## Assignment 1

1. **Write a program to output the string "Hello World" on an independent line.**

```
class Hello{
public static void main(String[]args){
System.out.println("Hello World");
}
}
```

```
osboxes  ~ > Java > OOP > javac Hello.java
osboxes  ~ > Java > OOP > java Hello
Hello World
```

**2. Write a program to read two numbers from the console, find their sum and**

**display the numbers and the sum on the console.**

```
import java.util.*;

class Sum{

public static void main(String[]args){

Scanner s=new Scanner(System.in);

System.out.println("Enter the first number n1:");

int n1=s.nextInt();

System.out.println("Enter the second number n2:");

int n2=s.nextInt();

int sum=n1+n2;

System.out.println("sum of two number are:"+sum);

}

}
```

```
osboxes    ~ > Java > OOP  javac Sum.java
osboxes    ~ > Java > OOP  java Sum
Enter the first number n1:
20
Enter the second number n2:
30
sum of two number are:50
```

**3. Write a user-defined function to find the sum of an array passed as argument.**

**-Write a program that declares an array of 10 elements and uses this**

**function to**

**a) Find the sum of all elements.**

**b) Find the sum of first 5 elements.**

**c) Find the sum of last 5 elements.**

```java
import java.util.*;

class ArraySum{

public static void main(String []args){

int n=10;

int sum=0;

int []arr=new int [n];

Scanner s=new Scanner(System.in);

System.out.print("Enter the elements of array:");

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

{ arr[i]=s.nextInt();}

ArraySum a=new ArraySum();

a.ArraySum(arr,n);

}


void ArraySum(int [] arr,int n){   //function
```
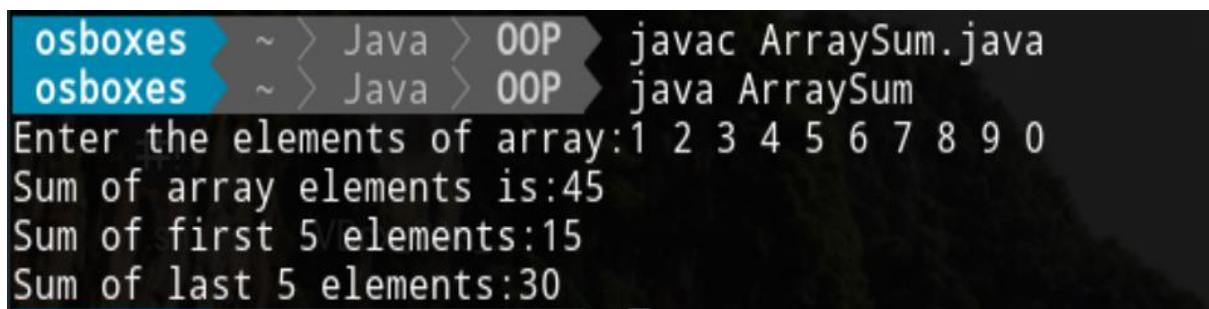
```java
int sum=0;int i;

for( i=0;i<arr.length;i++)

{ sum=sum+arr[i];}

System.out.println("Sum of array elements is:"+sum);


//finding sum of first five elements

int f=0;

for( i=0;i<n/2;i++)

{

        f=f+arr[i];

}

System.out.println("Sum of first 5 elements:"+f);


//find sum of last five elements of array

int l=0;

for(i=5;i<n;i++)

{

        l=l+arr[i];

}

System.out.println("Sum of last 5 elements:"+l);

}

}
```

```
osboxes    ~ > Java > OOP  javac ArraySum.java
osboxes    ~ > Java > OOP  java ArraySum
Enter the elements of array:1 2 3 4 5 6 7 8 9 0
Sum of array elements is:45
Sum of first 5 elements:15
Sum of last 5 elements:30
```

**4. Rework with the function and the program so that it finds the sum of elements when the index of the starting element and the number of elements is specified.**

import java.util.Scanner;

```java
class SumIndex{

int[] arr = new int[10];

int index, add;

int sum=0;

void getNum(){

Scanner sc=new Scanner(System.in);

System.out.print("Enter 10 elements in array :");

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

arr[i] = sc.nextInt();

}

System.out.print("Enter index form where you want to add numbers : ");

index=sc.nextInt();

System.out.print("Enter how many element you want to add from index : ");

add=sc.nextInt();

}

void sum(){

for (int i=index; i<(index+add)-1; i++){

sum=sum+arr[i];

}

System.out.println("Sum of all array  elements is : "+sum);

}

public static void main(String[] args){

SumIndex s=new SumIndex();
```

s.getNum();

s.sum();

}

}



**5. Define a class of type Student that has rollno, name and age as private data members. Define SetData() and GetData() as public member functions with appropriate functionality.**

**-Write a program that declares 2 student objects, initializes the first at run-time and second by reading from console, and then displays both student's data.**

import java.util.Scanner;

public class Student {

                private int rollno;

                private String name;

                private int age;

                public void setData(int rollno,String name,int age){

                      this.rollno=rollno;

                      this.name=name;

                      this.age=age;

                }

        public void getData(){

```java
        System.out.println("Student Roll No:" +rollno+ "\nStudent Name:" +name+ "\nStudent Age:"
+age);

                }
                public static void main (String [] args){

                        Student s1=new Student();

                        System.out.println("First Student Data");

                        System.out.println("####################");

                        s1.setData(106,"Prachi",23);

                        s1.getData();

                        System.out.println();


                        Scanner sc=new Scanner(System.in);

                        System.out.println("Input Data For Second Student");

                        System.out.println("############################");

                        System.out.print("Enter Roll no:");

                        int r=sc.nextInt();

                        System.out.print("Enter Name:");

                        String n=sc.next();

                        System.out.print("Enter Age:");

                        int a=sc.nextInt();


                        Student s2=new Student ();

                        System.out.println();

                        System.out.println("Second Student Data");

                        System.out.println("###################");

                        s2.setData(r,n,a);

                        s2.getData();




                }
```

        }



6. **Demonstrate the access specifiers public and default with the student class in program 5 and also demonstrate that other access specifiers(protected and private) can not be used with class.**

**When I make class default**

**I am able to access data of class**

**When I make class public**

import java.util.Scanner;

public class Student {

                private int rollno;

                private String name;

                private int age;

                public void setData(int rollno,String name,int age){

                        this.rollno=rollno;

```java
                this.name=name;

                this.age=age;

        }

    public void getData(){

    System.out.println("Student Roll No:" +rollno+ "\nStudent Name:" +name+ "\nStudent Age:"
+age);

        }

        public static void main (String [] args){

                Student s1=new Student();

                System.out.println("First Student Data");

                System.out.println("####################");

                s1.setData(106,"Prachi",23);

                s1.getData();

                System.out.println();


                Scanner sc=new Scanner(System.in);

                System.out.println("Input Data For Second Student");

                System.out.println("###########################");

                System.out.print("Enter Roll no:");

                int r=sc.nextInt();

                System.out.print("Enter Name:");

                String n=sc.next();

                System.out.print("Enter Age:");

                int a=sc.nextInt();


                Student s2=new Student ();

                System.out.println();

                System.out.println("Second Student Data");

                System.out.println("####################");

                s2.setData(r,n,a);

                s2.getData();
```
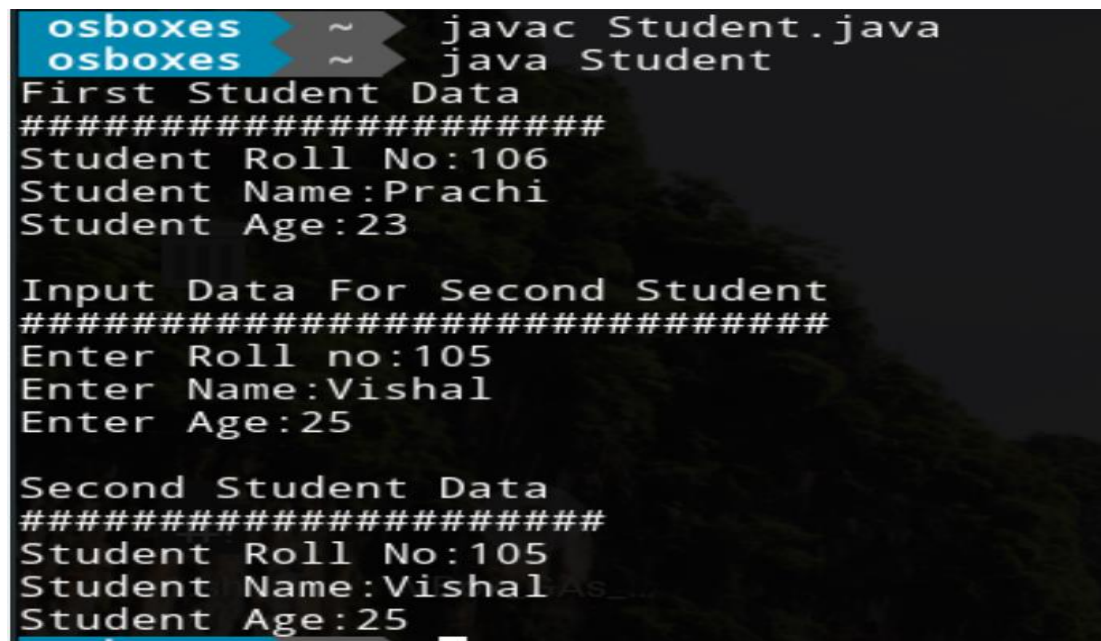
**PRN 210950320075**
**PRACHI YADAV**

```
                    }

            }
```

**I am able to access data of class**



**When I make class Protected**

import java.util.Scanner;

protected class Student {

       private int rollno;

       private String name;

       private int age;

       public void setData(int rollno,String name,int age){

          this.rollno=rollno;

          this.name=name;

          this.age=age;

```java
        }



        public void getData(){
        System.out.println("Student Roll No:" +rollno+ "\nStudent Name:" +name+ "\nStudent Age:"
+age);
        }
        public static void main (String [] args){
                Student s1=new Student();
                System.out.println("First Student Data");
                System.out.println("####################");
                s1.setData(106,"Prachi",23);
                s1.getData();
                System.out.println();


                Scanner sc=new Scanner(System.in);
                System.out.println("Input Data For Second Student");
                System.out.println("############################");
                System.out.print("Enter Roll no:");
                int r=sc.nextInt();
                System.out.print("Enter Name:");
                String n=sc.next();
                System.out.print("Enter Age:");
                int a=sc.nextInt();


                Student s2=new Student ();
                System.out.println();
                System.out.println("Second Student Data");
                System.out.println("####################");
                s2.setData(r,n,a);
```

s2.getData();

}

}



**When I make class private**

import java.util.Scanner;

private class Student {

private int rollno;

private String name;

private int age;

public void setData(int rollno,String name,int age){

this.rollno=rollno;

this.name=name;

this.age=age;

}

public void getData(){

System.out.println("Student Roll No:" +rollno+ "\nStudent Name:" +name+ "\nStudent Age:" +age);

}

public static void main (String [] args){

Student s1=new Student();

System.out.println("First Student Data");

```
                    System.out.println("####################");

                    s1.setData(106,"Prachi",23);

                    s1.getData();

                    System.out.println();


                    Scanner sc=new Scanner(System.in);

                    System.out.println("Input Data For Second Student");

                    System.out.println("############################");

                    System.out.print("Enter Roll no:");

                    int r=sc.nextInt();

                    System.out.print("Enter Name:");

                    String n=sc.next();

                    System.out.print("Enter Age:");

                    int a=sc.nextInt();


                    Student s2=new Student ();

                    System.out.println();

                    System.out.println("Second Student Data");

                    System.out.println("####################");

                    s2.setData(r,n,a);

                    s2.getData();




            }

        }
```
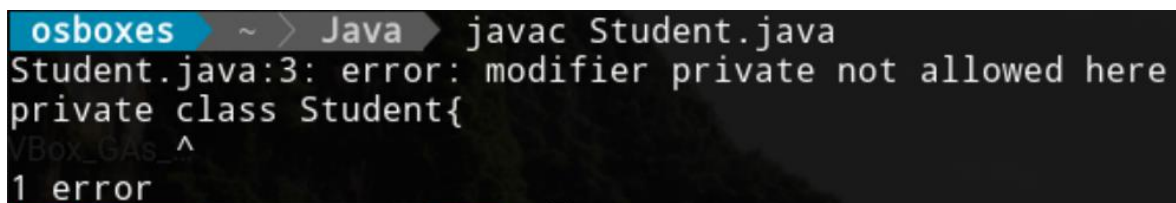
```
osboxes  ~  Java  javac Student.java
Student.java:3: error: modifier private not allowed here
private class Student{
VBox_GAs_^
1 error
```

**7. Demonstrate the use of all access specifiers(public, protected, default and private) with the data members of student class in program 5.**

```java
import java.util.Scanner;

public class Student {

        public int rollno;

        protected String name;

        private int age;

        public void setData(int rollno,String name,int age){

            this.rollno=rollno;

            this.name=name;

            this.age=age;

        }




    public void getData(){
    System.out.println("Student Roll No:" +rollno+ "\nStudent Name:" +name+ "\nStudent Age:" +age);

        }
        public static void main (String [] args){

            Student s1=new Student();

            System.out.println("First Student Data");

            System.out.println("####################");

            s1.setData(106,"Prachi",23);

            s1.getData();

            System.out.println();


            Scanner sc=new Scanner(System.in);

            System.out.println("Input Data For Second Student");

            System.out.println("###########################");

            System.out.print("Enter Roll no:");

            int r=sc.nextInt();
```

```
                              System.out.print("Enter Name:");

                              String n=sc.next();

                              System.out.print("Enter Age:");

                              int a=sc.nextInt();


                              Student s2=new Student ();

                              System.out.println();

                              System.out.println("Second Student Data");

                              System.out.println("####################");

                              s2.setData(r,n,a);

                              s2.getData();


                    }

          }
```
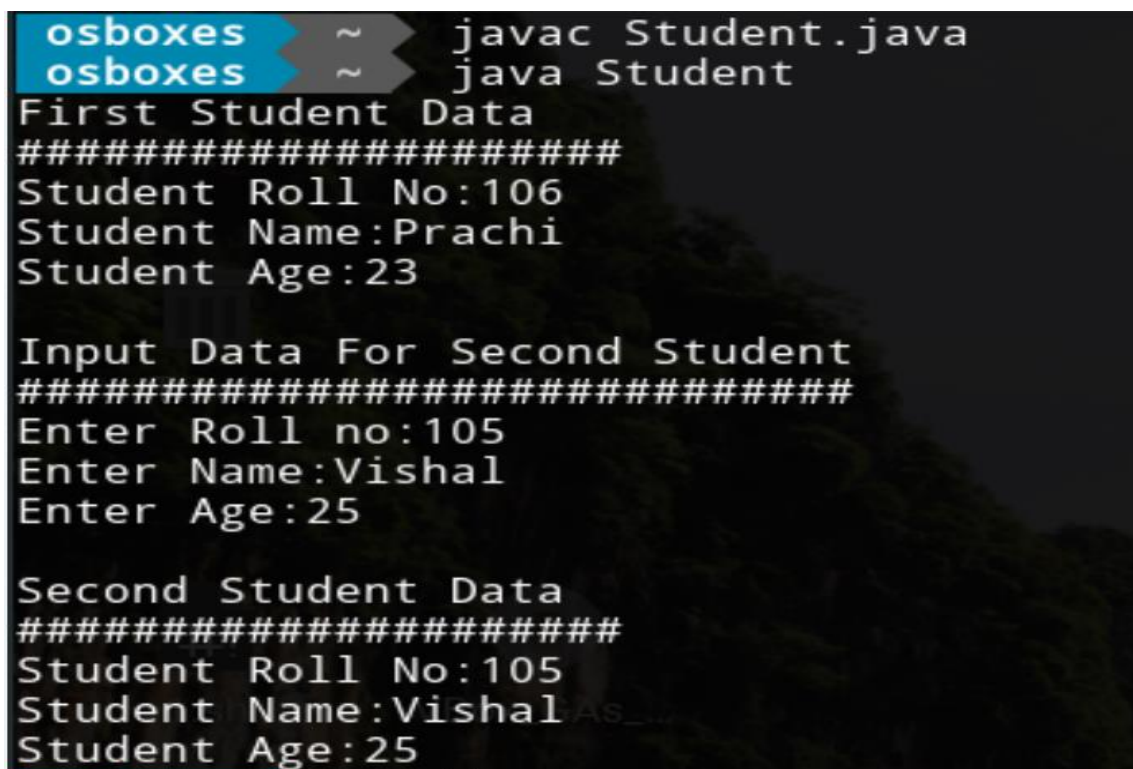


```
osboxes     ~       javac Student.java
osboxes     ~       java Student
First Student Data
####################
Student Roll No:106
Student Name:Prachi
Student Age:23

Input Data For Second Student
##############################
Enter Roll no:105
Enter Name:Vishal
Enter Age:25

Second Student Data
####################
Student Roll No:105
Student Name:Vishal
Student Age:25
```

**Here I observe that if I apply modifier(public,protected,default)on data members still I am able to access data of student.**

**8. Modify program 5 to add another array member marks to the class that stores of 5 subjects and then rework with the program.**

```java
import java.util.*;
 class Student{
static  int rollno=101;
static   String name="Prachi";
static  int age=23;
static int []marks={89,78,90,56,99};

public static void setData(int rollno, String name, int age,int[] marks)
{
rollno=rollno;
name=name;
age=age;
marks=marks;
}

public static void GetData()
{
System.out.println("Student Roll-No:"+rollno+"\nStudent Name:"+name+"\nStudent Age:"+age);
System.out.println("Student marks in 5 subjects : ");
for(int i:marks)
{
System.out.print(i+" ");
}
System.out.println();
}

public static void main(String [] args)
{
```

```java
System.out.println("Student First Data");

System.out.println("######################");


setData(101,"Prachi",23,new int[]{40, 50, 60, 70, 80});

GetData();



System.out.println("Student Second Data");

System.out.println("######################");



Scanner s=new Scanner(System.in);


System.out.print("Enter your roll-no:");

rollno=s.nextInt();


System.out.print("Enter your name:");

name=s.next();


System.out.print("Enter your age:");

age=s.nextInt();


System.out.print("Enter marks of 5 subjects : ");


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

{

marks[i]=s.nextInt();

}

System.out.println("Student Second Data");

System.out.println("######################");
```

```
setData(rollno,name,age,marks);

GetData();

}

}
```
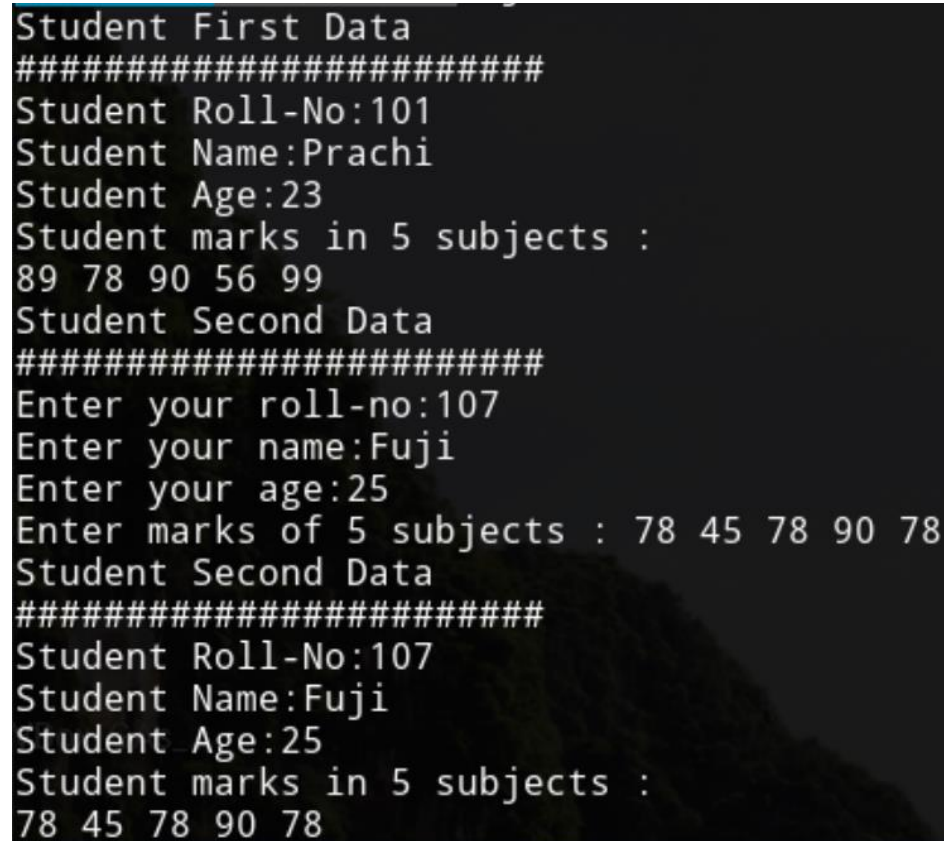
```
Student First Data
#######################
Student Roll-No:101
Student Name:Prachi
Student Age:23
Student marks in 5 subjects :
89 78 90 56 99
Student Second Data
#######################
Enter your roll-no:107
Enter your name:Fuji
Enter your age:25
Enter marks of 5 subjects : 78 45 78 90 78
Student Second Data
#######################
Student Roll-No:107
Student Name:Fuji
Student Age:25
Student marks in 5 subjects :
78 45 78 90 78
```

**9. Define a class of type address that has street, locality and city as members.**

**-Rework program 5 to add to the student class an object of address class**

**as a data member which stores the student's address.**

```
import java.util.Scanner;

class Address{

String street, locality, city;

void setAddress(){

Scanner sc=new Scanner(System.in);

System.out.print("Enter street name:");

street=sc.next();
```

```java
System.out.print("Enter locality:");

locality=sc.next();


System.out.print("Enter city name:");

city=sc.next();

}


void getAddress(){

System.out.println("Student Address");

System.out.println("###################");

System.out.println("Street:"+street+"\nLocality: "+locality+"\nCity:"+city);

}


}


class Student{

private int rollno;

private String name;

private int age;


Address add=new Address();


public void setData(int rollno, String name, int age)

{

this.rollno=rollno;

this.name=name;

this.age=age;

add.setAddress();

}
```

```java
public void getData(){

System.out.println("Student Roll No.:"+rollno+"\nStudent Name:"+name+"\nStudent Age:"+age);

add.getAddress();

}


}




class PrintData{


public static void main(String[] args){


int rollno;

String name;

int age;




Student s1=new Student();

Student s2=new Student();

System.out.println("First Student Data");

System.out.println("####################");

s1.setData(101, "Prachi", 23);

s1.getData();


Scanner sc=new Scanner(System.in);


System.out.print("Enter Student Roll No. : ");

rollno=sc.nextInt();
```

```
System.out.print("Enter Student Name:");

name=sc.next();


System.out.print("Enter Student age: ");

age=sc.nextInt();

//System.out.println("Second Student Data");

s2.setData(rollno, name, age);

System.out.println();

System.out.println("Second Student Data");

System.out.println("#####################");

s2.getData();


}

}
```
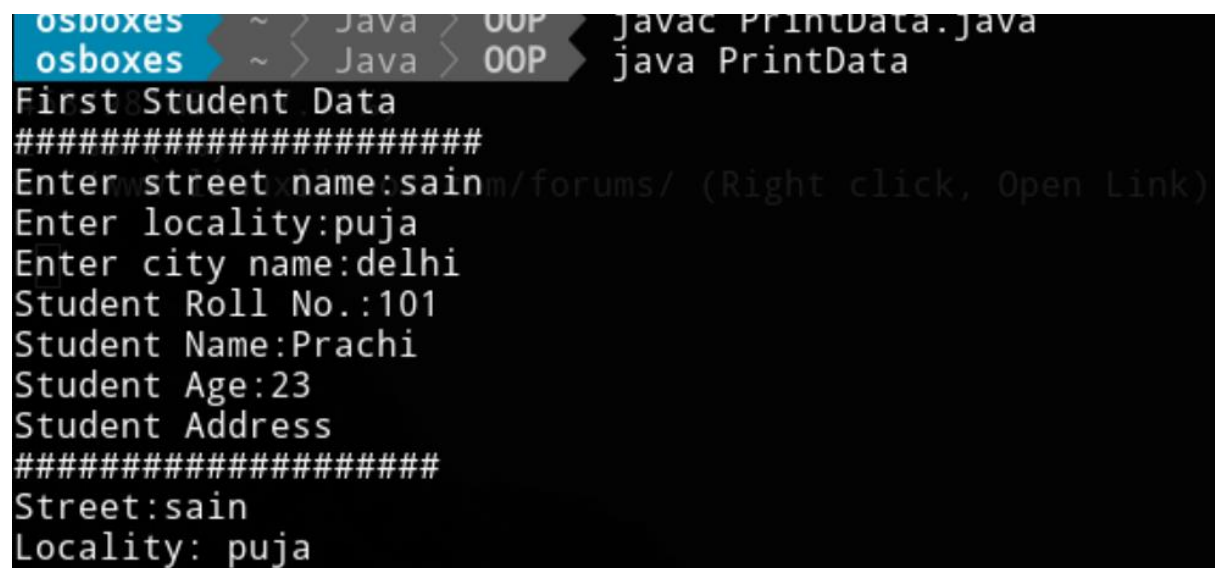
```
City:Delhi
Enter Student Roll No. : 102
Enter Student Name:Vish
Enter Student age: 24
Enter street name:hj com/forums/ (Rig
Enter locality:jn
Enter city name:Kolkata

Second Student Data
#####################
Student Roll No.:102
Student Name:Vish
Student Age:24
Student Address
####################
Street:hj
Locality: jn
City:Kolkata
```

**10. Define a class of type Distance that has Feet and Inches as members.**

**-Define a function that adds two Distances passed as argument and returns the sum as another Distance object.**

package User.own.pack;

import java.util.Scanner;

public class Distance{

    int feet;

    int inch;

    public void distance()

    {

        Scanner sc=new Scanner(System.in);

        System.out.print("Enter feet value:");

        feet=sc.nextInt();

        System.out.print("Enter inch value:");

        inch=sc.nextInt();

```java
        }

        public void add_Distance(Distance d1,Distance d2)

        {


                int sumofinch=d1.inch+d2.inch;

                int sumoffeet=d1.feet+d2.feet;


                System.out.println(sumoffeet+" "+sumofinch);

        }

}
```

**Next File where I import my package**

```java
package mypack;

import User.own.pack.*;

import java.util.*;


public class Dist{


        public static void main(String[] args)

        {

                Distance d1=new Distance();

                Distance d2=new Distance();

                Distance d3=new Distance();


                System.out.print("First Distance Input");

                System.out.println();

                System.out.println("##################");

                d1.distance();

                System.out.println();

                System.out.print("Second Distance Input");

                System.out.println();

                System.out.println("###################");
```
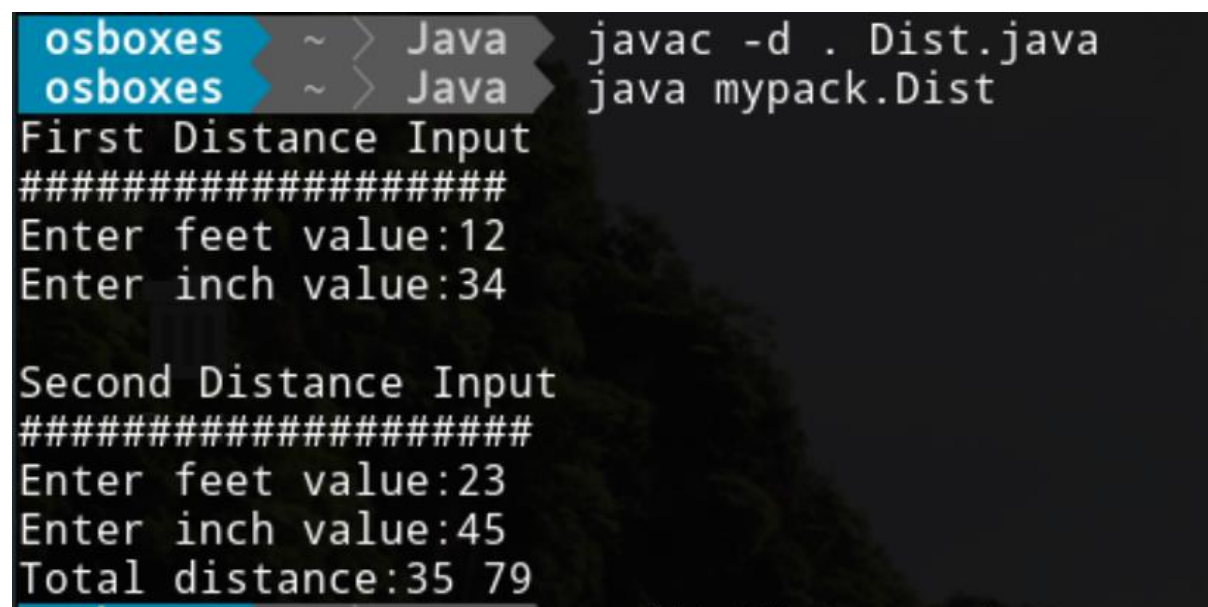
d2.distance();


System.out.print("Total distance:");


d3.add_Distance(d1,d2);



        }

}



**11. Write a program to swap two numbers by**

**a) Passing primitive values to the method (attempt to show that swapping is not possible)**

```java
import java.util.Scanner;
class SwapNum{



void Swap(int a,int b){
int temp=a;
a=b;
b=temp;
```

```java
}

public static void main(String[]args){

Scanner s=new Scanner(System.in);

System.out.print("Enter the two number a and b:");

int a=s.nextInt();

int b=s.nextInt();

SwapNum sw=new SwapNum();

sw.Swap( a,b);

System.out.print("Number After Swap:"+a+" "+b);

System.out.println();

}

}
```



```
osboxes   ~ > Java > OOP   javac SwapNum.java
osboxes   ~ > Java > OOP   java SwapNum
Enter the two number a and b:12 34
Number After Swap:12 34
```

**b) Creating two objects of Integer class and passing these object to method using reference variable.**

```java
class Integer{

   int num;



static void swapper(Integer a,Integer b){

   int t=a.num;

   a.num=b.num;

   b.num=t;

}

public static void main(String[] args) {

   Integer a=new Integer();

   Integer b=new Integer();

   a.num=10;b.num=20;
```

```
   System.out.println("Number before swap:"+a.num+" "+b.num);

   swapper(a,b);

   System.out.println("Number after swap:"+a.num + " "+b.num );

}

}
```



```
osboxes  ~  Java  OOP  javac Integer.java
osboxes  ~  Java  OOP  java Integer
Number before swap:10 20
Number after swap:20 10
```

**12. Write a program to demonstrate the scope and lifetime of primitive values and class objects.**

```java
public class Scope {

        static int x=10;   //global variable ----scope in entire program

        public static class Test

        {

          static int x=20;

          private int y=30;

          public void method(int x)

          {

            Test t = new Test();

            this.x= 40;

            y = 44;

            System.out.println("Access Local Variable Using Class");

            System.out.println("#################################");


            System.out.println("Test.x:" +Test.x);

            //System.out.println("Test.y:" +Test.y);

            System.out.println("Acesss Variable Using Class Object");

            System.out.println("#################################");
```

```java
            System.out.println("t.x:" + t.x);

            System.out.println("t.y:" + t.y);

            System.out.println("Access Local Variable ");

            System.out.println("######################");

            System.out.println("x:"+x);

            System.out.println("y:"+y);

        }


    }


    public static void main(String args[])

    {

        Test t = new Test();

        t.method(5);

        System.out.println("Acess Global Variable");

        System.out.println("####################");

        System.out.println("x:"+x);  //access global variable

    }
```
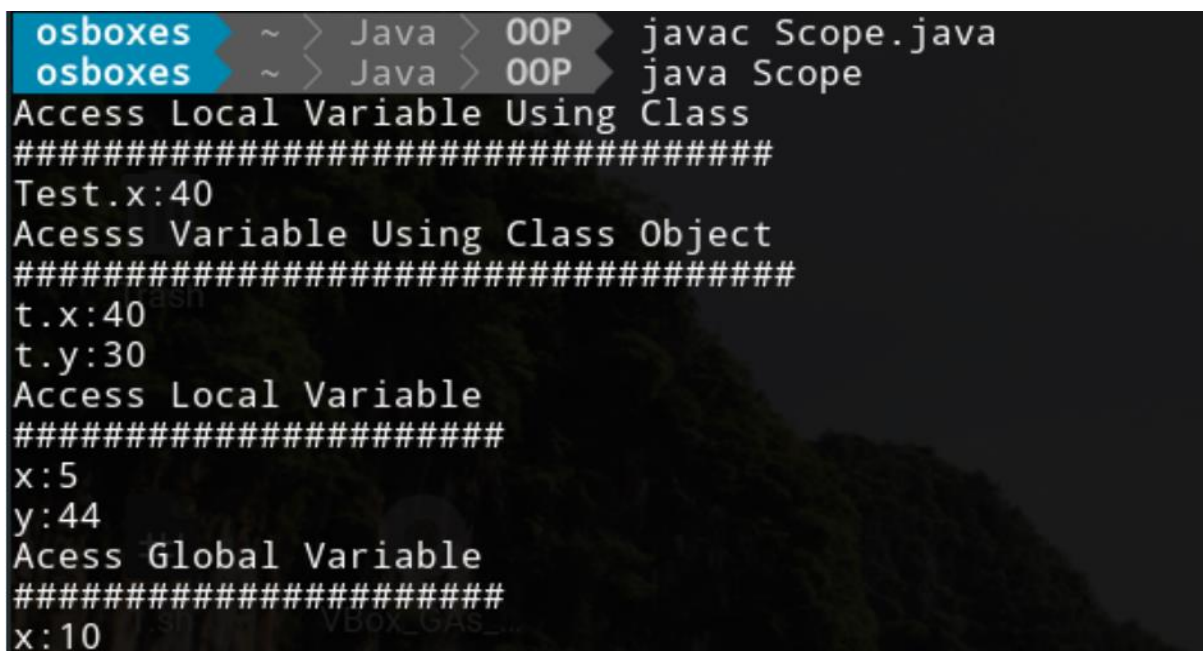


**13. Modify program 5 to add**

**a) a private static data member counter that keeps a track of the number**

of students currently existing

**b) a public static function member SetCounter() that increments the**

**counter by one.**

```java
import java.util.Scanner;
public class Q13 {
                private int rollno;
                private String name;
                private int age;
                public static int counter=51;


                public void setData(int rollno,String name,int age){
                        this.rollno=rollno;
                        this.name=name;
                        this.age=age;
                }


                public static void SetCounter(){
                        counter++;
                        System.out.println("increament bye one:"+counter);


                }
                public void getData(){
        System.out.println("Roll No:" +rollno+ "\nStudent Name:" +name+ "\nStudent Age:" +age);
                }
                public static void main (String [] args){
                        Q13 s1=new Q13();
                        System.out.println("First Student Data");
                        System.out.println("####################");
                        s1.setData(106,"Prachi",23);
                        s1.getData();
```

```
System.out.println();


Scanner sc=new Scanner(System.in);

System.out.println("Input Data For Second Student");

System.out.println("############################");

System.out.print("Enter Roll no:");

int r=sc.nextInt();

System.out.print("Enter Name:");

String n=sc.next();

System.out.print("Enter Age:");

int a=sc.nextInt();

Q13 s2=new Q13 ();

System.out.println();

System.out.println("Second Student Data");

System.out.println("####################");

s2.setData(r,n,a);

s2.getData();

SetCounter();




            }
        }
```

```
osboxes    ~ > Java > OOP > java Q13
First Student Data
####################
Roll No:106
Student Name:Prachi
Student Age:23

Input Data For Second Student
##########################
Enter Roll no:107
Enter Name:Vishal
Enter Age:24

Second Student Data
####################
Roll No:107
Student Name:Vishal
Student Age:24
increament bye one:52
```

**14. Define an interface and show that data members of interface are by default public, static and final and also show that method members of interface are by default abstract and public**

interface Interface{

int age=20;

void eat();

}

```
osboxes    ~ > Java > OOP > javac Interface.java
osboxes    ~ > Java > OOP > javap Interface
Compiled from "Interface.java"
interface Interface {
  public static final int age;
  public abstract void eat();
}
```