public class Product {

    private int productId;

    private String productName;

    private String category;

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

        this.productId = productId;

        this.productName = productName;

        this.category = category;

    }

    public int getProductId() { return productId; }

    public String getProductName() { return productName; }

    public String getCategory() { return category; }

    @Override

    public String toString() {

        return productId + ": " + productName + " (" + category + ")";

    }

}

import java.util.Arrays;

import java.util.Comparator;

public class SearchEngine {

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

        for (Product p : products) {

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

                return p;

            }

        }

        return null;

    }

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

        int left = 0;

        int right = products.length - 1;

        while (left <= right) {

            int mid = (left + right) / 2;

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

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

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

            else right = mid - 1;

        }

        return null;

    }

    public static void sortProductsByName(Product[] products) {

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

    }

}

public class Main {

    public static void main(String[] args) {

        Product[] products = {

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

            new Product(102, "Shirt", "Clothing"),

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

            new Product(104, "Mobile", "Electronics")

        };

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

        Product foundLinear = SearchEngine.linearSearch(products, "Shoes");

        System.out.println(foundLinear != null ? "Found: " + foundLinear : "Not found");

        System.out.println("\n🔍 Binary Search for 'Mobile':");

        SearchEngine.sortProductsByName(products);

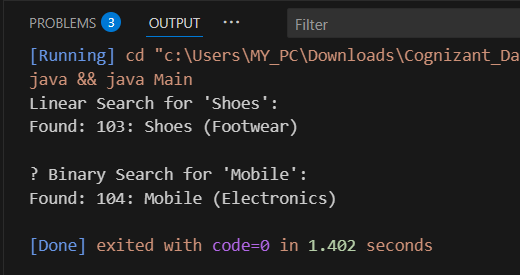
        Product foundBinary = SearchEngine.binarySearch(products, "Mobile");

        System.out.println(foundBinary != null ? "Found: " + foundBinary : "Not found");

    }

}

**OUTPUT:-**

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