DATA STRUCTURES AND ALGORITHMS

MANDATORY HANDS-ON

Exercise 2: E-commerce Platform Search Function

LINEAR SEARCH

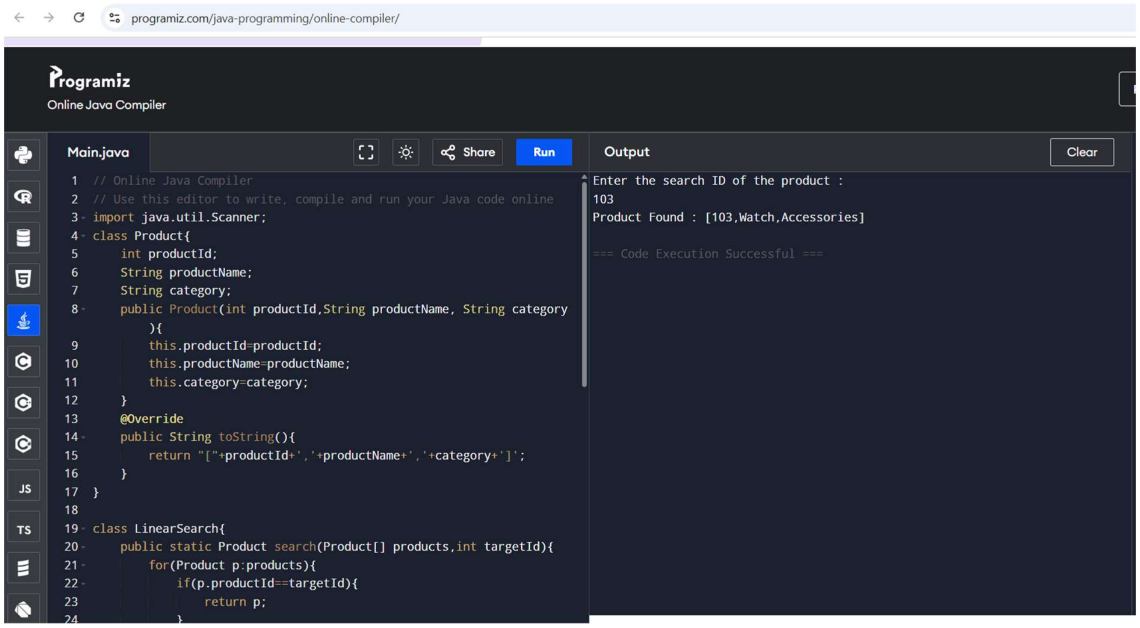
Main.java:

```
import java.util.Scanner;
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;
    }
    @Override
    public String toString(){
        return "["+productId+','+productName+','+category+']';
    }
}

class LinearSearch{
    public static Product search(Product[] products,int targetId){
        for(Product p:products){
            if(p.productId==targetId){
                return p;
            }
        }
        return null;
    }
}

public class Main {
    public static void main(String[] args) {
        //System.out.println("Try programiz.pro");
        Product[] products = {
            new Product(101, "T-Shirt", "Fashion"),
            new Product(105, "Kurta Set", "Clothing"),
            new Product(103, "Watch", "Accessories"),
            new Product(104, "Laptop", "Electronics"),
            new Product(106, "Bangles", "Jewellery"),
            new Product(102, "Shoes", "Footwear"),
        };
        Scanner s = new Scanner(System.in);
        int searchId;
        System.out.println("Enter the search ID of the product : ");
        searchId=s.nextInt();
        Product result = LinearSearch.search(products,searchId);
        if(result!=null){
            System.out.println("Product Found : "+result);
        }
        else{
            System.out.println("The Product with id "+searchId+" not found");
        }
    }
}
```

OUTPUT:

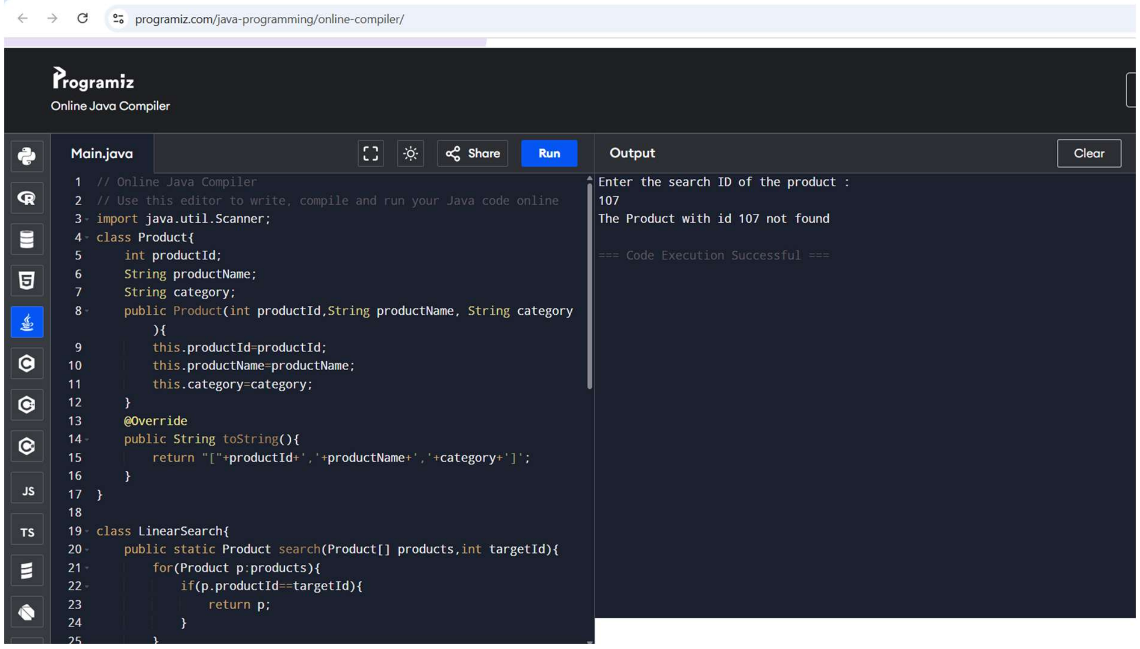


```java
// Online Java Compiler
// Use this editor to write, compile and run your Java code online
import java.util.Scanner;
class Product{
    int productId;
    String productName;
    String category;
    public Product(int productId,String productName, String category
        ){
        this.productId=productId;
        this.productName=productName;
        this.category=category;
    }
    @Override
    public String toString(){
        return "["+productId+','+productName+','+category+']';
    }
}

class LinearSearch{
    public static Product search(Product[] products,int targetId){
        for(Product p:products){
            if(p.productId==targetId){
                return p;
```

```
Enter the search ID of the product :
103
Product Found : [103,Watch,Accessories]

=== Code Execution Successful ===
```



```java
// Online Java Compiler
// Use this editor to write, compile and run your Java code online
import java.util.Scanner;
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;
    }
    @Override
    public String toString(){
        return "["+productId+','+productName+','+category+']';
    }
}

class LinearSearch{
    public static Product search(Product[] products,int targetId){
        for(Product p:products){
            if(p.productId==targetId){
                return p;
            }
```

```
Enter the search ID of the product :
107
The Product with id 107 not found

=== Code Execution Successful ===
```

Binary Search:

Main.java

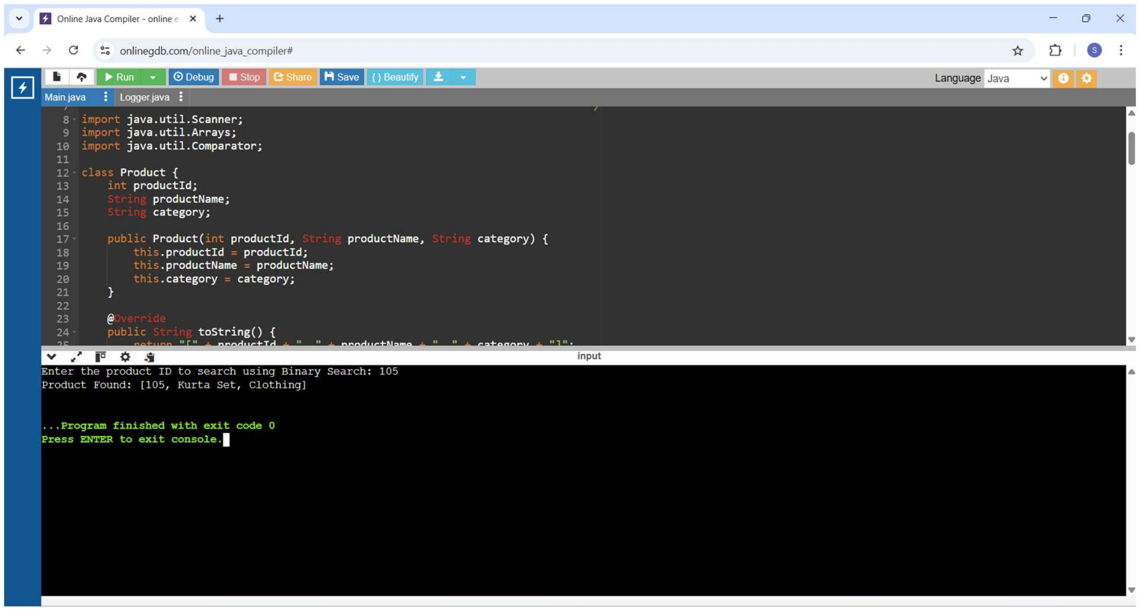
```
import java.util.Scanner;
import java.util.Arrays;
import java.util.Comparator;
class Product {
   int productId;
   String productName;
   String category;
   public Product(int productId, String productName, String category) {
      this.productId = productId;
      this.productName = productName;
      this.category = category;
   }
   @Override
   public String toString() {
      return "[" + productId + ", " + productName + ", " + category + "]";
   }
}
class BinarySearch {
   public static Product search(Product[] products, int targetId) {
      int left = 0, right = products.length - 1;
      while (left <= right) {
         int mid = left + (right - left) / 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 class Main {
    public static void main(String[] args) {
        Product[] products = {
            new Product(101, "T-Shirt", "Fashion"),
            new Product(105, "Kurta Set", "Clothing"),
            new Product(102, "Shoes", "Footwear"),
            new Product(106, "Bangles", "Jewellery"),
            new Product(103, "Watch", "Accessories"),
            new Product(104, "Laptop", "Electronics"),
        };

        Arrays.sort(products, Comparator.comparingInt(p -> p.productId)); //sorting
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter the product ID to search using Binary Search: ");
        int searchId = scanner.nextInt();

        Product result = BinarySearch.search(products, searchId);
        if (result != null) {
            System.out.println("Product Found: " + result);
        } else {
            System.out.println("Product with ID " + searchId + " not found.");
        }
    }
}
```

OUTPUT :



```
import java.util.Scanner;
import java.util.Arrays;
import java.util.Comparator;

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;
    }

    @Override
    public String toString() {
```

```
Enter the product ID to search using Binary Search: 105
Product Found: [105, Kurta Set, Clothing]


...Program finished with exit code 0
Press ENTER to exit console.
```

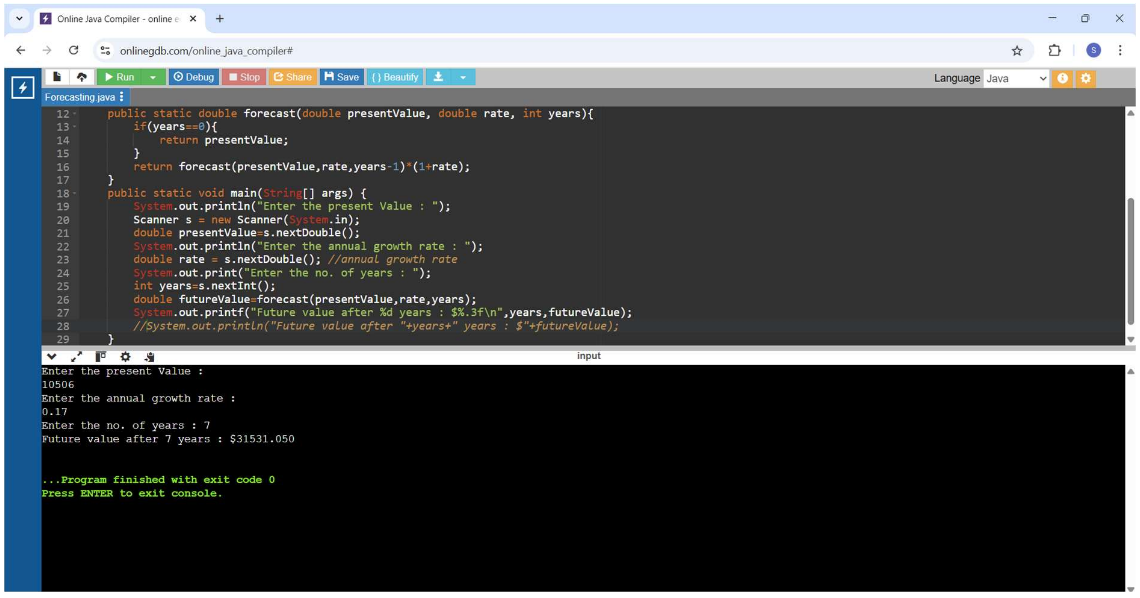
Exercise 7: Financial Forecasting

<u>Forecasting.java</u>

```
//to calculate future value using FV=PV*(1+r)^n
import java.util.*;
public class Forecasting
{
   public static double forecast(double presentValue, double rate, int years){
      if(years==0){
         return presentValue;
      }
      return forecast(presentValue,rate,years-1)*(1+rate);
   }
         public static void main(String[] args) {
                  System.out.println("Enter the present Value : ");
```

```
                    Scanner s = new Scanner(System.in);
                    double presentValue=s.nextDouble();
                    System.out.println("Enter the annual growth rate : ");
                    double rate = s.nextDouble(); //annual growth rate
                    System.out.print("Enter the no. of years : ");
                    int years=s.nextInt();
                    double futureValue=forecast(presentValue,rate,years);
                     System.out.printf("Future value after %d years : $%.3f\n", years,
futureValue);
                    //System.out.println("Future value after "+years+" years : $"+futureValue);
          }
}
```

OUTPUT:



```
    public static double forecast(double presentValue, double rate, int years){
        if(years==0){
            return presentValue;
        }
        return forecast(presentValue,rate,years-1)*(1+rate);
    }
    public static void main(String[] args) {
        System.out.println("Enter the present Value : ");
        Scanner s = new Scanner(System.in);
        double presentValue=s.nextDouble();
        System.out.println("Enter the annual growth rate : ");
        double rate = s.nextDouble(); //annual growth rate
        System.out.print("Enter the no. of years : ");
        int years=s.nextInt();
        double futureValue=forecast(presentValue,rate,years);
        System.out.printf("Future value after %d years : $%.3f\n",years,futureValue);
        //System.out.println("Future value after "+years+" years : $"+futureValue);
    }
```

```
Enter the present Value :
10506
Enter the annual growth rate :
0.17
Enter the no. of years : 7
Future value after 7 years : $31531.050


...Program finished with exit code 0
Press ENTER to exit console.
```

OUTPUT

```
Enter the present Value :
10506
Enter the annual growth rate :
0.17
Enter the no. of years : 7
Future value after 7 years : $31531.050
```