("Product not found.");

}

}

}

**CODE SNIPPET:**

A screenshot of a computer

AI-generated content may be incorrect.

**OUTPUT:**

A screenshot of a computer

AI-generated content may be incorrect.