REPORT ON LABORATORY WORK

Name: JOMY JOHNSON	**Roll No:14**	**Name of lab: Object Oriented Programming Language**	**Period:**
Class: S2, MCA	**Date:**	**Name of lab work: practical**	**Batch:2021- 2023**

PROGRAM NO-1

Aim: Define a class "product" with data members Pcode, Pname and Price create 3 objects of the class and find the product having the lowest price.

Algorithm:

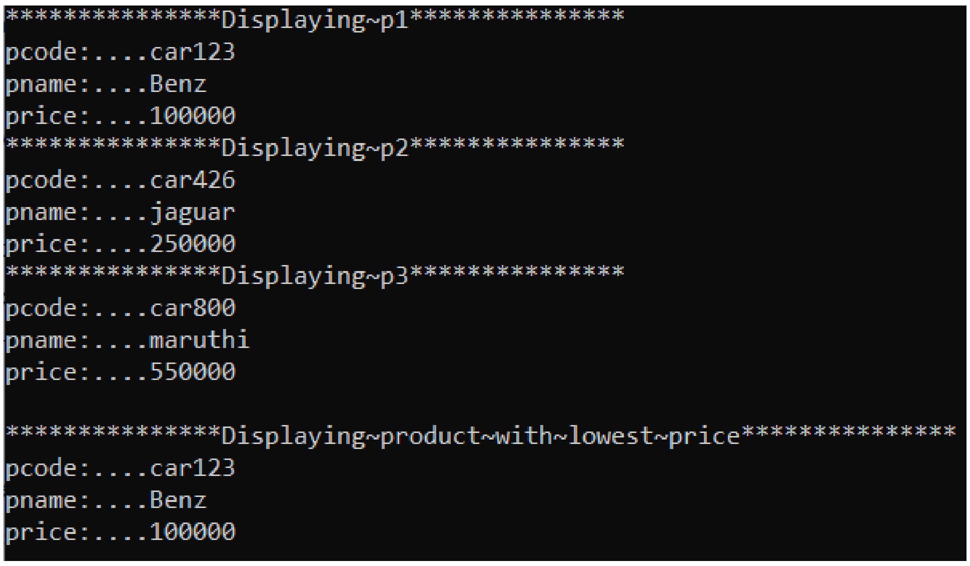
1. Create a public class product with members pname, pcode of strings datatypes and price of integer datatype.
2. Define both default and parameterized constructor.
3. Define getter and setter for members pname, pcode and price.
4. Define a used-defined method display () to display the product details.
5. End class product
6. Create public class EXP1
7. Define main (String [ ] args)
8. Create object p1 using default constructor and objects p2 and p3 using overloaded constructor
9. For object p1 created default constructor, assign value to p1.name, p1. code, p1. price and call p1. display ().
10. Get the product p which has the lowest price p1, p2 and p3.
11. Call display ();
12. End main
13. End class EXP1

Input:

```
public class EXP1
{
public static void main(String[] args)
{
Product p1=new Product();
p1.pcode="car123";
p1.pname="Benz";
p1.price=100000;
System.out.println("***************Displaying~p1***************");
p1.display();

Product p2=new Product("jaguar","car426",250000);
System.out.println("***************Displaying~p2***************");
p2.display();

Product p3=new Product("maruthi","car800",550000);
System.out.println("***************Displaying~p3***************");
p3.display();

Product p=p3.getprice()<(p1.price
<p2.price?p1.price:p2.price)?p3:(p1.price<p2.price?p1:p2);
System.out.println("\n***************Displaying~product~with~lowest~price*****
**********");
p.display();
}
}
class Product
{
String pname,pcode;
int price;
public String getpname()
{
return pname;
}
public Product()
{

}
public Product(String pname,String pcode,int price)
{
this.pname=pname;
this.pcode=pcode;
this.price=price;
}
public void setpname(String pname)
{
this.pname=pname;
}
public String getpcode()
{
return pcode;
}
public void setpcode(String pcode)
```

```
{
this.pcode=pcode;
}
public int getprice()
{
return price;
}
public void setprice(int price)
{
this.price=price;
}
public void display()
{
System.out.println("pcode:...."+this.pcode);
System.out.println("pname:...."+this.pname);
System.out.println("price:...."+this.price);
}
}
```

Output:



```
***************Displaying~p1***************
pcode:....car123
pname:....Benz
price:....100000
***************Displaying~p2***************
pcode:....car426
pname:....jaguar
price:....250000
***************Displaying~p3***************
pcode:....car800
pname:....maruthi
price:....550000

***************Displaying~product~with~lowest~price***************
pcode:....car123
pname:....Benz
price:....100000
```

Result/observation: successfully completed the program and output is obtained

Marks:

Viva (5)	**Performance (5)**	**Total (10)**

Assessor:

REPORT ON LABORATORY WORK

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PROGRAM NO-2

Aim: To read 2 matrices from the console and perform matrix addition.

Algorithm:

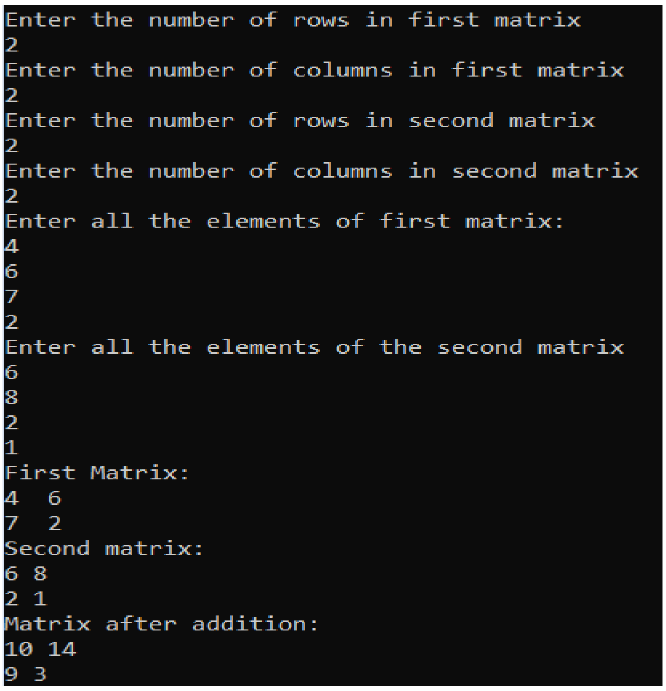
1. If both matrices are of the same size, then only, we can add the matrices.
2. Use the double dimensional array to store the matrix element.
3. Read row number, column number and initialize the double dimensional array a [ ][ ],b[ ][ ],c[ ][ ] with same row number ,column number.
4. Store the first number into the two dimensional array a[][] using two for loops i indicates row number indicates column index, similarly matrix 2 element into b[][]
5. Add the two matrices using for loop
6. For i=0 to i; row
7. For j=0 to j ; col
8. a[i][j] +b[i][j] and store it in to the matrix res at c[i][j]

Input:

```
import java.util.Scanner;
public class MatrixAdd
{
public static void main (String[] args)
{
   int p,q,m,n;
   Scanner S= new Scanner(System.in);
   System.out.println("Enter the number of rows in first matrix");
   p=S.nextInt();
   System.out.println("Enter the number of columns in first matrix");
   q=S.nextInt();
   System.out.println("Enter the number of rows in second matrix");
   m=S.nextInt();
   System.out.println("Enter the number of columns in second matrix");
```

```
    n=S.nextInt();
    if(p==m&&q==n)
    {
        int a[][]=new int [p][q];
        int b[][]=new int[m][n];
        int c[][]=new int[m][n];
        System.out.println("Enter all the elements of first matrix:");
        for(int i=0;i<p;i++)
        for(int j=0;j<q;j++)
        a[i][j]=S.nextInt();
        System.out.println("Enter all the elements of the second matrix");
        for(int i=0;i<m;i++)
        for(int j=0;j<n;j++)
        b[i][j]=S.nextInt();
        System.out.println("First Matrix:");
        for(int i=0;i<p;i++)
        {
            for(int j=0;j<q;j++)
            System.out.print(a[i][j]+"  ");
            System.out.println(" ");
        }
        System.out.println("Second matrix:");
        for(int i=0;i<m;i++)
        {
            for(int j=0;j<n;j++)
            {
                System.out.print(b[i][j]+" ");
            }
            System.out.println(" ");
        }
        for (int i=0;i<p;i++)
        for(int j=0;j<n;j++)
        for(int k=0;k<q;k++)
        c[i][j]=a[i][j]+b[i][j];
        System.out.println("Matrix after addition:");
        for(int i=0;i<p;i++)
        {
            for(int j=0;j<n;j++)
            System.out.print(c[i][j]+" ");
            System.out.println("  ");
        }
    }
    else
    {
        System.out.println("Addition would not be possible");
    }
}  }
```

Output:



```
Enter the number of rows in first matrix
2
Enter the number of columns in first matrix
2
Enter the number of rows in second matrix
2
Enter the number of columns in second matrix
2
Enter all the elements of first matrix:
4
6
7
2
Enter all the elements of the second matrix
6
8
2
1
First Matrix:
4  6
7  2
Second matrix:
6 8
2 1
Matrix after addition:
10 14
9 3
```

Result/observation: successfully completed the program and output is obtained

Marks:

Viva (5)	**Performance (5)**	**Total (10)**

Assessor:

REPORT ON LABORATORY WORK

Name: JOMY JOHNSON	**Roll No:14**	**Name of lab: Object Oriented Programming Language**	**Period:**
Class: S2, MCA	**Date:**	**Name of lab work: practical**	**Batch:2021- 2023**

PROGRAM NO-3

Aim: To add two complex numbers.

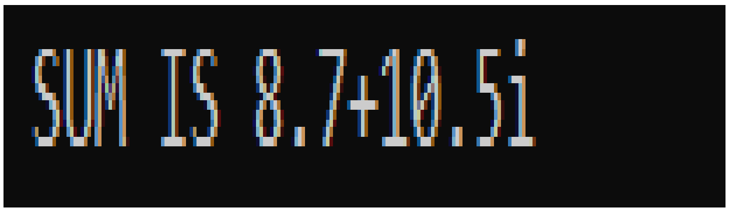
Algorithm:

1. Define class complex number with real img
2. Define a constructor to initialize real and img
3. Create a temporary complex number to hold the sum of two numbers
4. Do the summation and return the value

Input:

```
public class complexnumber
{
double real,img;
complexnumber(double r,double i)
{
this.real=r;
this.img=i;
}
public static complexnumber
sum(complexnumber c1, complexnumber c2)
{
complexnumber temp=new complexnumber(0,0);
temp.real=c1.real+c2.real;
temp.img=c1.img+c2.img;
return temp;
}
public static void main(String args[])
{
complexnumber c1=new complexnumber(7.5,6);
complexnumber c2=new complexnumber(1.2,4.5);
complexnumber temp=sum(c1,c2);
System.out.println("   SUM IS "+ temp.real+"+"+temp.img+"i");
}
}
```

Output:



```
SUM IS 8.7+10.5i
```

Result/observation: successfully completed the program and output is obtained

Marks:

Viva (5)	**Performance (5)**	**Total (10)**

Assessor:

REPORT ON LABORATORY WORK

Name: JOMY JOHNSON	**Roll No:14**	**Name of lab: Object Oriented Programming Language**	**Period:**
Class: S2, MCA	**Date:**	**Name of lab work: practical**	**Batch:2021- 2023**

PROGRAM NO-4

Aim: To read a matrix from the console and check whether it is symmetric or not.

Algorithm:

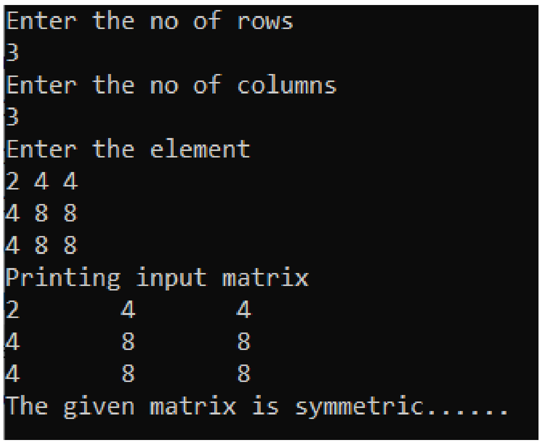
```
1. Start
2. Take a matrix as input from user using console
3. Check whether the given matrix is a square matrix or not
4. Then check whether every element at i th row and j th column is equal to
   element at j th row and i th column
5. If the given matrix satisfies these two conditions, then that matrix is a
   symmetric matrix, else not symmetric
6. Stop
```

Input:

```
import java.util.Scanner;
public class symmetricmatrixprgrm
{
public static void main(String args[])
{
Scanner sc=new Scanner(System.in);
System.out.println("Enter the no of rows");
int rows=sc.nextInt();
System.out.println("Enter the no of columns");
int cols=sc.nextInt();
int matrix[][]=new int [rows][cols];
System.out.println("Enter the element");
for(int i=0; i<rows;i++)
for(int j=0; j<cols;j++)
matrix[i][j]=sc.nextInt();
sc.close();
System.out.println("Printing input matrix");
for(int i=0;i<rows;i++)
{
```

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

Output:



```
Enter the no of rows
3
Enter the no of columns
3
Enter the element
2 4 4
4 8 8
4 8 8
Printing input matrix
2       4       4
4       8       8
4       8       8
The given matrix is symmetric......
```

Result/observation: successfully completed the program and output is obtained

Marks:

Viva (5)	**Performance (5)**	**Total (10)**

Assessor:

REPORT ON LABORATORY WORK

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PROGRAM NO-5

Aim: To create CPU with attribute price. Create inner class processor (no of cores, manufactures)and static nested class RAM (memory , manufacturer).Create an object of CPU and print information of processor and RAM.

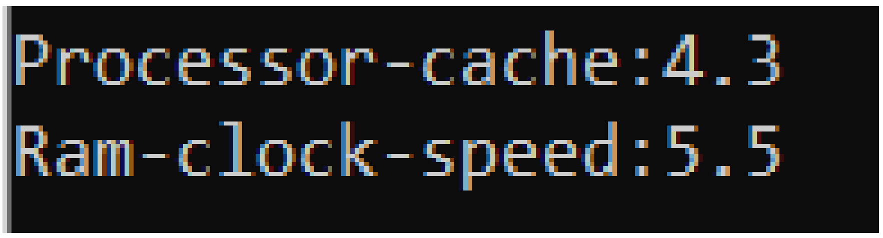
Algorithm:

1. Start
2. Created a class ‘Cpu’ with price as data member
3. Then created an inner class ‘Processor’ with ‘cores’ and ‘manufact’ as data members, then created a constructor for Processor class
4. And created a display function to print the processor details like cores and manufact Then created a static nested class RAM with memory and manufact as data members, then created a constructor for the ‘RAM ’ class
5. And created a display function to display RAM details and another display function to show price details
6. Then created objects for each class like inter for ‘Cpu’; i_processor for ‘Processor’;i_ram for ‘RAM’ and by using these objects acces all details
7. And displayed all details using display each functions
8. Stop

Input:

```
class CPU
{
double price;
class Processor
{
double cores;
String manufacturer;
double getcache()
{
return 4.3;
}
}
protected class RAM
{
double memory;
String manufacturer;
double getclockspeed()
{
return 5.5;
}
}
}
public class CPUdetails
{
public static void main(String[] args)
{
CPU cpu=new CPU();
CPU.Processor processor=cpu.new Processor();
CPU.RAM ram=cpu.new RAM();
System.out.println("Processor-cache:"+processor.getcache());
System.out.println("Ram-clock-speed:"+ram.getclockspeed());
}
}
```

Output:



```
Processor-cache:4.3
Ram-clock-speed:5.5
```

Result/observation: successfully completed the program and output is obtained

Marks:

Viva (5)	Performance (5)	Total (10)

Assessor:

REPORT ON LABORATORY WORK

Name: JOMY JOHNSON	**Roll No:14**	**Name of lab: Object Oriented Programming Language**	**Period:**
Class: S2, MCA	**Date:**	**Name of lab work: practical**	**Batch:2021- 2023**

PROGRAM NO-6

Aim: To write menu driven program that would choose either inbuild method or call a user defined method to sort an array of strings.

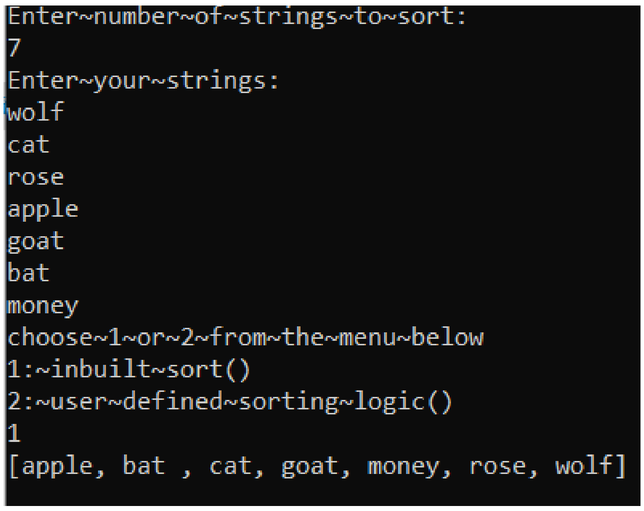
Algorithm:

1. Add user to enter number of strings to sort, as count.
2. Ask user to enter count number of strings and store them into an array of strings.
3. Give the user the menu where 1 chooses using inbuild sort method and 2 chooses using user defined sorting function.
4. If 1 is chosen use Array.sort()
5. If 2 is chosen call the user.defined method to sort where
   a) Each string is compared with other string
   b) Swap the string so that lexicographic order of string is obtained

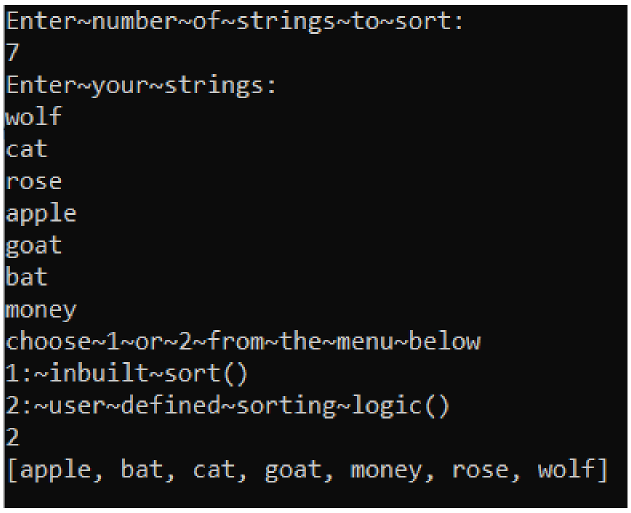
Input:

```
import java.util.Arrays;
import java.util.Scanner;
public class StringSort
{
public static void main(String[] args)
{
int count=0;
String tmp;
Scanner scan=new Scanner(System.in);
System.out.println("Enter~number~of~strings~to~sort:");
count=scan.nextInt();
String str_list[]=new String[count];
Scanner scan1=new Scanner(System.in);
System.out.println("Enter~your~strings:");
for(int i=0;i<count;i++)
str_list[i]=scan1.nextLine();
System.out.println("choose~1~or~2~from~the~menu~below");
System.out.println("1:~inbuilt~sort()");
System.out.println("2:~user~defined~sorting~logic()");
int choice;
choice=scan.nextInt();
switch(choice)
{
case 1:Arrays.sort(str_list);
System.out.println(Arrays.toString(str_list));
break;
case 2:for(int i=0;i<count-1;i++)
for(int j=i+1;j<str_list.length;j++)
if(str_list[i].compareTo(str_list[j])>0)
{
tmp=str_list[i];
str_list[i]=str_list[j];
str_list[j]=tmp;
}
System.out.println(Arrays.toString(str_list));
break;
}
}
}
```

Output:



```
Enter~number~of~strings~to~sort:
7
Enter~your~strings:
wolf
cat
rose
apple
goat
bat
money
choose~1~or~2~from~the~menu~below
1:~inbuilt~sort()
2:~user~defined~sorting~logic()
1
[apple, bat , cat, goat, money, rose, wolf]
```



```
Enter~number~of~strings~to~sort:
7
Enter~your~strings:
wolf
cat
rose
apple
goat
bat
money
choose~1~or~2~from~the~menu~below
1:~inbuilt~sort()
2:~user~defined~sorting~logic()
2
[apple, bat, cat, goat, money, rose, wolf]
```

Result/observation: successfully completed the program and output is obtained

Marks:

Viva (5)	**Performance (5)**	**Total (10)**

Assessor:

REPORT ON LABORATORY WORK

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Class: S2, MCA	**Date:**	**Name of lab work: practical**	**Batch:2021- 2023**

PROGRAM NO-7

Aim: To write program for linear search .

Algorithm:

Linear search

1. Set i to 1
2. If i n then go to step7
3. If a[i]=x then go to step 6
4. Set i to i+1
5. Go to step 2
6. Print x is present at location i and go to step 8
7. Print element not found
8. Exit

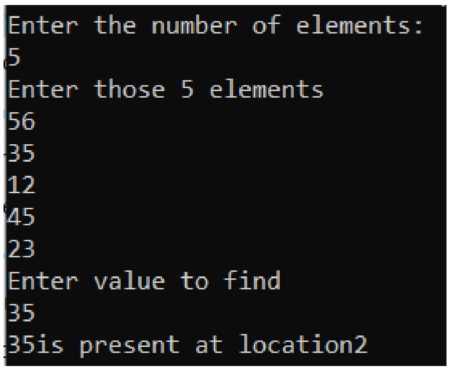
Binary search

1. Implement the naive binary search algorithm given in procedure binary search
2. Implement binary search recursively
3. Use in-built binary search
4. Ask user among 1,2 and 3 above which is users' choice of searching logic

Input:

```
import java.util.Scanner;
public class LinearSearch
{
 public static void main(String[] args)
  {
   int c,n,search,array[];
    Scanner in=new Scanner(System.in);
    System.out.println("Enter the number of elements:");
    n=in.nextInt();
    array=new int[n];
   System.out.println("Enter those "+n+" elements");
   for(c=0;c<n;c++)
   array[c]=in.nextInt();
   System.out.println("Enter value to find");
 search=in.nextInt();
for(c=0;c<n;c++)
if(array[c]==search)
{
System.out.println(search + "is present at location"   +(c+1));
break;
}
if(c==n)
System.out.println(search+ "isn't present in array");
}
}
```

Output:



```
Enter the number of elements:
5
Enter those 5 elements
56
35
12
45
23
Enter value to find
35
35is present at location2
```

Result/observation: successfully completed the program and output is obtained

Marks:

Viva (5)	**Performance (5)**	**Total (10)**

Assessor:

REPORT ON LABORATORY WORK

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Class: S2, MCA	**Date:**	**Name of lab work: practical**	**Batch:2021- 2023**

PROGRAM NO-8

Aim: To illustrate string manipulation methods.

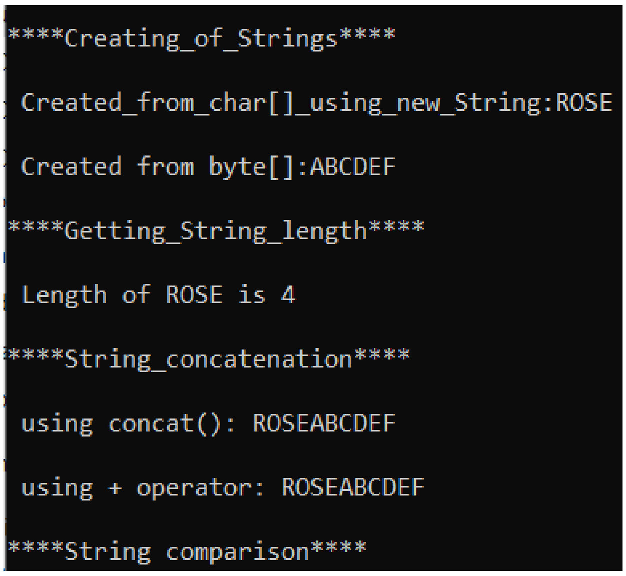
Algorithm:

1. Creating new string using new
2. Getting string length
3. String concatenation
4. Character extraction
5. String comparison
6. Searching substrings
7. Modifying a string
8. Data conversion using value of ( )

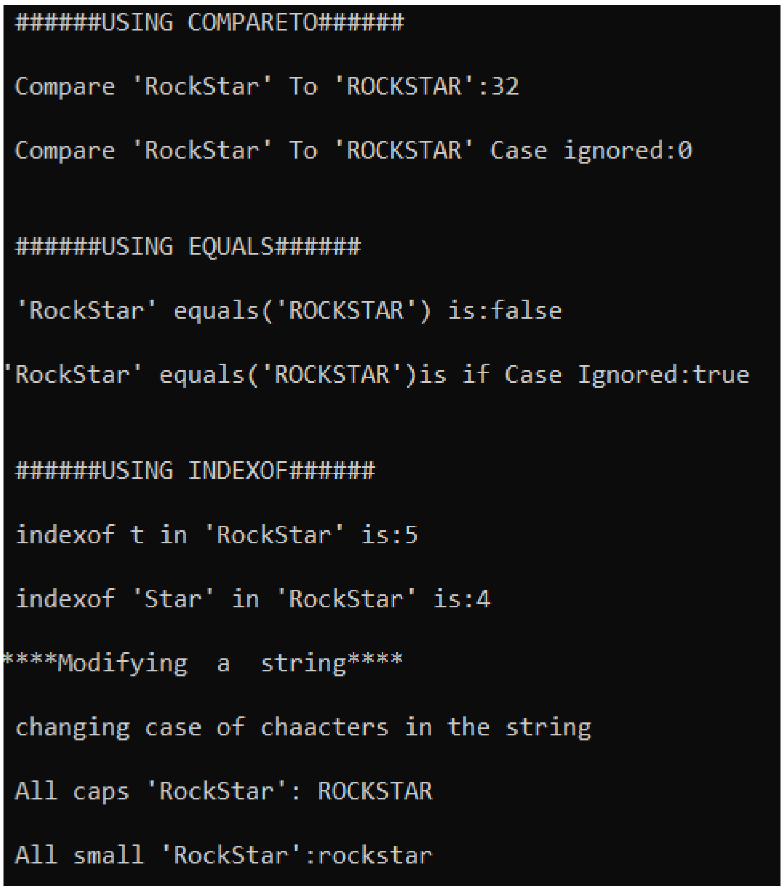
Input:

```
 public class StringManipulation
{
public static void main(String[] args)
{
System.out.println("\n \n****Creating_of_Strings****");
char arrSample[]={'R', 'O','S','E'};
String strSample_1=new String(arrSample);
System.out.println("\n Created_from_char[]_using_new_String:"+strSample_1);
byte ascii[]={65,66,67,68,69,70};
String strSample_2=new String(ascii);
System.out.println("\n Created from byte[]:"+strSample_2);

System.out.println("\n****Getting_String_length****");
System.out.println("\n Length of " +strSample_1+" is "+strSample_1.length());

System.out.println("\n****String_concatenation****");
String strSample_3=strSample_1.concat(strSample_2);
System.out.println("\n using concat(): "+strSample_3);
String strSample_4=strSample_1+strSample_2;
System.out.println("\n using + operator: "+strSample_4);
System.out.println("\n****String comparison****");
System.out.println("\n \n ######USING COMPARETO######");
String str_Sample="RockStar";
System.out.println("\n Compare 'RockStar' To
'ROCKSTAR':"+str_Sample.compareTo("ROCKSTAR"));
System.out.println("\n Compare 'RockStar' To 'ROCKSTAR' Case
ignored:"+str_Sample.compareToIgnoreCase("ROCKSTAR"));
System.out.println("\n \n ######USING EQUALS######");
System.out.println("\n 'RockStar' equals('ROCKSTAR')
is:"+str_Sample.equals("ROCKSTAR"));
System.out.println("\n'RockStar' equals('ROCKSTAR')is if Case
Ignored:"+str_Sample.equalsIgnoreCase("ROCKSTAR"));
System.out.println("\n \n ######USING INDEXOF######");
System.out.println("\n indexof t in 'RockStar' is:"+str_Sample.indexOf("t"));
System.out.println("\n indexof 'Star' in 'RockStar' is:"+str_Sample.indexOf("Star"));
System.out.println("\n****Modifying  a  string****");
System.out.println("\n changing case of chaacters in the string");
System.out.println("\n All caps 'RockStar': "+str_Sample.toUpperCase());
System.out.println("\n All small 'RockStar':"+str_Sample.toLowerCase());
System.out.println("\n \n  ######USING REPLACE######");
System.out.println("\n In 'RockStar' replace 'Star' with
'et'"+str_Sample.replace("Star","et"));
}
}
```

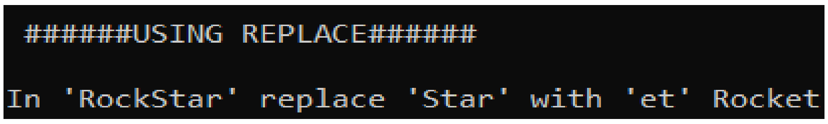
Output:



```
****Creating_of_Strings****

 Created_from_char[]_using_new_String:ROSE

 Created from byte[]:ABCDEF

****Getting_String_length****

 Length of ROSE is 4

****String_concatenation****

 using concat(): ROSEABCDEF

 using + operator: ROSEABCDEF

****String comparison****
```



```
######USING COMPARETO######

Compare 'RockStar' To 'ROCKSTAR':32

Compare 'RockStar' To 'ROCKSTAR' Case ignored:0


######USING EQUALS######

'RockStar' equals('ROCKSTAR') is:false

'RockStar' equals('ROCKSTAR')is if Case Ignored:true


######USING INDEXOF######

indexof t in 'RockStar' is:5

indexof 'Star' in 'RockStar' is:4

****Modifying  a  string****

changing case of chaacters in the string

All caps 'RockStar': ROCKSTAR

All small 'RockStar':rockstar
```



```
######USING REPLACE######

In 'RockStar' replace 'Star' with 'et' Rocket
```

Result/observation: successfully completed the program and output is obtained

Marks:

Viva (5)	**Performance (5)**	**Total (10)**

Assessor:

REPORT ON LABORATORY WORK

Name: JOMY JOHNSON	**Roll No:14**	**Name of lab: Object Oriented Programming Language**	**Period:**
Class: S2, MCA	**Date:**	**Name of lab work: practical**	**Batch:2021- 2023**

PROGRAM NO-9

Aim: Program to create a class for employee having attributes eNo, eName, and eSalary. Read n employee information and search for an employee given eNo using the concept of array of objects.

Algorithm:

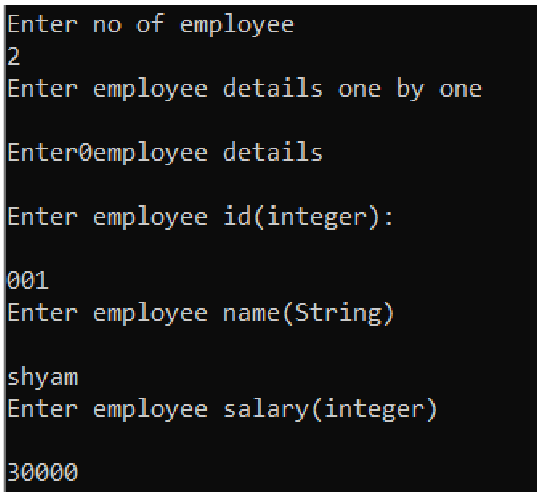
1. Create class employee with members eno , ename and salary
2. Create default constructor and parameterised constructor
3. Ask user to enter number of employees say n
4. In main( ),create an array of size n of employee type
5. Ask user to enter each employee details
6. Once details of an employee is entered call the parameterised constructor to create a new employee object. Assign this new object into indexed array
7. Show all employee details
8. Ask user to enter eno to search for an employee
9. Do a linear search an objects in array and display message accordingly

Input:

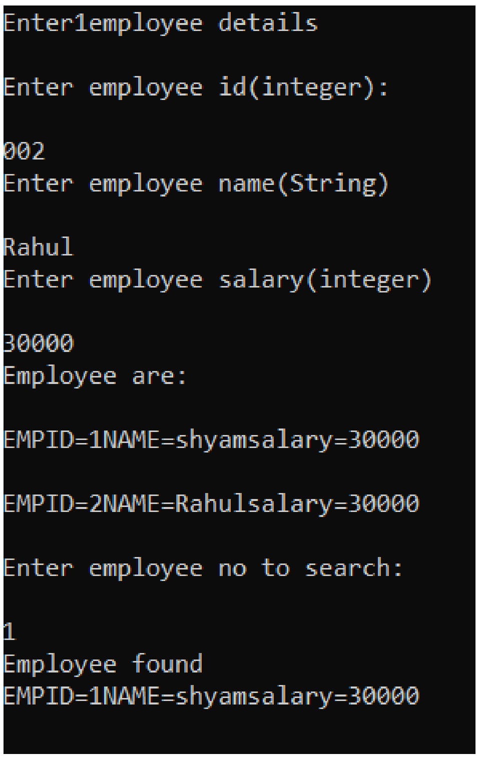
```
import java.util.Scanner;
import java.util.Arrays;
class Employee
{
int eno,esalary;
String ename;
```

```
public Employee()
{

}
public Employee(int no,int sal,String name)
{
eno=no;
esalary=sal;
ename=name;
}
public void showData()
{
System.out.println("EMPID="+eno+""+"NAME="+ename+""+"salary="+
esalary);
System.out.println();
}
}
public class EmpArrObjects
{
public static void main(String[] args)
{
System.out.println("Enter no of employee");
Scanner sc=new Scanner(System.in);
int n=sc.nextInt();
System.out.println("Enter employee details one by one\n");
Employee employees[ ]=new Employee[n];
Scanner sc_emp=new Scanner(System.in);
int eid,esal;
String enam;
for(int i=0;i<n;i++)
{
System.out.println("Enter"+ i +"employee details\n");
System.out.println("Enter employee id(integer):\n");
eid=sc_emp.nextInt();
System.out.println("Enter employee name(String)\n");
String nam=sc_emp.next();
enam=new String(nam);
System.out.println("Enter employee salary(integer)\n");
esal=sc_emp.nextInt();
Employee emp=new Employee(eid,esal,enam);
employees[i]=emp;
}
System.out.println("Employee are:\n");
for(Employee y: employees)
y.showData();
System.out.println("Enter employee no to search:\n");
int semp=sc.nextInt();
boolean found=false;
for(Employee e:employees)
{
if(semp==e.eno)
{
found=true;
System.out.println("Employee found");
e.showData();
break;
}
}
if(!found)
{
System.out.println("employee not found");
}
}
}
```

Output:



```
Enter no of employee
2
Enter employee details one by one

Enter0employee details

Enter employee id(integer):

001
Enter employee name(String)

shyam
Enter employee salary(integer)

30000
```



```
Enter1employee details

Enter employee id(integer):

002
Enter employee name(String)

Rahul
Enter employee salary(integer)

30000
Employee are:

EMPID=1NAME=shyamsalary=30000

EMPID=2NAME=Rahulsalary=30000

Enter employee no to search:

1
Employee found
EMPID=1NAME=shyamsalary=30000
```

Result/observation: successfully completed the program and output is obtained

Marks:

Viva (5)	Performance (5)	Total (10)

Assessor:

REPORT ON LABORATORY WORK

Name: JOMY JOHNSON	**Roll No:14**	**Name of lab: Object Oriented Programming Language**	**Period:**
Class: S2, MCA	**Date:**	**Name of lab work: practical**	**Batch:2021- 2023**

PROGRAM NO-10

Aim: To find the area of different shape using overloaded function.

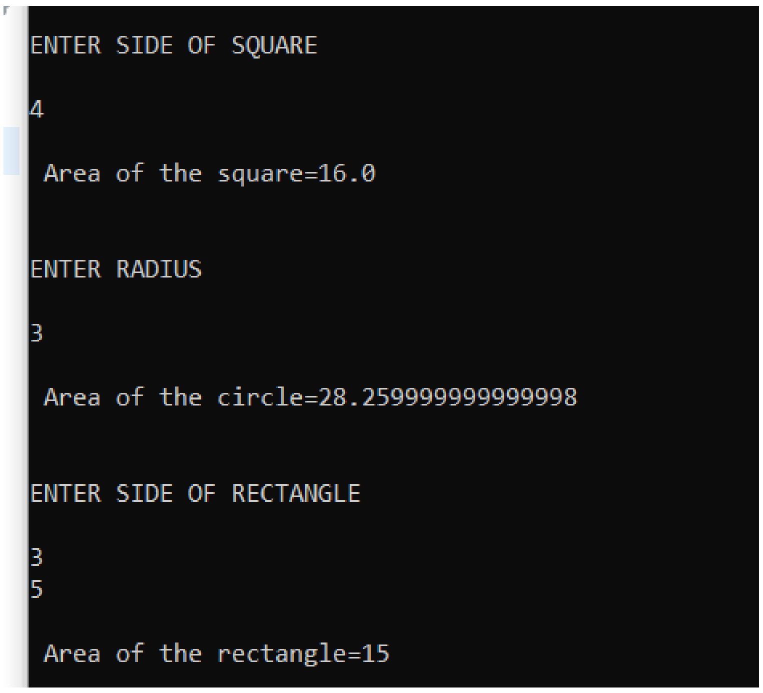
Algorithm:

1. Start
2. Created a function area for finding areas of different shapes
3. Using function overloading the function ‘area ()’ is called
4. Display shapes area as output
5. Stop

Input:

```
import java.util.Scanner;
public class shapearea
{
void calculatearea(float a)
{
System.out.println("\n Area of the square="+a*a);
}
void calculatearea(int l,int b)
{
System.out.println("\n Area of the rectangle="+l*b);
}
void calculatearea(double r)
{
double area=3.14*r*r;
System.out.println("\n Area of the circle="+area);
}
public static void main(String[] args)
{
shapearea obj=new shapearea();
System.out.println("\n\nENTER SIDE OF SQUARE\n");
Scanner sc=new Scanner(System.in);
float side=sc.nextFloat();
obj.calculatearea(side);
System.out.println("\n\nENTER RADIUS\n");
Scanner sc1=new Scanner(System.in);
double rad=sc.nextDouble();
obj.calculatearea(rad);
System.out.println("\n\nENTER SIDE OF RECTANGLE\n");
Scanner sc2=new Scanner(System.in);
int side1=sc.nextInt();
int side2=sc.nextInt();
obj.calculatearea(side1,side2);
}
}
```

Output:



```
ENTER SIDE OF SQUARE

4

 Area of the square=16.0


ENTER RADIUS

3

 Area of the circle=28.259999999999998


ENTER SIDE OF RECTANGLE

3
5

 Area of the rectangle=15
```

Result/observation: successfully completed the program and output is obtained

Marks:

Viva (5)	Performance (5)	Total (10)

Assessor:

REPORT ON LABORATORY WORK

Name: JOMY JOHNSON	**Roll No:14**	**Name of lab: Object Oriented Programming Language**	**Period:**
Class: S2, MCA	**Date:**	**Name of lab work: practical**	**Batch:2021- 2023**

PROGRAM NO-11

Aim: Create a class 'Employee' with data members Empid, Name, Salary, Address and constructors to initialize the data members, create another class 'Teacher' that inherit the properties of class employee and contain its own data members department, subject taught and constructors to initialize these data members and also include display function to display all the data members. Use array of object to display details of N teachers.

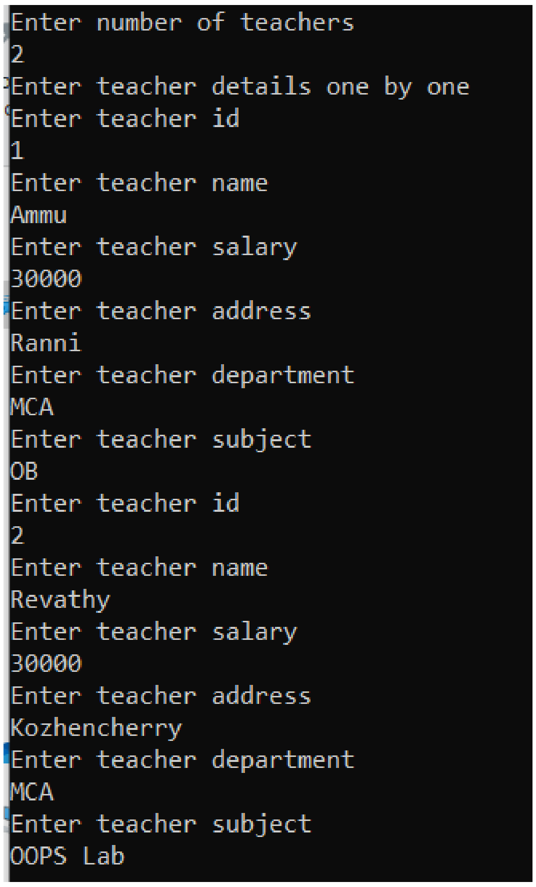
Algorithm:

1. Start
2. Created class 'Employee' with attributes Empid,Name,Salary,Address and its constructors
3. Then classTeacher is inherirted with its attributes Department,subjets,and its constructors
4. Using display function, display all details of N teachers as output
5. Stop

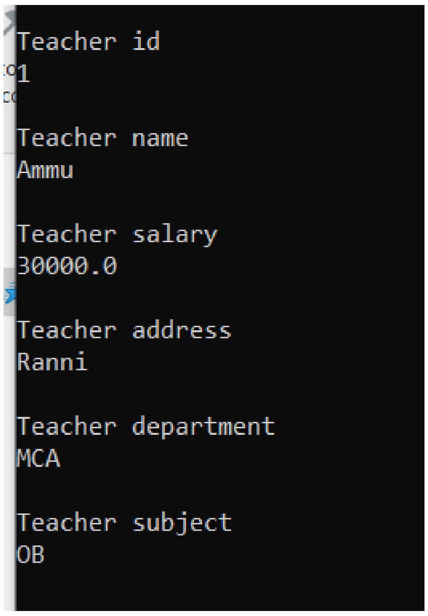
Input:

```
import java.util.Scanner;
class EmployeeT
{
int empid;
String name;
float salary;
String address;
EmployeeT()
{
}
EmployeeT(int empid,String name,float salary,String address)
{
this.empid=empid;
this.name=name;
this.salary=salary;
this.address=address;
}
}
class Teacher extends EmployeeT
{
String dept,sub;
Teacher(int empid,String name,float salary,String address,String dept,String sub)
{
super(empid,name,salary,address);
this.dept=dept;
this.sub=sub;
}
public void display()
{
System.out.println("\nTeacher id\n" +empid);
System.out.println("\nTeacher name\n" +name);
System.out.println("\nTeacher salary\n"+salary);
System.out.println("\nTeacher address\n" +address);
System.out.println("\nTeacher department\n" +dept);
System.out.println("\nTeacher subject\n"+sub);
}
}
public class Techarrays
{
public static void main(String args[])
{
System.out.println("Enter number of teachers");
Scanner sc=new Scanner(System.in);
int n=sc.nextInt();
System.out.println("Enter teacher details one by one");
Teacher teacher[]=new Teacher[n];
Scanner sc1=new Scanner(System.in);
int tid;
String name;
float salary;
String add;
String dept,sub;
for(int i=0;i<n;i++)
{
System.out.println("Enter teacher id");
tid=sc1.nextInt();
System.out.println("Enter teacher name");
name=sc1.next();
System.out.println("Enter teacher salary");
salary=sc1.nextFloat();
System.out.println("Enter teacher address");
add=sc1.next();
System.out.println("Enter teacher department");
dept=sc1.next();
System.out.println("Enter teacher subject");
sub=sc1.next();
Teacher t=new Teacher(tid,name,salary,add,dept,sub);
teacher[i]=t;
}
for(Teacher x:teacher)
{
x.display();
System.out.println("\n");
}
}
}
```

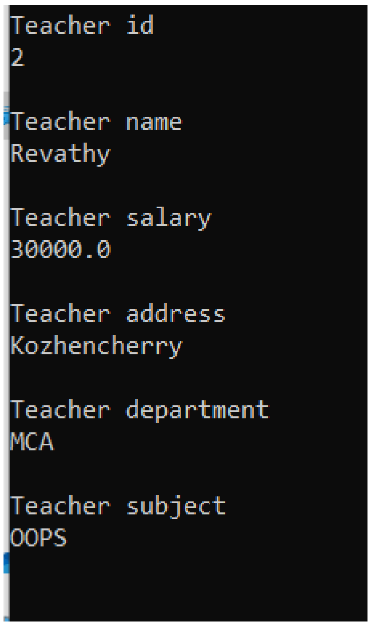
Output:



```
Enter number of teachers
2
Enter teacher details one by one
Enter teacher id
1
Enter teacher name
Ammu
Enter teacher salary
30000
Enter teacher address
Ranni
Enter teacher department
MCA
Enter teacher subject
OB
Enter teacher id
2
Enter teacher name
Revathy
Enter teacher salary
30000
Enter teacher address
Kozhencherry
Enter teacher department
MCA
Enter teacher subject
OOPS Lab
```



```
Teacher id
1

Teacher name
Ammu

Teacher salary
30000.0

Teacher address
Ranni

Teacher department
MCA

Teacher subject
OB
```



```
Teacher id
2

Teacher name
Revathy

Teacher salary
30000.0

Teacher address
Kozhencherry

Teacher department
MCA

Teacher subject
OOPS
```

Result/observation: successfully completed the program and output is obtained

Marks:

Viva (5)	**Performance (5)**	**Total (10)**

Assessor:

REPORT ON LABORATORY WORK

Name: JOMY JOHNSON	**Roll No:14**	**Name of lab: Object Oriented Programming Language**	**Period:**
Class: S2, MCA	**Date:**	**Name of lab work: practical**	**Batch:2021- 2023**

PROGRAM NO-12

Aim: Create a class 'person' with data members Name, Gender, Age, Address and constructors to initialize the data members, create another class 'Employee' that inherit the properties of class person and contain its own data members like Empid, Company name, Qualification, Salary, and its own constructor. Create another class 'Teacher' that inherits the properties of class Employee and contain its own data members like subject, department, Teacher id and also contain constructor and methods to display the data members. Use array of objects to display details of N teachers.

Algorithm:

1. Start
2. Created class person with its members and a constructor
3. Created another class Employee by inheriting person and define its members and its own constructor
4. Created another class Teacher by inheriting Employee and define its method display()
5. Display details of N teachers using array of objects
6. Stop

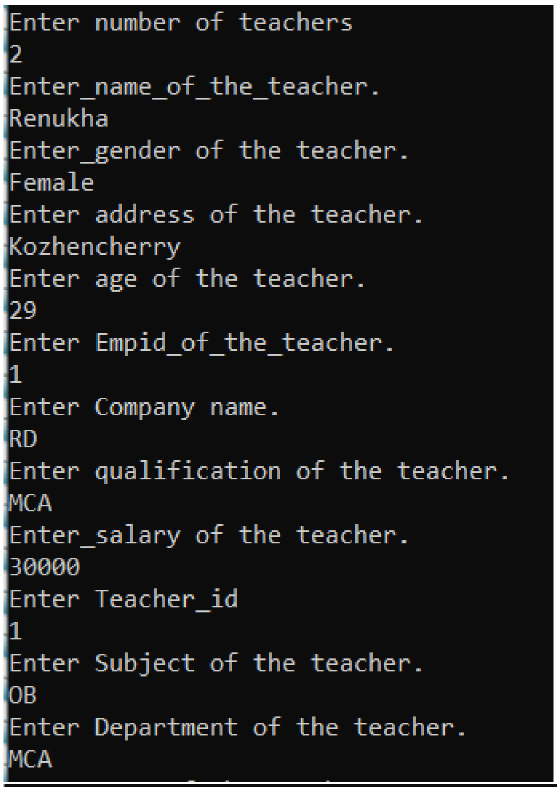
Inputs:

```
import java.util.Scanner;
class Person
{
String Name, Gender,Address;
protected int Age;
public Person()
{

}
public Person (String n , String g, String addr, int a)
{
this.Name=n;
this.Gender=g;
this.Address =addr;
this.Age=a;
}
public void displayPerson()
{
System.out.println("Name:___"+Name);
System.out.println("Gender:___"+ Gender);
System.out.println("Address:___" + Address);
System.out.println("Age:____"+Age);
}
}
class Employee extends Person
{
int Empid,Salary;
String Company_name,Qualification;
public Employee()
{

}
public Employee (String n,String g , String addr, int a,int eid,String cname,String qual,
int sal)
{
super(n,g,addr,a);
Empid=eid;
Company_name=cname;
Qualification=qual;
Salary=sal;
}
public void displayEmployee()
{
super.displayPerson ();
System.out.println("Empid:___"+Empid);
System.out.println("Company name:___" +Company_name);
System.out.println("Qualification :___"+Qualification);
System.out.println("Salary:___"+ Salary);
}
}
class Teacher1 extends Employee
{
String Subject,Department;
int Teacherid;
public Teacher1(String n, String g, String addr, int a,int eid, String cname, String qual,
int sal ,String sub, String dept,int tid)
{
super(n,g,addr,a, eid, cname, qual, sal );
Subject=sub;
```

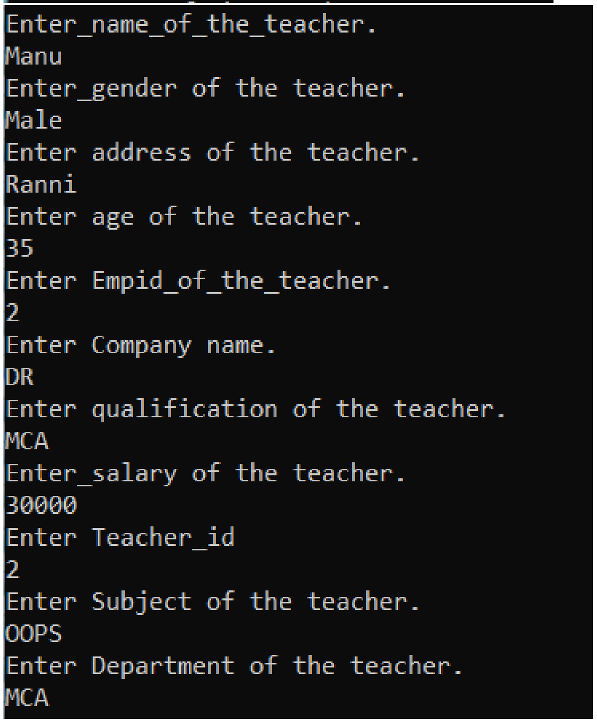
```
Department=dept;
Teacherid=tid;
}
public void displayTeacher()
 {
super.displayEmployee();
System.out.println ("Teacher_id____"+Teacherid);
System.out.println("Subject :____"+ Subject);
System.out.println ("Department:____"+ Department);
}
}
public class InheritencePersonExample
{
public static void main(String args[])
{
System.out.println("Enter number of teachers" );
Scanner sc = new Scanner (System.in);
int N= sc.nextInt ();
Teacher1[] teacherls = new Teacher1[N];
Scanner scs = new Scanner(System.in);
for (int i = 0; i<N;i++)
{
System.out.println("Enter_name_of_the_teacher.");
String name=scs.next();
System.out.println("Enter_gender of the teacher.");
String gen=scs.next();
System.out.println("Enter address of the teacher.");
String addr = scs.next();
System.out.println("Enter age of the teacher.");
int ag = sc.nextInt ();
System.out.println("Enter Empid_of_the_teacher.");
int eid=sc.nextInt ();
System.out.println("Enter Company name.");
String cn=scs.next();
System.out.println("Enter qualification of the teacher.");
String quali = scs. next();
System.out.println("Enter_salary of the teacher.");
int sal=sc. nextInt ();
System.out.println("Enter Teacher_id");
int tid=sc.nextInt ();
System.out.println("Enter Subject of the teacher.");
String sub=scs.next();
System.out.println("Enter Department of the teacher.");
String dept = scs.next();
Teacher1 t= new Teacher1 (name, gen, addr, ag, eid, cn, quali,sal,sub, dept, tid);
teacherls[i] = t;
}
```

```
        for (Teacher1 t:teacherls)
        {
        t. displayTeacher();
        }
        }
        }
```

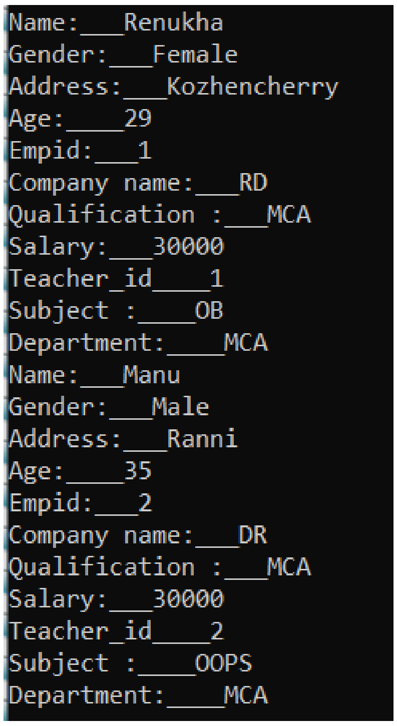
Output:



```
Enter number of teachers
2
Enter_name_of_the_teacher.
Renukha
Enter_gender of the teacher.
Female
Enter address of the teacher.
Kozhencherry
Enter age of the teacher.
29
Enter Empid_of_the_teacher.
1
Enter Company name.
RD
Enter qualification of the teacher.
MCA
Enter_salary of the teacher.
30000
Enter Teacher_id
1
Enter Subject of the teacher.
OB
Enter Department of the teacher.
MCA
```



```
Enter_name_of_the_teacher.
Manu
Enter_gender of the teacher.
Male
Enter address of the teacher.
Ranni
Enter age of the teacher.
35
Enter Empid_of_the_teacher.
2
Enter Company name.
DR
Enter qualification of the teacher.
MCA
Enter_salary of the teacher.
30000
Enter Teacher_id
2
Enter Subject of the teacher.
OOPS
Enter Department of the teacher.
MCA
```


```
Name:___Renukha
Gender:___Female
Address:___Kozhencherry
Age:____29
Empid:___1
Company name:___RD
Qualification :___MCA
Salary:___30000
Teacher_id____1
Subject :____OB
Department:____MCA
Name:___Manu
Gender:___Male
Address:___Ranni
Age:____35
Empid:___2
Company name:___DR
Qualification :___MCA
Salary:___30000
Teacher_id____2
Subject :____OOPS
Department:____MCA
```

Result/observation: successfully completed the program and output is obtained

Marks:

Viva (5)	**Performance (5)**	**Total (10)**

Assessor:

REPORT ON LABORATORY WORK

Name: JOMY JOHNSON	**Roll No:14**	**Name of lab: Object Oriented Programming Language**	**Period:**
Class: S2, MCA	**Date:**	**Name of lab work: practical**	**Batch:2021- 2023**

PROGRAM NO-13

Aim: Write a program has class publisher, Book, Literature and Fiction. Read the information and print the details of books from either the category using inheritance.

Algorithm:

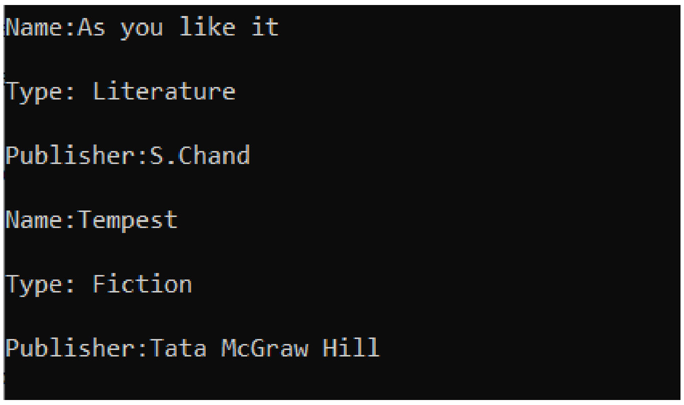
1. Start
2. Create classes for Publisher, Book, Literature, Fiction
3. Take input details from user
4. Print details of book as output of either category using inheritance
5. Stop

Input:

```
class Publisher
{
String publisher;
Publisher (String publi)
{
this.publisher=publi;
}
}

class Book
{
String name;
Publisher publisher;
Book (){}
public Book(String name,Publisher publisher)
{
this.name = name;
this.publisher = publisher;
}
}
```

```
class Literature extends Book
{
String Littype = "Literature";
Literature (String name, Publisher publisher)
{
super (name, publisher);
}

void display ()
{
System.out.println ("\nName:" + super.name);
System.out.println("\nType: "+ this. Littype);
System.out.println("\nPublisher:" + this.publisher.publisher);
}
}


class Fiction extends Book
{
String Littype="Fiction";
Fiction (String name, Publisher publisher)
{
 super (name, publisher);
}

void display ()
{
System.out.println ("\nName:"+super.name);
System.out.println("\nType: "+ this.Littype);
System.out.println("\nPublisher:" + this.publisher.publisher);
}
}
public class InheritanceBookExample
{
public static void main(String[] args)
{
 Publisher lp= new Publisher ("S.Chand" );
Literature l = new Literature ("As you like it",lp);
l.display ();
Publisher fp = new Publisher ("Tata McGraw Hill");
Fiction f = new Fiction ("Tempest",fp);
f.display();
}
}
```

Output:



```
Name:As you like it

Type: Literature

Publisher:S.Chand

Name:Tempest

Type: Fiction

Publisher:Tata McGraw Hill
```

Result/observation: successfully completed the program and output is obtained

Marks:

Viva (5)	**Performance (5)**	**Total (10)**

Assessor:

REPORT ON LABORATORY WORK

Name: JOMY JOHNSON	**Roll No:14**	**Name of lab: Object Oriented Programming Language**	**Period:**
Class: S2, MCA	**Date:**	**Name of lab work: practical**	**Batch:2021- 2023**

PROGRAM NO-14

Aim: Create classes Student and sports. Create another class Result inherited from student and Sports. Display the academic and sports score of a student.

Algorithm:

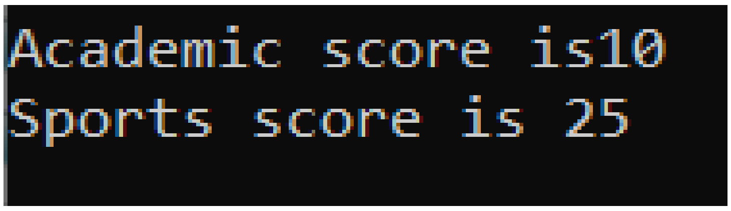
1. Start
2. Create Classes of Student , Sports
3. Create Result class by inheriting Student, Sports with inputted details
4. Display academic and sports score of student as output
5. Stop

Input:

```
interface
student
{
int score=10;
void displayscore();
}
interface sports
{
int score=25;
void displaysports();
}
class result implements student,sports
{
public void displayscore()
{
System.out.println("Academic score is"+student.score);
}
public void displaysports()
{
```

```
System.out.println("Sports score is "+sports.score);
}
}
public class Sportsresult
{
public static void main(String[] args)
{
result r=new result();
r.displayscore();
r.displaysports();
}
}
```

Output:



```
Academic score is10
Sports score is 25
```

Result/observation: successfully completed the program and output is obtained

Marks:

Viva (5)	Performance (5)	Total (10)

Assessor:

REPORT ON LABORATORY WORK

Name: JOMY JOHNSON	**Roll No:14**	**Name of lab: Object Oriented Programming Language**	**Period:**
Class: S2, MCA	**Date:**	**Name of lab work: practical**	**Batch:2021- 2023**

PROGRAM NO-15

Aim: To create a graphics package that has classes and interfaces for figures Triangle, Square, and Circle and test the package by finding the area of these figures.

Algorithm:

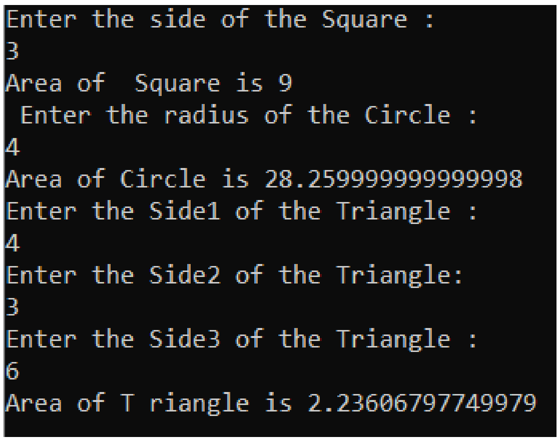
1. Create a folder called org in our path.
2. Open the folder, create another folder called shapes.
3. Write three programs called Circle, Square, and triangle. the first line of the program will be org. shapes;
4. Go to our own path and write another program which invokes the package.
5. Now execute it.

Input:

```
package org.shape;
public class Square
{
private int side;
public Square(int s)
{
side=s;
}
public int area( )
{
return(side*side);
}
}


package org.shape;
public class Triangle
{
```

```
private int side1,side2,side3;
public Triangle(int s1,int s2, int s3)
{
side1=s1;
side2=s2;
side3=s3;
}
public double area( )
{
double s=( side1+side2+side3)/2;
double a=Math.sqrt((s-side1 )+( s-side2)+( s-side3));
return a;
}
}

package org.shape;
public class Circle
{
private int radius;
public Circle(int r)
{
radius=r;
}
public double area( )
{
return(3.14*radius*radius);
}
}

import org.shape.*;
import java.util .*;
class TestPackage
{
public static void main(String[ ] args)
{
Scanner sc=new Scanner(System.in);
System.out.println("Enter the side of the Square : ");
int s=sc.nextInt();
Square sq=new Square(s);
System.out.println("Area of  Square is "+ sq . area( ));
System.out.println( " Enter the radius of the Circle : " );
int r=sc.nextInt();
Circle ci=new Circle(s);
System.out.println( "Area of Circle is "+ ci . area());
System.out.println( "Enter the Side1 of the Triangle :");
int s1=sc.nextInt();
System.out.println( "Enter the Side2 of the Triangle: ");
int s2=sc.nextInt();
System.out.println("Enter the Side3 of the Triangle : ");
int s3=sc.nextInt();
Triangle t=new Triangle(s1,s2,s3);
System.out.println("Area of T riangle is "+ t .area( ));
}
}
```

Output:



```
Enter the side of the Square :
3
Area of  Square is 9
 Enter the radius of the Circle :
4
Area of Circle is 28.259999999999998
Enter the Side1 of the Triangle :
4
Enter the Side2 of the Triangle:
3
Enter the Side3 of the Triangle :
6
Area of T riangle is 2.23606797749979
```

Result/observation: successfully completed the program and output is obtained

Marks:

Viva (5)	**Performance (5)**	**Total (10)**

Assessor:

REPORT ON LABORATORY WORK

Name: JOMY JOHNSON	**Roll No:14**	**Name of lab: Object Oriented Programming Language**	**Period:**
Class: S2, MCA	**Date:**	**Name of lab work: practical**	**Batch:2021- 2023**

PROGRAM NO-16

Aim: To create an arithmetic package that has classes and interfaces for the 4 basic arithmetic operations and test the packages by implementing all operations on two given numbers.

Algorithm:

1. create a folder called org in our path.
2. open the folder, create another folder called calc.
3. write three programs called Add, Sub, Multiply and Divide. the first line of the program will be package org. calc;
4. go to our own path and write another program which invokes the package.
5. Now execute it.

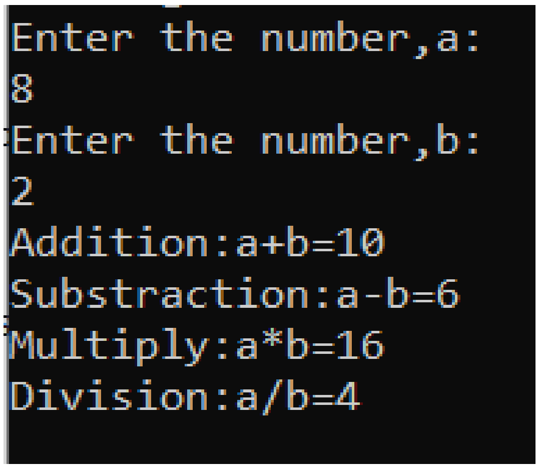
Input:

```
package org.calc;
public class Add
{
private int x,y;
public Add(int a,int b)
{
x=a;
y=b;
}
public int add()
{
return(x+y);
}
}
```

```
package org.calc;
public class Divide
{
private int x,y;
public Divide (int a,int b)
{
x=a;
y=b;
}
public int div()
{
return(x/y);
}
}
package org.calc;
public class Multiply
{
private int x,y;
public Multiply(int a,int b)
{
x=a;
y=b;
}
public int mul()
{
return(x*y);
}
}


package org.calc;
public class Sub
{
private int x,y;
public Sub(int a,int b)
{
x=a;
y=b;
}
public int sub()
{
return(x-y);
}
}
```

```
import org.calc.*;
import java.util.*;
public class Test
{
public static void main(String[] args)
{
Scanner sc=new Scanner(System.in);

System.out.println("Enter the number,a:");
int a=sc.nextInt();

System.out.println("Enter the number,b:");
int b=sc.nextInt();

Add add=new Add(a,b);
System.out.println("Addition:a+b="+add.add());

Sub s=new Sub(a,b);
System.out.println("Substraction:a-b="+s.sub());

Multiply m=new Multiply(a,b);
System.out.println("Multiply:a*b="+m.mul());

Divide d=new Divide(a,b);
System.out.println("Division:a/b="+d.div());
}
}
```

Output:



```
Enter the number,a:
8
Enter the number,b:
2
Addition:a+b=10
Substraction:a-b=6
Multiply:a*b=16
Division:a/b=4
```

Result/observation: successfully completed the program and output is obtained

Marks:

Viva (5)	**Performance (5)**	**Total (10)**

Assessor:

REPORT ON LABORATORY WORK

Name: JOMY JOHNSON	**Roll No:14**	**Name of lab: Object Oriented Programming Language**	**Period:**
Class: S2, MCA	**Date:**	**Name of lab work: practical**	**Batch:2021- 2023**

PROGRAM NO-17

Aim: Write a user defined exception class to authenticate the user name and password.

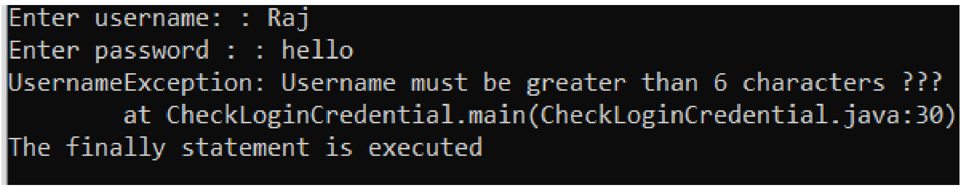
Algorithm:

1. Define a class to inherit from Exception for handling exception in Username
2. Define a class to inherit from Exception for handling exception in Password
3. Ask user to enter username and password
4. Use try.. catch to catch and display appropriate Exception messages.

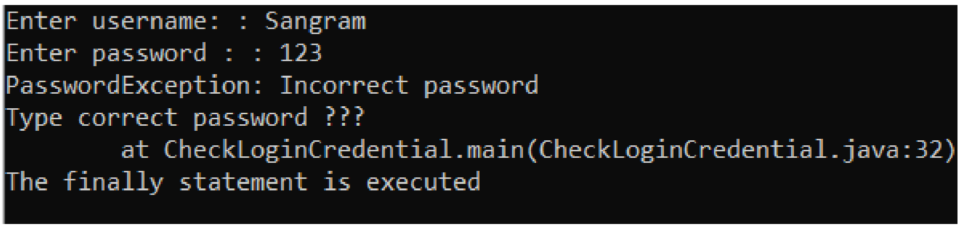
Input:

```
 import java.util.Scanner;
class UsernameException extends Exception
{
public UsernameException(String msg)
{
super(msg);
}
}
class PasswordException extends Exception
{
public PasswordException(String msg)
{
super(msg);
}
}
public class CheckLoginCredential
{
public static void main (String [ ] args)
{
 Scanner s = new Scanner(System.in);
String username,password;
System.out.print("Enter username: : ");
username = s.nextLine( );
System.out.print("Enter password : : ");
password =s.nextLine ( );
int length = username.length( );
try
{
if(length<6 )
throw new UsernameException("Username must be greater than 6 characters ??? ");
else if (!password.equals("hello"))
throw new PasswordException("Incorrect password \nType correct password ??? ") ;
else
System.out.println("Login Successful ! ! ! ");
}
catch(UsernameException u )
{
u.printStackTrace( );
}
catch(PasswordException p )
{
p.printStackTrace( );
}
finally
{
System.out.println("The finally statement is executed");
}
}
}
```

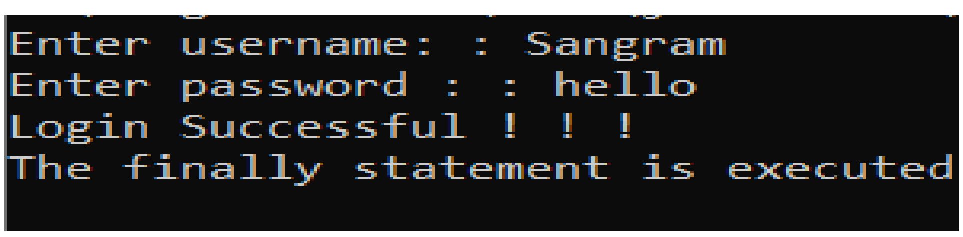
Output:



```
Enter username: : Raj
Enter password : : hello
UsernameException: Username must be greater than 6 characters ???
        at CheckLoginCredential.main(CheckLoginCredential.java:30)
The finally statement is executed
```



```
Enter username: : Sangram
Enter password : : 123
PasswordException: Incorrect password
Type correct password ???
        at CheckLoginCredential.main(CheckLoginCredential.java:32)
The finally statement is executed
```



```
Enter username: : Sangram
Enter password : : hello
Login Successful ! ! !
The finally statement is executed
```

Result/observation: successfully completed the program and output is obtained

Marks:

Viva (5)	**Performance (5)**	**Total (10)**

Assessor:

REPORT ON LABORATORY WORK

Name: JOMY JOHNSON	**Roll No:14**	**Name of lab: Object Oriented Programming Language**	**Period:**
Class: S2, MCA	**Date:**	**Name of lab work: practical**	**Batch:2021- 2023**

PROGRAM NO-18

Aim: To find the average of N positive integers, raising a user defined exception for each negative inputs.

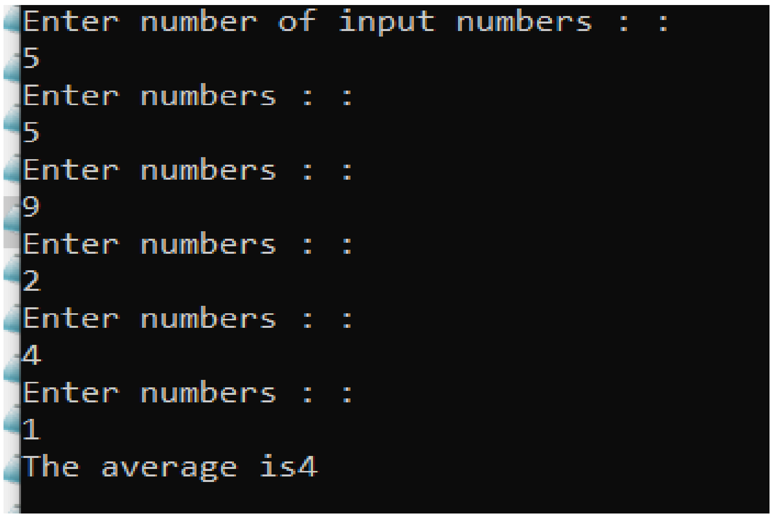
Algorithm:

1. Read a number from user at run time
2. throw an exception if the entered number is negative
3. add to an array otherwise
4. find the sum of the positive numbers and display the average

Input:

```
import java.io.IOException;
import java.util.Scanner;
class MyException extends Exception
{
public MyException (String str)
{
System.out.println(str);
}
}
public class SignException
{
public static void main(String[ ] args)throws IOException
{
System.out.println("Enter number of input numbers : :");
Scanner sc = new Scanner(System.in);
int n =sc.nextInt( );
int k =0, sum =0;
Integer mynumbers[ ] = new Integer[n];
while(n>0)
{
try
{
System.out.println("Enter numbers : : ");
int num = sc.nextInt( );
if(num<0)
throw new MyException ("Number is negative");
else
{
mynumbers[k]=num;
sum=sum+num;
k++;
}
n--;
}
catch(MyException m)
{
System.out.println(m);
}
}
System.out.println("The average is"+ sum/k);
}
}
```

Output:



```
Enter number of input numbers : :
5
Enter numbers : :
5
Enter numbers : :
9
Enter numbers : :
2
Enter numbers : :
4
Enter numbers : :
1
The average is4
```

Result/observation: successfully completed the program and output is obtained

Marks:

Viva (5)	**Performance (5)**	**Total (10)**

Assessor:

REPORT ON LABORATORY WORK

Name: JOMY JOHNSON	**Roll No:14**	**Name of lab: Object Oriented Programming Language**	**Period:**
Class: S2, MCA	**Date:**	**Name of lab work: practical**	**Batch:2021- 2023**

PROGRAM NO-19

Aim: To define 2 classes; one for generating multiplication table of 5 and other for displaying first N prime numbers. Implement using threads.

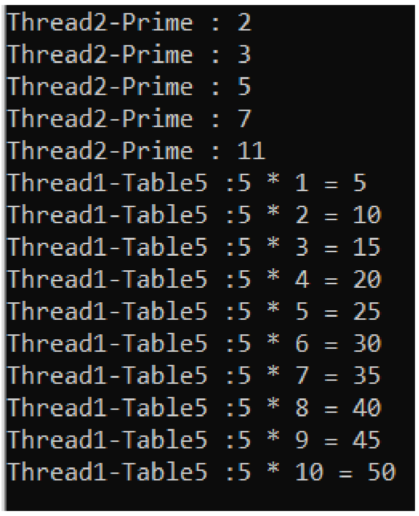
Algorithm:

1. Create class extending class Thread named Multiple5 and implement run() to display multiplication table of 5.
2. Create class extending Thread named PrimeN and implement run() to display prime numbers.
3. Create another class and write the main method, creating objects of classes Multiple5 and PrimeN
4. start both threads.

Input:

```
class Multiple5 extends Thread
{
public void run( )
{
int num=5;
for(int i=1;i<=10;++i)
System.out.printf("Thread1-Table5 :%d * %d = %d \n", num , i , num * i);
}
}
class PrimeN extends Thread
{
public void run( )
{
int ct =0, n=0, i =1, j =1;
while(n<5)
{
j =1; ct =0;
while (j<=i )
{
if(i%j ==0)
ct++; j ++;
}
if(ct==2)
{
System.out.printf("Thread2-Prime : %d \n", i) ;
n++;
}
i++;
}
}
}
public class TreadClassExp
{
public static void main(String[ ] args)
{
Multiple5 m5 = new Multiple5( );
PrimeN pn = new PrimeN( ) ;
pn.start( );
m5.start( );
}
}
```

Output:



```
Thread2-Prime : 2
Thread2-Prime : 3
Thread2-Prime : 5
Thread2-Prime : 7
Thread2-Prime : 11
Thread1-Table5 :5 * 1 = 5
Thread1-Table5 :5 * 2 = 10
Thread1-Table5 :5 * 3 = 15
Thread1-Table5 :5 * 4 = 20
Thread1-Table5 :5 * 5 = 25
Thread1-Table5 :5 * 6 = 30
Thread1-Table5 :5 * 7 = 35
Thread1-Table5 :5 * 8 = 40
Thread1-Table5 :5 * 9 = 45
Thread1-Table5 :5 * 10 = 50
```

Result/observation: successfully completed the program and output is obtained

Marks:

Viva (5)	**Performance (5)**	**Total (10)**

Assessor:

REPORT ON LABORATORY WORK

Name: JOMY JOHNSON	**Roll No:14**	**Name of lab: Object Oriented Programming Language**	**Period:**
Class: S2, MCA	**Date:**	**Name of lab work: practical**	**Batch:2021- 2023**

PROGRAM NO-20

Aim: To define 2 classes; one for generating Fibonacci numbers and other for displaying even numbers in a given range. Implement using thread.

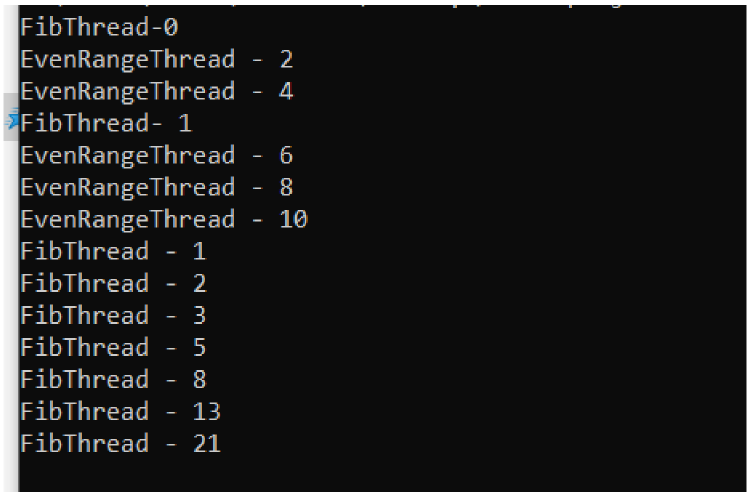
Algorithm:

1. Create class implementing Runnable interface to display Fibonacci numbers.
2. Create class implementing Runnable interface to display even numbers.
3. Create two threads with the reference to the objects of above classes respectively
4. start both threads created.

Input:

```
class FibThread implements Runnable
{
public void run( )
{
int a=0, b=1, c=0;
System.out.println("FibThread-"+ a);
System.out.println("FibThread- "+ b);
for(int h = 1 ; h<=7; h++)
{
c = a + b ;
System.out.println("FibThread - "+c);
a = b ;
b = c ;
}
}
}
class EvenRangeThread implements Runnable
{
public void run( )
{
int a = 2 , b = 10;
for(int k = a ; k<=b ; k+=2)
System.out.println("EvenRangeThread - " + k);
}
}
public class FibEven
 {
public static void main (String args [ ] )
{
FibThread ft = new FibThread ( ) ;
EvenRangeThread er = new EvenRangeThread( );
Thread t1 = new Thread(ft);
Thread t2 = new Thread(er);
t1.start( );
t2.start( );
}
}
```

Output:



```
FibThread-0
EvenRangeThread - 2
EvenRangeThread - 4
FibThread- 1
EvenRangeThread - 6
EvenRangeThread - 8
EvenRangeThread - 10
FibThread - 1
FibThread - 2
FibThread - 3
FibThread - 5
FibThread - 8
FibThread - 13
FibThread - 21
```

Result/observation: successfully completed the program and output is obtained

Marks:

Viva (5)	Performance (5)	Total (10)

Assessor:

REPORT ON LABORATORY WORK

Name: JOMY JOHNSON	**Roll No:14**	**Name of lab: Object Oriented Programming Language**	**Period:**
Class: S2, MCA	**Date:**	**Name of lab work: practical**	**Batch:2021- 2023**

PROGRAM NO-21

Aim: To write a program to create a generic stack and do the push and pop operations.

Algorithm:

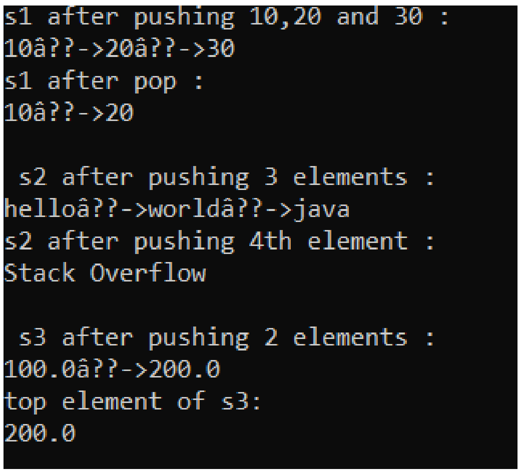
1. Define a class stack which has an ArrayList of type T.
2. Create a stack object s1 to manipulate integer values.
3. create another stack s2 to manipulate strings
4. create stack s3 and manipulate floating numbers.

Input:

```
import java.io.*;
import java.util.*;
class stack<T>
{
ArrayList<T>A;
int top=-1;
int size;
stack(int size )
{
this.size=size ;
this.A = new ArrayList<T>(size);
}
void push(T X)
{
if(top+1==size)
{
System.out.println("Stack Overflow");
}
else
{
top=top+1;
if(A.size( )>top)
A.set(top,X);
else
A.add(X);
}
}
T top( )
{
if(top==-1)
{
System.out.println("Stack Underflow");
return null;
}
else
return A.get(top);
}
void pop ( )
{
if(top==-1)
{
System.out.println("Stack Underflow");
}
else
top--;
}
boolean empty ( )
{
return top==-1;
}
public String toString( )
{
String Ans="";
for(int i=0;i<top;i++)
{
Ans += String.valueOf(A.get(i)) + "−->";
}
Ans += String.valueOf(A.get(top));
return Ans;
}
}
public class GenericStack
{
public static void main(String [ ] args)
{
stack<Integer> s1 = new stack<>(3);
s1.push(10);
s1.push(20);
s1.push(30);
```

```
System.out.println ("s1 after pushing 10,20 and 30 : \n" +s1 );
s1.pop();
System.out.println ("s1 after pop :\n" +s1);
stack<String> s2= new stack<>(3);
s2.push("hello");
s2.push("world");
s2.push("java");
System.out.println("\n s2 after pushing 3 elements : \n" +s2);
System.out.println("s2 after pushing 4th element : ");
s2.push("GFG");
stack<Float> s3 = new stack<>(2);
s3.push(100.0f);
s3.push(200.0f);
System.out.println("\n s3 after pushing 2 elements : \n" +s3);
System.out.println("top element of s3:\n"+ s3.top( ));
}
}
```

Output:



```
s1 after pushing 10,20 and 30 :
10â??->20â??->30
s1 after pop :
10â??->20

 s2 after pushing 3 elements :
helloâ??->worldâ??->java
s2 after pushing 4th element :
Stack Overflow

 s3 after pushing 2 elements :
100.0â??->200.0
top element of s3:
200.0
```

Result/observation: successfully completed the program and output is obtained

Marks:

Viva (5)	**Performance (5)**	**Total (10)**

Assessor:

REPORT ON LABORATORY WORK

Name: JOMY JOHNSON	**Roll No:14**	**Name of lab: Object Oriented Programming Language**	**Period:**
Class: S2, MCA	**Date:**	**Name of lab work: practical**	**Batch:2021- 2023**

PROGRAM NO-22

Aim: To maintain a list of strings using Array list from collection framework, and perform built-in operations.

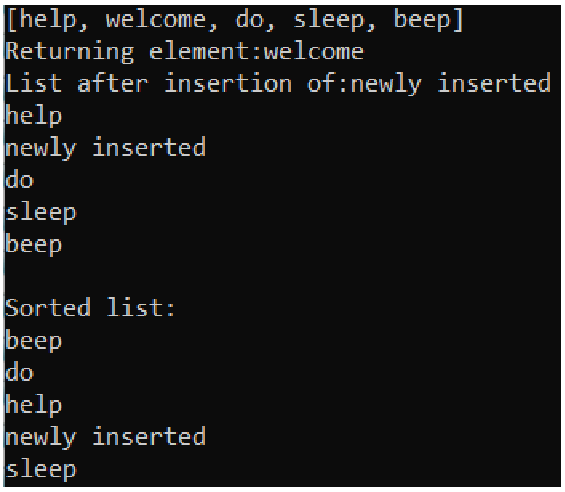
Algorithm:

1. Create an ArrayList of Strings
2. Insert elements using add()
3. display the list
4. display an element from the list using get()
5. Replace an element at given position using set()
6. sort the list using Collections.sort()

Input:

```
import java.util.*;
public class ArrayListExp
{
public static void main(String args[])
{
ArrayList<String>list=new ArrayList<String>( );
list.add("help");
list.add("welcome");
list.add("do");
list.add("sleep");
list.add("beep");
System.out.println(list);
System.out.println("Returning element:"+list.get(1));
list.set(1,"newly inserted");
System.out.println("List after insertion of:newly inserted");
for(String word:list)
System.out.println(word);
Collections.sort(list);
System.out.println("\nSorted list:");
for(String word:list)
System.out.println(word);
}
}
```

Output:



```
[help, welcome, do, sleep, beep]
Returning element:welcome
List after insertion of:newly inserted
help
newly inserted
do
sleep
beep

Sorted list:
beep
do
help
newly inserted
sleep
```

Result/observation: successfully completed the program and output is obtained

Marks:

Viva (5)	Performance (5)	Total (10)

Assessor:

REPORT ON LABORATORY WORK

Name: JOMY JOHNSON	**Roll No:14**	**Name of lab: Object Oriented Programming Language**	**Period:**
Class: S2, MCA	**Date:**	**Name of lab work: practical**	**Batch:2021- 2023**

PROGRAM NO-23

Aim: Program to remove all the elements from a linked list.

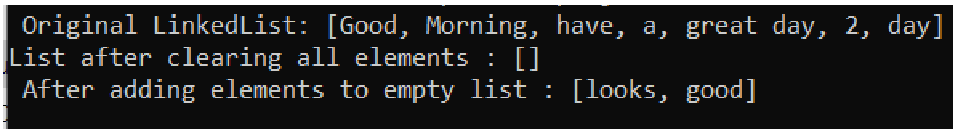
Algorithm:

1. Insert values into a LinkedList using add()
2. display original linked list.
3. call clear() on the linkedlist
4. Repeat step 1 and 2

Input:

```
import java.io.*;
import java.util.LinkedList;
public class RemoveElementsLinkedList
{
public static void main(String args[])
{
LinkedList<String>list=new LinkedList<String>();
list.add("Good");
list.add("Morning");
list.add("have");
list.add("a" );
list.add("great day");
list.add("2");
list.add("day");
System.out.println(" Original LinkedList: " + list);
list.clear();
System.out.println("List after clearing all elements : "+ list);
list.add("looks");
list.add("good");
System.out.println(" After adding elements to empty list : " + list);
}
}
```

Output:



```
 Original LinkedList: [Good, Morning, have, a, great day, 2, day]
List after clearing all elements : []
 After adding elements to empty list : [looks, good]
```

Result/observation: successfully completed the program and output is obtained

Marks:

Viva (5)	Performance (5)	Total (10)

Assessor:

REPORT ON LABORATORY WORK

Name: JOMY JOHNSON	**Roll No:14**	**Name of lab: Object Oriented Programming Language**	**Period:**
Class: S2, MCA	**Date:**	**Name of lab work: practical**	**Batch:2021- 2023**

PROGRAM NO-24

Aim: Program to demonstrate the creation of queue object using the priority queue class.

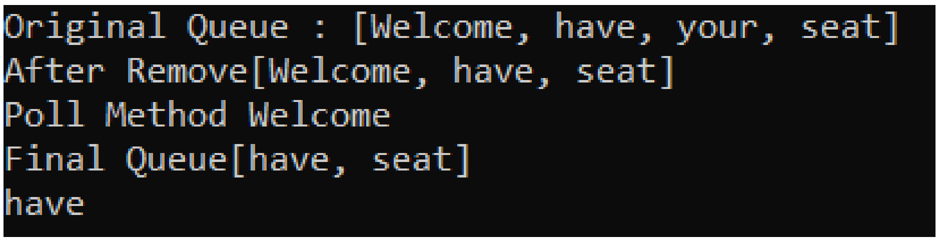
Algorithm:

1. Create a queue of type Queue using Priority Queue
2. Insert elements using add()
3. display the queue
4. remove an element
5. poll() the queue
6. display the queue
7. get the top element using peek()

Input:

```
import java.util.PriorityQueue;
import java.util.Queue;
public class QPriorityQ
{
public static void main(String args[])
{
Queue<String> pq = new PriorityQueue<>();
pq.add("Welcome");
pq.add("have");
pq.add("your");
pq.add("seat");
System.out.println("Original Queue : " +pq);
pq.remove("your");
System.out.println("After Remove"+ pq);
System.out.println("Poll Method " + pq.poll());
System.out.println("Final Queue" +pq);
System.out.println(pq.peek());
} }
```

Output:



```
Original Queue : [Welcome, have, your, seat]
After Remove[Welcome, have, seat]
Poll Method Welcome
Final Queue[have, seat]
have
```

Result/observation: successfully completed the program and output is obtained

Marks:

Viva (5)	**Performance (5)**	**Total (10)**

Assessor:

REPORT ON LABORATORY WORK

Name: JOMY JOHNSON	**Roll No:14**	**Name of lab: Object Oriented Programming Language**	**Period:**
Class: S2, MCA	**Date:**	**Name of lab work: practical**	**Batch:2021- 2023**

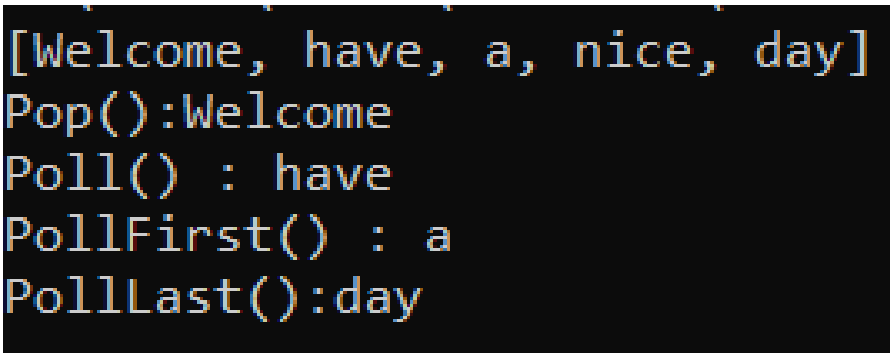
PROGRAM NO-25

Aim: Program to demonstrate the addition and deletion of elements in deque

Input:

```
import java.util.ArrayDeque;
import java.util.Deque;
public class DequeOperations
{
public static void main(String[] args)
{
Deque<String>dq= new ArrayDeque<String>();
dq.add("have");
dq.addFirst("Welcome");
dq.add("a");
dq.add("nice");
dq.addLast("day");
System.out.println(dq);
System.out.println("Pop():"+dq.pop());
System.out.println("Poll() : " +dq.poll());
System.out.println("PollFirst() : " +dq.pollFirst());
System.out.println("PollLast():" +dq.pollLast());
}
}
```

Output:



```
[Welcome, have, a, nice, day]
Pop():Welcome
Poll() : have
PollFirst() : a
PollLast():day
```

Result/observation: successfully completed the program and output is obtained

Marks:

Viva (5)	**Performance (5)**	**Total (10)**

Assessor:

REPORT ON LABORATORY WORK

Name: JOMY JOHNSON	**Roll No:14**	**Name of lab: Object Oriented Programming Language**	**Period:**
Class: S2, MCA	**Date:**	**Name of lab work: practical**	**Batch:2021- 2023**

PROGRAM NO-26

Aim: Program to implement a simple calculator using AWT components.

Algorithm:

1. Start
2. Using AWT components, construct a simple calculator
3. Display it as output S
4. Stop

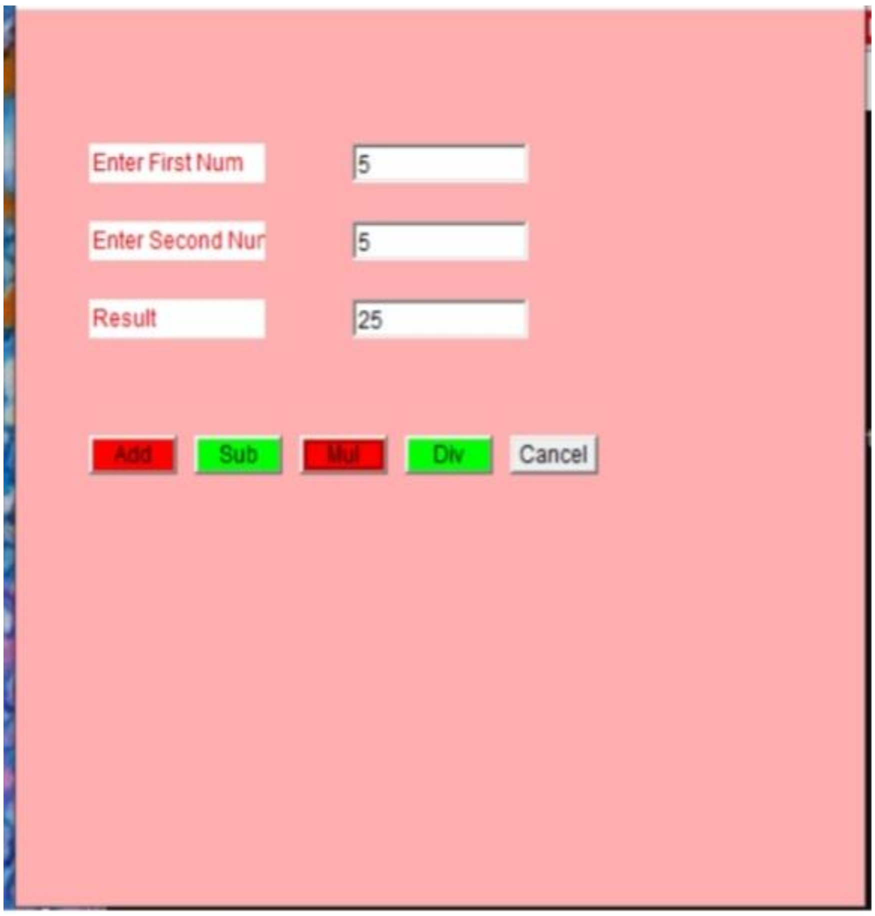
Input:

```
import java.awt.*;
import java.awt.event.*;
class SimpleCalculator extends Frame implements ActionListener {
Frame f1=new Frame();
Label l1=new Label("Enter First Num");
Label l2=new Label("Enter Second Num");
Label l3=new Label("Result");
TextField t1=new TextField();
TextField t2=new TextField();
TextField t3=new TextField();
Button b1=new Button("Add");
Button b2=new Button("Sub");
Button b3=new Button("Mul");
Button b4=new Button("Div");
Button b5=new Button("Cancel");
SimpleCalculator()
{
l1.setBounds(50,100,100,20);
l2.setBounds(50,140,100,20);
l3.setBounds(50,180,100,20);
```

```
t1.setBounds(200,100,100,20);
t2.setBounds(200,140,100,20);
t3.setBounds(200,180,100,20);
b1.setBounds(50,250,50,20);
b2.setBounds(110,250,50,20);
b3.setBounds(170,250,50,20);
b4.setBounds(230,250,50,20);
b5.setBounds(290,250,50,20);
b1.setBackground(Color.red);
b2.setBackground(Color.green);
b3.setBackground(Color.red);
b4.setBackground(Color.green);
f1.add(l1);
f1.add(l2);
f1.add(l3);
f1.add(t1);
f1.add(t2);
f1.add(t3);
f1.add(b1);
f1.add(b2);
f1.add(b3);
f1.add(b4);
f1.add(b5);
b1.addActionListener(this);
b2.addActionListener(this);
b3.addActionListener(this);
b4.addActionListener(this);
b5.addActionListener(this);
f1.setLayout(null);
f1.setVisible(true);
f1.setSize(500,500);
l1.setForeground(Color.red);
l2.setForeground(Color.red);
l3.setForeground(Color.red);
f1.setBackground(Color.pink);
}
public void actionPerformed(ActionEvent e)
{
int n1=Integer.parseInt(t1.getText());
int n2=Integer.parseInt(t2.getText());
if(e.getSource()==b1)
{
t3.setText(String.valueOf(n1+n2));
}
if(e.getSource()==b2)
{
t3.setText(String.valueOf(n1-n2));}
```

```
if(e.getSource()==b3)
{
t3.setText(String.valueOf(n1*n2));
}
if(e.getSource()==b4)
{
t3.setText(String.valueOf(n1/n2));
}
if(e.getSource()==b5)
{
System.exit(0);
}
}
public static void main(String args[])
{
new SimpleCalculator();
}
}
```

Output:



```
Enter First Num      5
Enter Second Nur     5
Result               25
```

Result/observation: successfully completed the program and output is obtained

Marks:

Viva (5)	**Performance (5)**	**Total (10)**

Assessor:

REPORT ON LABORATORY WORK

Name: JOMY JOHNSON	**Roll No:14**	**Name of lab: Object Oriented Programming Language**	**Period:**
Class: S2, MCA	**Date:**	**Name of lab work: practical**	**Batch:2021- 2023**

PROGRAM NO-27

Aim: Program to find maximum of three numbers using AWT.

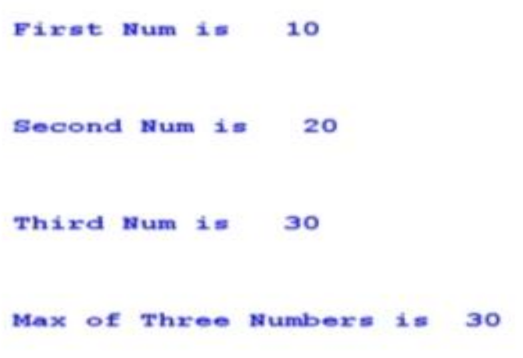
Algorithm:

1. Start
2. Using awt,input three numbers
3. Then find the maximum of three numbers
4. Display maximum as output
5. Stop

Input:

```
import java.awt.*;
import java.applet.
import java.io.*;
/*
<applet code="AppletMax3" width=500 height=500>
<param name="a" value="10">
<param name="b" value="20">
<param name="c" value="30">
</applet>
*/
public class AppletMax3 extends Applet
{
int a;
int b;
int c;
int d;
String str;
public void start()
{
String s1;
s1 = getParameter("a");
a = Integer.parseInt(s1);
s1 = getParameter("b");
b = Integer.parseInt(s1);
s1 = getParameter("c");
c = Integer.parseInt(s1);
}
public void paint(Graphics g)
{
if( a >= b && a >= c)
d = a;
else if (b >= a && b >= c)
d=b;
else
d=c;
g.setColor(Color.blue);
Font myFont = new Font("Courier", Font.BOLD,20);
g.setFont(myFont);
g.drawString("First Num is " + a, 100, 100);
g.drawString("Second Num is " + b, 100, 200);
g.drawString("Third Num is " + c, 100, 300);
g.drawString("Max of Three Numbers is " + d, 100, 400);
}
}
```

Output:



```
First Num is   10


Second Num is   20


Third Num is   30


Max of Three Numbers is   30
```

Result/observation: successfully completed the program and output is obtained

Marks:

Viva (5)	**Performance (5)**	**Total (10)**

Assessor:

REPORT ON LABORATORY WORK

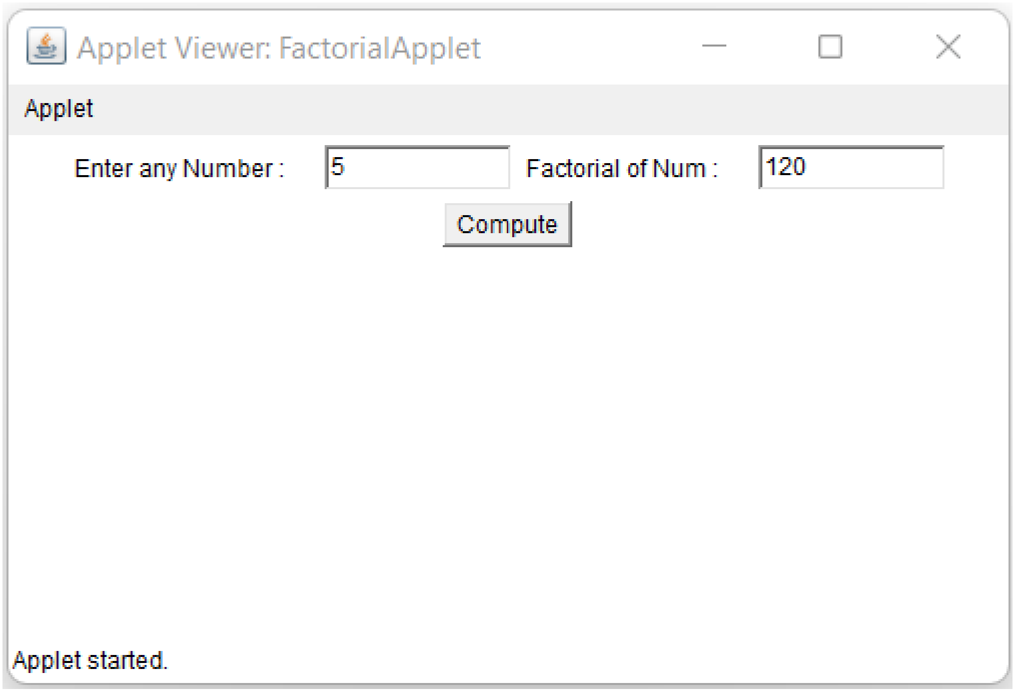
Name: JOMY JOHNSON	**Roll No:14**	**Name of lab: Object Oriented Programming Language**	**Period:**
Class: S2, MCA	**Date:**	**Name of lab work: practical**	**Batch:2021- 2023**

PROGRAM NO-28

Aim: Develop an applet in Java that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named "Compute" is clicked.

```
/** Develop applet to find factorial of the given number */
import java.awt.*;
import java.applet.*;
import java.awt.event.*;
/*<applet code="FactorialApplet" width=500 height=250>
</applet>*/


public class FactorialApplet extends Applet implements ActionListener {
    Label L1,L2;
    TextField T1,T2;
    Button B1;

    public void init() {
        L1=new Label("Enter any Number : ");
        add(L1);
        T1=new TextField(10);
        add(T1);
        L2=new Label("Factorial of Num : ");
        add(L2);
        T2=new TextField(10);
        add(T2);
        B1=new Button("Compute");
        add(B1);
        B1.addActionListener(this);
    }

    public void actionPerformed(ActionEvent e) {
        if(e.getSource()==B1)
        {
        int value=Integer.parseInt(T1.getText());
        int fact=factorial(value);
        T2.setText(String.valueOf(fact));
        }
    }

    int factorial(int n) {
        if(n==0)
            return 1;
        else
            return n*factorial(n-1);
    }
}
```

OUTPUT



Applet Viewer: FactorialApplet

Applet

Enter any Number : 5

Factorial of Num : 120

Compute

Applet started.

Result/observation: successfully completed the program and output is obtained

Marks:

Viva (5)	Performance (5)	Total (10)

Assessor: