OOPS Through Java Lab Manual

List of Experiments

1. Lab No 1: Basic Programs in JAVA
2. Lab No 2: Programming Assignments on Arrays and Strings
3. Lab No 3: Programming Assignments on Classes, Objects and Encapsulation
4. Lab No 4: Implementing the concepts of Inheritance and Array Objects
5. Lab No 5: Implementing the OOPS Concepts of Abstract, Interfaces and Polymorphism
6. Lab No. 6: Programming Assignments on File Handling
7. Lab No. 7: Programming Exercises on Exception Handling
8. Lab No 8: Working with List Operations
9. Lab No 9: Implementing the concepts of Multi-Threading
10. Lab No 10: Programming Exercises on Event Handling,

1. Lab No 1: Basic Programs in JAVA

1.Write a java program that takes user input as a number and check weather the number is odd or even.

Algorithm
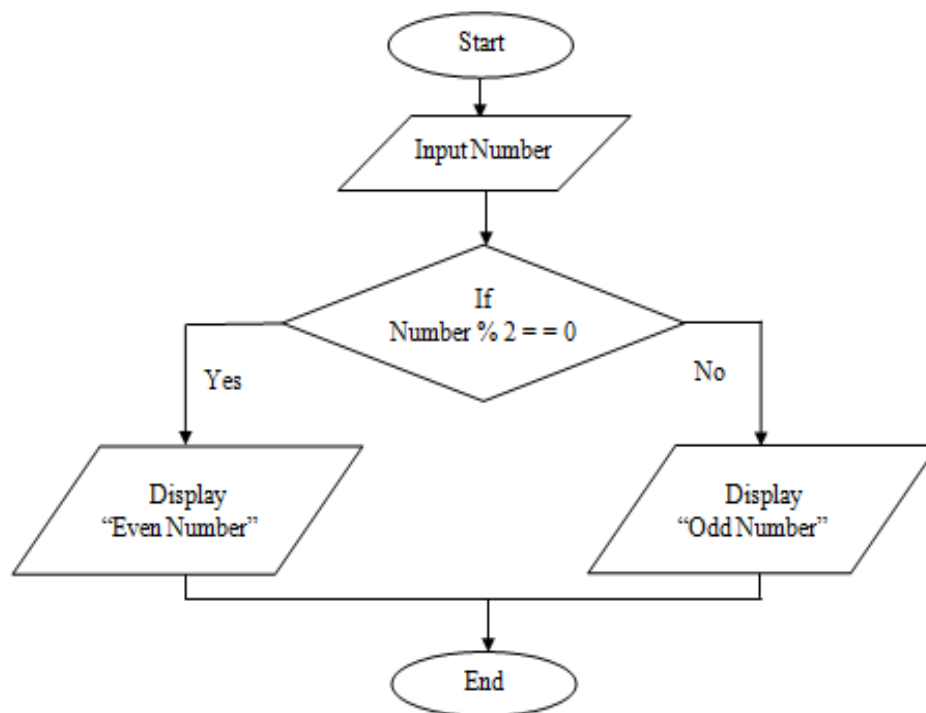
Step 1- Start

Step 2- Read / input the number.

Step 3- if n%2==0 then number is even.

Step 4- else number is odd.

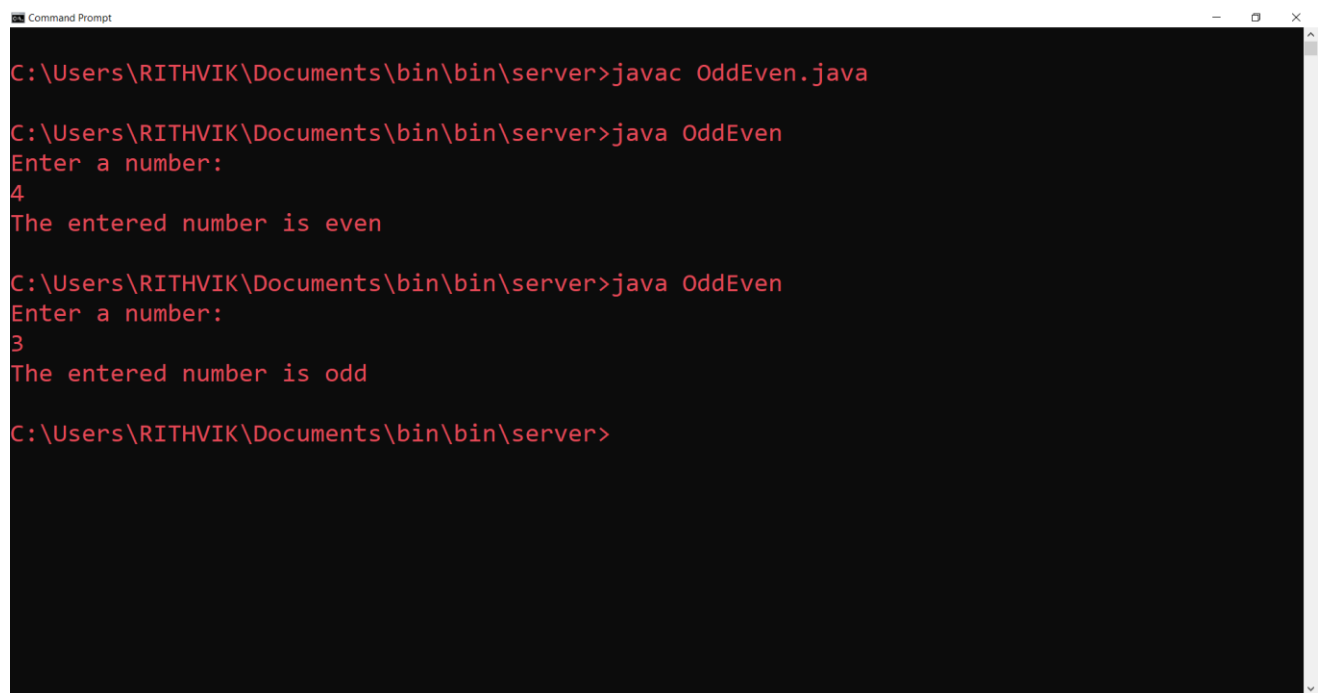Step 5- display the output.

Step 6- Stop

Flowchart

Program

```java
import java.util.Scanner;
public class OddEven
{
  public static void main(String args[])
  {
   //To take input from the user
   //Create an object of scanner class
   Scanner input = new Scanner(System.in);
   int num;  //Declare a variable
   System.out.println("Enter a number:");
   num = input.nextInt();

   //If number is divisible by 2 then it's an even number
   //else odd number
   if ( num % 2 == 0 )
      System.out.println("The entered number is even");
    else
      System.out.println("The entered number is odd");
  }
}
```

Output

2.Write a java program that takes user input as a String and check weather the string is a palindrome or not.

Algorithm

Step 1. Start
Step 2. Read the string from the user
Step 3. Calculate the length of the string
Step 4. Initialize rev = " "   [empty string]
Step 5. Initialize i = length - 1
Step 6. Repeat until i>=0:
                    6.1: rev = rev + Character at position 'i' of the string
                    6.2: i = i – 1
Step 7. If string = rev:
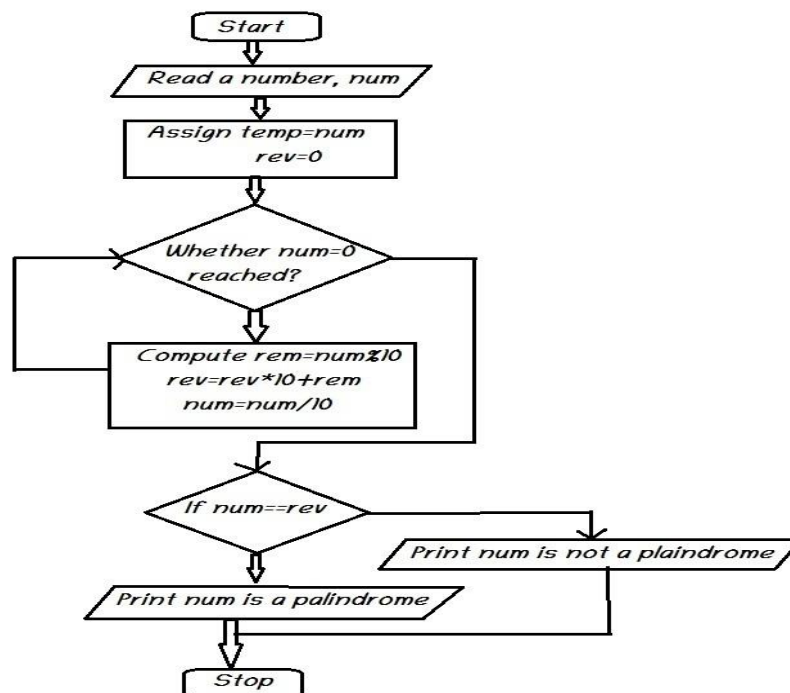   7.1: Print "Given string is palindrome"
Step 8. Else:
                    8.1: Print "Given string is not palindrome"
Step 9. Stop

Flowchart

Program to check whether a number is palindrome or not.
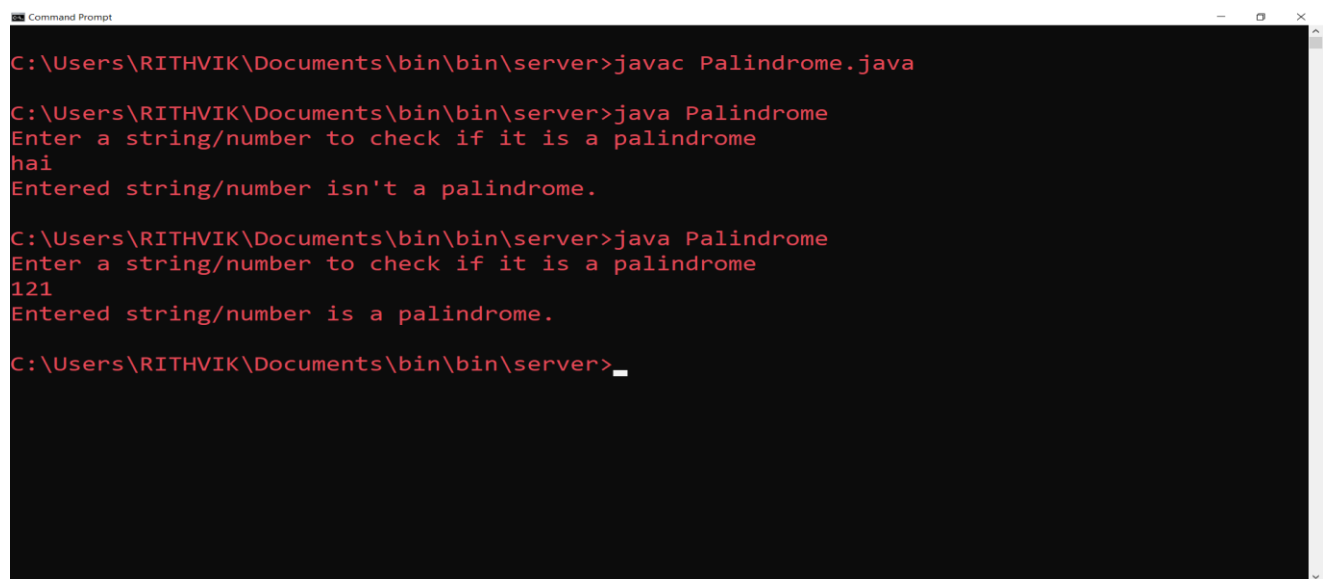
Program

```
import java.util.*;

class Palindrome

{

  public static void main(String args[])

  {

    String original, reverse = ""; // Objects of String class

    Scanner in = new Scanner(System.in);

    System.out.println("Enter a string/number to check if it is a palindrome");

    original = in.nextLine();

    int length = original.length();

    for ( int i = length - 1; i >= 0; i-- )

      reverse = reverse + original.charAt(i);

    if (original.equals(reverse))

      System.out.println("Entered string/number is a palindrome.");

    else

      System.out.println("Entered string/number isn't a palindrome.");

  }

}
```

Output

3.Write a java program that takes user input as a number and find the factorial of a number.

Algorithm

Step 1: Start

Step 2: Declare Variable n, fact, i

Step 3: Read number from User

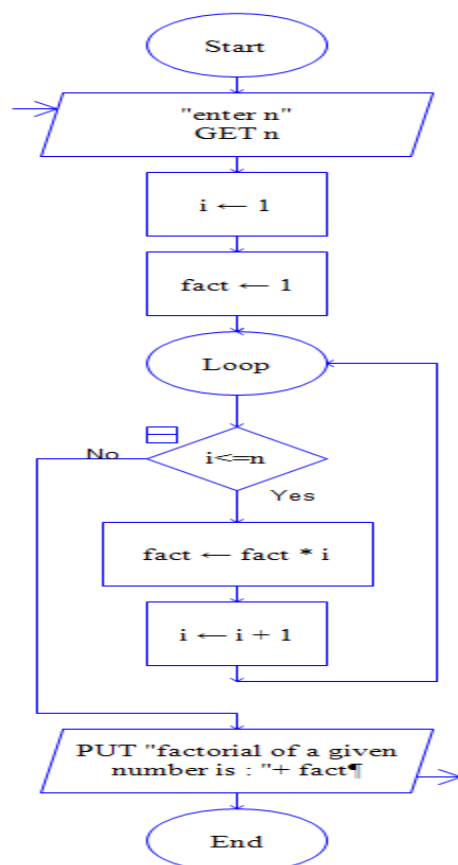Step 4: Initialize Variable fact=1 and i=1

Step 5: Repeat Until i<=number

      5.1 fact=fact*i

      5.2 i=i+1

Step 6: Print fact

Step 7: Stop

Flowchart

Program

```java
import java.util.Scanner;
public class Factorial {
    public static void main(String[] args) {
        //We will find the factorial of this number
        int number;
        System.out.println("Enter the number: ");
        Scanner scanner = new Scanner(System.in);
        number = scanner.nextInt();
        scanner.close();
        long fact = 1;
        int i = 1;
        while(i<=number)
        {
            fact = fact * i;
            i++;
        }
        System.out.println("Factorial of "+number+" is: "+fact);
    }
}
```
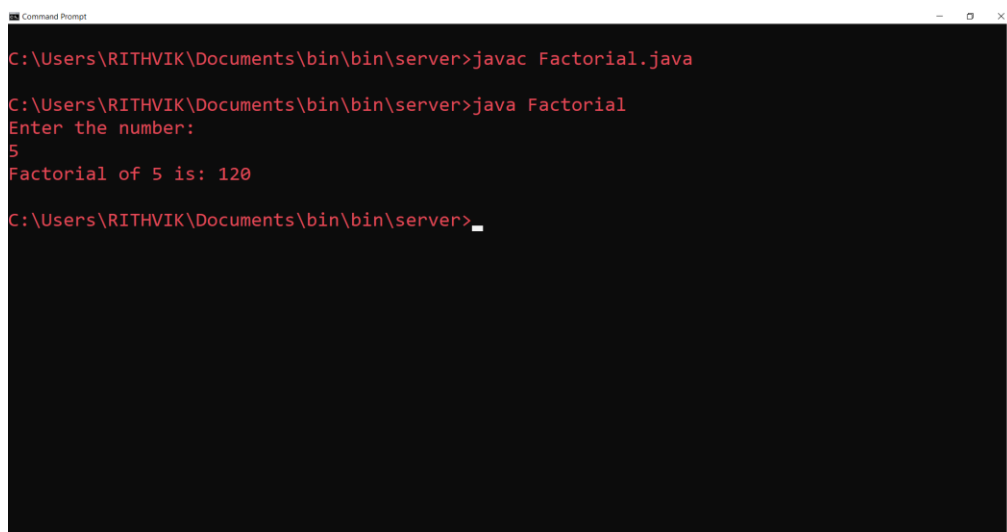
Output

4.Write a java program that takes user input as a number and find weather the number is an Armstrong number or not.

Algorithm

Step 1: Start

Step 2: Declare Variable sum, temp, num

Step 3: Read num from User

Step 4: Initialize Variable sum=0 and temp=num

Step 5: Repeat Until num>=0

      5.1 sum=sum + cube of last digit i.e [(num%10)*(num%10)*(num%10)]

      5.2 num=num/10
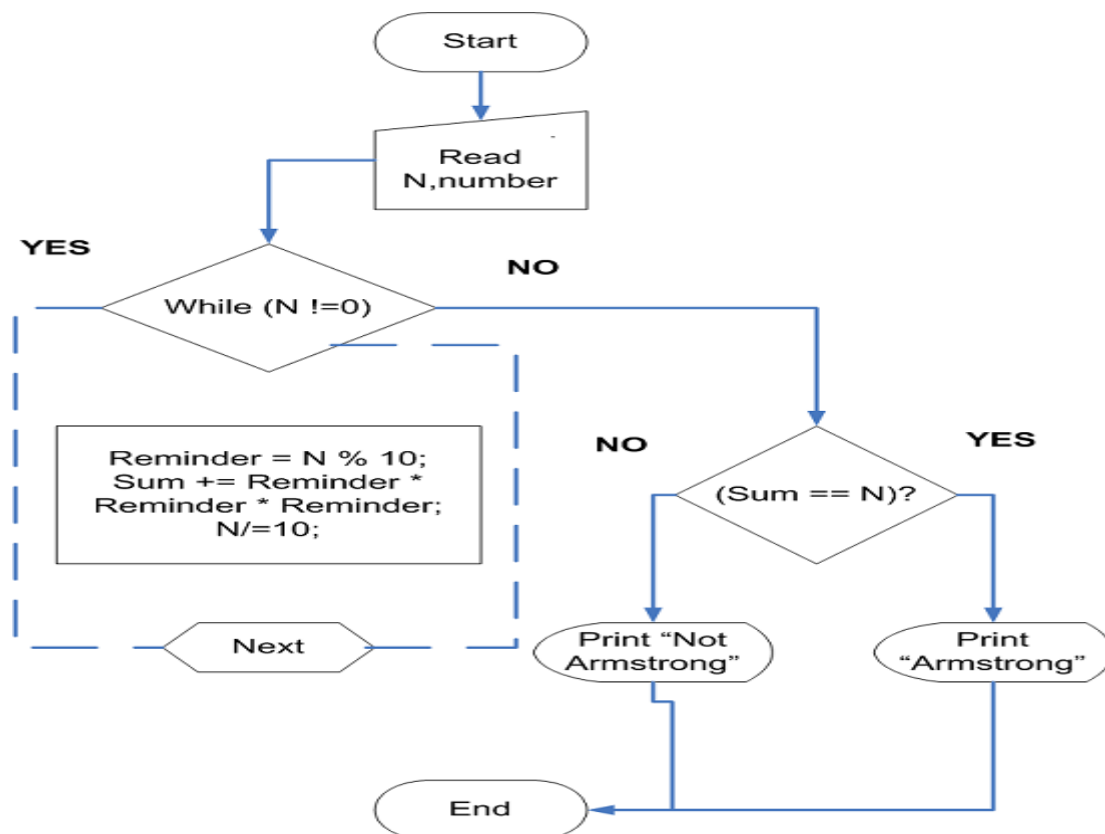
Step 6: IF sum==temp

      Print "Armstrong Number"

    ELSE

      Print "Not Armstrong Number"

Step 7: Stop

Flowchart

Program

```java
import java.util.Scanner;

import java.lang.Math;

public class Armstsrong

{

//function to check if the number is Armstrong or not

static boolean isArmstrong(int n)

{

int temp, digits=0, last=0, sum=0;

//assigning n into a temp variable

temp=n;

//loop execute until the condition becomes false

while(temp>0)

{

temp = temp/10;

digits++;

}

temp = n;

while(temp>0)

{

//determines the last digit from the number

last = temp % 10;

//calculates the power of a number up to digit times and add the resultant to the sum variable

sum +=  (Math.pow(last, digits));

//removes the last digit

temp = temp/10;

}

//compares the sum with n

if(n==sum)

//returns if sum and n are equal
```

```java
return true;
//returns false if sum and n are not equal
else return false;
}
//driver code
public static void  main(String args[])
{
int num;
Scanner sc= new Scanner(System.in);
System.out.print("Enter the number: ");
//reads the limit from the user
num=sc.nextInt();
if(isArmstrong(num))
{
System.out.print("Armstrong ");
}
else
{
System.out.print("Not Armstrong ");
}
}
}
```

Output

Lab No 2: Programming Assignments on Arrays and Strings

1.Write a java program to calculate the average value of array elements

Algorithm to find average of all array elements

- Let inputArray is an integer array having N elements.
- Declare an integer variable 'sum' and initialize it to 0. We will use 'sum' variable to store **total sum of elements of array**.
- Using for loop, we will traverse inputArray from array from index 0 to N-1.
- For any index i (0<= i <= N-1), add the value of element at index i to sum.
  sum = sum + inputArray[i];
- After termination of for loop, sum will contain the **total sum of all array elements**.
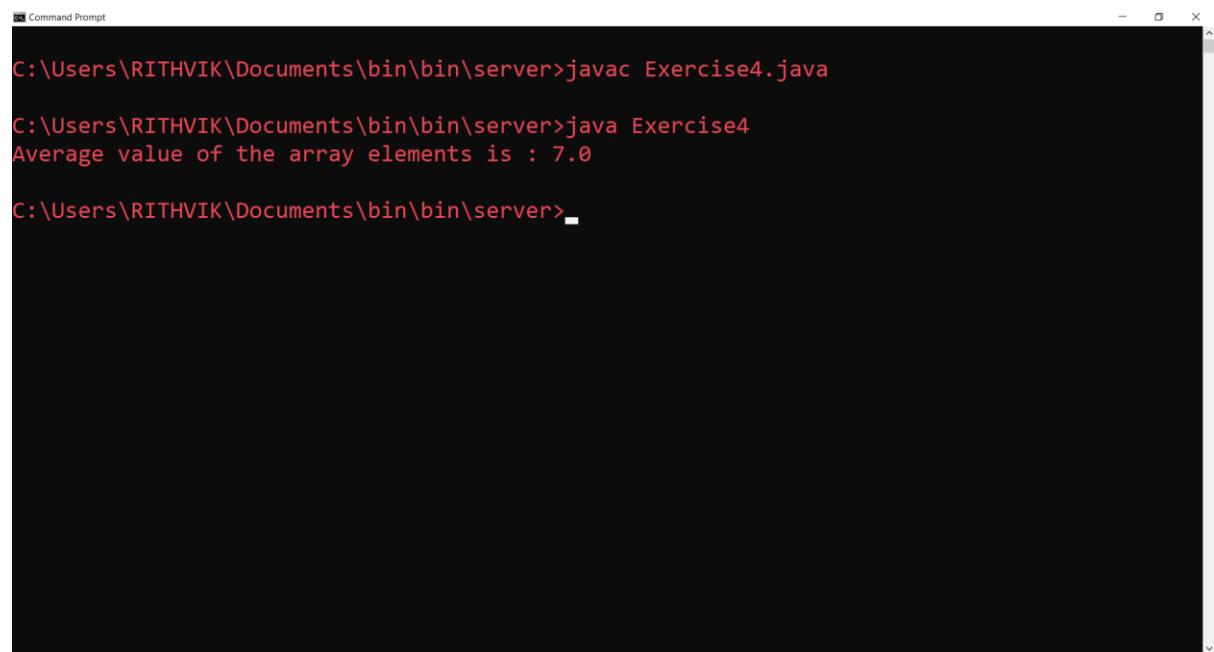- Now calculate average as : Average = sum/N;

Flowchart
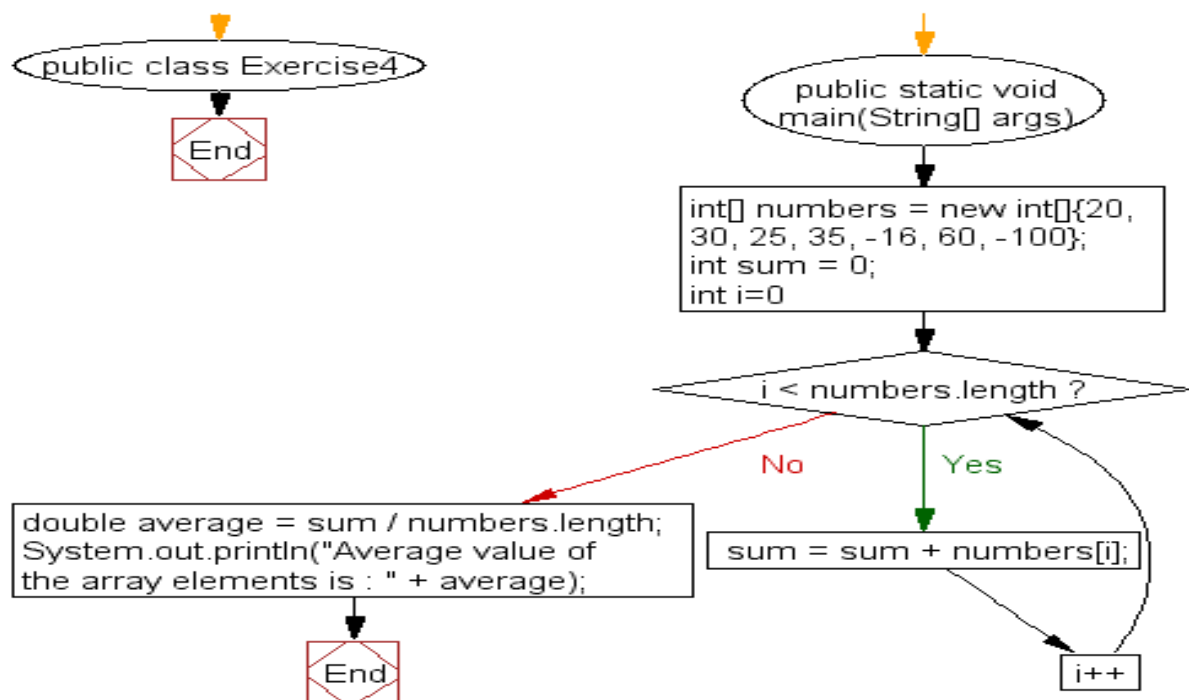
Program

public class Exercise4 {

public static void main(String[] args) {

    int[] numbers = new int[]{20, 30, 25, 35, -16, 60, -100};

```
    //calculate sum of all array elements

    int sum = 0;

    for(int i=0; i < numbers.length ; i++)

     sum = sum + numbers[i];

    //calculate average value

     double average = sum / numbers.length;

     System.out.println("Average value of the array elements is : " + average);

  }

}
```
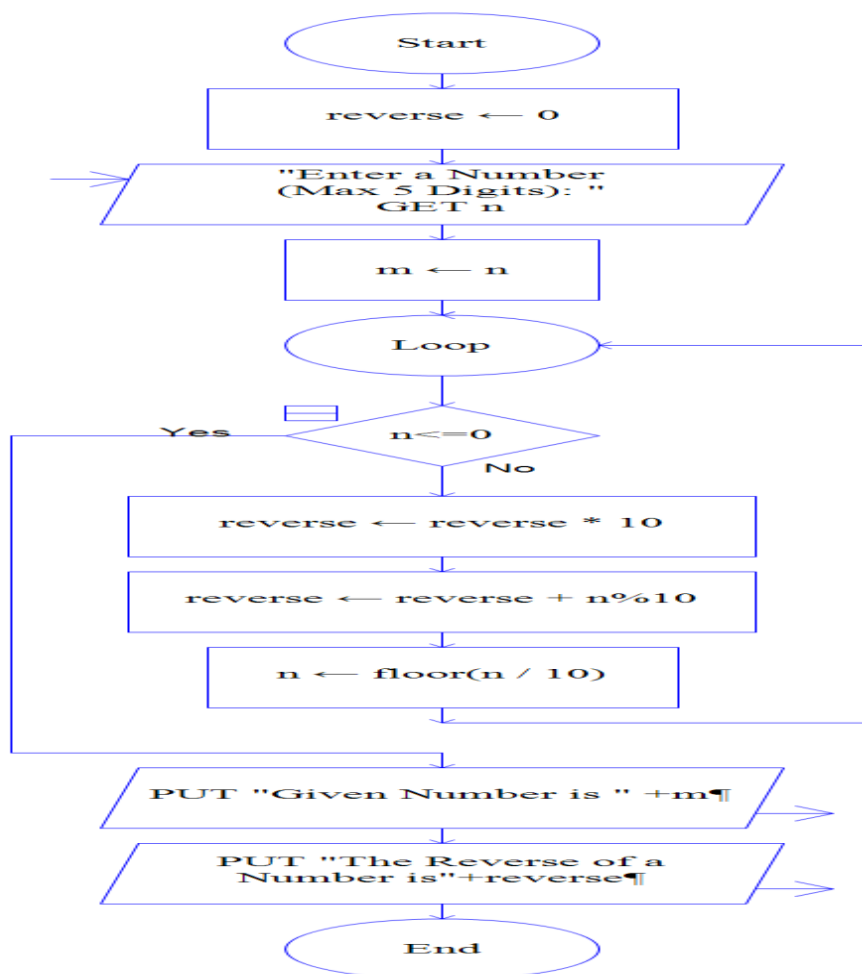
Output

2. Write a java program to Reverse an array of integer values .

Algorithm

- ○ **STEP 1:** START
- ○ **STEP 2:** INITIALIZE arr[] = {1, 2, 3, 4, 5}
- ○ **STEP 3:** PRINT "Original Array:"
- ○ **STEP 4:** REPEAT STEP 5 for(i=0; i<arr.length ; i++)
- ○ **STEP 5:** PRINT arr[i]
- ○ **STEP 6:** PRINT "Array in reverse order"
- ○ **STEP 7:** REPEAT STEP 8 for(i= arr.length-1; i>=0; i--)
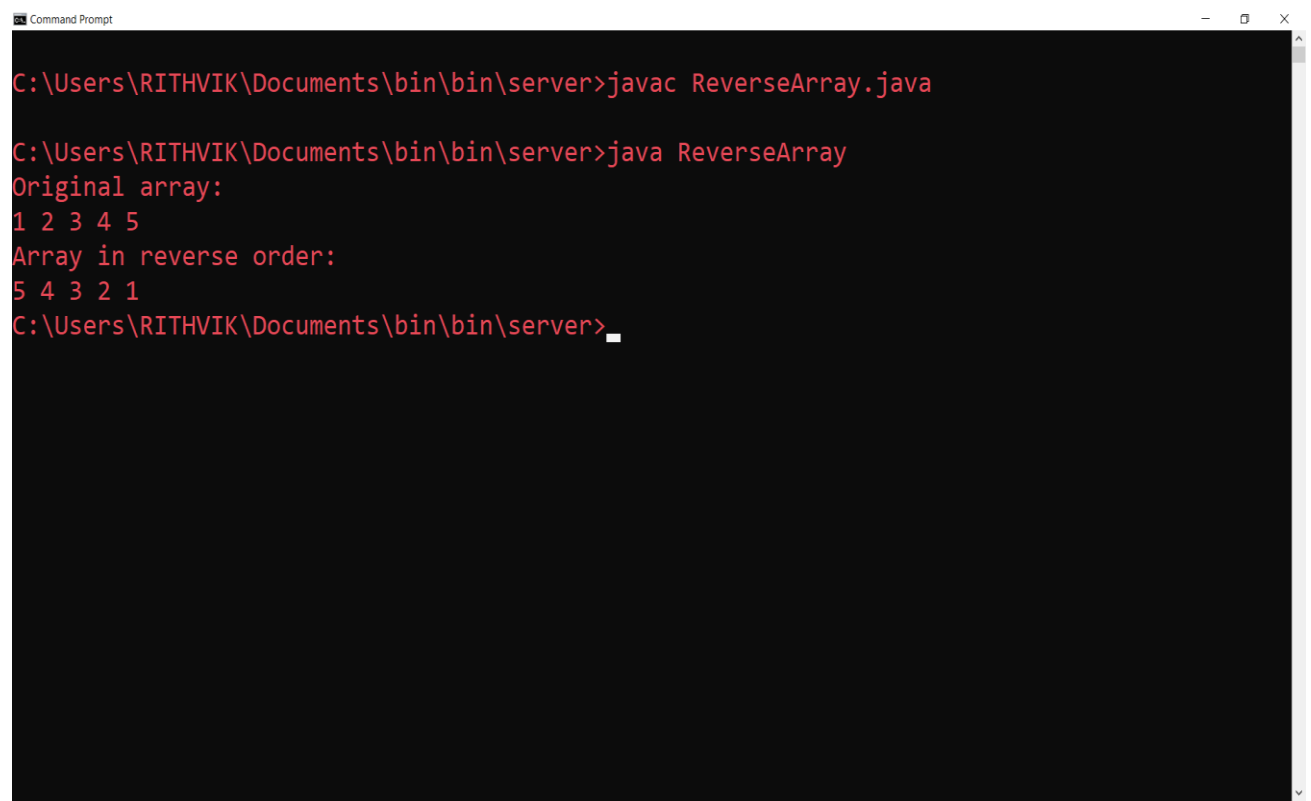- ○ **STEP 8:** PRINT a[i]
- ○ **STEP 9:** END

Flowchart

Program

```java
public class ReverseArray {
    public static void main(String[] args) {
        //Initialize array
        int [] arr = new int [] {1, 2, 3, 4, 5};
        System.out.println("Original array: ");
        for (int i = 0; i < arr.length; i++) {
            System.out.print(arr[i] + " ");
        }
        System.out.println();
        System.out.println("Array in reverse order: ");
        //Loop through the array in reverse order
        for (int i = arr.length-1; i >= 0; i--) {
            System.out.print(arr[i] + " ");
        }
    }
}
```
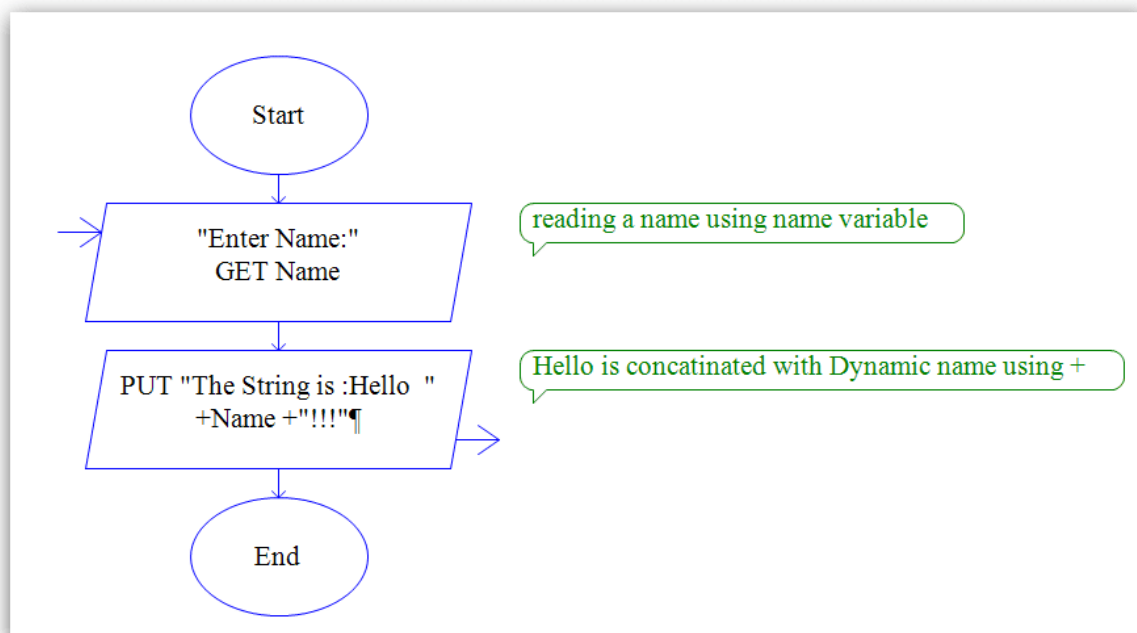
Output

3.Write a java program to take the input from the string and print the string.

Algorithm

- o **STEP 1:** START
- o **STEP 2:** INPUT the given String
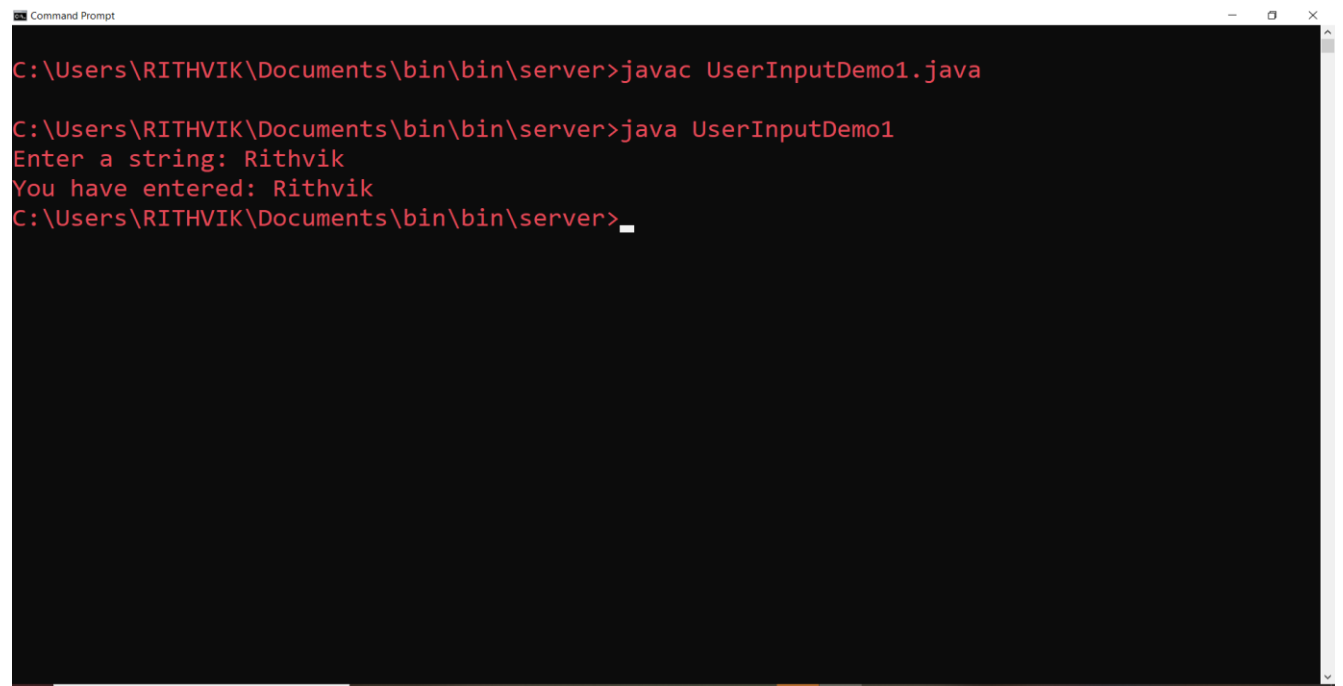- o **STEP 3:** PRINT the string

Flowchart

Program

```
import java.util.*;
class UserInputDemo1
{
public static void main(String[] args)
{
Scanner sc= new Scanner(System.in); //System.in is a standard input stream
System.out.print("Enter a string: ");
String str= sc.nextLine();           //reads string
System.out.print("You have entered: "+str);
}
}
```

Output

4.Write a java program to illustrate the working of String Tokenizer class
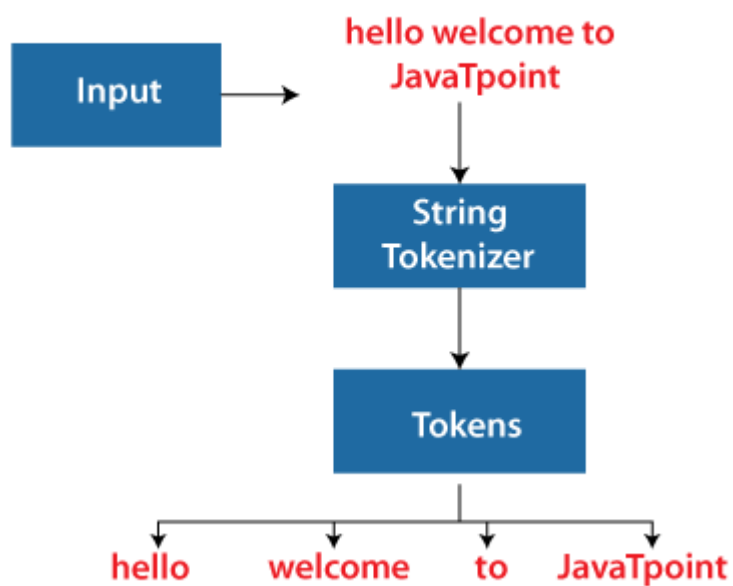
Algorithm

Step1 : Input the given string

Step 2: Subdivide the string into tokens

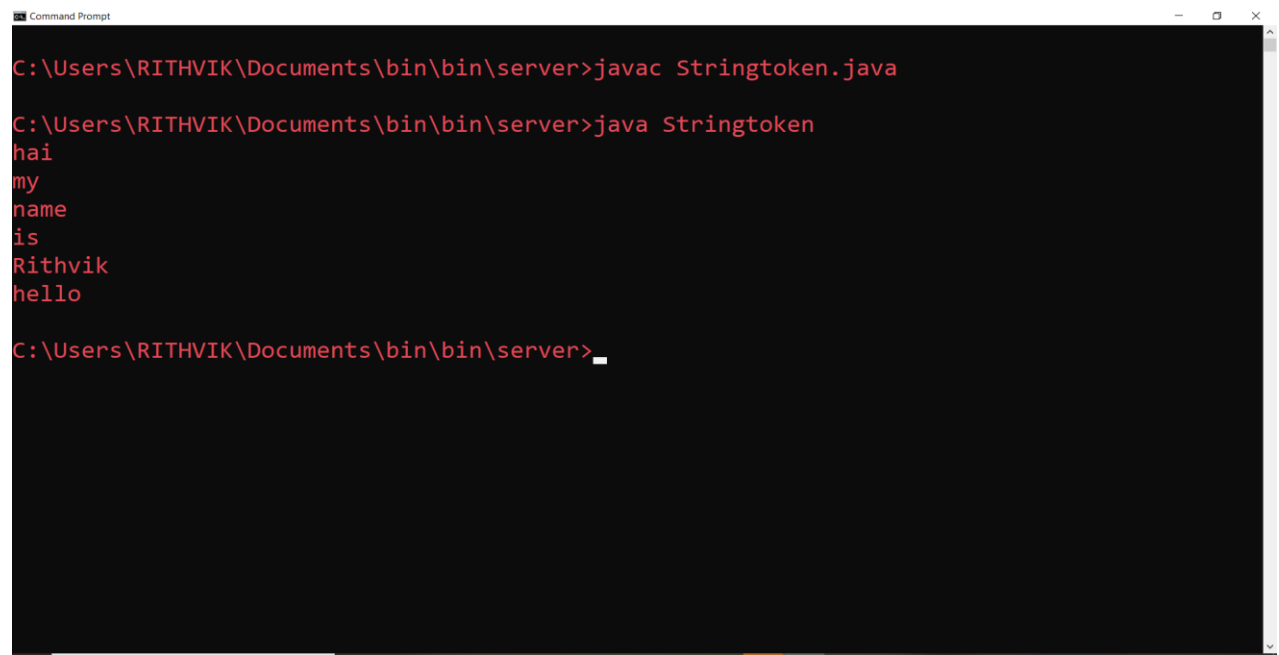Step 3: Display the tokens

Flowchart

Example of String Tokenizer class in Java

Program

```
public class Simple{

 public static void main(String args[]){

   StringTokenizer st = new StringTokenizer("my name is khan"," ");

    while (st.hasMoreTokens()) {

       System.out.println(st.nextToken());

    }

   }

}
```

Lab No 3: Programming Assignments on Classes, Objects and Encapsulation

1.Write a java program to Define the class and Object
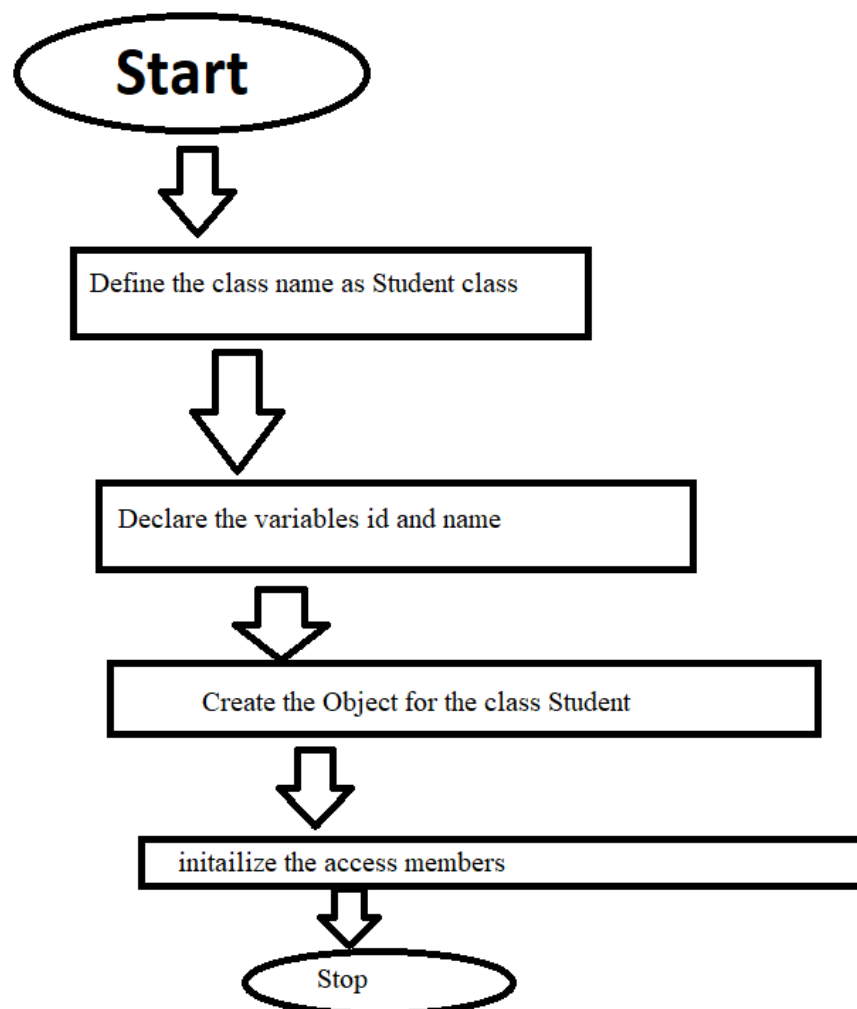
Algorithm

Step1 :Define the class name as Student class

Step 2: Declare the variables id and name

Step 3: Create the Object for the class Student

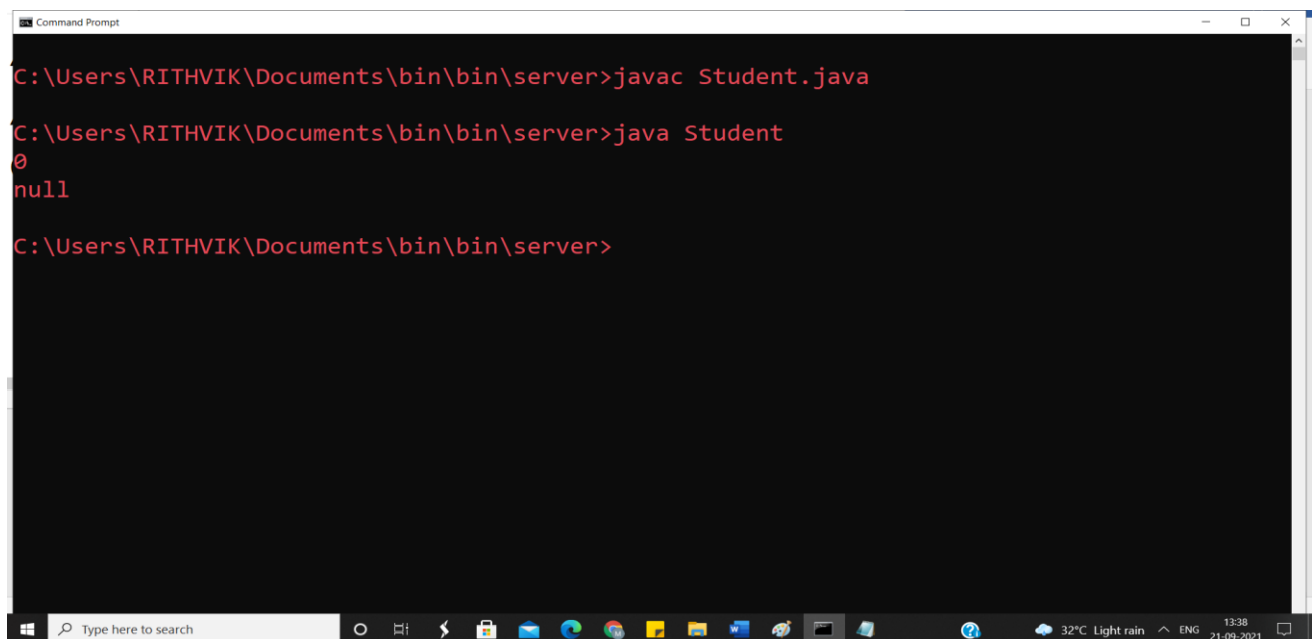Step 4: Initialize the parameters to access the reference members in the class

Flowchart

Program

```
//Java Program to illustrate how to define a class and fields
//Defining a Student class.
class Student{
 //defining fields
 int id;//field or data member or instance variable
 String name;
 //creating main method inside the Student class
 public static void main(String args[]){
  //Creating an object or instance
  Student s1=new Student();//creating an object of Student
  //Printing values of the object
  System.out.println(s1.id);//accessing member through reference variable
  System.out.println(s1.name);
 }
}
```
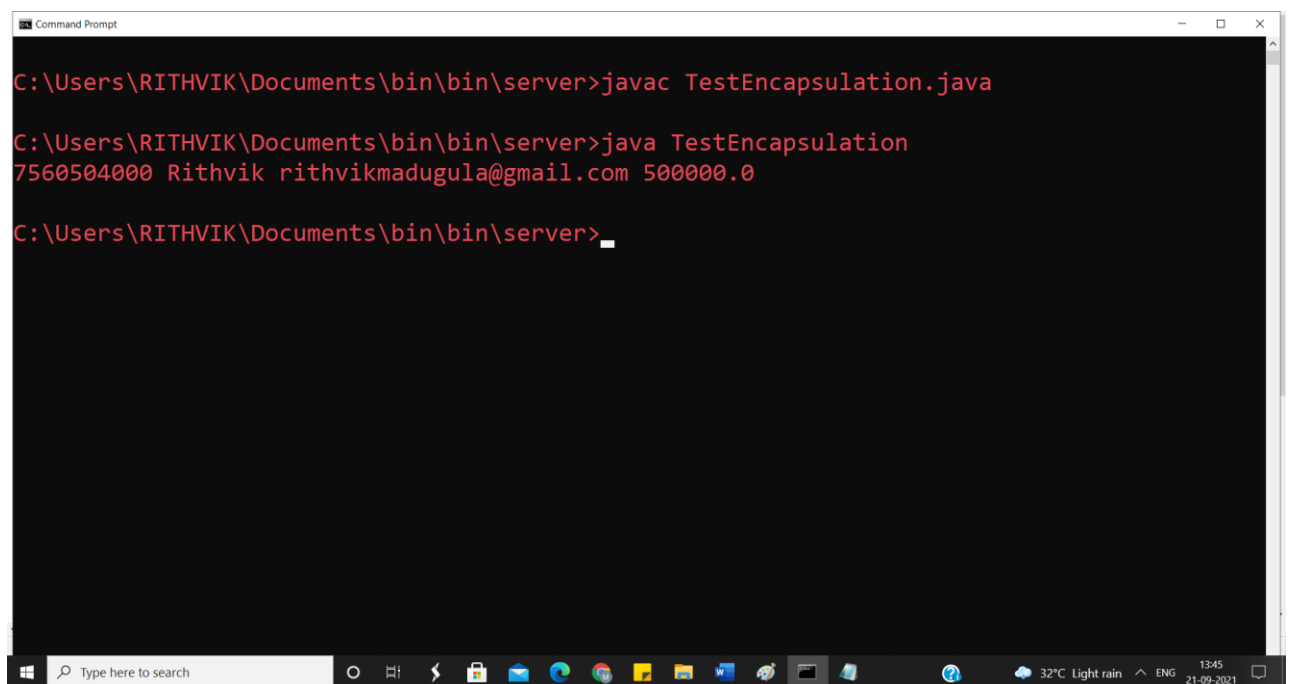
Output

2.Write a java program to perform Encapsulation.

Program

Account.java

```java
class Account {
//private data members
private long acc_no;
private String name,email;
private float amount;
//public getter and setter methods
public long getAcc_no() {
    return acc_no;
}
public void setAcc_no(long acc_no) {
    this.acc_no = acc_no;
}
public String getName() {
    return name;
}
public void setName(String name) {
    this.name = name;
}
public String getEmail() {
    return email;
}
public void setEmail(String email) {
    this.email = email;
}
public float getAmount() {
    return amount;
}
public void setAmount(float amount) {
    this.amount = amount;
}
}
```

Test Encapsulation class

```java
public class TestEncapsulation {
public static void main(String[] args) {
    //creating instance of Account class
    Account acc=new Account();
    //setting values through setter methods
    acc.setAcc_no(7560504000L);
    acc.setName("Rithvik");
    acc.setEmail("rithvikmadugula@gmail.com");
    acc.setAmount(500000f);
    //getting values through getter methods
  System.out.println(acc.getAcc_no()+" "+acc.getName()+" "+acc.getEmail()+ "
+acc.getAmount());
}
}
```

Output