**Product.java :**

public class Product{

int productId;

String productName;

String category;

public Product(int id, String name, String category) {

this.productId=id;

this.productName=name;

this.category=category;

}

@Override

public String toString() {

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

}

}

**SearchEngine.java :**

import java.util.Arrays;

import java.util.Comparator;

public class SearchEngine {

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

for (Product product : products){

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

return product;

}

}

return null;

}

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

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

while(left<=right) {

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

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

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

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

else right=mid - 1;

}

return null;

}

public static void sortByName(Product[] products){

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

}

}

**SearchTest.java :**

public class SearchTest {

public static void main(String[] args) {

Product[] products={

new Product(1,"Laptop","Electronics"),

new Product(2,"Shoes","Footwear"),

new Product(3,"Phone","Electronics"),

new Product(4,"T-shirt","Clothing"),

new Product(5,"Watch","Accessories")

};

Product found1=SearchEngine.linearSearch(products, "Phone");

System.out.println("Linear Search Result: " +(found1 != null ? found1 : "Not Found"));

SearchEngine.sortByName(products);

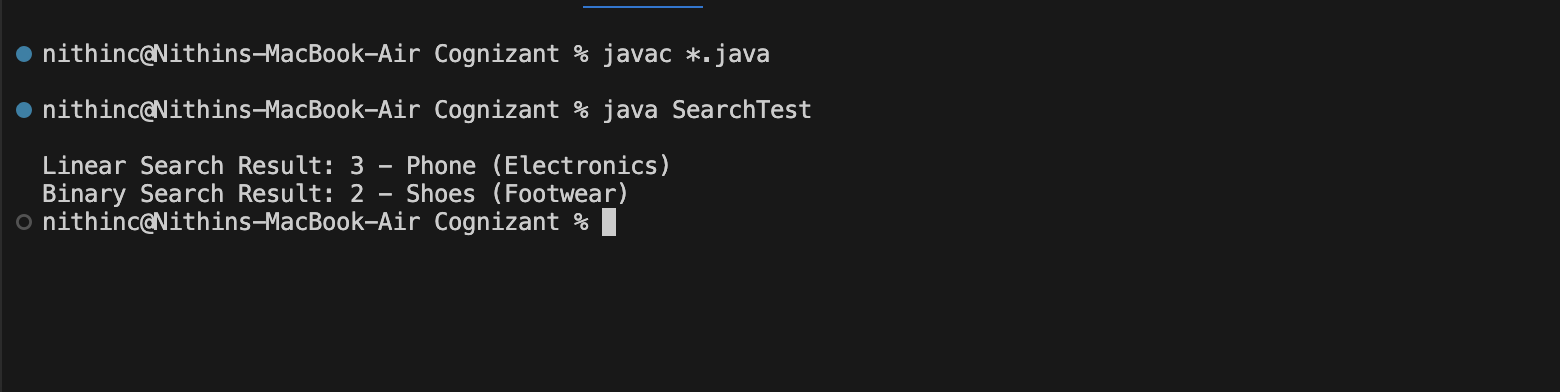
Product found2=SearchEngine.binarySearch(products, "Shoes");

System.out.println("Binary Search Result: "+(found2 != null ? found2 : "Not Found"));

}

}

**Output :**

****