Program 1	**Date: 14-12-2022**
Write a program to print your name	

Code:

```
class Name
{
public static void main(String[] args)
{
String Name="Balu";
System.out.print(Name+" S Unny");
}
}
```

Output:

```
D:\Java>javac Name.java

D:\Java>java Name
Balu S Unny
D:\Java>
```

Program 2	**Date:14-12-2022**
Write a program to display two numbers received as command line argument, and print its product.	

Code:

```
class Prod
{
	public static void main(String[] args){
	int p=1;
	int i;
	int a=Integer.parseInt(args[0]);
	for(i=1;i<=a;i++)
	{
		p=p*i;
	}
	System.out.println("Product of "+a+" is " +p);
	}
}
```

Output:

```
D:\Java>javac Prod.java

D:\Java>java Prod 3
Product of 3 is 6
```

Program 3	**Date:14-12-2022**
Write a program to display two strings received as command line arguments	

Code:

```
class Str
{
public static void main(String[] args)
{
        System.out.println("Strings are: ");
for(int i=0;i<args.length;i++)
{
System.out.println(args[i]);
    }
  }
}
```

Output:

```
D:\Java>javac Str.java

D:\Java>java Str Glenn Max
Strings are:
Glenn
Max
```

Program 4	**Date: 14-12-2022**
Write a program to read two numbers and display the output in the form of 'Sum of 2 and 3 is 5	

Code:

```
class Sum
{
	public static void main(String[] args)
	{
		int x=Integer.parseInt(args[0]);
		int y=Integer.parseInt(args[1]);
		int sum=x+y;
		System.out.println("sum of "+x+" and "+y+" is: " +sum);
	}
}
```

Output

```
D:\Java>javac Sum.java

D:\Java>java Sum 5 8
sum of 5 and 8 is: 13
```

Program 5	**Date: 14-12-2022**
Write a program to accept two numbers from the keyboard and swap them.	

Code:

```
import java.util.Scanner;
class Swap
{
        public static void main(String[] args)
{
         int n,m,t;
        Scanner num=new Scanner(System.in);
        System.out.println("Enter the first number");
        n=num.nextInt();
        System.out.println("Enter the second number");
        m=num.nextInt();

        t=n;
        n=m;
        m=t;
        System.out.print("The numbers are "+n+" and "+m+" ");
  }
}
```

Output:

```
D:\Java>javac Swap.java

D:\Java>java Swap
Enter the first number
2
Enter the second number
5
The numbers are 5 and 2
D:\Java>
```

Program 6	**Date: 16-12-2022**
WAP to read three numbers and the find maximum	

Code:

```
import java.util.Scanner;

public class Maximum {
   static Scanner sc = new Scanner(System.in);
   public static void main(String[] args) {
      int a,b,c;
      System.out.println("Enter 3 Numbers");
      a = sc.nextInt();
      b = sc.nextInt();
      c = sc.nextInt();

      int max;

      if(a > b && a > c){
         max = a;
      }else if(b > c){
         max = b;
      }else{
         max = c;
      }
      System.out.println("The maximum number is "+max);
   }
}
```

Output:

```
D:\Java>javac Maximum.java

D:\Java>java Maximum
Enter 3 Numbers
5
10
20
The maximum number is 20
```

Program 7	**Date: 16-12-2022**
Find the minimum of three numbers using a single statement	

Code:

```
import java.util.Scanner;
public class Min
{
public static void main(String[] args)
{
        Scanner no=new Scanner(System.in);
        int a=no.nextInt();
        int b=no.nextInt();
        int c=no.nextInt();
int min=(a<b?a<c?a:c:b<c?b:c);
        System.out.println("minimum is : " +min);
  }
}
```

Output:

```
D:\Java>javac Min.java

D:\Java>java Min
20
50
40
minimum is : 20
```

Program 8	**Date: 16-12-2022**
WAP to search for a given element in an array.	

Code:

```
import java.util.Scanner;
class Search
{
	public static void main(String[] args)
	{
		int n,i,key;
		Scanner scn=new Scanner(System.in);
		System.out.println("enter size of array" );
		n=scn.nextInt();
		int a[]=new int[n];
		System.out.println("enter the numbers: " );
		for(i=0;i<n;i++)  {
			a[i]=scn.nextInt();
		}
		System.out.print("numbers are: " );
		for(i=0;i<n;i++)  {
			System.out.println(+a[i]);
		}
		System.out.print("enter the number to find: " );
		key=scn.nextInt();

		for(i=0;i<n;i++)  {
		if(a[i]==key) {
		 System.out.println("number found");
		 break;
		}
	 }
	if(i==n)  {
		 System.out.println("not found " );
	}
  }
}
```

Output:

```
D:\Java>javac Search.java

D:\Java>java Search
enter size of array
5
enter the numbers:
2
100
70
150
80
numbers are: 2
100
70
150
80
enter the number to find: 80
number found
```

Program 9	**Date:16-12-2022**
WAP to sort elements in an array in ascending order.	

Code:

```
import java.util.Scanner;
class Sort
{
public static void main(String[] args)
{
        int n,i,j,t;
System.out.println("enter array size");
        Scanner scn=new Scanner(System.in);
        n=scn.nextInt();

        int a[]=new int[n];
System.out.print("enter elements");

for(i=0;i<n;i++)  {
                a[i]=scn.nextInt();
        }
System.out.println("the elements are:");
for(i=0;i<n;i++)  {
                System.out.print(" "+a[i]);
}
System.out.println();
System.out.println("sorted elements are:");
for(i=0;i<n;i++){
        for(j=i+1;j<n;j++){
                if(a[i]>a[j]){
                        t=a[i];
                        a[i]=a[j];
                        a[j]=t;
                }
        }
}
for(i=0;i<n;i++)
{
        System.out.print(" "+a[i]);
}
}
}
```

Output:

```
D:\Java>javac Sort.java

D:\Java>java Sort
enter array size
5
enter elements10 8 9 4 6
the elements are:
 10 8 9 4 6
sorted elements are:
 4 6 8 9 10
```

Program 10	**Date:16-12-2022**
Write a program to print the row wise and column wise sum of a 2D array.	

Code:

```
import java.util.Scanner;
class Sum2d
{
public static void main(String[] args)
{
        int r,c;
        int i,j;
        System.out.println("Enter the row size:");
        Scanner scn=new Scanner(System.in);
        r=scn.nextInt();
        System.out.println("Enter the column size:");
        c=scn.nextInt();
        int a[][]=new int[r][c];

        System.out.print("Element at a[i][j] : " );
        for(i=0;i<r;i++)  {
                for(j=0;j<c;j++) {
                        a[i][j]=scn.nextInt();
                        }
                }
        System.out.println("the array elements are:");
        for(i=0;i<r;i++)  {
                for(j=0;j<c;j++) {
                        System.out.print(" "+a[i][j]);
                        }
                        System.out.println();
                }
        int sum=0;
        for(i=0;i<r;i++)  {
                        int rsum=0;
                        int csum=0;
                for(j=0;j<c;j++) {
                        rsum += a[i][j];
                        csum += a[j][i];
                        }
                System.out.println("Row sum " +(i)+ "=" +rsum);
                System.out.println("Column sum" +(i+1)+ "=" +csum);
                }

        }
}
```

Output:

```
D:\Java>javac Sum2d.java

D:\Java>java Sum2d
Enter the row size:
3
Enter the column size:
3
Element at a[i][j] : 2 2 4
2 3 5
3 2 1
the array elements are:
 2 2 4
 2 3 5
 3 2 1
Row sum 0=8
Column sum1=7
Row sum 1=10
Column sum2=7
Row sum 2=6
Column sum3=10
```

Program 11	**Date: 21-12-2022**
WAP with two functions to check for an integer palindrome.	

Code:

```
import java.util.Scanner;

public class Palin {
   public static void main(String[] args) {
      Scanner sc = new Scanner(System.in);
      System.out.print("Enter a Number: ");
      int num = sc.nextInt();
      int rev = 0, n = num;

      while (n > 0) {
         rev = (rev * 10) + (n % 10);
         n = n / 10;
      }
                  if(num == rev)
                  {
                              System.out.println("The number is a palindrome");
                  }
                  else{
                        System.out.println("The number is not a palindrome");
                  }
   }
}
```

Output:

```
D:\Java>javac Palin.java

D:\Java>java Palin
Enter a Number: 121
The number is a palindrome
```

Program 12	**Date: 21-12-2022**
WAP to display numbers from m to n using a single while loop. (eg: m=2, n=8 - randomly given numbers)	

Code:

```
import java.util.Scanner;

public class Randomn{
   public static void main(String[] args) {
      Scanner sc = new Scanner(System.in);
      int m,n;
      System.out.println("Enter the first number: ");
      m = sc.nextInt();
      System.out.println("Enter the last number ");
      n = sc.nextInt();

      while(m != n){
         System.out.print(m+"\t");
         if(m > n){
            m--;
         }else{
            m++;
         }
      }

      System.out.print(n);
   }
}
```

Output:

```
D:\Java>javac Randomn.java

D:\Java>java Randomn
Enter the first number:
10
Enter the last number
20
10      11      12      13      14      15      16      17      18      19      20
```

Program 13	**Date: 21-12-2022**
WAP to find the sum of the series 1+(1+2)+(1+2+3)+(1+2+3+…+n) using a single while loop.	

Code:

```
import java.util.Scanner;

public class Sumseries{
   public static void main(String[] args) {
      Scanner sc = new Scanner(System.in);
      int n,sum = 0,i = 1;
      System.out.print("Enter the value of n: ");
      n = sc.nextInt();
      while(i <= n+1){
         sum += i;
         System.out.print(sum+"\t");
         i++;
      }
   }
}
```

Output:

```
D:\Java>javac Sumseries.java

D:\Java>java Sumseries
Enter the value of n: 4
1       3       6       10      15
```

Program 14	**Date: 21-12-2022**
WAP to find the sum of 1+2/2!+3/3!+4/4!++n/n! using a single for loop.	

Code:

```
import java.util.*;
public class Sfact
{
        static int fact(float x){
        int fact=1;
        for(int i=1;i<=x;i++)
        {
                fact=fact*i;
                }
                return fact;
                }
        public static void main(String[]args)
        {
                Scanner sc = new Scanner(System.in);
                System.out.print("Enter the number: ");
                int n= sc.nextInt();
                float sum=0;
                for(float i=1;i<=n;i++)
                {
                sum=sum+i/fact(i);
                }
                System.out.println("sum : " +sum);
        }
}
```

Output:

```
D:\Java>javac Sfact.java

D:\Java>java Sfact
Enter the number: 10
sum : 2.7182817
```

Program 15	**Date: 21-12-2022**
WAP to calculate the area of a circle (method with no argument and no return type.	

Code:

```
import java.util.Scanner;
class Area
{
double r,pi;
Area(double t)  {
        r=t;
        pi=3.14;
}

void area()  {
double area=0;
        area=pi*r*r;
        System.out.println("area is: " +area);
}


public static void main(String[] args)
{

        Scanner scn=new Scanner(System.in);
System.out.print("enter value of radius: ");
        double r=scn.nextDouble();
        Area a=new Area(r);
        a.area();
}
}
```

Output:

```
D:\Java>javac Area.java

D:\Java>java Area
enter value of radius: 5
area is: 78.5
```

Program 16	**Date: 21-12-2022**
WAP to calculate sum of n even numbers (method with no argument and return type.)	

Code:

```
import java.util.Scanner;
class Sum_even
{
        int n;
Sum_even(int e)
 {
        n=e;
}
void sum()  {
 int s=0;
  int i;
        for(i=1;i<=n;i++)  {
                if(i%2==0)  {
                        s=s+i;
                }
  }
System.out.println("Sum is: " +s);
}


public static void main(String[] args)
{
        int n;
System.out.println("Enter the limit: ");
        Scanner scn=new Scanner(System.in);
        n=scn.nextInt();
        Sum_even obj=new Sum_even(n);
        obj.sum();
}
}
```

Output:

```
D:\Java>javac Sum_even.java

D:\Java>java Sum_even
Enter the limit:
7
Sum is: 12
```

Program 17	Date: 21-12-2022
WAP to reverse a number (method with argument and no return type.)	

Code:

```
import java.util.Scanner;
class Reverse
{
        void rev(int n)  {
                int t,d,rem;
        t=n;
        rem=0;
        while(t!=0)  {
                d=t%10;
                rem=(rem*10)+d;
                t=t/10;
        }
System.out.println("Reverse of a number is : "+rem);
}


public static void main(String[] args)
{
        int n;
System.out.println("enter the number");
        Scanner scn=new Scanner(System.in);
        n=scn.nextInt();

Reverse obj=new Reverse();
obj.rev(n);
}
}
```

Output:

```
D:\Java>javac Reverse.java

D:\Java>java Reverse
enter the number
123456
Reverse of a number is : 654321
```

Program 18	**Date: 21-12-2022**
WAP to calculate the sum of digits of a number (method with argument and return type.)	

Code:

```
import java.util.*;
class Sums
{
        int sum(int n)
        {
                int t=n;
                int rev=0,d;
                while(t!=0)
                {
                        d=t%10;
                        rev=rev+d;
                        t=t/10;
                }
                return rev;
        }
public static void main(String[] args)
{
        int n;
        System.out.println("Enter the number");
        Scanner scn=new Scanner(System.in);
        n=scn.nextInt();
        Sums obj=new Sums();
        int s=obj.sum(n);
        System.out.println("Sum of digit is :"+s);
}
}
```

Output:

```
D:\Java>javac Sums.java

D:\Java>java Sums
Enter the number
120
Sum of digit is :3
```

Program 19	**Date: 04-01-2023**
A function takes 2 arguments and returns the maximum. Use this function for finding max of 3 numbers. (use both the concepts of method overloading and reusability)	

Code:

```
import java.util.Scanner;
class Maxnum
{
   int max(int a,int b)
   {
      if(a > b)
      {
         return a;
      }
      else
      {
         return b;
      }
   }
   int max(int a,int b,int c)
   {
      if( a >=b )
      {
         if( a >= c)
         {
            return a;
         }
         else
         {
            return c;
         }
      }
      else
      {
         if( b >= c)
         {
            return b;
         }
         else
         {
            return c;
         }
      }
   }
   public static void main(String[] args)
   {
```

```
        Scanner in=new Scanner(System.in);
        Maxnum obj=new Maxnum();
        System.out.println("Enter two numbers");
        int a=in.nextInt();
        int b=in.nextInt();
        int c=0;
        c=obj.max(a,b);
        System.out.println("The maximum of "+a+" and "+b+" is "+c);
        System.out.println("Enter three numbers");
        a=in.nextInt();
        b=in.nextInt();
        c=in.nextInt();
        int d=0;
        d=obj.max(a,b,c);
        System.out.println("The maximum of "+a+","+b+" and "+c+"is " +d);
    }
}
```

Output:

```
D:\Java>javac Maxnum.java

D:\Java>java Maxnum
Enter two numbers
20 100
The maximum of 20 and 100 is 100
Enter three numbers
100 500 1000
The maximum of 100,500 and 1000is 1000
```

Program 20	**Date: 04-01-2023**
WAP to find the factorial of n, using recursion.	

Code:

```
import java.util.Scanner;
class Fact
{
int fact(int n)
{
        if(n!=0) {
                return n*fact(n-1);
        }
        return 1;
}

public static void main(String[] args)
{
        int n,s;
        System.out.println("Enter a number");
        Scanner scn=new Scanner(System.in);
        s=scn.nextInt();
        Fact obj=new Fact();
        n=obj.fact(s);

        System.out.println("the factorial is :" +n);
}
}
```

Output:

```
D:\Java>javac Fact.java

D:\Java>java Fact
Enter a number
5
the factorial is :120
```

Program 21	**Date: 04-01-2023**
WAP to display numbers from n to 1 and vice versa, using recursion.	

Code:

```
import java.util.Scanner;
class Recurto1
{
int oneton(int m,int n)  {
        if(n<=m) {
                System.out.print(n+ " ");
                return (oneton(m,++n));
                }
        return 1;
}

int ntone(int i)
{
        if(i!=0) {
                System.out.print(i+ " ");
                ntone (i-1);
        }
                return 1;
        }

public static void main(String[] args)
{
        int n;
        System.out.println("enter the limit");
        Scanner scn=new Scanner(System.in);
        n=scn.nextInt();
        Recurto1 rc=new Recurto1();
        System.out.println();
        rc.oneton(n,1);
        System.out.println();
        rc.ntone(n);
        }
}
```

Output:

```
D:\Java>javac Recurto1.java

D:\Java>java Recurto1
enter the limit
6

1 2 3 4 5 6
6 5 4 3 2 1
```

Program 22 **Date: 04-01-2023**

Create a class complex having a real and imaginary part. Provide functions for read, display ,add and multiplying two complex numbers

Code:

```
import java.util.*;
class Complex
{
	double r,i;
	void read()
	{
		System.out.println("enter the real part");
		Scanner scn=new Scanner(System.in);
		r=scn.nextDouble();
		System.out.println("Enter the imaginary part");
		i=scn.nextDouble();
	}

	void disp()
	{
		System.out.println("The real part is: " +r);
		System.out.println("The imaginary  part is: " +i+"i");
	}

	void add(Complex c,Complex c1)
	{
		r=c.r+c1.r;
		i=c.i+c1.i;
		System.out.println("sum is:" +r+ "+" +i+"i");
	}

	void mult(Complex c,Complex c1)
	{
		r=c.r*c1.r-c.i*c1.i;
		i=c.r*c1.i+c.i*c1.r;
		System.out.println("Multiplication value is: " +r+ "+" +i+"i");
	}

public static void main(String[] args)
{
	Complex c=new Complex();
	Complex c1=new Complex();
	c.read();
	c.disp();
	c1.read();
	c1.disp();
```

```
        Complex c3=new Complex();
        c3.add(c,c1);
        c3.mult(c,c1);
}
}
```

Output:

```
D:\Java>javac Complex.java

D:\Java>java Complex
enter the real part
4
Enter the imaginary part
6
The real part is: 4.0
The imaginary  part is: 6.0i
enter the real part
6
Enter the imaginary part
5
The real part is: 6.0
The imaginary  part is: 5.0i
sum is:10.0+11.0i
Multiplication value is: -6.0+56.0i
```

Program 23	**Date: 04-01-2023**
Program to explain static keyword with different usage including function	

Code:

```
class St
{
        static int a=10;
static void disp() {
        System.out.println("It's a static function");
}
public static void main(String[] args)
{
        St o1=new St();
        St.disp();
        System.out.println(St.a);
        System.out.println(o1.a);
        o1.a=15;
        System.out.println(St.a);
        System.out.println(o1.a);
        System.out.println(a);
        }
}
```

Output:

```
D:\Java>javac St.java

D:\Java>java St
It's a static function
10
10
15
15
15
```

Program 24	Date: 04-01-2023
WAP to display even numbers upto 'n' using a static function	

Code:

```
import java.util.*;
class Eventon
{
static void st(int n) {
        for(int i=1;i<=n;i++) {
                if(i%2==0)
                {
                        System.out.println(" " +i);
                }
        }
}
static Scanner scn=new Scanner(System.in);
public static void main(String[] args)
{
        System.out.println("enter the number ");
        int n=scn.nextInt();
        System.out.println("the numbers are:");
        Eventon.st(n);
        }
}
```

Output:

```
D:\Java>javac Eventon.java

D:\Java>java Eventon
enter the number
10
the numbers are:
 2
 4
 6
 8
 10
```

Program 25	**Date: 06-01-2023**
WAP (menu driven) to demonstrate method overriding in java, by displaying details of a student, and a teacher	

Code:

```
import java.util.*;
class Teacher
{
        String name,dept;
        void read()
        {
                System.out.println("Enter the teacher name");
                Scanner scn=new Scanner(System.in);
                name=scn.nextLine();
                System.out.println("Enter the dept name");
                dept=scn.nextLine();
        }

        void disp()
        {
        System.out.println("Name of the teacher: " +name);
        System.out.println("Name of department: " +dept);
        }
}
        class Student extends Teacher
        {
        void read()
        {
                System.out.println("Enter the student name");
                Scanner scn=new Scanner(System.in);
                name=scn.nextLine();
                System.out.println("Enter the dept name of the Student");
                dept=scn.nextLine();
        }

        void disp()
        {
        System.out.println("Name of the student: " +name);
        System.out.println("Name of department: " +dept);
        }
}
        class Overriding
        {
        public static void main(String[] args)
        {
                int ch=0;
```

```
                Scanner sc=new Scanner(System.in);
                Teacher obj=new Teacher();
                        Teacher ob=new Student();
                while(ch!=6)
                {
                        System.out.println("1.Enter the teacher details:");
                        System.out.println("2.Enter the student details:");
                        System.out.println("3.Display the teacher details:");
                        System.out.println("4.Display the student details:");
                        System.out.println("5.Exit");
                        System.out.println("Enter your choice:");
                        ch=sc.nextInt();
                switch(ch) {
                        case 1:
                                obj.read();
                                break;
                        case 2:
                                ob.read();
                                break;
                        case 3:
                                obj.disp();
                                break;
                        case 4:
                                ob.disp();
                                break;
                        case 5:
                                break;
                        default:
                                System.out.println("Wrong Choice");
                        }
                }
        }
}
```

Output:

```
D:\Java>javac Overriding.java

D:\Java>java Overriding
1.Enter the teacher details:
2.Enter the student details:
3.Display the teacher details:
4.Display the student details:
5.Exit
Enter your choice:
1
Enter the teacher name
Ashley
Enter the dept name
Computer Science
1.Enter the teacher details:
2.Enter the student details:
3.Display the teacher details:
4.Display the student details:
5.Exit
Enter your choice:
2
Enter the student name
Glenn
Enter the dept name of the Student
Computer Science
1.Enter the teacher details:
2.Enter the student details:
3.Display the teacher details:
4.Display the student details:
5.Exit
Enter your choice:
3
Name of the teacher: Ashley
Name of department: Computer Science
1.Enter the teacher details:
2.Enter the student details:
3.Display the teacher details:
4.Display the student details:
5.Exit
Enter your choice:
4
Name of the student: Glenn
Name of department: Computer Science
1.Enter the teacher details:
2.Enter the student details:
3.Display the teacher details:
4.Display the student details:
5.Exit
Enter your choice:
```

Program 26 **Date: 06-01-2023**

Create a class for employees having eno,ename and esal as data members. Provide functions for reading and displaying employee details. (Accept information of n employees in the main function, display the same and search for an emp (using eno)).

Code:

```
import java.util.*;
class Employee
{
        int eno;
        int esal;
        String ename;

        void read(String name,int no,int sal)
        {
                this.eno=no;
                this.esal=sal;
                this.ename=name;
        }
        void disp()
        {
                System.out.println("employee number is: "+eno);
                System.out.println("Name of employee is: "+ename);
                System.out.println("Salary of employee: "+esal);
        }
public static void main(String[] args)
{
        int n,number;
        System.out.println("Enter number of employees: ");
        Scanner scn=new Scanner(System.in);
        n=scn.nextInt();
        Employee[] obj=new Employee[n];
        for(int i=0;i<n;i++)
        {
                obj[i]=new Employee();
                Scanner sc=new Scanner(System.in);
                System.out.println("Enter the employee name:");
                String name=sc.nextLine();
                System.out.println("Enter the employee number:");
                int no=sc.nextInt();
                System.out.println("Enter the employee salary:");
                int sal=sc.nextInt();
                obj[i].read(name,no,sal);
                obj[i].disp();
        }
      int ch=0;
```

```
        while(ch!=3)
        {
           System.out.println("1.Display all Employees");
           System.out.println("2.search Employees");
           System.out.println("3.Exit");
           System.out.println("Enter your option");
           ch=scn.nextInt();
           switch(ch)
           {
              case 1:for(int i=0;i<n;i++)
                     {
                        obj[i].disp();
                     }
                     break;
              case 2: System.out.println("Enter the eno number");
                     number=scn.nextInt();
                     for(int i=0;i<n;i++)
                     {
                        if(obj[i].eno==number)
                        {
                           obj[i].disp();
                        }
                                          }
                     break;
              case 3:break;
              default:System.out.println("Wrong option");
           }
        }
     }
}
```

Output:

```
D:\Java>javac Employee.java

D:\Java>java Employee
Enter number of employees:
2
Enter the employee name:
Glenn
Enter the employee number:
24
Enter the employee salary:
3000
employee number is: 24
Name of employee is: Glenn
Salary of employee: 3000
Enter the employee name:
Max
Enter the employee number:
50
Enter the employee salary:
6000
employee number is: 50
Name of employee is: Max
Salary of employee: 6000
1.Display all Employees
2.search Employees
3.Exit
Enter your option
2
Enter the eno number
24
employee number is: 24
Name of employee is: Glenn
Salary of employee: 3000
1.Display all Employees
2.search Employees
3.Exit
Enter your option
3
```

Program 27	**Date: 11-01-2023**
Program to implement ISA and HASA relationship.	

Code:

```
import java.util.Scanner;
class Address
{
   String city, state, country;
   int pinCode;

   public Address(String city, String state, String country, int pinCode)
   {
      this.city = city;
      this.state = state;
      this.country = country;
      this.pinCode = pinCode;
   }
}
class Student
{
   String name;
   int rollNo;
   Address address;
   public Student(String name, int rollNo, Address address)
   {
      this.rollNo = rollNo;
      this.name = name;
      this.address=address;
   }
   void display()
   {
      System.out.println("Name: " +name);
      System.out.println("Roll no: " +rollNo);
      System.out.println("Address:");
      System.out.println(address.city+" "+address.state+" "+address.country+ " "
+address.pinCode);
      System.out.println("\n");
   }
   public static void main(String[] args)
   {
      Scanner sc=new Scanner(System.in);
      System.out.println("Enter the name of city");
      String city=sc.nextLine();
      System.out.println("Enter the name of state");
      String state=sc.nextLine();
```

```
        System.out.println("Enter the name of country");
        String country=sc.nextLine();
        System.out.println("Enter the pincode");
        int pincode=sc.nextInt();
        System.out.println("Enter the name ");
        String name=sc.next();
        System.out.println("Enter the rollno");
        int rollNo=sc.nextInt();
        Address addres = new Address(city,state,country,pincode);
        Student st = new Student(name,rollNo,addres);
        st.display();
    }
}
```

Output:

```
D:\Java>javac Student.java

D:\Java>java Student
Enter the name of city
Ernakulam
Enter the name of state
Kerala
Enter the name of country
India
Enter the pincode
682306
Enter the name
Balu
Enter the rollno
13
Name: Balu
Roll no: 13
Address:
Ernakulam Kerala India 682306
```

Program 28	**Date: 11-01-2023**
Program to overcome function overriding in java	

Code:

```
class Animal
{
	Animal()
	{
		System.out.println("Animal cons");
	}
	final void eat()
	{
		System.out.println("Animal eats");
	}
}
class Cat extends Animal
{
	Cat()
	{
		System.out.println("Cat cons");
	}
	void eat1()
	{
		System.out.println("Cat eats");
	}
}
class Funcov
{
	public static void main(String args[])
	{
		Cat c=new Cat();
		c.eat();
	}
}
```

Output:

```
D:\Java>javac Funcov.java

D:\Java>java Funcov
Animal cons
Cat cons
Animal eats
```

Program 29	**Date: 11-01-2023**
Program to implement run time polymorphism in Java using Interface, wrt calculating area of a triangle.	

Code:

```
import java.util.Scanner;
interface Shape{
   void cal(int b,int h);
}
class Triangle implements Shape
{
   public void cal(int b,int h)
   {
      float ans=(h*b)/2;
      System.out.println("The area of the triangle:"+ans);
   }
}
class Area
{
   public static void main(String[] args)
   {
   Scanner in=new Scanner(System.in);
   Shape obj=new Triangle();
   System.out.println("Enter b");
   int b=in.nextInt();
   System.out.println("Enter h");
   int h=in.nextInt();
   obj.cal(b,h);
   }
}
```

Output:

```
D:\Java>javac Area.java

D:\Java>java Area
Enter b
10
Enter h
12
The area of the triangle:60.0
```

Program 30	**Date: 11-01-2023**

Create an interface Shape having two prototypes disp() and calc(), to display the shape and calculate area respectively. Create two classes: circle and rectangle which implements the above interface. In the main function create a reference of Shape depending on the user-choice.

Code:

```
import java.util.Scanner;
interface Shape
{
   public void disp();
   public void calc();
}
class Circle implements Shape
{
   int radius;
   Circle(int radius)
   {
      this.radius = radius;
   }
   public void disp()
   {
      System.out.println("Shape is Circle");
   }
   public void calc()
   {
      double area = 3.14*radius*radius;
      System.out.println("The area of the Circle with radius " + radius + " is " + area);
   }
}
class Rectangle implements Shape
{
   int l, b;

   Rectangle(int l, int b) {
      this.l = l;
      this.b = b;
   }
   public void disp()
   {
      System.out.println("Shape is Rectangle");
   }

   public void calc()
   {
      double area = l * b;
```

```
            System.out.println("The area of the rectangle with l=" + l + " and b=" + b + " is "
+ area);
        }
    }
    class Area
    {
       public static void main(String[] args)
       {
          Scanner sc = new Scanner(System.in);
          Shape sh=null;
          int ch=0;
          while(ch!=3)
          {
             System.out.println("Select your choice ");
             System.out.println("1. Circle");
             System.out.println("2. Rectangle");
             System.out.println("3. Exit");
             System.out.print("Enter your Choice: ");
             ch = sc.nextInt();
             switch (ch)
             {
                case 1:
                   System.out.print("Enter the radius of the Circle: ");
                   sh = new Circle(sc.nextInt());
                   break;
                case 2:
                   System.out.print("Enter the length and breath of the Rectangle: ");
                   sh = new Rectangle(sc.nextInt(),sc.nextInt());
                case 3: break;
                default:System.out.println("Enter the choice");
             }
             if(sh != null)
             {
                sh.calc();
             }
             else
             {
                System.out.println("Invalid");
             }
          }
       }
    }
```

Output:

```
D:\Java>javac Area.java

D:\Java>java Area
Select your choice
1. Circle
2. Rectangle
3. Exit
Enter your Choice: 1
Enter the radius of the Circle: 4
The area of the Circle with radius 4 is 50.24
Select your choice
1. Circle
2. Rectangle
3. Exit
Enter your Choice: 2
Enter the length and breath of the Rectangle: 5
5
The area of the rectangle with l=5 and b=5 is 25.0
Select your choice
1. Circle
2. Rectangle
3. Exit
Enter your Choice: 3
```

Program 31	**Date: 11-01-2023**
WAP to implement a function using call by value to swap two float numbers.	

Code:

```
import java.util.Scanner;
class num
{
   void test(float a,float b)
   {
          float c=a;
            a=b;
          b=c;
                System.out.println("After Swapping :: a = "+a+" b = "+b);
          }
}
class CBVSwap
{
          public static void main(String args[])
   {
                num n=new num();
                float a,b;
                Scanner in=new Scanner(System.in);
                System.out.println("Enter the values for a and b:");
                a=in.nextFloat();
                b=in.nextFloat();
                System.out.println("Before Swapping : a = "+a+" b = "+b);
                n.test(a,b);
          }
}
```

Output:

```
D:\Java>javac CBVSwap.java

D:\Java>java CBVSwap
Enter the values for a and b:
20
80
Before Swapping : a = 20.0 b = 80.0
After Swapping :: a = 80.0 b = 20.0
```

Program 32	**Date: 11-01-2023**
WAP to implement a function using call by reference to find the square root of a given number.	

Code:

```
import java.util.Scanner;
import java.lang.Math;
class Sqt
{
	double x;
	double sqr(Sqt obj)
	{
			double s=Math.sqrt(x);
			return s;
	}
	public static void main(String args[])
	{
			Scanner sc=new Scanner(System.in);
			Sqt obj=new Sqt();
			System.out.println("Enter a number:");
			obj.x=sc.nextInt();
			System.out.println("Square root of "+obj.x+" is: "+
obj.sqr(obj));
	}
}
```

Output:

```
D:\Java>javac Sqt.java

D:\Java>java Sqt
Enter a number:
16
Square root of 16.0 is: 4.0
```

Program 33 **Date: 13-01-2023**

Create a class for Cstring having a string data member and provide functions for read, display, compare (return Boolean value), add and concatenate.

Code:

```
import java.util.*;
class Cstring
{
        String name;
void read(String name)
{
        this.name=name;

}
void display()
{
        System.out.println("Name is :" +name);
}
void compare(String name1)
{
        System.out.println(name.equals(name1));
}
void concatenate(String n)
{
        System.out.println(name  +  n);
}
public static void main(String[] args)
{
        Scanner sc=new Scanner(System.in);
        System.out.println("Enter first name");
        String name=sc.nextLine();
        Cstring obj=new Cstring();
        obj.read(name);
        obj.display();
        System.out.println("Enter second name");
        String name1=sc.nextLine();
        obj.compare(name1);
        System.out.println("Enter the name to add");
        String n=sc.nextLine();
        obj.concatenate(n);

}
}
```

Output:

```
D:\Java>java Cstring
Enter first name
Glenn
Name is :Glenn
Enter second name
Glenn
true
Enter the name to add
Max
GlennMax
```

Program 34 **Date: 13-01-2023**

Write a program to implement object cloning for the class Distance which has inch and feet as data members.

Code:

```
import java.util.*;
class distance
{
        int inch;
        int ft;
}
class Clone
{
        public static void main(String[] args)
        {
                distance dis=new distance();
                System.out.println("Enter Measure(inch)");
                Scanner scn=new Scanner(System.in);
                dis.inch=scn.nextInt();
                System.out.println("Enter Measure(ft)");
                dis.ft=scn.nextInt();
                distance dis1=new distance();
                dis1=dis;
                System.out.println("1st object");
                System.out.println(dis.inch+ " and" +dis.ft);
                System.out.println("2nd object");
                System.out.println(dis1.inch+ " and " +dis1.ft);
        }
}
```

Output:

```
D:\Java>javac Clone.java

D:\Java>java Clone
Enter Measure(inch)
6
Enter Measure(ft)
5
1st object
6 and5
2nd object
6 and 5
```

Program 35	**Date: 13-01-2023**

Write a menu driven program for performing the following operations.

a. Length of a given string
b. Compare for equality
c. Extract a substring from a string.
d. Convert to uppercase and lowercase

Code:

```
import java.util.Scanner;
class Strings_7_3
{
   String value;
   Scanner in=new Scanner(System.in);
   Strings_7_3(String v1)
   {
      value=v1;
   }
   void length()
   {
      System.out.println("The length is "+value.length());
   }
   void compare(String s1)
   {
      System.out.println(value.equals(s1));
   }
   void subsring()
   {
      int start,end;
      System.out.println("Enter the strating index");
      start=in.nextInt();
      System.out.println("The substrings is "+value.substring(start));
      System.out.println("Enter the strating and ending index");
      start=in.nextInt();
      end=in.nextInt();
      System.out.println("The substrings starting from "+start+" to "+end+" is
"+value.substring(start,end));
   }
   void convert()
   {
      System.out.println("The upper case is "+value.toUpperCase());
      System.err.println("The lower case is "+value.toLowerCase());
   }
}
class Mainstring
{
```

```
    public static void main(String[] arsg)
    {
       Scanner sc=new Scanner(System.in);
       System.out.println("Enter the string");
       String s1=sc.next();
       Strings_7_3 obj=new Strings_7_3(s1);
       int ch=0;
       while(ch!=5)
       {
       System.out.println("1.Length of the String");
       System.err.println("2.Compare");
       System.err.println("3.Extract a substring");
       System.err.println("4.converting case");
       System.err.println("5.Exit");
       System.out.println("Enter your option");
       ch=sc.nextInt();
       switch(ch)
       {
          case 1: obj.length();
                  break;
          case 2: System.out.println("Enter a String to compare");
                  String s2=sc.next();
                   obj.compare(s2);
                   break;
          case 3: obj.subsring();
                  break;
          case 4: obj.convert();
                  break;
          case 5: break;
          default:System.out.println("Wrong option");
       }
       }
    }
}
```

Output:

```
D:\Java>java Mainstring
Enter the string
glenn
1.Length of the String
2.Compare
3.Extract a substring
4.converting case
5.Exit
Enter your option
1
The length is 5
1.Length of the String
2.Compare
3.Extract a substring
4.converting case
5.Exit
Enter your option
2
Enter a String to compare
max
false
1.Length of the String
2.Compare
3.Extract a substring
4.converting case
5.Exit
Enter your option
3
Enter the strating index
2
The substrings is enn
Enter the strating and ending index
2 4
The substrings starting from 2 to 4 is en
1.Length of the String
2.Compare
3.Extract a substring
4.converting case
5.Exit
Enter your option
4
The upper case is GLENN
The lower case is glenn
1.Length of the String
2.Compare
3.Extract a substring
4.converting case
5.Exit
```

Program 36	**Date: 13-01-2023**
Write a program to reverse a string	

Code:

```
import java.util.Scanner;
class Stringss
{
   String s1;
   Stringss(String value)
   {
      s1=value;
   }
   void display()
   {
      System.out.println("The string is "+s1);
   }
   void revdisplay()
   {
      String revstr="";
      for(int i=0;i<s1.length();i++)
      {
         char ch=s1.charAt(i);
         revstr=ch+revstr;
      }
      System.out.println("The reverse "+revstr);
   }
}
class Reverse_7_4
{
   public static void main(String[] args)
   {
         Scanner in=new Scanner(System.in);
         System.out.print("Enter the string: ");
         String str=in.next();
         Stringss obj=new Stringss(str);
         obj.display();
         obj.revdisplay();
   }
}
```

Output:

```
D:\Java>javac Reverse.java

D:\Java>java Reverse
Enter the string: Glenn
The string is Glenn
The reverse nnelG
```

Program 37	**Date: 13-01-2023**
Write a program to calculate the prime factors of a given number, using packages.	

Code:

```
import java.util.*;

public class PrimeFactors {
   public static List<Integer> primeFactors(int number) {
      List<Integer> factors = new ArrayList<Integer>();
      for (int i = 2; i <= number; i++) {
         while (number % i == 0) {
            factors.add(i);
            number /= i;
         }
      }
      return factors;
   }
}

import java.util.*;

public classMain {
   public static void main(String[] args) {
      Scanner sc = new Scanner(System.in);
      System.out.print("Enter a number: ");
      int number = sc.nextInt();
      List<Integer> factors = PrimeFactors.primeFactors(number);
      System.out.println("Prime factors of " + number + ": " + factors);
   }
}
```

Output:

```
D:\set 5>java ClassMain
Enter a number: 123
Prime factors of 123: [3, 41]
```

Program 38	**Date: 18-01-2023**
Read numbers into an array. Perform validations using multiple catch statements / predefined Exceptions.	

Code:

```
import java.util.Scanner;
class TCarr
{
   public static void  main(String[] args)
   {
      Scanner sc=new Scanner(System.in);
      System.out.println("Enter the limit of the array");
      int x=sc.nextInt();
      int array[]=new int[x];
      System.out.println("Enter the elements to array");
      for(int i=0;i<x;i++)
      {
         try
         {
            array[i]=sc.nextInt();
         }catch(NumberFormatException n)
         {
            System.out.println("Enter a valid number");
         }catch(Exception e)
         {
            System.out.println("Enter a valid number");
         }
      }
   }
}
```

Output:

```
D:\Java>javac TCarr.java

D:\Java>java TCarr
Enter the limit of the array
4
Enter the elements to array
20
15
h
Enter a valid number
```

Program 39 **Date: 18-01-2023**

Write a program to implement a user defined Exception, which will throw an Exception when a given number is prime.

Code:

```
import java.io.*;
import java.util.Scanner;


class PrimeNumberException extends Exception{
    public PrimeNumberException(String message) {
        super(message);
    }
}

class Prime {
    static Scanner sc = new Scanner(System.in);

    static void checkPrime(int n) throws PrimeNumberException {
        if (n == 1 || n == 3 || n == 2) {
            throw new PrimeNumberException("The Number is a Prime Number");
        } else if (((n * n) - 1) % 24 == 0) {
            throw new PrimeNumberException("The Number is a Prime Number");
        } else {
            System.out.println("The Number is not a Prime Number");
        }
    }
    public static void main(String[] args) {
        int n, ch;
        while (true) {
            System.out.println("1. Enter a Number");
            System.out.println("2. Exit");
            ch = sc.nextInt();

            if (ch == 2) {
                break;
            }
            try {
                n = sc.nextInt();
                checkPrime(n);
            } catch (PrimeNumberException p) {
                System.out.println("Error: " + p.getMessage());
            } catch (Exception e) {
                System.out.println("An Error has Occurred! Try Again!");
            }
```

```
    }
  }
}
```

Output:

```
D:\Java>javac Prime.java

D:\Java>java Prime
1. Enter a Number
2. Exit
1
11
Error: The Number is a Prime Number
1. Enter a Number
2. Exit
1
20
The Number is not a Prime Number
1. Enter a Number
2. Exit
```

Program 40	**Date: 18-01-2023**
Write a program to implement throw and finally.	

Code:

```
import java.util.*;
class Tf
{
	public static void main(String[] args)
	{
		Scanner scn=new Scanner(System.in);
		System.out.println("Enter a number");
		try
		{
			int n=scn.nextInt();
		}catch(Exception e)
		{
			System.out.println("Enter a valid number");
		}finally
		{
			System.out.println("exit");
		}
	}
}
```

Output:

```
D:\Java>javac Tf.java

D:\Java>java Tf
Enter a number
4h
Enter a valid number
exit
```

Program 41	**Date: 20-01-2023**
Write a program to create multiple threads by extending the Thread class.	

Code:

```
class Multi  extends Thread
{
   int n;
   Multi(int n)
   {
      this.n = n;
   }
   public void run()
   {
      for (int i = 0; i < n; i++)
      {
         System.out.println(i);
         try
         {
            Thread.sleep(1000);
         } catch (InterruptedException e)
         {
            System.out.println("Something went Wrong "+e.getMessage());
         }
      }
   }
   public static void main(String[] args)
   {
      Multi t1 = new Multi(5);
      Multi t2 = new Multi(15);
      new Thread(t1).start();
      new Thread(t2).start();
   }
}
```

Output:

```
D:\Java>javac Multi.java

D:\Java>java Multi
0
0
1
1
2
2
3
3
4
4
5
6
7
8
9
10
11
12
13
14
```

Program 42	**Date: 20-01-2023**
Write a program to implement threads by implementing the Runnable interface.	

Code:

```
class Implementthreads implements Runnable
{
   int n;
   Implementthreads(int n)
   {
      this.n = n;
   }
   public void run()
   {
      for (int i = 0; i < n; i++)
      {
         System.out.println(i);
         try
         {
            Thread.sleep(1000);
         } catch (InterruptedException e)
         {
            System.out.println("Something went Wrong " + e.getMessage());
         }
      }
   }
   public static void main(String[] args) {
      Implementthreads s1 = new Implementthreads(4);
      Implementthreads s2 = new Implementthreads(10);
      new Thread(s1).start();
      new Thread(s2).start();
   }
}
```

Output:

```
E:\Java>javac Implementthreads.java

E:\Java>java Implementthreads
0
0
1
1
2
2
3
3
4
5
6
7
8
9
```

Program 43	**Date: 20-01-2023**
Write a program to implement Synchronization using inter-thread communication.	

Code:

```
class Stud
{
	void print(int n)
	{
		for(int i=0;i<n;i++)
		{
			System.out.println(i);
		}
	}
}
class Thread1 extends Thread
{
	Stud s;
	Thread1(Stud s)
	{
		this.s=s;
	}
	public void run()
	{
		s.print(5);
	}
}
class Thread2 extends Thread
{
	Stud s;
	Thread2(Stud s)
	{
		this.s=s;
	}
	public void run()
	{

		s.print(8);
	}
}
class Thread3 extends Thread
{
	Stud s;
	Thread3(Stud s)
	{
		this.s=s;
```

```
        }
        public void run()
        {
                s.print(6);
        }
}
public class Exam2
{
        public static void main(String[] args)
        {
                Stud obj=new Stud();
                Thread1 t=new Thread1(obj);
                Thread2 t1=new Thread2(obj);
                Thread3 t2=new Thread3(obj);
                t.start();
                t1.start();
                t2.start();
        }
}
```

Output:

```
E:\Java>javac Itc.java

E:\Java>java Itc
0
1
2
0
1
2
3
4
5
6
7
8
0
1
2
3
4
5
```

Program 44	**Date: 20-01-2023**
Implement the Producer- Consumer Problem, using Threads.	

Code:

```
public class ProducerConsumerTest {
  public static void main(String[] args) {
    Container c = new Container();
    Producer p1 = new Producer(c, 1);
    Consumer c1 = new Consumer(c, 1);
    p1.start();
    c1.start();
  }
}
class Container {
  private int contents;
  private boolean available = false;

  public synchronized int get() {
    while (available == false) {
      try {
        wait();
      } catch (InterruptedException e) {}
    }
    available = false;
    notifyAll();
    return contents;
  }
  public synchronized void put(int value) {
    while (available == true) {
      try {
        wait();
      } catch (InterruptedException e) { }
    }
    contents = value;
    available = true;
    notifyAll();
  }
}
class Consumer extends Thread {
  private Container con;
  private int number;

  public Consumer(Container c, int number) {
    con = c;
    this.number = number;
```

```
    }
    public void run() {
      int value = 0;
      for (int i = 1; i < 10; i++) {
        value = con.get();
        System.out.println("Consumer #" + this.number + " got: " + value);
      }
    }
}
class Producer extends Thread {
    private Container con;
    private int number;
    public Producer(Container c, int number) {
      con = c;
      this.number = number;
    }
    public void run() {
      for (int i = 0; i < 10; i++) {
        con.put(i);
        System.out.println("Producer #" + this.number + " put: " + i);
      }
    }
}
```

Output:

```
E:\Java>javac ProducerConsumerTest.java

E:\Java>java ProducerConsumerTest
Consumer #1 got: 0
Producer #1 put: 0
Producer #1 put: 1
Consumer #1 got: 1
Producer #1 put: 2
Consumer #1 got: 2
Consumer #1 got: 3
Producer #1 put: 3
Producer #1 put: 4
Consumer #1 got: 4
Consumer #1 got: 5
Producer #1 put: 5
Producer #1 put: 6
Consumer #1 got: 6
Producer #1 put: 7
Consumer #1 got: 7
Consumer #1 got: 8
Producer #1 put: 8
Producer #1 put: 9
```

Program 45 **Date: 25-01-2023**

Write a program to display the contents of a directory by displaying the subdirectory's name first, then the file names.

Code:

```
import java.io.*;
class Contents
{
	public void set(File[] a,int i,int lvl)
	{
		if(i == a.length)
		{
			return;
		}
		for(int j=0;j<lvl;j++)
		{
			System.out.println("\t");
		}
		if(a[i].isFile())
		{
			System.out.println(a[i].getName());
		}
		else if(a[i].isDirectory())
		{
			System.out.println("[" +a[i].getName() + "]");
			set(a[i].listFiles(),0,lvl+1);
		}

		set(a,i+1,0);
	}

	public static void main(String[] args)
	{
		String st = "P:\\CAE 2";

		File fi = new File(st);

		Contents cs = new Contents();

		if(fi.exists() && fi.isDirectory())
		{
			File a[] = fi.listFiles();
			System.out.println("Files are:" +fi);

			cs.set(a,0,0);
```

```
                }
        }
}
```

Output:

```
D:\Java>javac Contents.java

D:\Java>java Contents
Files are:P:\CAE 2
Module 3,4,5.pdf
```

Program 46	**Date: 25-01-2023**
Write a program to search for a given file name in a directory	

Code:

```
import java.io.*;
import java.util.Scanner;
class Search implements FilenameFilter
{
	String name;
	public Search(String name)
	{
		this.name = name;
	}
	public boolean accept(File dir, String name1)
	{
		return name1.startsWith(name);
	}
}
 class Sear {

	public static void main(String[] args)
	{
	Scanner in=new Scanner(System.in);
	System.out.println("Enter the path");
		File directory = new File(in.nextLine());
	System.out.println("Enter the name of file with extension");
		Search filter= new Search(in.nextLine());
		String[] flist = directory.list(filter);
		if (flist == null)
	{
System.out.println("Empty directory or directory does not exists.");
		}
		else
	{
			for (int i = 0; i < flist.length; i++)
	{
				System.out.println(flist[i]+" found");
			}
		}
	}
}
```

Output:

```
D:\Java>javac Sear.java

D:\Java>java Sear
Enter the path
p:\\CAE 2
Enter the name of file with extension
Module 3,4,5.pdf
Module 3,4,5.pdf found
```

Program 47	**Date: 25-01-2023**
Write a program to search for a given string in a file.	

Code:

```
import java.io.File;
import java.io.FileInputStream;
import java.io.FileOutputStream;
import java.io.IOException;
import java.util.Scanner;

public class Searchst {
   static Scanner sc = new Scanner(System.in);
   public static void main(String[] args) throws IOException {
      File f = new File("test.txt");
      if(!f.exists()){
         FileOutputStream fos = new FileOutputStream("test.txt");
         String message = "Computer Science";
         fos.write(message.getBytes());
         fos.close();
      }
      FileInputStream fis = new FileInputStream("test.txt");
      String content = new String(fis.readAllBytes());
      if(content.contains("is")){
         System.out.println("Word is found");
      }else{
         System.out.println("Word not found");
      }
      System.out.println("Total Characters in the file is "+f.length());
   }
}
```

Output:

```
D:\Java>javac Searchst.java

D:\Java>java Searchst
Word not found
Total Characters in the file is 16
```

Program 48	**Date: 25-01-2023**
Write a program to find the number of characters, number of words and number of lines in a given file	

Code:

```
import java.io.File;
import java.io.FileInputStream;
import java.io.FileOutputStream;
import java.io.IOException;

public class CFile{
   public static void main(String[] args) throws IOException {
      File f1 = new File("sample.txt");
      File f2 = new File("final.txt");
      if(!f2.exists()){
         f2.createNewFile();
      }

      FileInputStream fis = new FileInputStream(f1);
      FileOutputStream fos = new FileOutputStream(f2);

      byte[] f1_data = fis.readAllBytes();

      fos.write(f1_data);

      fis.close();
      fos.close();
   }
}
```

Output:

```
D:\Java>javac CFile.java

D:\Java>java CFile
The number of lines in the file is 1
Number of Characters : 16
Total Number of Words: 2
```

Program 49	**Date: 25-01-2023**
Write a program to accept two filenames, copy the content from the first file to the second file	

Code:

```
import java.io.*;
import java.util.*;

public class Copy
{
        public static void copyContent(File a, File b)
            throws Exception
        {
            FileInputStream in = new FileInputStream(a);
            FileOutputStream out = new FileOutputStream(b);

            try {

                    int n;

                    // read() function to read the
                    // byte of data
                    while ((n = in.read()) != -1) {
                            // write() function to write
                            // the byte of data
                            out.write(n);

                    }
            }
            finally {
                    if (in != null) {

                            // close() function to close the
                            // stream
                            in.close();
                    }
                    // close() function to close
                    // the stream
                    if (out != null) {
                            out.close();
                    }
            }
            System.out.println("File Copied");
        }
        public static void main(String[] args) throws Exception
        {
            Scanner sc = new Scanner(System.in);
```

```
            System.out.println("Enter the source filename from where you have to
        read/copy :");
            String a = sc.nextLine();

            // source file
            File x = new File(a);

            // get the destination file name
            System.out.println("Enter the destination filename where you have to
        write/paste :");
            String b = sc.nextLine();

            // destination file
            File y = new File(b);

            // method called to copy the
            // contents from x to y
            copyContent(x, y);
        }
}
```

Output:

```
D:\Java>javac Copy.java

D:\Java>java Copy
Enter the source filename from where you have to read/copy :
P://Files//Dept.txt
Enter the destination filename where you have to write/paste :
P://Files//Name.txt
File Copied
```

Program 50	**Date: 27-01-2023**
Write a menu driven program to demonstrate Random Access File handling, with options for creating, deleting, writing, appending and reading the file.	

Code:

```
import java.io.File;
import java.io.FileNotFoundException;
import java.io.RandomAccessFile;
import java.util.Scanner;

 class Randomfile
 {
   static Scanner sc = new Scanner(System.in);
   static void menu()
   {
      System.out.println("1. Create a File");
      System.out.println("2. Delete a File");
      System.out.println("3. Write a File");
      System.out.println("4. Append to File");
      System.out.println("5. Read File");
      System.out.println("6. Exit");
      System.out.print("Enter your Choice: ");
   }

   RandomAccessFile rf;
   String fileName;

   Randomfile(String fileName){
      try{
         this.fileName = fileName;
         rf = new RandomAccessFile(this.fileName,"rw");
      }catch (FileNotFoundException fnf){
         this.create();
      }
      catch(Exception e){
         System.out.println(e.getMessage());
         System.exit(0);
      }

   }

   void create(){
      try{
         System.out.println("Cresting file "+this.fileName);
         File f = new File(this.fileName);
```

```
            if(f.exists()){
               System.out.println("File with the Name Already Exists!");
            }else{
               if(f.createNewFile()){
                  System.out.println("File Created Successfully!");
               }else{
                  throw new Exception("Error Creating File!");
               }
            }
         }catch(Exception e){
            System.out.println("Error Creating File...");
            System.out.println("Error: "+e.getMessage());
         }
      }

      void delete(){
         try{
            File f = new File(this.fileName);
            rf.close();
            if(f.delete()){
               System.out.println("File Deleted Successfully!");
            }
         }catch (Exception e){
            System.out.println("Something went Wrong");
            System.out.println(e.getMessage());
         }
      }

      void write(){
         System.out.println("Enter the Content to write:");
         sc.nextLine();
         String content = sc.nextLine();
         try{
            this.rf.write(content.getBytes());
            System.out.println("Successfully wrote to File!");
         }catch(Exception e){
            System.out.println("Error Writing file");
            System.out.println(e.getMessage());
         }

      }

      void append(){
         System.out.println("Enter the Contents to Append into File: ");
         sc.nextLine();
         String message = sc.nextLine();
```

```
            try{
               long length = rf.length();
               rf.seek(length);
               rf.write(message.getBytes());
               System.out.println("Append Successful!");
            }catch(Exception e){
               System.out.println("Error Appending File!");
               System.out.println(e.getMessage());
            }
         }

         void read(){
            try{
               String message = rf.readLine();
               System.out.println("Contents of the file are: ");
               System.out.println(message);
            }catch(Exception e){
               System.out.println("Error Reading File!");
               System.out.println(e.getMessage());
            }
         }

         public static void main(String[] args) {
            System.out.print("Enter the Name of the file: ");
            String fileName;
            fileName = sc.nextLine();
            Randomfile obj = new Randomfile(fileName);
            int ch;
            boolean isRunning = true;

            while(isRunning){
               menu();
               ch = sc.nextInt();
               switch(ch){
                  case 1:obj.create();break;
                  case 2:obj.delete();break;
                  case 3:obj.write();break;
                  case 4:obj.append();break;
                  case 5:obj.read();break;
                  case 6:isRunning = false; break;
                  default:System.out.println("Enter a Valid Choice");
               }
            }
         }
      }
```

Output:

```
D:\Java>javac Randomfile.java

D:\Java>java Randomfile
Enter the Name of the file: test
1. Create a File
2. Delete a File
3. Write a File
4. Append to File
5. Read File
6. Exit
Enter your Choice: 1
Cresting file test
File with the Name Already Exists!
1. Create a File
2. Delete a File
3. Write a File
4. Append to File
5. Read File
6. Exit
Enter your Choice: 3
Enter the Content to write:
Java Lab
Successfully wrote to File!
1. Create a File
2. Delete a File
3. Write a File
4. Append to File
5. Read File
6. Exit
Enter your Choice: 4
Enter the Contents to Append into File:
Computer Science
Append Successful!
```

Program 51 **Date: 27-01-2023**

Write a program to implement a Generic method, which can display the elements of various arrays of different data types, and find the length of each array.

Code:

```
class Myclass
{
 public static <T> void display(T[] array)
 {
          for(T t : array)
          {
           System.out.print(t+ " ");
          }
  System.out.println();
  System.out.println("The length of array is "+array.length);
 }
}

class Gen{
public static void main(String[] args)
{
    Integer[ ] arr1 = {10,20,30};
    System.out.println("Integers: ");
    Myclass.display(arr1);

    Double[ ] arr2 = {1.1, 2.2, 3.3};
    System.out.println("Double: ");
    Myclass.display(arr2);

    String[ ] arr3 = {"Hello","How are you"};
    System.out.println("Strings: ");
    Myclass.display(arr3);
  }
}
```

Output:

```
D:\Java>javac Gen.java

D:\Java>java Gen
Integers:
10 20 30
The length of array is 3
Double:
1.1 2.2 3.3
The length of array is 3
Strings:
Hello How are you
The length of array is 2
```

Program 52 **Date: 27-01-2023**

Write a program to implement a Generic class, and display the types of various parameters passed

Code:

```
class GenericClass<T, U>
{
   T ob1;
   U ob2;
   GenericClass(T ob1, U ob2)
   {
      this.ob1 = ob1;
      this.ob2 = ob2;
   }

   public void displayTypes()
   {
      System.out.println("Type of T is " + ob1.getClass().getName());
      System.out.println("Type of U is " + ob2.getClass().getName());
   }
}
class Param
{
   public static void main(String[] args)
   {

      GenericClass<Integer, String> ob
         = new GenericClass<Integer, String>(15, "hello");

      ob.displayTypes();
   }
}
```

Output:

```
D:\Java>javac Param.java

D:\Java>java Param
Type of T is java.lang.Integer
Type of U is java.lang.String
```

Program 53	**Date: 03-02-2023**
Program to implement Serialization and DeSerialization, for an object of Student Class	

Code:

```
import java.io.*;
import java.util.*;
class Student implements Serializable
{
	String name;
	String course;
	int age;
	Student(String name,String course)
	{
		this.name=name;
		this.course=course;
	}
}
class Student1 extends Student{
	int age;
	public Student1(String name,String course,int age)
	{
		super(name,course);
		this.age=age;
	}
}
class Sedes
{
	public static void main(String[] args)throws Exception
	{

			Student1 st=new Student1("Balu","Msc",13);
			FileOutputStream fos=new
FileOutputStream("D:\\Student.ser");
			ObjectOutputStream oos=new ObjectOutputStream(fos);
			oos.writeObject(st);
			oos.close();
			fos.close();

			FileInputStream fis=new FileInputStream("D:\\Student.ser");
			ObjectInputStream ois=new ObjectInputStream(fis);
			Student1 st1=(Student1)ois.readObject();
			ois.close();
			fis.close();
```

```
                System.out.println("Student name is:" +st1.name);
                System.out.println("age:" +st1.age);
                System.out.println("course:" +st1.course);
        }
}
```

Output:

```
D:\Java>javac Sedes.java

D:\Java>java Sedes
Student name is:Balu
age:13
course:Msc
```

Program 54	**Date: 03-02-2023**
Program to implement IS A Serialization and DeSerialization, for a Maruti Car inherited from Vehicle	

Code:

```
import java.io.*;
import java.util.*;
class Vehicle implements Serializable
{
	String name;
	Vehicle(String s)
	{
		name=s;
	}
}
class Car extends Vehicle
{
	String model;
	int number;
	Car(String name,String model,int number)
	{
		super(name);
		this.model=model;
		this.number=number;
	}
}
class Isedes
{
	public static void main(String[] args)throws Exception
	{
		Car c=new Car("Maruthi","VXI", 2314);
		System.out.println("name is:" +c.name);
		System.out.println("model is:" +c.model);
		System.out.println("number is:" +c.number);

		FileOutputStream fos=new FileOutputStream("files.ser");
		ObjectOutputStream oos=new ObjectOutputStream(fos);
		oos.writeObject(c);
		oos.close();
		fos.close();
		System.out.println("Serialized");

		FileInputStream fis=new FileInputStream("files.ser");
		ObjectInputStream ois=new ObjectInputStream(fis);
		Car c1=(Car)ois.readObject();
```

```
                ois.close();
                fis.close();

                System.out.println("Deserialized");
                System.out.println("name is:" +c1.name);
                System.out.println("model is:" +c1.model);
                System.out.println("number is:" +c1.number);
        }
}
```

Output:

```
D:\Java>javac Isedes.java

D:\Java>java Isedes
name is:Maruthi
model is:VXI
number is:2314
Serialized
Deserialized
name is:Maruthi
model is:VXI
number is:2314
```

Program 55	**Date: 03-02-2023**
Write a program to implement HAS-A Serialization and De- Serialization for the Engine of a Vehicle.	

Code:

```
import java.io.*;

class Engine implements Serializable{
   String model;
   int capacity;
   boolean isPetrol;

   public Engine(String model, int capacity, boolean isPetrol) {
      this.model = model;
      this.capacity = capacity;
      this.isPetrol = isPetrol;
   }
}

class Vehicle_New implements Serializable {
   String name;
   Engine eng;

   public Vehicle_New(String name, Engine eng) {
      this.name = name;
      this.eng = eng;
   }

   void getInfo(){
      System.out.println(String.format("Engine %s and name is
%s",eng.model,name));
   }
}

public class Hsedes{
   public static void main(String[] args)throws Exception {
      Engine en = new Engine("XL",30,true);
      Vehicle_New car = new Vehicle_New("Benz Car",en);
      car.getInfo();

      System.out.println("Serializing...");
      FileOutputStream fos = new FileOutputStream("alto.ser");
      ObjectOutputStream oos = new ObjectOutputStream(fos);
      oos.writeObject(car);
      System.out.println("Serialization Successful!");
      oos.close();
```

```
        fos.close();

        System.out.println("DeSerializing...");
        FileInputStream fis = new FileInputStream("alto.ser");
        ObjectInputStream ois = new ObjectInputStream(fis);
        Vehicle_New new_car = (Vehicle_New) ois.readObject();
        System.out.println("DeSerialization Successful!");
        new_car.getInfo();

        ois.close();
        fis.close();
    }
}
```

Output:

```
D:\Java>javac Hsedes.java

D:\Java>java Hsedes
Engine XL and name is Benz Car
Serializing...
Serialization Successful!
DeSerializing...
DeSerialization Successful!
Engine XL and name is Benz Car
```

Program 56	**Date: 03-02-2023**
Write a program to Serialize/De-Serialize selected attributes of an Employee.	

Code:

```
import java.io.*;
import java.util.*;
class Student implements Serializable
{
        String name;
        String dept;
        int age;

}
class Sd
{
        public static void main(String[] args)throws Exception
        {
                Student s = new Student();
                Scanner scn=new Scanner(System.in);
                s.name=scn.nextLine();
                s.dept=scn.nextLine();
                s.age=scn.nextInt();

                System.out.println("Name is:" +s.name);
                System.out.println("Age is:" +s.age);
                System.out.println("Dept is:" +s.dept);

                FileOutputStream fos=new FileOutputStream("file5.ser");
                ObjectOutputStream oos=new ObjectOutputStream(fos);
                oos.writeObject(s);
                oos.close();
                fos.close();


                System.out.println("Serialized");

                FileInputStream fis=new FileInputStream("file5.ser");
                ObjectInputStream ois=new ObjectInputStream(fis);
                Student s1=(Student)ois.readObject();
                ois.close();
                fis.close();

                System.out.println("Deserialized");

                System.out.println("Name is:" +s1.name);
```

```
                System.out.println("Dept is:" +s1.dept);
        }
}
```

Output:

```
D:\Java>javac Sd.java

D:\Java>java Sd
Balu
cs
13
Name is:Balu
Age is:13
Dept is:cs
Serialized
Deserialized
Name is:Balu
Dept is:cs
```

Program 57	**Date: 08-02-2023**
Write a program to implement various methods of a StringBuffer class.	

Code:

```
import java.util.*;
class Pgm_13_1
{
   public static void main(String args[])
   {
      int ch=0;
      Scanner in=new Scanner(System.in);
      System.out.println("Enter the value:");
      String value=in.next();
      StringBuffer sb=new StringBuffer(value);
      while(ch!=8)
      {
      System.out.println("1.Show");
      System.out.println("2.Append");
      System.out.println("3.Insert");
      System.out.println("4.Replace");
      System.out.println("5.Delete");
      System.out.println("6.Reverse");
      System.out.println("7.Capacity ");
      System.out.println("8.Exit ");
      System.out.println("Enter your option:");
      ch=in.nextInt();
      switch(ch)
      {
         case 1:
               System.out.println(sb);
               break;
         case 2:
               System.out.println("Enter the value to append:");
               sb.append(in.next());
               System.out.println(sb);
               break;
         case 3: System.out.println("Enter the value to insert:");
               String v1=in.next();
               System.out.println("Enter the position:");
               int position=in.nextInt();
               sb.insert(position,v1);
               System.out.println(sb);
               break;
         case 4: System.out.print("Ente the value to replace:");
               String v2=in.next();
```

```
                    System.out.println("Enter the beginning position and ending position:");
                    int position1=in.nextInt();
                    int position2=in.nextInt();
                    sb.replace(position1, position2, v2);
                    System.out.println(sb);
                    break;
                case 5: System.out.println("Enter the beginning position and ending position
to delete:");
                    position1=in.nextInt();
                    position2=in.nextInt();
                    sb.delete(position1, position2);
                    System.out.println(sb);
                    break;
                case 6: System.out.println(sb.reverse());
                    break;
                case 7: System.out.println(sb.capacity());
                    break;
                case 8: break;
                default: System.out.println("Worong option");
            }
            }
            in.close();
        }
    }
```

Output:

```
D:\Java>javac Strbuffer.java

D:\Java>java Strbuffer
Enter the value:
5
1.Show
2.Append
3.Insert
4.Replace
5.Delete
6.Reverse
7.Capacity
8.Exit
Enter your option:
3
Enter the value to insert:
10
Enter the position:
1
510
1.Show
2.Append
3.Insert
4.Replace
5.Delete
6.Reverse
7.Capacity
8.Exit
Enter your option:
1
510
1.Show
2.Append
3.Insert
4.Replace
5.Delete
6.Reverse
7.Capacity
8.Exit
Enter your option:
1
510
```

Program 58	**Date: 08-02-2023**
Write a program to implement communication between a client and server via Socket Programming	

Code:

```
import java.io.*;
import java.net.*;
class Myclient
{
   public static void main(String[] args)
   {
      try
      {
         Socket s=new Socket("localhost",6666);
         DataOutputStream dout=new DataOutputStream(s.getOutputStream());//write
to an output source
         dout.writeUTF("fine");
         DataInputStream dis=new DataInputStream(s.getInputStream());
         String  str=(String)dis.readUTF();
         System.out.println("message: "+str);
         dout.flush();
         dout.close();
         s.close();
      }
      catch(Exception e)
      {
         System.out.println(e);
      }
   }
}
```

```
import java.io.*;
import java.net.*;
public class Server {
public static void main(String[] args){
try{
ServerSocket ss=new ServerSocket(6666);
Socket s=ss.accept();//establishes connection
DataInputStream dis=new DataInputStream(s.getInputStream()); //to read data from
client
DataOutputStream dout=new DataOutputStream(s.getOutputStream());
String  str=(String)dis.readUTF();
if(str !=null)
{
```

```
System.out.println("message: "+str);
dout.writeUTF("How are you");
}
ss.close();
}catch(Exception e){System.out.println(e);}
}
}
```

Output:

```
E:\Java>javac Myclient.java

E:\Java>java Myclient
message: How are you
```

```
E:\Java>javac Server.java

E:\Java>java Server
message: fine
```

Program 59	**Date: 15-02-2023**
Write a program to implement one-one chatting using the TCP protocol	

Code:

```
import java.io.*;
import java.net.*;
import java.util.*;
public class Soccli
{
	public static void main(String[] args)
	{
		try
		{
		Socket s=new Socket("localhost",4444);
		Scanner dis=new Scanner(System.in); //read from keyboard
		DataInputStream di=new DataInputStream(s.getInputStream());
		DataOutputStream dos=new DataOutputStream(s.getOutputStream());
		String str;
		while(true)
		{
			dos.writeUTF("hai");
			str=di.readUTF();
			if(str.equals("bye"))
				break;
			System.out.println("Server says " + str);

			System.out.println("Enter data for server");
			str= dis.nextLine();
			dos.writeUTF(str);
			if(str.equals("bye"))
				break;
		}
		s.close();
		}catch(Exception e)
		{
			System.out.println(e);
		}
	}
}

import java.io.*;
import java.net.*;
import java.util.*;
public class Socser
{
```

```
	public static void main(String[] args)
	{
		try
		{
		ServerSocket ss=new ServerSocket(4444);
		Socket s=ss.accept();
		Scanner din=new Scanner(System.in); //read from keyboard
		DataInputStream dins=new DataInputStream(s.getInputStream());
		DataOutputStream dout=new DataOutputStream(s.getOutputStream());
		String str;

		while(true)
		{
			str=dins.readUTF();
			System.out.println("Client says " +str);
			if(str.equals("bye"))
				break;
			System.out.println("Enter msg for client");
			str=din.nextLine();
			dout.writeUTF(str);
			if(str.equals("bye"))
				break;

		}
		ss.close();
		}catch(Exception e)
		{
			System.out.println(e);
		}
	}
}
```

Output:

```
E:\Java>javac Soccli.java

E:\Java>java Soccli
Server says hello
Enter data for server
how r you?
Server says fine
Enter data for server
bye
```

```
E:\Java>javac Socser.java

E:\Java>java Socser
Client says hai
Enter msg for client
hello
Client says how r you?
Enter msg for client
fine
Client says hai
Enter msg for client
```

Program 60	**Date: 15-02-2023**
Write a program to implement public chatting.	

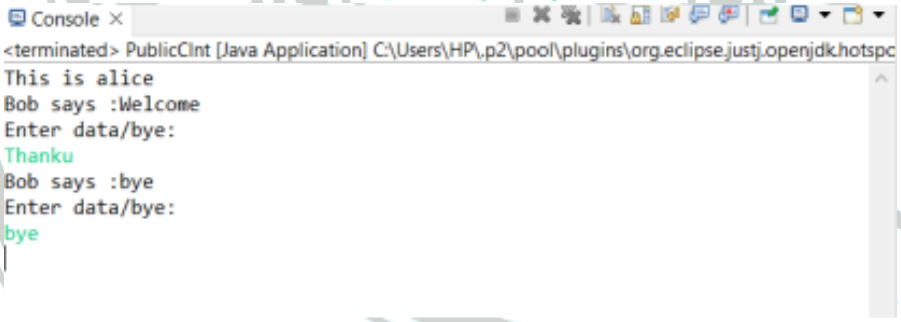
Code:

```
import java.net.*;
import java.io.*;
import java.util.*;

public class GroupChat
{
	private static final String TERMINATE = "Exit";
	static String name;
	static volatile boolean finished = false;
	public static void main(String[] args)
	{
		if (args.length != 2)
			System.out.println("Two arguments required: <multicast-host>
<port-number>");
		else
		{
			try
			{
				InetAddress group = InetAddress.getByName(args[0]);
				int port = Integer.parseInt(args[1]);
				Scanner sc = new Scanner(System.in);
				System.out.print("Enter your name: ");
				name = sc.nextLine();
				MulticastSocket socket = new MulticastSocket(port);

				// Since we are deploying
				socket.setTimeToLive(0);
				//this on localhost only (For a subnet set it as 1)

				socket.joinGroup(group);
				Thread t = new Thread(new
				ReadThread(socket,group,port));

				// Spawn a thread for reading messages
				t.start();

				// sent to the current group
				System.out.println("Start typing messages...\n");
				while(true)
				{
					String message;
```

```
                                        message = sc.nextLine();

        if(message.equalsIgnoreCase(GroupChat.TERMINATE))
                                        {
                                                finished = true;
                                                socket.leaveGroup(group);
                                                socket.close();
                                                break;
                                        }
                                        message = name + ": " + message;
                                        byte[] buffer = message.getBytes();
                                        DatagramPacket datagram = new
        DatagramPacket(buffer,buffer.length,group,port);
                                        socket.send(datagram);
                                    }
                                }
                                catch(SocketException se)
                                {
                                        System.out.println("Error creating socket");
                                        se.printStackTrace();
                                }
                                catch(IOException ie)
                                {
                                        System.out.println("Error reading/writing from/to
socket");
                                        ie.printStackTrace();
                                }
                        }
                }
        }
        class ReadThread implements Runnable
        {
                private MulticastSocket socket;
                private InetAddress group;
                private int port;
                private static final int MAX_LEN = 1000;
                ReadThread(MulticastSocket socket,InetAddress group,int port)
                {
                        this.socket = socket;
                        this.group = group;
                        this.port = port;
                }

                @Override
                public void run()
                {
```

```
                while(!GroupChat.finished)
                {
                        byte[] buffer = new byte[ReadThread.MAX_LEN];
                        DatagramPacket datagram = new
                        DatagramPacket(buffer,buffer.length,group,port);
                        String message;
                    try
                    {
                        socket.receive(datagram);
                        message = new
                        String(buffer,0,datagram.getLength(),"UTF-8");
                        if(!message.startsWith(GroupChat.name))
                            System.out.println(message);
                    }
                    catch(IOException e)
                    {
                        System.out.println("Socket closed!");
                    }
                }
            }
}
```

Output:



Program 61	**Date: 17-02-2023**
Write a program to get the protocol, file name, host, path and port of a given URL.	

Code:

```
import java.io.IOException;
import java.io.InputStream;
import java.net.URL;
import java.net.URLConnection;

public class Details {
   public static void main(String[] args) throws IOException {
      URL u = new URL("https://github.com/openai/chatgpt-retrieval-plugin");
      URLConnection uc = u.openConnection();
      System.out.println("Protocol is "+u.getProtocol());
      System.out.println("File Name: "+u.getFile());
      System.out.println("Host is: "+u.getHost());
      System.out.println("Path is "+u.getPath());
      System.out.println("Port is "+u.getDefaultPort());
         }
}
```

Output:

```
D:\Java>javac Details.java

D:\Java>java Details
Protocol is https
File Name: /openai/chatgpt-retrieval-plugin
Host is: github.com
Path is /openai/chatgpt-retrieval-plugin
Port is 443
```

Program 62	**Date: 17-02-2023**
Write a program to download a file from a given URL	

Code:

```
package db_package;
import java.net.*;
import java.util.Scanner;
import java.io.*;

public class FileDownURL
{
public static void main(String[] args)
{
        try
        {
                Scanner sc = new Scanner(System.in);
                System.out.println ("Enter the url to download: ");
                String link = sc.nextLine();
                URL u = new URL(link);
                String s = u.getFile();
                String ext = s.substring(s.indexOf(".") + 1);
                System.out.println ("File type: "+ext);
                InputStream is = u.openStream();
        FileOutputStream os = new FileOutputStream("E:\\URL\\URLsample.pdf");
                int l;
                byte[] b = new byte[2048];
                while ((l=is.read(b))!=-1)
                {
                        os.write(b,0,l);
                }
                System.out.println ("File written");
        }
        catch (Exception e) { System.out.println(e); }
}
}
```

Ouput:

```
<terminated> FileDownURL [Java Application] C:\Program Files\Java\jdk-18\bin\javaw.exe (22-Ma
Enter the url to download:
https://www.africau.edu/images/default/sample.pdf
File type: pdf
File written
```

Program 63	**Date: 17-02-2023**
Implement Two- way Communication using UDP Protocol.	

Code:

```
import java.io.IOException;
import java.net.*;

public class UDPTwoWayCli
{
        public static void main String[] args) throws IOException
        {
                int i = 10;
                byte[] b = (String.valueOf(i)).getBytes();
                DatagramSocket ds = new DatagramSocket();
                InetAddress my = InetAddress.getLocalHost();
DatagramPacket dp =  new DatagramPacket(b,b.length,my,1520);
                ds.send(dp);
                System.out.println ("Data is sent");
                DatagramSocket ds1 = new DatagramSocket(1750);
                byte [] b2 = new byte[2048];
                DatagramPacket dp1 = new DatagramPacket(b2,b2.length);
                ds1.receive(dp1);
                System.out.println("Data is received again");
                String str2 = new String(dp1.getData());
                int num  = Integer.parseInt(str2.trim());
                int sq = num*num;
                System.out.println("Data2 is "+sq);//display 11^2=121
        }
}


import java.io.IOException;
import java.net.*;

public class UDPTwoWaySer
{
        public static void main(String[] args) throws IOException
        {
                byte[] b1 = new byte[2048];
                DatagramSocket ds = new DatagramSocket(1520);
                DatagramPacket dp = new DatagramPacket(b1,b1.length);
                ds.receive(dp);
                String str = new String(dp.getData());
                int num = Integer.parseInt(str.trim());
                num++;
```

```
                System.out.println ("Data 1 is " +num);
                byte[] b = (String.valueOf(num)).getBytes();
                InetAddress my = InetAddress.getLocalHost();
                DatagramPacket dp1 = new DatagramPacket(b,b.length,my,1750);
                ds.send(dp1);
                System.out.println("Data is sent again");
        }

}
```

Output:

```
E:\Java>javac UDPClient.java

E:\Java>java UDPClient
Data is sent
```

```
E:\Java>javac UDPServer.java

E:\Java>java UDPServer
Data is sent
```

Program 64	**Date: 22-02-2023**
Write a program to create a table Citizen(Id(Primary), Name, age, address, DOB), insert records, and display the records	

Code:

```
package lab;

import java.sql.*;

public class Citizen {

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

			Class.forName("oracle.jdbc.driver.OracleDriver");

			java.sql.Connection con=
DriverManager.getConnection("jdbc:oracle:thin:@localhost:1521:orcl","hr"," A121619_a");

			Statement stmt=con.createStatement();

			ResultSet rs=stmt.executeQuery("select * from Citizen");

			while(rs.next()) {

			System.out.println(rs.getString(1)+" "+rs.getString(2)+"
"+rs.getInt(3)+" "+rs.getString(4)+" "+rs.getString(5));

			}

			System.out.println("done");

			con.close();

			}catch(Exception e){ System.out.println(e);}
	}

}
```

Output:

```
S1 Balu 24 Ernakulam -1977
S2 Anu 22 Ernakulam -1987
done
```

Program 65	**Date: 22-02-2023**
Assume that login is a table which has Uname, Upass. Check whether a record with "Uname=”Bob” and “UPass=”Alice123#”is present in the table.	

Code:

```
package cw;

import java.sql.Connection;
import java.sql.DriverManager;
import java.sql.SQLException;
import java.sql.Statement;
import java.util.Scanner;

public class Pro_002 {
	static Scanner sc = new Scanner(System.in);
	public static void main(String[] args) {
		// TODO Auto-generated method stub
		try (Connection conn =
DriverManager.getConnection("jdbc:oracle:thin:@localhost:1521:orcl", "hr", "
A121619_a");
				Statement st = conn.createStatement();) {
			Class.forName("oracle.jdbc.driver.OracleDriver");
			String uname;
			String upass;

			System.out.println("Enter the Username: ");
			uname = sc.nextLine();

			System.out.println("Enter the Password: ");
			upass = sc.nextLine();

			String s = String.format("SELECT * FROM login where
uname='%s' and upass='%s'",uname,upass);
			int res = st.executeUpdate(s);

			if(res > 0) {
				System.out.println("Login Successful");

			}else {
				System.out.println("Invalid Credentials");
			}
		} catch (SQLException se) {
			System.out.println(se.getMessage());

		} catch (Exception e) {
			System.out.println(e.getMessage());
```

```
            }
        }
}
```

Output:

```
SQL> select * from login;

UNAME           UPASS
--------------- --------------------
Bob             Alice123#
```

```
Enter the Username:
Bob
Enter the Password:
Alice123#
Login Successful
```

Program 66	**Date: 24-02-2023**

Construct the following tables:
Department (dno(Primary), dname, dloc)
Emp (eno(Primary), ename, esal ,dno(Foreign))

Code:

```
package cw;

import java.sql.Connection;
import java.sql.DriverManager;
import java.sql.SQLException;
import java.sql.Statement;

public class Pro_003 {

	public static void main(String[] args) {
		// TODO Auto-generated method stub
		try (Connection conn =
DriverManager.getConnection("jdbc:oracle:thin:@localhost:1521:orcl", "hr", "
A121619_a");
				Statement st = conn.createStatement();) {
			Class.forName("oracle.jdbc.driver.OracleDriver");

			System.out.println("Quering...");
			boolean res = st.execute("CREATE TABLE Department(dno
number primary key,dname varchar(10),dloc varchar2(25))");
			if (res) {
			System.out.println("Department Table Created Successfully!");
			}

			res = st.execute("CREATE TABLE EMP(eno number primary
key,ename varchar(10),esal float,dno number references Department(dno))");
			if (res) {
			System.out.println("Employee Table Created Successfully!");
			}

			String deps[] = { "CS", "BCom", "Lib", "Stat", "MSW" };
			for (int i = 0; i < deps.length; i++) {
			String q = String.format("INSERT INTO Department
VALUES(%d,'%s','%s')", i+1,deps[i],"RCSS");
				System.out.println(q);
				st.executeUpdate(q);
			}

			System.out.println("Departments Added Successfully");
```

```
                    String emps[] = {"A","B","C","D","E"};
                    for (int i = 0; i < emps.length; i++) {
                    String q = String.format("INSERT INTO EMP
VALUES(%d,'%s',%f,%d)", i+1,emps[i],(float)100*(i+1),i+1);
                        System.out.println(q);
                        st.executeUpdate(q);
                    }

                    System.out.println("Employees Added Successfully");

                    System.out.println("Done");
                } catch (SQLException se) {
                    System.out.println(se.getMessage());

                } catch (Exception e) {
                    System.out.println(e.getMessage());
                }
        }
}
```

Output:

```
Quering...
INSERT INTO Department VALUES(1,'CS','RCSS')
INSERT INTO Department VALUES(2,'BCom','RCSS')
INSERT INTO Department VALUES(3,'Lib','RCSS')
INSERT INTO Department VALUES(4,'Stat','RCSS')
INSERT INTO Department VALUES(5,'MSW','RCSS')
Departments Added Successfully
INSERT INTO EMP VALUES(1,'A',100.000000,1)
INSERT INTO EMP VALUES(2,'B',200.000000,2)
INSERT INTO EMP VALUES(3,'C',300.000000,3)
INSERT INTO EMP VALUES(4,'D',400.000000,4)
INSERT INTO EMP VALUES(5,'E',500.000000,5)
Employees Added Successfully
Done
```

```
SQL> select * from department;

       DNO DNAME      DLOC
---------- ---------- -------------------------
         1 CS         RCSS
         2 BCom       RCSS
         3 Lib        RCSS
         4 Stat       RCSS
         5 MSW        RCSS

SQL> select * from emp;

       ENO ENAME            ESAL        DNO
---------- ---------- ---------- ----------
         1 A                 100          1
         2 B                 200          2
         3 C                 300          3
         4 D                 400          4
         5 E                 500          5
```

Program 67				**Date: 24-02-2023**
Write a program for displaying information in the following order:				
eno	**ename**	**esal**	**dname**	**dloc**
101	**Rani**	**10,000**	**MCA**	**Kochi**
102	**Vani**	**20,000**	**MSW**	**Delhi**

Code:

```
package cw;

import java.sql.Connection;
import java.sql.DriverManager;
import java.sql.ResultSet;
import java.sql.SQLException;
import java.sql.Statement;

public class Pro_004 {
	public static void main(String[] args) {
		// TODO Auto-generated method stub
		try (Connection conn =
DriverManager.getConnection("jdbc:oracle:thin:@localhost:1521:orcl", "hr", "
A121619_a");
				Statement st = conn.createStatement();) {
			Class.forName("oracle.jdbc.driver.OracleDriver");

			ResultSet rs = st.executeQuery(
					"select e.eno,e.ename,e.esal,d.dname,d.dloc
from emp e inner join department d on d.dno=e.dno");
			System.out.println("eno ename esal dname dloc");
			while (rs.next()) {
				System.out.println(rs.getInt(1) + " " + rs.getString(2) +
" " + rs.getDouble(3) + " " + rs.getString(4)
						+ " " + rs.getString(5));
			}
			System.out.println("Done");
		} catch (SQLException se) {
			System.out.println(se.getMessage());

		} catch (Exception e) {
			System.out.println(e.getMessage());
		}
	}
}
```

Output:

```
eno ename esal dname dloc
1 A 100.0 CS RCSS
2 B 200.0 BCom RCSS
3 C 300.0 Lib RCSS
4 D 400.0 Stat RCSS
5 E 500.0 MSW RCSS
Done
```

Program 68	**Date: 01-03-2023**
Write a JDBC program with Parameterized queries to update a given record (Rani's salary to 15,000) in the Emp table.	

Code:

```
package cw;

import java.sql.Connection;
import java.sql.DriverManager;
import java.sql.SQLException;
import java.sql.Statement;
import java.util.Scanner;

public class Pro_005 {
	static Scanner sc = new Scanner(System.in);
	public static void main(String[] args) {
		// TODO Auto-generated method stub
		try (Connection conn =
DriverManager.getConnection("jdbc:oracle:thin:@localhost:1521:xe", "hr", "
A121619_a");
					Statement st = conn.createStatement();) {
				Class.forName("oracle.jdbc.driver.OracleDriver");

				double salary = 15000;
				String name = "Rani";
				int rs = st.executeUpdate("Update emp set esal="+salary+"
where ename='"+name+"'");
				if(rs > 0) {
					System.out.println("Done");
				}
		} catch (SQLException se) {
				System.out.println(se.getMessage());

		} catch (Exception e) {
				System.out.println(e.getMessage());
		}
	}
}
```

Output:

```
SQL> select * from emp;

       ENO ENAME            ESAL        DNO
---------- ---------- ---------- ----------
         1 A                 100          1
         2 B                 200          2
         3 C                 300          3
         4 D                 400          4
         5 E                 500          5
         6 Rani            10000          2

6 rows selected.
```

```
Pro_005 [Java Application] C:\Pr
Done
```

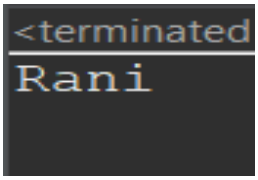
```
SQL> select * from emp;

       ENO ENAME            ESAL        DNO
---------- ---------- ---------- ----------
         1 A                 100          1
         2 B                 200          2
         3 C                 300          3
         4 D                 400          4
         5 E                 500          5
         6 Rani            15000          2

6 rows selected.
```

Program 69	**Date: 01-03-2023**
Write a JDBC program with Parameterized queries to list the records of the Emp table which has records whose names start with the alphabet "R".	

Code:

```
package cw;

import java.sql.Connection;
import java.sql.DriverManager;
import java.sql.ResultSet;
import java.sql.SQLException;
import java.sql.Statement;
import java.util.Scanner;

public class Pro_006 {
	static Scanner sc = new Scanner(System.in);
	public static void main(String[] args) {
		// TODO Auto-generated method stub
		try (Connection conn =
DriverManager.getConnection("jdbc:oracle:thin:@localhost:1521:xe", "hr", "
A121619_a");
					Statement st = conn.createStatement();) {
				Class.forName("oracle.jdbc.driver.OracleDriver");

				ResultSet rs = st.executeQuery("SELECT * FROM EMP
WHERE ENAME like'R%'");
				while(rs.next()) {
					System.out.println(rs.getString(2));
				}
		} catch (SQLException se) {
			System.out.println(se.getMessage());

		} catch (Exception e) {
			System.out.println(e.getMessage());
		}
	}
}
```

Output:



Program 70 **Date: 01-03-2023**

Write a JDBC program with PreparedStatement to delete the records of the Emp table which has records whose salary is less than 10,000.

Code:

```
package db_package;
import java.sql.*;
import java.util.Scanner;
public class EmpPara3
{
public static void main(String[] args)
{
        try
        {
                Scanner sc = new Scanner(System.in);
                Class.forName("oracle.jdbc.driver.OracleDriver");
                Connection con = DriverManager.getConnection
("jdbc:oracle:thin:@localhost:1521:orcl","hr","hr");
                PreparedStatement stmt = con.prepareStatement("delete from
Employee1 where esal<=15000");
                int l = stmt.executeUpdate();
                System.out.println(l+" row(s) updated");
                System.out.println("Records Deleted");
                con.close();
        }
        catch(Exception e) { System.out.println(e); }
        }
}
```

Output:

```
SQL> select *from Employee1;

ENO   ENAME                                ESAL DNUM
----- ------------------------------ ---------- -----
2     VANI                                20000 102
```

Program 71	**Date: 03-03-2023**
Implement a JDBC program which uses a Stored Procedure to insert records into the Department table.	

SQL:

```
create or replace procedure "EMPINSERT3"
 (dno IN varchar2,dname IN varchar2)
 is
 begin
 insert into Dept values(dno,dname);
 end;
 /
```

Code:

```
package dbprg;

import java.sql.*;

import java.io.*;

import java.util.*;

public class InsrtDept

{

        public static void main(String[] args)

        {

                try

                {

                        Class.forName("oracle.jdbc.driver.OracleDriver");

                        Connection con = DriverManager.getConnection
("jdbc:oracle:thin:@localHost:1521:orcl","hr"," A121619_a");

                        CallableStatement cs=con.prepareCall("{call
EMPINSERT3(?,?)}");

                        cs.setString(1,"103");

                        cs.setString(2,"Ammu");

                        cs.executeUpdate();

                         System.out.println("Value inserted");

                        con.close();

                }
```

```
                catch (ClassNotFoundException a)
                {
                        System.out.println( "ERROR"+a);
                }
                catch(SQLException e)
                {
                        System.out.println( "ERROR"+e);
                }
        }
}
```

Output:

```
SQL> create or replace procedure "EMPINSERT3"
  2     (id IN varchar2,name IN varchar2)
  3      is
  4      begin
  5      insert into dept values(id,name);
  6       end;
  7      /

Procedure created.
```

```
<terminated> Procedure_dept [Java Application] C:\Users\linta\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jre.ful
Value inserted
```

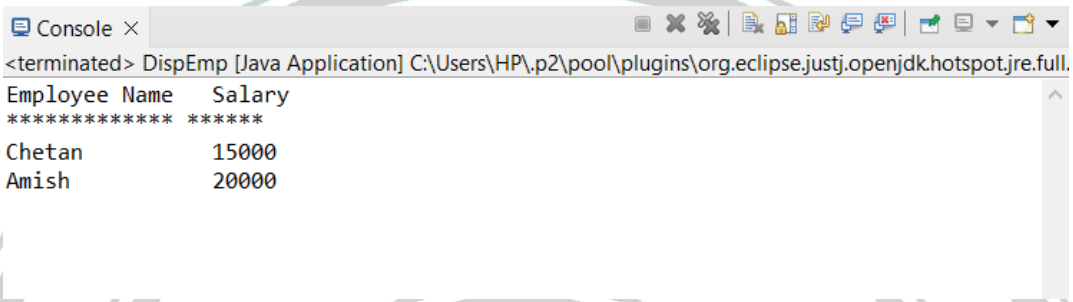
Program 72	**Date: 03-03-2023**
Use Callable statement to implement a Stored Procedure to display the Ename and Salary of all employees.	

Code:

```
package dbprg;
import java.sql.*;
import java.util.*;

public class DispEmp
 {
        public static void main(String[] args)
{
                try
{
                        Class.forName("oracle.jdbc.driver.OracleDriver");
                        Connection con=
DriverManager.getConnection("jdbc:oracle:thin:@localhost:1521:orcl","hr",”
A121619_a");
                        CallableStatement cs = con.prepareCall("{call
DispEmp(?,?,?)}");
                        Statement stmt = con.createStatement();
                        ResultSet rs =stmt.executeQuery("select * from Employee2");
                        System.out.println("Employee Name\tSalary");
                        System.out.println("************** ******");
                        while(rs.next())
                        {
                                Scanner sc = new Scanner(System.in);
                                int id = rs.getInt(1);
                                cs.registerOutParameter(1, java.sql.Types.VARCHAR);
                                cs.registerOutParameter(2, java.sql.Types.NUMERIC);
                                cs.setInt(3, id);
                                cs.executeUpdate();
                                String name = cs.getString(1);
                                String salary = cs.getString(2);
                                System.out.println(name+"\t\t"+salary);
                        }
}
                catch(Exception e)
                {
                        System.out.println("error "+e);
                }
}
}
```

Output:

```
SQL> create or replace procedure DispEmp(name out varchar2 ,sal out number,no in number)
  2  is
  3  begin
  4  select ename,esal into name,sal from Employee2 where eno=no;
  5  end;
  6  /

Procedure created.
```



Program 73 **Date: 03-03-2023**

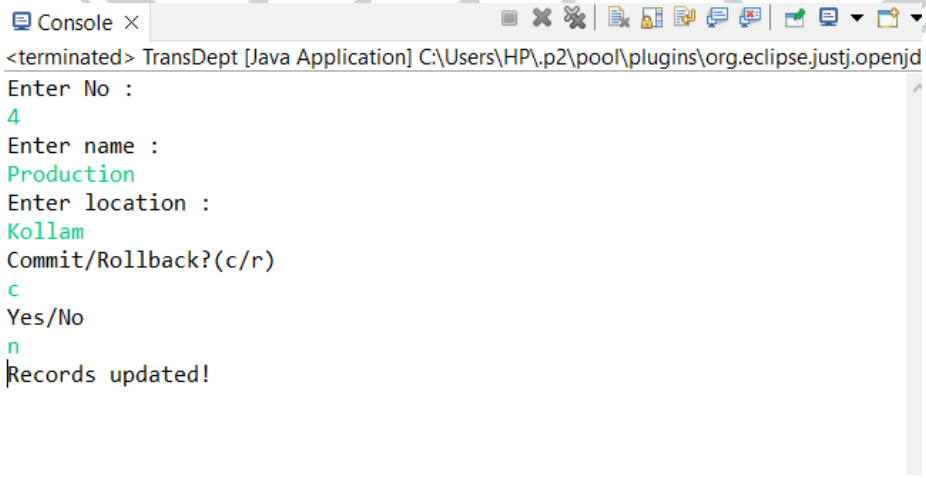
Write a JDBC program to implement Transaction Management in the Department table.

Code:

```
package dbprg;
import java.sql.*;
import java.io.*;
public class TransDept {
	public static void main(String[] args) {
		try
		{
		Class.forName("oracle.jdbc.driver.OracleDriver");
		Connection con=DriverManager.getConnection("jdbc:oracle:thin:@localhost:1521:orcl","hr", "A121619_a");
		PreparedStatement pst=con.prepareStatement("insert into department values(?,?,?)");
		con.setAutoCommit(false);
		BufferedReader br=new BufferedReader(new
		InputStreamReader(System.in));
		do
		{
		System.out.println("Enter No :");
		int id=Integer.parseInt(br.readLine());
		System.out.println("Enter name :");
		String name=br.readLine();
		System.out.println("Enter location :");
		String loc=br.readLine();
		pst.setInt(1,id);
		pst.setString(2,name);
		pst.setString(3,loc);
```

```
                pst.executeUpdate();
                System.out.println("Commit/Rollback?(c/r)");
                String ans=br.readLine();
                if(ans.startsWith("c"))
                con.commit();
                else
                con.rollback();
                System.out.println("Yes/No");
                String s=br.readLine();
                if(s.startsWith("n"))
                break;
                }while(true);
                System.out.println("Records updated!");
                con.close();
                }
                catch(Exception e)
                {
                System.out.println(e);
                }
        }
}
```

Output:

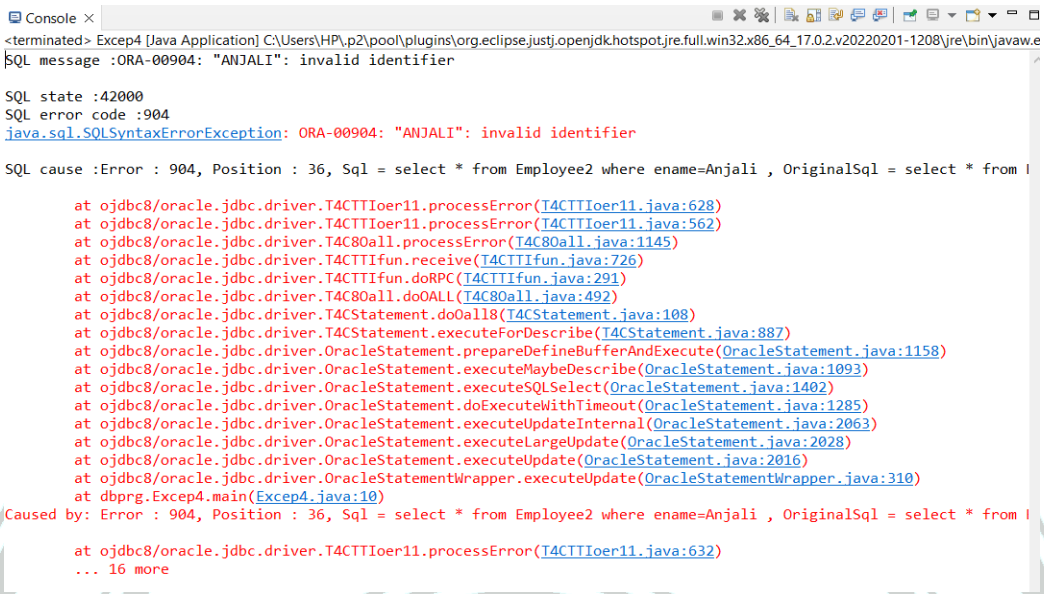


Program 74	**Date: 03-03-2023**
Write a JDBC program to depict the usage of SQLException Class and SQLWarning Class	

Code:

```
package dbprg;

import java.sql.*;

public class Excep4
{
	public static void main(String[] args)
 {
		try
		{
			Class.forName("oracle.jdbc.driver.OracleDriver");
			Connection con = DriverManager.getConnection
("jdbc:oracle:thin:@localhost:1521:orcl","hr",” A121619_a");
			Statement stmt=con.createStatement();
			stmt.executeUpdate("select * from Employee2 where
ename=Anjali ");
		}
		catch(SQLException e)
		{
			System.out.println("SQL message :"+e.getMessage());
			System.out.println("SQL state :" +e.getSQLState());
			System.out.println("SQL error code :"+e.getErrorCode());
			System.out.println("SQL cause :"+e.getCause());
			e.printStackTrace();
		}
		catch(Exception e)
		{
			System.out.println("error "+e);
		}
}
}
```

Output:


Console
<terminated> Excep4 [Java Application] C:\Users\HP\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_17.0.2.v20220201-1208\jre\bin\javaw.e
SQL message :ORA-00904: "ANJALI": invalid identifier
SQL state :42000
SQL error code :904
java.sql.SQLSyntaxErrorException: ORA-00904: "ANJALI": invalid identifier
SQL cause :Error : 904, Position : 36, Sql = select * from Employee2 where ename=Anjali , OriginalSql = select * from
at ojdbc8/oracle.jdbc.driver.T4CTTIoer11.processError(T4CTTIoer11.java:628)
at ojdbc8/oracle.jdbc.driver.T4CTTIoer11.processError(T4CTTIoer11.java:562)
at ojdbc8/oracle.jdbc.driver.T4C8Oall.processError(T4C8Oall.java:1145)
at ojdbc8/oracle.jdbc.driver.T4CTTIfun.receive(T4CTTIfun.java:726)
at ojdbc8/oracle.jdbc.driver.T4CTTIfun.doRPC(T4CTTIfun.java:291)
at ojdbc8/oracle.jdbc.driver.T4C8Oall.doOALL(T4C8Oall.java:492)
at ojdbc8/oracle.jdbc.driver.T4CStatement.doOall8(T4CStatement.java:108)
at ojdbc8/oracle.jdbc.driver.T4CStatement.executeForDescribe(T4CStatement.java:887)
at ojdbc8/oracle.jdbc.driver.OracleStatement.prepareDefineBufferAndExecute(OracleStatement.java:1158)
at ojdbc8/oracle.jdbc.driver.OracleStatement.executeMaybeDescribe(OracleStatement.java:1093)
at ojdbc8/oracle.jdbc.driver.OracleStatement.executeSQLSelect(OracleStatement.java:1402)
at ojdbc8/oracle.jdbc.driver.OracleStatement.doExecuteWithTimeout(OracleStatement.java:1285)
at ojdbc8/oracle.jdbc.driver.OracleStatement.executeUpdateInternal(OracleStatement.java:2063)
at ojdbc8/oracle.jdbc.driver.OracleStatement.executeLargeUpdate(OracleStatement.java:2028)
at ojdbc8/oracle.jdbc.driver.OracleStatement.executeUpdate(OracleStatement.java:2016)
at ojdbc8/oracle.jdbc.driver.OracleStatementWrapper.executeUpdate(OracleStatementWrapper.java:310)
at dbprg.Excep4.main(Excep4.java:10)
Caused by: Error : 904, Position : 36, Sql = select * from Employee2 where ename=Anjali , OriginalSql = select * from
at ojdbc8/oracle.jdbc.driver.T4CTTIoer11.processError(T4CTTIoer11.java:632)
... 16 more

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