OBJECT ORIENTED PROGRAMMING LAB

Submitted by,

Ananya B

S2-MCA

Roll NO:208

COURSE OUTCOME 1

PROGRAM NO 1

AIM: Define a class ‘product’ with data members pcode, pname and price. Create 3 objects of the class and find the product having the lowest price.

ALGORITHM

Step 1: Start

Step 2: Created a class ‘Product’ with pcode,pname and price as data members

Step 3: Then created a function ‘printChanges’ to display details of product

Step 4: Then in main function created 3 objects,then accessed data members using objects

Step 5: Then compared which product have lowest price using If..else..condition

Step 6: Then displayed the details of lower priced product

Step 7: Stop

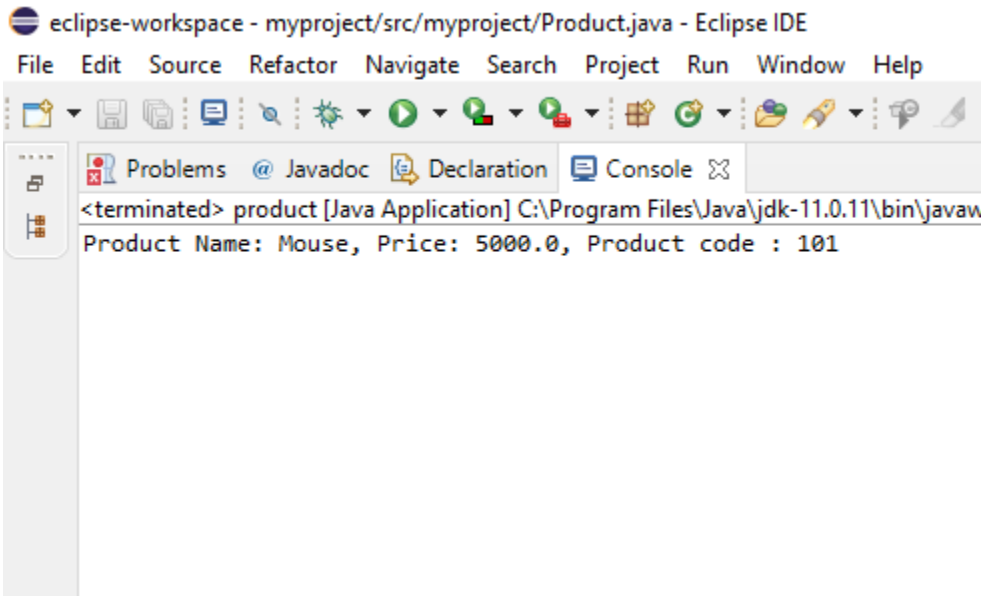
PROGRAM CODE:

```
package myproject;

public class Product {
String pname;
   double price;
   int pcode;

   void printChanges() {
      System.out.println("Product Name: "+pname+",
Price: "+price+", Product code : "+pcode);
   }

 public static void main(String[] args) {

      // Create 3 product object
      Product product1 = new Product();
      Product product2 = new Product();
      Product product3=  new Product();
      // Invoke method on each objects
      product1.pname="Keyboard";
      product1.price=85000;
      product1.pcode=100;

      product2.pname="Mouse";
      product2.price=5000;
      product2.pcode=101;
    product3.pname="Monitor";
      product3.price=100000;
      product3.pcode=103;

      if(product1.price<product2.price &&
product1.price<product3.price) {
     product1.printChanges();
```

	}else if (product2.price<product3.price && product2.price<product1.price)
	{
	product2.printChanges();
	
	}else
	{
	product3.printChanges();
	
	}
	
	}
	
	}

RESULT: The program is executed successfully and obtained the output

OUTPUT


eclipse-workspace - myproject/src/myproject/Product.java - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
Problems Javadoc Declaration Console
<terminated> product [Java Application] C:\Program Files\Java\jdk-11.0.11\bin\javaw
Product Name: Mouse, Price: 5000.0, Product code : 101

PROGRAM NO 2

AIM: Read 2 matrices from the console and perform matrix addition

ALGORITHM

Step 1: Start

Step 2: Take inputs like no. of rows and colums , and elements of two matrices from user

Step 3: Then the sum of two matrices is done using for loop

Step 4: Then displayed the resultant matrix as output

Step 5: Stop

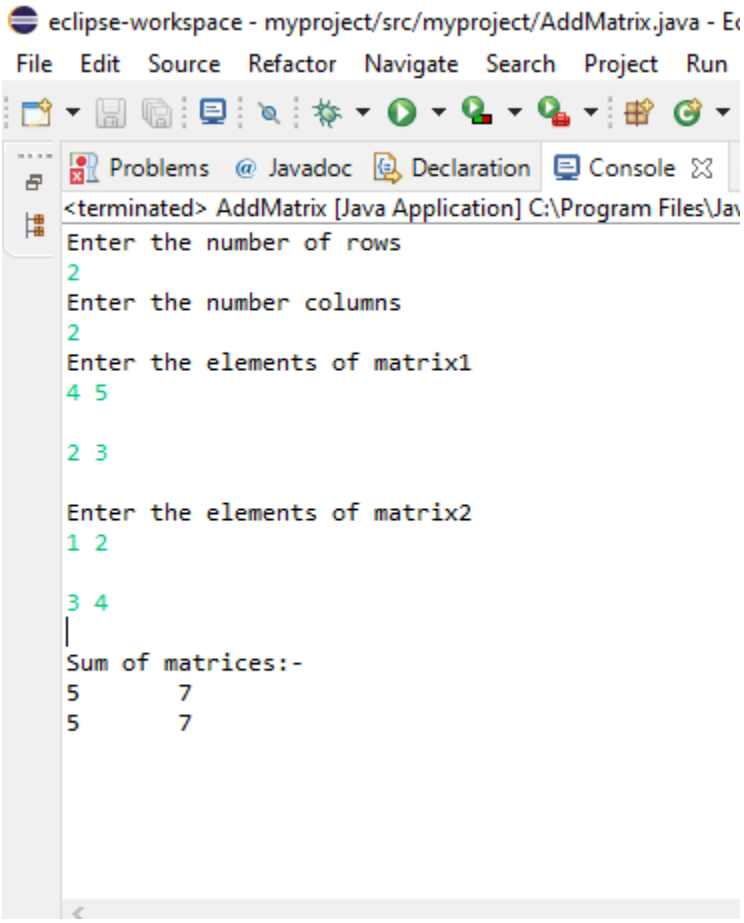
PROGRAM CODE

```
package myproject;
import java.util.Scanner;

class AddMatrix
{
public static void main(String args[])
{
int row, col,i,j;
Scanner in = new Scanner(System.in);
System.out.println("Enter the number of rows");
row = in.nextInt();
System.out.println("Enter the number columns");
col = in.nextInt();
int mat1[][] = new int[row][col];
int mat2[][] = new int[row][col];
int res[][] = new int[row][col];
System.out.println("Enter the elements of matrix1");

for ( i= 0 ; i < row ; i++ )
{
for ( j= 0 ; j < col ;j++ )
mat1[i][j] = in.nextInt();
System.out.println();
}

System.out.println("Enter the elements of matrix2");
for ( i= 0 ; i < row ; i++ )
{
for ( j= 0 ; j < col ;j++ )
mat2[i][j] = in.nextInt();
System.out.println();
}

for ( i= 0 ; i < row ; i++ )
for ( j= 0 ; j < col ;j++ )
res[i][j] = mat1[i][j] + mat2[i][j] ;
System.out.println("Sum of matrices:-");
for ( i= 0 ; i < row ; i++ )
{
for ( j= 0 ; j < col ;j++ )
```

	System.out.print(res[i][j]+"\t"); System.out.println(); } } }

RESULT: The program is executed successfully and obtained the output

OUTPUT


eclipse-workspace - myproject/src/myproject/AddMatrix.java - E
File Edit Source Refactor Navigate Search Project Run
Problems Javadoc Declaration Console
<terminated> AddMatrix [Java Application] C:\Program Files\Jav
Enter the number of rows
2
Enter the number columns
2
Enter the elements of matrix1
4 5
2 3
Enter the elements of matrix2
1 2
3 4
Sum of matrices:-
5 7
5 7

PROGRAM NO 3

AIM: Add complex numbers

ALGORITHM

Step 1: Start

Step 2: Created a constructor for the class ‘CompNum’

Step 3: Created a function to find the sum of complex numbers and

Step 4: Created a function to print the result

Step 5: In main function, created 2 objects c1 and c2 by giving values of real and img part

Step 6: Then by calling sum function to find sum and displayed result by calling ‘printComplexNum’ function

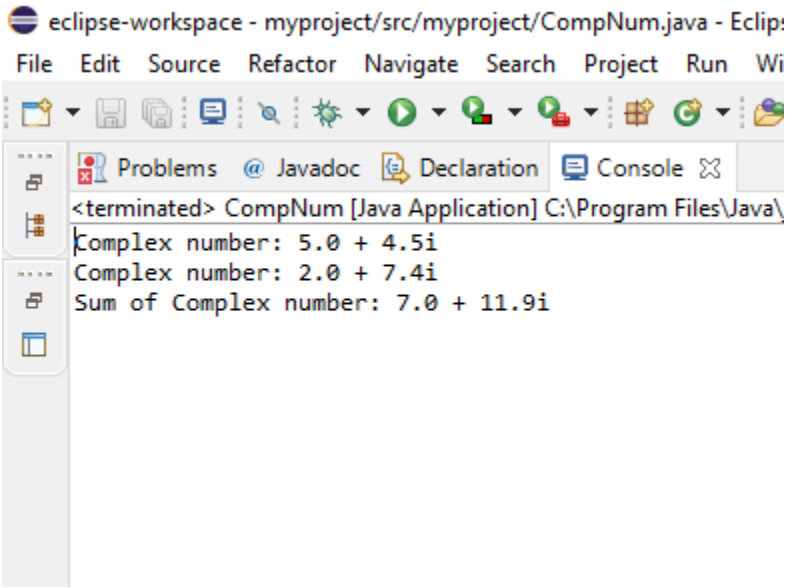
Step 7: Stop

PROGRAM CODE

```
package myproject;

public class CompNum {
        double real,img;

        public CompNum(double real,double img) {
                this.real=real;
                this.img=img;

        }
        public static CompNum sum(CompNum c1,
CompNum c2) {
                CompNum temp = new CompNum(0,0);
                temp.real=c1.real+c2.real;
                temp.img=c1.img+c2.img;
                return temp;
        }
        void printComplexNum()
   {
      System.out.println("Complex number: "
                        + real + " + "
                        + img + "i");
   }
public static void main(String[] args) {
                CompNum c1= new CompNum(5,4.5);
                c1.printComplexNum();
                CompNum c2= new CompNum(2,7.4);
                c2.printComplexNum();
                CompNum temp=sum(c1,c2);
                System.out.print("Sum of ");
      temp.printComplexNum();

        }
}
```

RESULT: The program is executed successfully and obtained the output

OUTPUT


eclipse-workspace - myproject/src/myproject/CompNum.java - Eclips
File Edit Source Refactor Navigate Search Project Run Wi
Problems @ Javadoc Declaration Console
<terminated> CompNum [Java Application] C:\Program Files\Java\
Complex number: 5.0 + 4.5i
Complex number: 2.0 + 7.4i
Sum of Complex number: 7.0 + 11.9i

PROGRAM NO 4

AIM: Read a matrix from the console and check whether it is symmetric or not.

ALGORITHM

Step 1: Start

Step 2: Take a matrix as input from user using console

Step 3: Check whether the given matrix is a square matrix or not

Step 4: Then check whether every element at i^{th} row and j^{th} column is equal to element at j^{th} row and i^{th} column

Step 5: If the given matrix satisfy these two conditions, then that matrix is a symmetric matrix, else not symmetric

Step 6: Stop

PROGRAM CODE

```
package myproject;

import java.util.Scanner;

public class Msym {

	public static void main(String[] args )
	{
	Scanner in = new Scanner( System.in);
	System.out.println( "Enter the number of rows :");
	int rows = in.nextInt();
	System.out.println("Enter the number of columns
:");
	int cols = in.nextInt();
	int matrix[][] = new int[rows][cols];
	System.out.println("Enter the elements :");
	for ( int i = 0; i < rows; i++ )
	{
	for ( int j = 0; j < cols; j++ )
	{
	matrix[i][j] = in.nextInt();
	}
	}
	System.out.println("The input matrix is :");
	for ( int i = 0; i < rows; i++ )
	{
	for ( int j = 0; j < cols; j++ )
	{
	System.out.print(matrix[i][j]+"\t");
	}
	System.out.println();
	}


	if ( rows != cols )
	{
	System.out.println("The given matrix is not a square
matrix, so it can't be symmetric.");
	}
	else
```

```
{
boolean symm = true;
for ( int i = 0; i < rows; i++ )
{
for ( int j = 0; j < cols; j++ )
{
if ( matrix[i][j] != matrix[j][i] )
{
symm = false;
break;
}
}
}
if ( symm)
{
System.out.println("The given matrix is
symmetric.");
}
else
{
System.out.println("The given matrix is not
symmetric.");
}
 }
   }
}
```

RESULT: The program is executed successfully and obtained the output

OUTPUT

pse IDE

n Window Help

Problems @ Javadoc Declaration Console

<terminated> Msym [Java Application] C:\Program Files\Java\

```
Enter the number of rows :
2
Enter the number of columns :
2
Enter the elements :
1 2
2 1
The input matrix is :
1       2
2       1
The given matrix is symmetric.
```

PROGRAM NO 5

AIM: Create CPU with attribute price. Create inner class Processor (no. of cores, manufacturer) and static nested class RAM (memory, manufacturer). Create an object of CPU and print information of Processor and RAM

ALGORITHM

Step 1: Start

Step 2: Created a class ‘Cpu’ with price as data member

Step 3: Then created an inner class ‘Processor’ with ‘cores’ and ‘manufact’ as data members, then created a constructor for Processor class

Step 4: And created a display function to print the processor details like cores and manufact

Step 4: Then created a static nested class RAM with memory and manufact as data members, then created a constructor for the ‘RAM ’ class

Step 5: And created a display function to display RAM details and another display function to show price details

Step 6: Then created objects for each class like inter for ‘Cpu’; i_processor for ‘Processor’;i_ram for ‘RAM’ and by using these objects acces all details

Step 7: And displayed all details using display each functions

Step 8:Stop

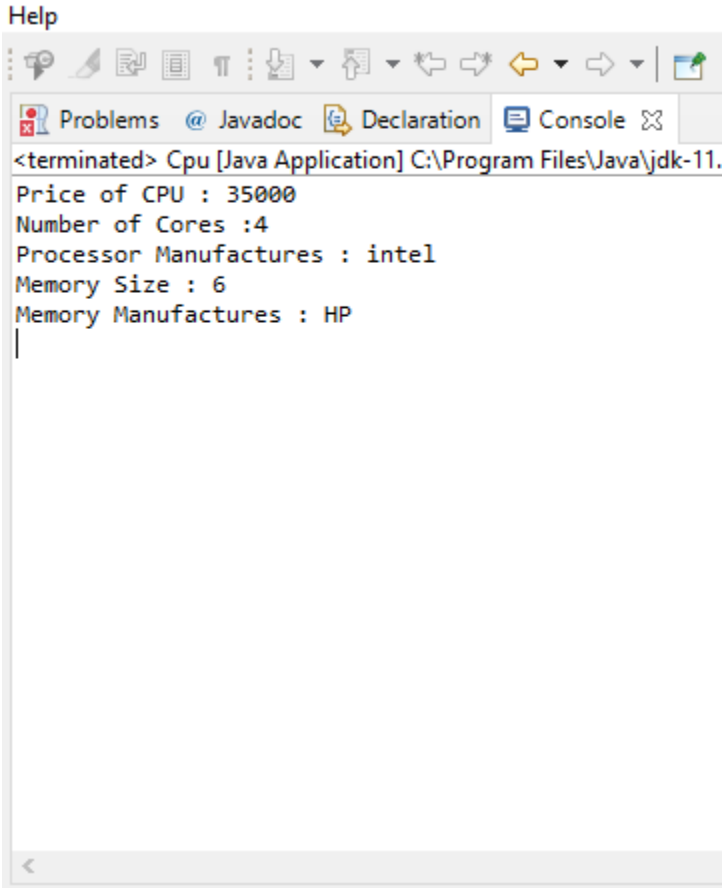
PROGRAM CODE

```
package myproject;

public class Cpu {
        int price;

        Cpu(int p){
                this.price=p;
                }

    class Processor{
        int cores;
        String manufact;

        Processor(int c,String m){
                this.cores=c;
                this.manufact=m;
        }

        void display() {
                System.out.println("Number of Cores
:"+this.cores);
                System.out.println("Processor Manufactures :
" + this.manufact);
        }
    }

     static class Ram {
       int memory;
       String manufact;

       Ram(int n, String m) {
          this.memory = n;
          this.manufact = m;
       }

       void display() {
          System.out.println("Memory Size : " +
this.memory);
          System.out.println("Memory Manufactures : " +
this.manufact);
```

```
        }
    }
    void display() {
        System.out.println("Price of CPU : " + this.price);
    }

        public static void main(String[] args) {
                Cpu intel = new Cpu(35000);
        Cpu.Processor i_processor = intel.new Processor(4,
"intel");
        Cpu.Ram i_ram = new Ram(6, "HP");
        intel.display();
        i_processor.display();
        i_ram.display();
                // TODO Auto-generated method stub

        }

}
```

RESULT: The program is executed successfully and obtained the output

OUTPUT


Help
Problems
Javadoc
Declaration
Console
<terminated> Cpu [Java Application] C:\Program Files\Java\jdk-11.
Price of CPU : 35000
Number of Cores :4
Processor Manufactures : intel
Memory Size : 6
Memory Manufactures : HP

COURSE OUTCOME 2

PROGRAM NO 1

AIM: Program to Sort strings

ALGORITHM

Step 1: Start

Step 2: Take a number of strings from user

Step 3: Perform sorting of strings

Step 4: Display sorted strings as output

Step 5: Stop

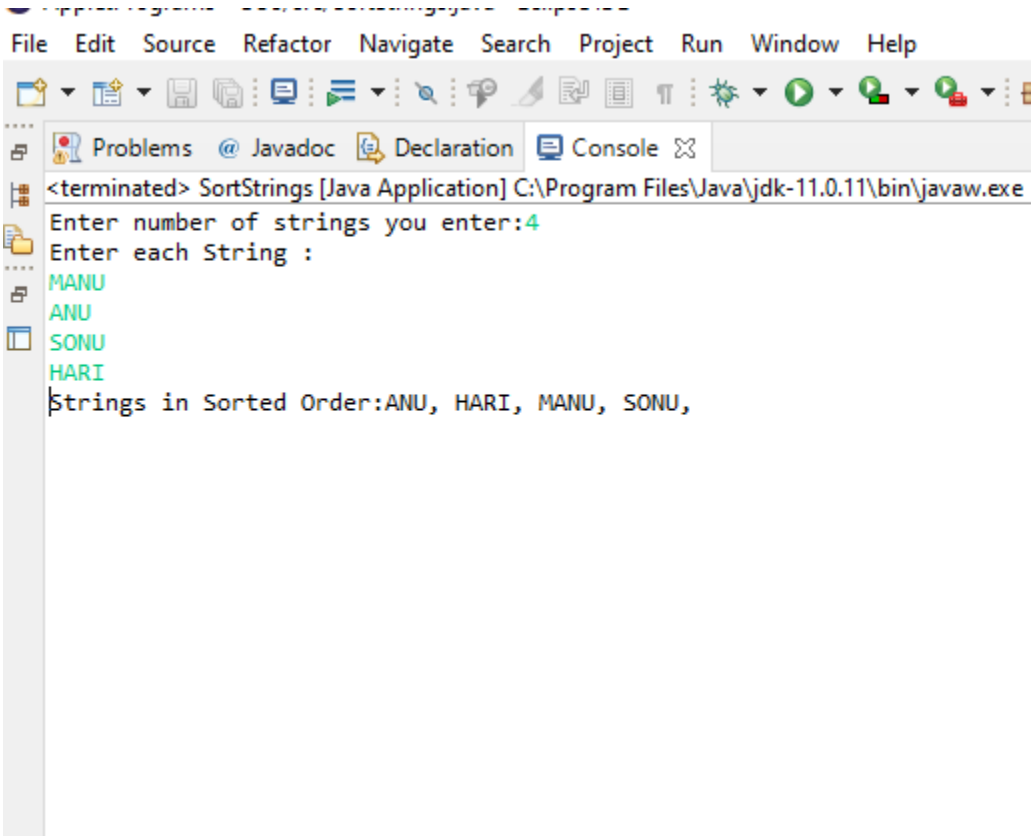
PROGRAM CODE

```
package myproject;

import java.util.Scanner;

public class SortStrings {

public static void main(String[] args) {
        int count;
        String temp;
        Scanner sc = new Scanner(System.in);


        System.out.print("Enter number of strings you enter:");
        count = sc.nextInt();


        String str[] = new String[count];
        Scanner sc2 = new Scanner(System.in);


        System.out.println("Enter each String :");
        for(int i = 0; i < count; i++)
        {
            str[i] = sc2.nextLine();
        }
        sc.close();
        sc2.close();

        //Sorting the strings
        for (int i = 0; i < count; i++)
        {
            for (int j = i + 1; j < count; j++) {
                if (str[i].compareTo(str[j])>0)
                {
                    temp = str[i];
                    str[i] = str[j];
                    str[j] = temp;
                }
            }
        }
```

	System.out.print("Strings in Sorted Order:");
	for (int i = 0; i <= count - 1; i++)
	{
	System.out.print(str[i] + ", ");
	}
	}
	
	}

RESULT: The program is executed successfully and obtained the output

OUTPUT


File Edit Source Refactor Navigate Search Project Run Window Help
Problems Javadoc Declaration Console
<terminated> SortStrings [Java Application] C:\Program Files\Java\jdk-11.0.11\bin\javaw.exe
Enter number of strings you enter:4
Enter each String :
MANU
ANU
SONU
HARI
Strings in Sorted Order:ANU, HARI, MANU, SONU,

PROGRAM NO 2

AIM: Search an element in an array.

ALGORITHM

Step 1: Start

Step 2: Input array of elements and take an element to search from user

Step 3: Search for it in array

Step 4: If found, display its index and else, display not found message

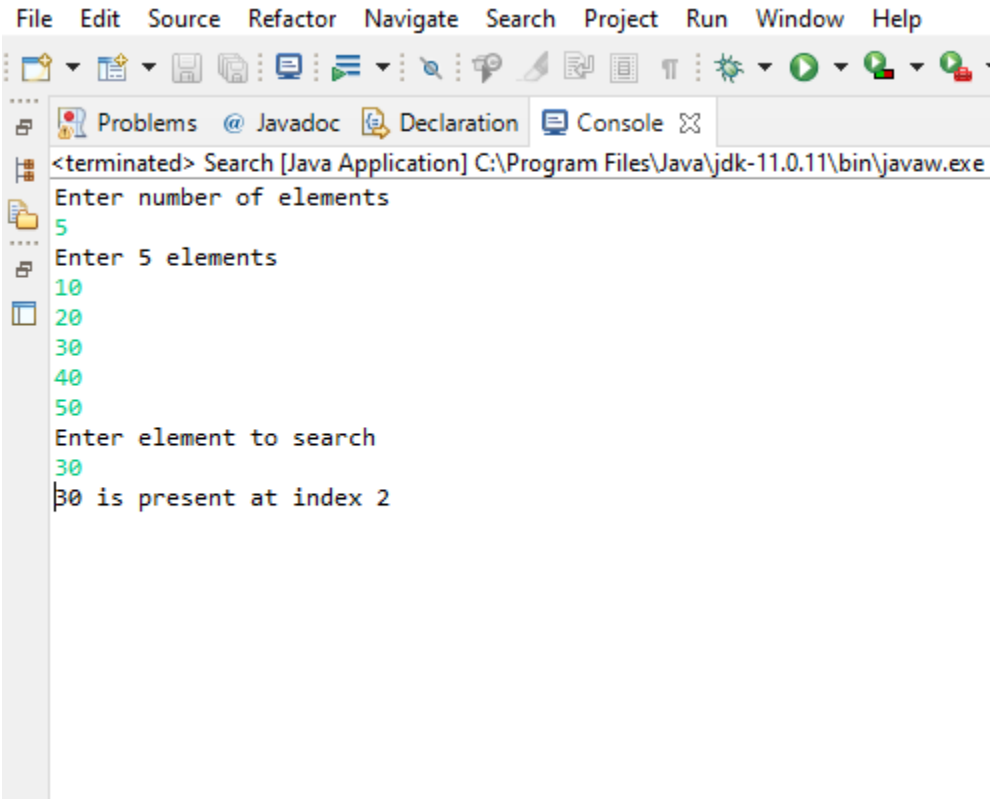
Step 5: Stop

PROGRAM CODE

```
package myproject;

import java.util.Scanner;

public class Search {
public static void main(String args[]) {
        int count, num, i;
        int[] inputArray = new int[500];

        Scanner in = new Scanner(System.in);

        System.out.println("Enter number of elements");
        count = in.nextInt();
        System.out.println("Enter " + count + " elements");
        for(i = 0; i < count; i++) {
            inputArray[i] = in.nextInt();
        }

        System.out.println("Enter element to search");
        num = in.nextInt();
        // Compare each element of array with num
        for (i = 0; i < count ; i++) {
            if(num == inputArray[i]){
                System.out.println(num+" is present at index "+i);
                break;
            }
        }

        if(i == count)
          System.out.println(num + " not present in input
array");
    }
}
```

RESULT: The program is executed successfully and obtained the output

OUTPUT


File Edit Source Refactor Navigate Search Project Run Window Help
Problems Javadoc Declaration Console
<terminated> Search [Java Application] C:\Program Files\Java\jdk-11.0.11\bin\javaw.exe
Enter number of elements
5
Enter 5 elements
10
20
30
40
50
Enter element to search
30
30 is present at index 2

PROGRAM NO 3

AIM: Perform string manipulations

ALGORITHM

Step 1: Start

Step 2: Take two strings as inputs

Step 3: Perform various string operations on it

Step 4: Displays each operation's result as output

Step 5: Stop

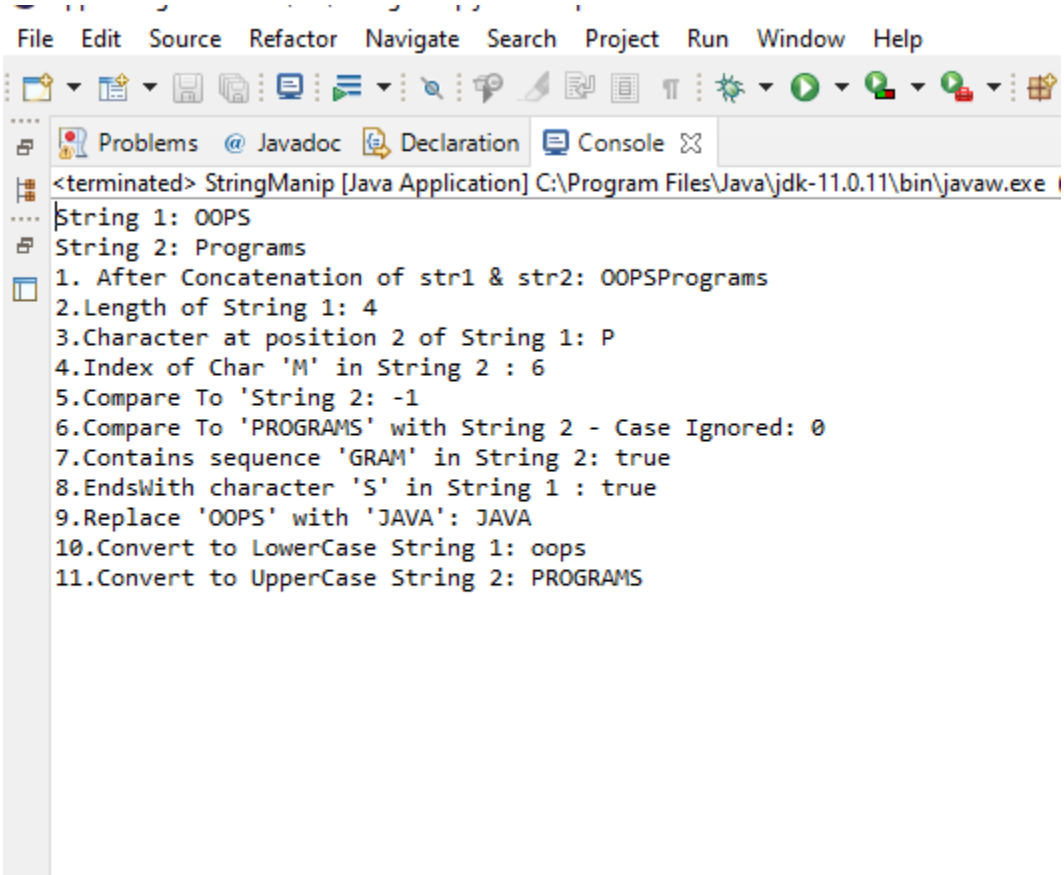
PROGRAM CODE

```
package myproject;

public class StringManip {

public static void main(String[] args) {

String str1="OOPS";
String str2="Programs";
System.out.println("String 1: " + str1);
System.out.println("String 2: " +str2);

//String Manipulations

//1.CONCATENATION
String str3=str1.concat(str2);
System.out.println("1. After Concatenation of str1 & str2:
"+str3);

//Length of a String
System.out.println("2.Length of String 1: " + str1.length());

//3.CHARACTER AT
System.out.println("3.Character at position 2 of String 1: " +
str1.charAt(2));

//4.INDEX OF
System.out.println("4.Index of Char 'M' in String 2 : " +
str2.indexOf('m'));

//5.COMPARE TO
System.out.println("5.Compare To 'String 2: " +
str1.compareTo(str2));

//6.COMPARE TO IGNORE CASE
System.out.println("6.Compare To 'PROGRAMS' with
String 2 - Case Ignored: " +
str2.compareToIgnoreCase("Programs"));

//7.CONTAIN
```

```
System.out.println("7.Contains sequence 'GRAM' in String 2: " + str2.contains("ram"));

//8.ENDS WITH
System.out.println("8.EndsWith character 'S' in String 1 : " + str1.endsWith("S"));

//9.REPLACE ALL
System.out.println("9.Replace 'OOPS' with 'JAVA': " + str1.replaceAll("OOPS","JAVA"));

//10.TO LOWERCASE
System.out.println("10.Convert to LowerCase String 1: " + str1.toLowerCase());

//11.TO UPPERCASE
System.out.println("11.Convert to UpperCase String 2: " + str2.toUpperCase());

// TODO Auto-generated method stub

}

}
```

RESULT: The program is executed successfully and obtained the output

OUTPUT


File Edit Source Refactor Navigate Search Project Run Window Help
Problems @ Javadoc Declaration Console
<terminated> StringManip [Java Application] C:\Program Files\Java\jdk-11.0.11\bin\javaw.exe
String 1: OOPS
String 2: Programs
1. After Concatenation of str1 & str2: OOPSPrograms
2.Length of String 1: 4
3.Character at position 2 of String 1: P
4.Index of Char 'M' in String 2 : 6
5.Compare To 'String 2: -1
6.Compare To 'PROGRAMS' with String 2 - Case Ignored: 0
7.Contains sequence 'GRAM' in String 2: true
8.EndsWith character 'S' in String 1 : true
9.Replace 'OOPS' with 'JAVA': JAVA
10.Convert to LowerCase String 1: oops
11.Convert to UpperCase String 2: PROGRAMS

PROGRAM NO 4

AIM: Program to create a class for Employee having attributes eNo, eName eSalary. Read n employ information and Search for an employee given eNo, using the concept of Array of Objects.

ALGORITHM

Step 1: Start

Step 2: Created a class Employee with attributes eNo,eName,eSalary

Step 3: Take n employee information as input

Step 4: And search an employee details using eNo and display it as output

Step 5: Stop

PROGRAM CODE

```
package myproject;
import java.util.Scanner;

public class Employee {
int eNO;
String eName;
int eSalary;

public void GetEmployeeData()

{
Scanner in = new Scanner(System.in);

System.out.print("Enter Employee id:");
eNO=in.nextInt();

System.out.print("Enter name of Employee:");
eName=in.next();

System.out.print("Enter salary of Employee:");
eSalary=in.nextInt();
System.out.println("\n");

}

void display() {
System.out.println("Employee id =  " + eNO);
System.out.println("Employee name = " + eName);
System.out.println("Employee salary = " + eSalary);
System.out.println("\n");

}

public static void main(String[] args) {
int num;
Scanner sc= new Scanner(System.in);

System.out.print("Enter No of employees :");
num=sc.nextInt();
Employee e[]= new Employee[num];
```

```
for( int i=0;i<num;i++) {
e[i]= new Employee();
e[i].GetEmployeeData();

}
System.out.println("****Details of Employees****");
for(int i =0;i<num;i++) {
e[i].display();
}

System.out.print("Enter the Employee ID to search :");
int id = sc.nextInt();
int i;
for(i =0;i<num;i++)
{
if(id == e[i].eNO)
{
e[i].display();
}
}
if(i == 0)
{
System.out.println("\nEmployee Details are not available,
Please enter a valid ID!!");
}
sc.close();

// TODO Auto-generated method stub
}

}
```

RESULT: The program is executed successfully and obtained the output

OUTPUT

File Edit Source Refactor Navigate Search Project Run Window Help

Problems @ Javadoc Declaration Console

```
<terminated> Employee [Java Application] C:\Program Files\Java\jdk-11.0.11\bin\javaw.exe
Enter No of employees :3
Enter Employee id:101
Enter name of Employee:HARI
Enter salary of Employee:35000


Enter Employee id:102
Enter name of Employee:MANU
Enter salary of Employee:44300


Enter Employee id:103
Enter name of Employee:VARUN
Enter salary of Employee:34500


****Details of Employees****
Employee id =  101
Employee name = HARI
Employee salary = 35000


Employee id =  102
Employee name = MANU
Employee salary = 44300


Employee id =  103
Employee name = VARUN
Employee salary = 34500


Enter the Employee ID to search :102
Employee id =  102
Employee name = MANU
Employee salary = 44300
```