UTTARANCHAL UNIVERSITY

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UTTARANCHAL UNIVERSITY

Lab Manual

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Subject Name:	**Programming with core JAVA**
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Department of Computer Science & Engineering
Uttaranchal Institute of Technology

UTTARANCHAL INSTITUTE OF

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```java
/*
QUE: Develop a Java application to generate electricity bill.
create a class with following members:
1.consumer_name
2.consumer_number
3.previous_reading
4.current_reading
5.eb_connection - domestic,commercial
compute the bill amount using following method :
if type of eb connection is domestic then calculate amount to be paid :
0 to 100 unit - 1 Rs per unit
101 to 200 unit - 2.5 Rs per unit
201 to 500 unit - 4 Rs per unit
above 501 unit - 6 Rs per unit
if type of eb connection is commercial then calculate amount to be paid :
0 to 100 unit - 2 Rs per unit
101 to 200 unit - 4.5 Rs per unit
201 to 500 unit - 6 Rs per unit
above 501 unit - 7 Rs per unit
*/
import java.util.*;
class electricitybill {
    public static void main(String[] args) {
        Scanner in = new Scanner(System.in);
        Scanner ins = new Scanner(System.in);
        String consumer_name;
        int consumer_number,eb_connection;
        double current_reading,previous_reading,total_bill = 0,units;
        System.out.print("\n\t Enter consumer number:");
        consumer_number = in.nextInt();
        System.out.print("\n\t Enter Type of connection (0 for Domestic or 1 for Commercial):");
        eb_connection = in.nextInt();
        System.out.print("\n\t Enter consumer name:");
        consumer_name = ins.nextLine();
        System.out.print("\n\t Enter previous month reading:");
        previous_reading = in.nextDouble();
        System.out.print("\n\t Enter current month reading :");
        current_reading = in.nextDouble();
        units = current_reading-previous_reading;
        if(eb_connection == 0)
```

```
        {
            if (units>=0 && units<=100)
                total_bill = 1 * units;
            else if (units>100 && units<=200)
                total_bill=(100*1)+((units-100)*2.5);
            else if(units>200 && units<=500)
                total_bill=(100*1)+(100*2.5)+((units-200)*4);
            else
                total_bill=(100*1)+(100*2.5)+(300*4)+((units-500)*6);
        }
        else if(eb_connection == 1)
        {
            if (units>=0 && units<=100)
                total_bill = 2 * units;
            else if (units>100 && units<=200)
                total_bill=(100*2)+((units-100)*4.5);
            else if(units>200 && units<=500)
                total_bill=(100*2)+(100*4.5)+((units-200)*6);
            else
                total_bill=(100*2)+(100*4.5)+(300*6)+((units-500)*7);
        }
        System.out.println("This electricity_bill is generated for consumer_number: "+consumer_number+" belongs to: "+consumer_name);
        System.out.println("units used: "+units);
        System.out.println("Total Bill amount: Rs."+total_bill);
    }
}
```

Run - electricitybill.java

Run: electricitybill

```
C:\Users\piyus\.jdks\openjdk-16\bin\java.exe "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2021.1\lib\idea_rt.jar=54611:C:\Pro

    Enter consumer number:40236512

    Enter Type of connection (0 for Domestic or 1 for Commercial):0

    Enter consumer name:Piyush

    Enter previous month reading:4521

    Enter current month reading:4703
This electricity_bill is generated for consumer_number: 40236512 belongs to: Piyush
units used: 182.0
Total Bill amount: Rs.305.0

Process finished with exit code 0
```

```java
/*
QUE: Develop a java application with Employee class with Emp_name Emp_id,Address,Mail_id,Mobile_no
as members. Inherit the classes,Programmer, AssistantProfessor,Associate Professor and Professor from
employee class.Add BasicPay(BP)as the member of all the inherited classes with 97% of BP as DA,
10% of BP as HRA,12% of BP as PF, 0.1% of BP for staff club fund. Generate pay slips for the employees
with their gross and net salary.
*/
import java.util.Scanner;
class Employee
{
    int Emp_id;
    String Emp_name;
    String Address;
    String Mail_Id;
    String Mobile_no;
    Employee(){}
    Employee(int id,String name,String addr,String mail, String mob)
    {
        this.Emp_id = id;
        this.Emp_name = name;
        this.Address = addr;
        this.Mail_Id = mail;
        this.Mobile_no = mob;
    }
}
class Programmer extends Employee
{
    double BP,Gross_salary,Net_salary;
    public Programmer(int id,String name,String addr, String mail,String mob)
    {
        super(id,name,addr,mail,mob);
    }
    void computePay() {
        System.out.print("Enter Basic Pay:");
        Scanner input = new Scanner(System.in);
        BP = input.nextDouble();
        double DA, HRA, PF, Fund;
        DA = (BP * 97 / 100);
        HRA = (BP * 10 / 100);
        PF = (BP * 12 / 100);
        Fund = (BP * 0.1 / 100);
```

```
        Gross_salary = BP + DA + HRA;
        Net_salary = BP + DA + HRA - (PF + Fund);
        System.out.println("Emp_ID: " + Emp_id);
        System.out.println("Emp_Name: " + Emp_name);
        System.out.println("Address: " + Address);
        System.out.println("Mail_ID: " + Mail_Id);
        System.out.println("Mobile Number: " + Mobile_no);
        System.out.println("Gross Pay: " + Gross_salary);
        System.out.println("Net Pay: " + Net_salary);
    }
}
class Asst_Professor extends Employee
{
    double BP,Gross_salary,Net_salary;
    public Asst_Professor(int id,String name,String addr,String mail,String mob)
    {
        super(id,name,addr,mail,mob);
    }
    void computePay() {
        System.out.print("Enter Basic Pay:");
        Scanner input = new Scanner(System.in);
        BP = input.nextDouble();
        double DA, HRA, PF, Fund;
        DA = (BP * 97 / 100);
        HRA = (BP * 10 / 100);
        PF = (BP * 12 / 100);
        Fund = (BP * 0.1 / 100);
        Gross_salary = BP + DA + HRA;
        Net_salary = BP + DA + HRA - (PF + Fund);
        System.out.println("Emp_ID: " + Emp_id);
        System.out.println("Emp_Name: " + Emp_name);
        System.out.println("Address: " + Address);
        System.out.println("Mail_ID: " + Mail_Id);
        System.out.println("Mobile Number: " + Mobile_no);
        System.out.println("Gross Pay: " + Gross_salary);
        System.out.println("Net Pay: " + Net_salary);
    }
}
class Associate_Professor extends Employee
{
    double BP,Gross_salary,Net_salary;
    public Associate_Professor(int id,String name,String addr,String mail,String mob)
    {
        super(id,name,addr,mail,mob);
    }
```

```
    void computePay() {
        System.out.print("Enter Basic Pay:");
        Scanner input = new Scanner(System.in);
        BP = input.nextDouble();
        double DA, HRA, PF, Fund;
        DA = (BP * 97 / 100);
        HRA = (BP * 10 / 100);
        PF = (BP * 12 / 100);
        Fund = (BP * 0.1 / 100);
        Gross_salary = BP + DA + HRA;
        Net_salary = BP + DA + HRA - (PF + Fund);
        System.out.println("Emp_ID: " + Emp_id);
        System.out.println("Emp_Name: " + Emp_name);
        System.out.println("Address: " + Address);
        System.out.println("Mail_ID: " + Mail_Id);
        System.out.println("Mobile Number: " + Mobile_no);
        System.out.println("Gross Pay: " + Gross_salary);
        System.out.println("Net Pay: " + Net_salary);
    }
}
class Professor extends Employee
{
    double BP,Gross_salary,Net_salary;
    public Professor(int id,String name,String addr, String mail,String mob)
    {
        super(id,name,addr,mail,mob);
    }
    void computePay() {
        System.out.print("Enter Basic Pay:");
        Scanner input = new Scanner(System.in);
        BP = input.nextDouble();
        double DA, HRA, PF, Fund;
        DA = (BP * 97 / 100);
        HRA = (BP * 10 / 100);
        PF = (BP * 12 / 100);
        Fund = (BP * 0.1 / 100);
        Gross_salary = BP + DA + HRA;
        Net_salary = BP + DA + HRA - (PF + Fund);
        System.out.println("Emp_ID: " + Emp_id);
        System.out.println("Emp_Name: " + Emp_name);
        System.out.println("Address: " + Address);
        System.out.println("Mail_ID: " + Mail_Id);
        System.out.println("Mobile Number: " + Mobile_no);
        System.out.println("Gross Pay: " + Gross_salary);
```

```
        System.out.println("Net Pay: " + Net_salary);
    }
}
public class PaySlip
{
    public static void main(String[] args)
    {
        Programmer p = new Programmer(10, "AAA", "xxx", "aaa_xxx@gmail.com", "1111111111");
        System.out.println("------- Programmer ----------");
        p.computePay();
        Asst_Professor Ap = new
                Asst_Professor(20, "BBB", "yyy", "bbb_yyy@gmail.com", "2222222222");
        System.out.println("------- Assistant Professor ----------");
        Ap.computePay();
        Associate_Professor As = new
                Associate_Professor(30, "CCC", "zzz", "ccc_zzz@gmail.com", "3333333333");
        System.out.println("------- Associate Professor ----------");
        As.computePay();
        Professor pf = new
                Professor(40, "DDD", "www", "ddd_www@gmail.com", "44444444444");
        System.out.println("------- Professor ----------");
        pf.computePay();
    }
}
```

Run - electricitybill.java

Run: PaySlip

```
C:\Users\piyus\.jdks\openjdk-16\bin\java.exe "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2021.1\lib\idea_rt.jar=54608:C:\Pro
------- Programmer ----------
Enter Basic Pay:50000
Emp_ID: 10 Emp_Name: AAA
Address: xxx
Mail_ID: aaa_xxx@gmail.com Mobile Number: 1111111111
Gross Pay: 103500.0 Net Pay: 97450.0
------- Assistant Professor ----------
Enter Basic Pay:30000
Emp_ID: 20 Emp_Name: BBB
Address: yyy
Mail_ID: bbb_yyy@gmail.com Mobile Number: 2222222222
Gross Pay: 62100.0 Net Pay: 58470.0
------- Associate Professor ----------
Enter Basic Pay:25000
Emp_ID: 30 Emp_Name: CCC
Address: zzz
Mail_ID: ccc_zzz@gmail.com Mobile Number: 3333333333
Gross Pay: 51750.0 Net Pay: 48725.0
------- Professor ----------
Enter Basic Pay:20000
Emp_ID: 40 Emp_Name: DDD
Address: www
Mail_ID: ddd_www@gmail.com Mobile Number: 44444444444
Gross Pay: 41400.0 Net Pay: 38980.0

Process finished with exit code 0
```

```java
/*
QUE: Design a Java interface for ADT Stack.Implement this interface using
array. Provide necessary exception handling in both the implementations.
*/
import java.io.*;
import java.util.*;
interface interface1
{
    void push(int item);
    int pop();
}
class ArrStack implements interface1
{
    int size;
    int[] st;
    private int top;
    private int items_count;
    public ArrStack(int Max)
    {
        size = Max;
        st = new int[size];
        top = -1;
    }
    public void push(int item)
    {
        try
        {
            st[++top] = item;
        }
        catch(Exception e)
        {
            System.out.println("\n Satck Full!! Can not insert element");
        }
    }
    public int pop()
    {
        int item;
        try
        {
            item = st[top];
            top--;
            return item;
        }
        catch(Exception e)
```

```
        {
            System.out.println("\n Satck Empty!!Can not pop the element");
            return -1;
        }
    }
public void display()
{
    System.out.println("\n Stack contains:");
    for(int i=top;i>=0;i--)
    {
        if(top==-1)
            System.out.println("Stack is empty");
        else if(size==top)
            System.out.println("Stack is Full");
        else
            System.out.println(" "+st[i]);
    }
}
}
class Stack
{
    public static void main(String[] args)
    {
        ArrStack obj = new ArrStack(10);  // stack holds 10 items
        System.out.println("\n ----------------------------------------");
        System.out.println("\n\t Stack using Array");
        System.out.println("\n ----------------------------------------");
        obj.push(10);
        obj.push(20);
        obj.push(30);
        obj.display();
        System.out.println("\n The Popped item is "+obj.pop());
        obj.display();
    }
}
```

Run - electricitybill.java

Run: Stack

```
C:\Users\piyus\.jdks\openjdk-16\bin\java.exe "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2021.1\lib\idea_rt.jar=54614:C:\Pro

-------------------------------------

    Stack using Array

-------------------------------------

 Stack contains:
 30
 20
 10

 The Popped item is 30

 Stack contains:
 20
 10

Process finished with exit code 0
```

```java
/*
QUE: Write a program to perform string operations using ArrayList.
Write functions for the following :
a. Append - add at end
b. Insert - add at particular index
c. Search
d. List all string starts with given letter
*/
import java.util.*;
class Lst
{
    Scanner sc;
    String str;
    public void append(ArrayList AL) {
        char ans;
        do {
            System.out.println("Enter string: ");
            sc = new Scanner(System.in);
            str = sc.next();
            AL.add(str);
            System.out.println("Do you want to append more string: ");
            ans = sc.next().charAt(0);
        } while (ans == 'y');
        System.out.println("The array elements are... " + AL);
        System.out.println("The array size is...  " + AL.size());
    }
    public void insert(ArrayList AL) {
        System.out.println("Enter string: ");
        sc = new Scanner(System.in);
        str = sc.next();
        System.out.println("Enter index at which the string is to be inserted: ");
        sc = new Scanner(System.in);
        int index = sc.nextInt();
        AL.add(index, str);
        System.out.println("The array elements are... " + AL);
    }
    public void search(ArrayList AL) {
        append(AL);
        String searchStr;
        System.out.println("Enter string for searching ");
        sc = new Scanner(System.in);
```

```
        searchStr = sc.next();
        boolean found = false;
        Iterator<String> iter = AL.iterator();
        String curItem = "";
        int pos = 0;
        while (iter.hasNext() == true) {
            pos = pos + 1;
            curItem = (String) iter.next();
            if (curItem.equals(searchStr)) {
                found = true;
                break;
            }
        }
        if (found == false) {
            pos = 0;
        }
        if (pos != 0) {
            System.out.println(searchStr + " String Found in position : " + pos);
        } else {
            System.out.println(searchStr + " String not found");
        }
    }
    public void find(ArrayList AL) {
        append(AL);
        Object[] objs = AL.toArray(new String[0]);
        String[] str_list = new String[objs.length];
        System.arraycopy(objs, 0, str_list, 0, objs.length);
        System.out.println("Enter starting letter: ");
        sc = new Scanner(System.in);
        String searchChar = sc.next();
        System.out.println("The strings starting with letter " + searchChar + " are...");
        for (int i = 0; i < str_list.length; i++)//Iterate through array of strings
        {
            if (str_list[i].startsWith(searchChar))
                System.out.println(str_list[i]);
        }
    }
}
class ArrayListProg
{
    public static void main(String[] args)
    {
```

```
        System.out.println("\n\t\t Program for Implementing Array List for List of Strings");
        ArrayList AL=new ArrayList<String>();                //creation of ArrayList
        Lst obj=new Lst();
        char ans;
        do
        {
            System.out.println("Main Menu");
            System.out.println("1. Append \n2. Insert at particular Index \n3. Search \n4. List strings");
            System.out.print("Enter your choice: ");
            Scanner sc=new Scanner(System.in);
            int choice=sc.nextInt();
            switch(choice)
            {
                case 1:obj.append(AL);
                    break;
                case 2:obj.insert(AL);
                    break;
                case 3:obj.search(AL);
                    break;
                case 4:obj.find(AL);
                    break;
            }
            System.out.println("Do you want to go to Main Menu?(y/n): ");
            ans=sc.next().charAt(0);
        }while(ans=='y');
    }
}
```

Run - electricitybill.java

Run: ArrayListProg

```
C:\Users\piyus\.jdks\openjdk-16\bin\java.exe "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2021.1\lib\idea_rt.jar=54617:C:\Pro

        Program for Implementing Array List for List of Strings
Main Menu
1. Append
2. Insert at particular Index
3. Search
4. List strings
Enter your choice: 1
Enter string:
piyush
Do you want to append more string:
y
Enter string:
bhatt
Do you want to append more string:
n
The array elements are... [piyush, bhatt]
The array size is...  2
Do you want to go to Main Menu?(y/n):
y
Main Menu
1. Append
2. Insert at particular Index
3. Search
4. List strings
Enter your choice: 3
Enter string:
piyush
Do you want to append more string:
```

```java
/*
QUE: Write a Java Progra to create an abstract class named Shape than
contains two integers and an empty method named printArea(). Provide three
classes named Rectangle,Triangle and Circle such that each one of the classes
extends the class Shape.Each one of the classes contains only the method
printArea() that prints the area of the given shape.
*/
import java.util.Scanner;
abstract class Shape {
    abstract void Printarea();
    int a,b;
    Scanner sc = new Scanner(System.in);
}
class Rectangle extends Shape {

    void Printarea() {
        System.out.println("<--- Rectangle --->");
        System.out.println("Enter length: ");
        a = sc.nextInt();
        System.out.println("Enter bredth: ");
        b = sc.nextInt();
        System.out.println("area of rectangle is "+(a*b));
    }
}
class Triangle extends Shape {
    void Printarea() {
        System.out.println("<--- Triangle --->");
        System.out.println("Enter height: ");
        a = sc.nextInt();
        System.out.println("Enter base: ");
        b = sc.nextInt();
        System.out.println("area of triangle is "+(0.5*a*b));
    }
}
class Circle extends Shape {
    void Printarea() {
        System.out.println("<--- Circle --->");
        System.out.println("Enter radius: ");
        a = sc.nextInt();
        System.out.println("area of circle is "+(3.14*a*a));
    }
```

```
}
class display {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.println("<--- Area Calculator --->\n 1 for Rectangle \n 2 for Triangle \n 3 for Circle \n");
        System.out.println("Enter Choice: ");
        int ch = sc.nextInt();
        switch (ch) {
            case 1:
                Rectangle R = new Rectangle();
                R.Printarea();
                break;
            case 2:
                Triangle T = new Triangle();
                T.Printarea();
                break;
            case 3:
                Circle C = new Circle();
                C.Printarea();
                break;
            default:
                System.out.println("Entered Choice is incorrect");
        }
    }
}

```

Run - electricitybill.java

Run: display

```
C:\Users\piyus\.jdks\openjdk-16\bin\java.exe "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2021.1\lib\idea_rt.jar=54620:C:\Pro
<--- Area Calculator --->
 1 for Rectangle
 2 for Triangle
 3 for Circle

Enter Choice:
1
<--- Rectangle --->
Enter length:
30
Enter bredth:
20
area of rectangle is 600

Process finished with exit code 0
```

```java
/*
QUE: Write a Java program that reads a file name from the user,
displays information about whether the file exists,whether the
file is readable or writable,type of file and the length of the
file in bytes.
*/
import java.util.Scanner;
import java.io.File;
class FileDemo
{
    public static void main(String[] args)
    {
        System.out.println("Enter the name of the file: ");
        Scanner input=new Scanner(System.in);
        String s=input.nextLine();
        File f1 = new File(s);
        System.out.println("----------------------------------------");
        System.out.println("File Name:"+f1.getName());
        System.out.println("Path:"+f1.getPath());
        System.out.println("Abs Path:"+f1.getAbsolutePath());
        System.out.println("This file is:"+(f1.exists()?"Exists":"Does not exists"));
        System.out.println("Is file:"+f1.isFile());
        System.out.println("Is Directory:"+f1.isDirectory());
        System.out.println("Is Readable:"+f1.canRead());
        System.out.println("IS Writable:"+f1.canWrite());
        System.out.println("Is Absolute:"+f1.isAbsolute());
        System.out.println("File Size:"+f1.length()+"bytes");
        System.out.println("Is Hidden:"+f1.isHidden());
    }
}
```

Run - electricitybill.java

Run: FileDemo

```
C:\Users\piyus\.jdks\openjdk-16\bin\java.exe "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2021.1\lib\idea_rt.jar=54623:C:\Pro
Enter the name of the file:
FileDemo.java
---------------------------------------
File Name:FileDemo.java
Path:FileDemo.java
Abs Path:D:\codes\java\src\FileDemo.java
This file is:Exists
Is file:true
Is Directory:false
Is Readable:true
IS Writable:true
Is Absolute:false
File Size:1265bytes
Is Hidden:false

Process finished with exit code 0
```

```java
/*
QUE: Write a Java program to implement user defined exception handling.
*/
class MyException extends Exception
{
    String str1;
    MyException(String str2)
    {
        str1=str2;
    }
    public String toString()
    {
        return ("MyException Occurred: "+str1) ;
    }
}
class main{
    public static void main(String args[])
    {
        try
        {
            System.out.println("Starting of try block");
            throw new MyException("This is My error Message");
        }
        catch(MyException exp)
        {
            System.out.println("Catch Block") ;
            System.out.println(exp) ;
        }
    }
}
```

Run - electricitybill.java

Run: exp

```
C:\Users\piyus\.jdks\openjdk-16\bin\java.exe "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2021.1\lib\idea_rt.jar=54686:C:\Pro
Starting of try block
Catch Block
MyException Occurred: This is My error Message

Process finished with exit code 0
```

```java
/*
QUE: Write a java program to find the maximum value from the given type of elements using a generic function.
*/
import java.util.*;
public class Test {
    public static <T extends Object & Comparable<? super T>> T max(Collection<? extends T> coll) {
        Iterator<? extends T> MyList = coll.iterator();
        T element = MyList.next();
        while (MyList.hasNext()) {
            T next_element = MyList.next();
            if (next_element.compareTo(element) > 0)
                element = next_element;
        }
        return element;
    }
    public static void main(String[] args)
    {
        List<Integer> ints = new ArrayList<Integer>(Arrays.asList(1, 55, 4, 3, 23, 12, 25, 9));
        int max = Collections.max(ints);
        System.out.println(ints);
        System.out.println("maximum Value is " + max);
        List<Character> chars = new ArrayList<Character>(Arrays.asList('a', 'e', 'i', 'o', 'u'));
        char maxc = Collections.max(chars);
        System.out.println(chars);
        System.out.println("Maximum Value is " + maxc);
    }
}
```

Run - electricitybill.java

Run: Test

```
C:\Users\piyus\.jdks\openjdk-16\bin\java.exe "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2021.1\lib\idea_rt.jar=54649:C:\Pro
[1, 55, 4, 3, 23, 12, 25, 9]
maximum Value is 55
[a, e, i, o, u]
Maximum Value is u

Process finished with exit code 0
```

```java
/*
QUE: Write a java program that implements a multi-threaded
application that has three threads. First thread generates a
random integer every 1 second and if the value is even, second
thread computes the square of the number and prints. If the value
is odd, the third thread will print the value of cube of the number.
*/
import java.util.*;
class NumberGenerate
{
    private int value;
    private boolean flag;
    public synchronized void put()
    {
        while (flag)
        {
            try
            {
                wait();
            } catch (InterruptedException e) { }
        }
        flag = true;
        Random random = new Random();
        this.value = random.nextInt(10);
        System.out.println("The generated Number is: "+value);
        notifyAll();
    }
    public synchronized void get1()
    {
        while (!flag) {
            try {
                wait();
            }
            catch (InterruptedException e) { }
        }
        if(value%2==0)
        {
            System.out.println("Second is executing now ...");
            int ans=value*value;
            System.out.println(value+" is Even Number and its square is: "+ans);
```

```
        }
        flag = false;
        notifyAll();
    }
    public synchronized void get2()
    {
        while (!flag)
        {
            try
            {
                wait();
            }
            catch (InterruptedException e) { }
        }
        if(value%2!=0)
        {
            System.out.println("Third Thread is executing now...");
            int ans=value*value*value;
            System.out.println(value+" is Odd Number and its cube is: "+ans);
        }
        flag = false;
        notifyAll();
    }
}
class Main
{
    public static void main(String[] args)
    {
        final NumberGenerate obj = new NumberGenerate();
        Thread producerThread = new Thread()
        {
            public void run()
            {
                for(int i=1;i<=6;i++)
                {
                    System.out.println("Main thread started...");
                    obj.put();
                    try
                    {
                        Thread.sleep(1000);
                    }catch(InterruptedException e){}
                }
            }
        };
```

```
        Thread consumerThread1 = new Thread()
        {
            public void run()
            {
                for(int i=1;i<=3;i++)
                {
                    obj.get1();
                    try
                    {
                        Thread.sleep(2000);
                    }
                    catch(InterruptedException e){}
                }
            }
        };
        Thread consumerThread2 = new Thread()
        {
            public void run() {
                for(int i=1;i<=3;i++)
                {
                    obj.get2();
                    try
                    {
                        Thread.sleep(3000);
                    }
                    catch(InterruptedException e){}
                }
            }
        };
        producerThread.start();
        consumerThread1.start();
        consumerThread2.start();
    }
}
```

Run - electricitybill.java

Run: Main

```
C:\Users\piyus\.jdks\openjdk-16\bin\java.exe "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2021.1\lib\idea_rt.jar=54652:C:\Pro
Main thread started...
The generated Number is: 2
Second is executing now...
2 is Even Number and its square is: 4
Main thread started...
The generated Number is: 7
Third Thread is executing now...
7 is Odd Number and its cube is: 343
Main thread started...
The generated Number is: 2
Second is executing now...
2 is Even Number and its square is: 4
Main thread started...
The generated Number is: 4
Main thread started...
The generated Number is: 7
Main thread started...
The generated Number is: 0

Process finished with exit code 0
```

Objective: **Develop a java application to implement currency converter (Dollar to INR, EURO to INR, Yen to INR and vice versa), distance converter (meter to KM, miles to KM and vice versa) , time converter (hours to minutes, seconds and vice versa) using packages.**

Source Code:-

Step 1 : Create a folder named ConversionDemo. This is the name of the package. Following 3 Java files are stored in this folder.

A. CurrencyConverter.java
B. DistanceConverter.java
C. TimeConverter.java

CurrencyConverter.java

```
package ConversionDemo;
public class CurrencyConverter
{
double ER = 0;
public CurrencyConverter(double CurrentExchange)
{
ER = CurrentExchange;
}
public double DollarToINR(double Dollars)
{
double INR = 0;
INR = Dollars * ER;
return INR;
}
public double INRToDollar(double INR)
{
double Dollars = 0;
Dollars = INR / ER;
return Dollars;
}
public double EuroToINR(double Euros)
{
double INR = 0;
INR = Euros * ER;
return INR;
```

```
}
public double INRToEuro(double INR)
{
double Euros = 0;
Euros = INR / ER;
return Euros;
}
public double YenToINR(double Yens)
{
double INR = 0;
INR = Yens * ER;
return INR;
}
public double INRToYen(double INR)
{
double Yens = 0;
Yens = INR / ER;
return Yens;
}
```

DistanceConverter.java

```
package ConversionDemo;
public class DistanceConverter
{
public double MeterToKM(double Meters)
{
double KM = 0;
KM = Meters / 1000;
return KM;
}
public double KMToMeter(double KM)
{
double Meters = 0;
Meters = KM * 1000;
return Meters;
}
public double MileToKM(double Miles)
{
double KM = 0;
KM = Miles / 0.621371;
return KM;
}
```

```
public double KMToMile(double KM)
{
double Miles = 0;
Miles = KM * 0.621371;
return Miles;
}
}
```

TimeConverter.java

```
package ConversionDemo;
public class TimeConverter
{
public double HrToMin(double Hours)
{
double Minutes = 0;
Minutes = Hours * 60;
return Minutes;
}
public double MinToHour(double Minutes)
{
double Hours = 0;
Hours = Minutes / 60;
return Hours;
}
public double HrToSec(double Hours)
{
double Seconds = 0;
Seconds = Hours * 3600;
return Seconds;
}
public double SecToHour(double Seconds)
{
double Hours = 0;
Hours = Seconds / 3600;
return Hours;
}
}
```

Step 2 : Now go to the parent directory of **ConversionDemo** directory and store following Java program under this parent directory.

Converter.java

```
import ConversionDemo.CurrencyConverter;
import ConversionDemo.DistanceConverter;
import ConversionDemo.TimeConverter;
import java.util.Scanner;
class Converter
{
public static void main(String[] args) throws NoClassDefFoundError
{
double CurrentExchange;
int choice,choice1,choice2,choice3;
double inr;
double km;
double hr;
char ans='y';
do
{
System.out.println("\n Main Menu");
System.out.println("1.Currency Converter \n2.Distance Converter \n3. Time
Converter");
System.out.println("Enter your choice: ");
Scanner input = new Scanner(System.in);
choice = input.nextInt();
switch(choice)//outer Switch
{
case 1:System.out.println("\tCurrency Conversion");
do
{
System.out.println("Menu For Currency Conversion");
System.out.println("1. Dollar to INR");
System.out.println("2. INR to Dollar");
System.out.println("3. Euro to INR");
System.out.println("4. INR to Euro");
System.out.println("5. Yen to INR");
System.out.println("6. INR to Yen");
System.out.println("Enter your choice: ");
choice1 = input.nextInt();
System.out.println("Please enter the current exchange rate: ");
CurrentExchange = input.nextDouble();
CurrencyConverter cc=new CurrencyConverter(CurrentExchange);
switch(choice1)//inner switch
```

```
{
case 1:
System.out.print("Enter Dollars :");
double dollar=input.nextDouble();
System.out.println (dollar+" dollars are converted to"+cc.DollarToINR(dollar)+" Rs.");
break;
case 2:
System.out.print("Enter INR :");
inr=input.nextDouble();
System.out.println(inr+" Rs. are converted to"+cc.INRToDollar(inr)+" Dollars");
break;
case 3:
System.out.print("Enter Euro :");
double euro=input.nextDouble();
System.out.println(euro+" Euros are converted to"+cc.EuroToINR(euro)+" Rs.");
break;
case 4:
System.out.print("Enter INR :");
inr=input.nextDouble();
System.out.println(inr+" Rs. are converted to"+cc.INRToEuro(inr)+" Euros");
break;
case 5:
System.out.print("Enter Yen :");
double yen=input.nextDouble();
System.out.println(yen+" Yens are converted to "+cc.YenToINR(yen)+" Rs.");
break;
case 6:
System.out.print("Enter INR :");
inr=input.nextDouble();
System.out.println(inr+" Rs. are converted to"+cc.INRToYen(inr)+" Yens");
break;
}
System.out.println("Do You want to go to Currency Conversion Menu?(y/n) ");
ans = input.next().charAt(0);
}while(ans=='y');
break;
case 2:System.out.println("\tDistance Conversion");
do
{
System.out.println("Menu For Distance Conversion");
System.out.println("1. Meter to Km");
System.out.println("2. Km to Meter");
System.out.println("3. Miles to Km");
System.out.println("4. Km to Miles");
```

```
System.out.println("Enter your choice: ");
choice2 = input.nextInt();
DistanceConverter dc=new DistanceConverter();
switch(choice2)
{
case 1:
System.out.print("Enter meters to convert to Km:");
double meter=input.nextDouble();
System.out.println(meter+" Meters are converted to"+dc.MeterToKM(meter)+" Km.");
break;
case 2:
System.out.print("Enter Km to convert to meters:");
km=input.nextDouble();
System.out.println(km+" Km. are converted meters"+dc.KMToMeter(km)+" Meters");
break;
case 3:
System.out.print("Enter Miles to convert to Km:");
double miles=input.nextDouble();
System.out.println(miles+" Miles are converted to"+dc.MileToKM(miles)+" Km.");
break;
case 4:
System.out.print("Enter Km to convert to miles:");
km=input.nextDouble();
System.out.println(km+" Km. are converted miles"+dc.KMToMile(km)+" Miles");
break;
}
System.out.println("Do You want to go to Distance Conversion Menu?(y/n) ");
ans = input.next().charAt(0);
}while(ans=='y');
break;
case 3:System.out.println("\tTime Conversion");
do
{
System.out.println("Menu For Time Conversion");
System.out.println("1. Hour to Minutes");
System.out.println("2. Minutes to Hour");
System.out.println("3. Hour to Seconds");
System.out.println("4. Seconds to Hour");
System.out.println("Enter your choice: ");
choice3 = input.nextInt();
TimeConverter tc=new TimeConverter();
switch(choice3)
{
case 1:
```

```
System.out.print("Enter hours to convert to Minutes:");
hr=input.nextDouble();
System.out.println(hr+" Hours are converted to"+tc.HrToMin(hr)+" min.");
break;
case 2:
System.out.print("Enter Minutes to convert to hours:");
double minutes=input.nextDouble();
System.out.println(minutes+" Minutes. are converted hours"+tc.MinToHour(minutes)+" Hours");
break;
case 3:
System.out.print("Enter Hours to convert to Seconds:");
hr=input.nextDouble();
System.out.println(hr+" Hours are converted to"+tc.HrToSec(hr)+" Seconds.");
break;
case 4:
System.out.print("Enter Seconds to convert to hours:");
double seconds=input.nextDouble();
System.out.println(seconds+" Seconds. are converted hours"+tc.SecToHour(seconds)+" Hours");
break;
}
System.out.println("Do You want to go to Time Conversion Menu?(y/n) ");
ans = input.next().charAt(0);
}while(ans=='y');
break;
}//end of outer switch
System.out.println("Do you want to go back to Main Menu?(y/n)");
ans=input.next().charAt(0);
}while(ans=='y');
}//end of main
}//end of class
```

Step 3 :

Open the Command prompt and issue following commands

Output:

```
D:\>cd ConversionDemo
D:\ConversionDemo>javac CurrencyConverter.java
D:\ConversionDemo>javac DistanceConverter.java
D:\ConversionDemo>javac TimeConverter.java
D:\ConversionDemo>cd..
D:\>javac Converter.java
D:\>java Converter

Main Menu
```

```
1.Currency Converter
2.Distance Converter
3. Time Converter
Enter your choice:
1
Currency Conversion
Menu For Currency Conversion
1. Dollar to INR
2. INR to Dollar
3. Euro to INR
4. INR to Euro
5. Yen to INR
6. INR to Yen
Enter your choice:
1
Please enter the current exchange rate:
66.21
Enter Dollars :25
25.0 dollars are converted to 1655.2499999999998 Rs.
Do You want to go to Currency Conversion Menu?(y/n)
y
Menu For Currency Conversion
1. Dollar to INR
2. INR to Dollar
3. Euro to INR
4. INR to Euro
5. Yen to INR
6. INR to Yen
Enter your choice:
4
Please enter the current exchange rate:
81.1
Enter INR :5000
5000.0 Rs. are converted to 61.652281134401974 Euros
Do You want to go to Currency Conversion Menu?(y/n)
n
Do you want to go back to Main Menu?(y/n)
y
Main Menu
1.Currency Converter
2.Distance Converter
3. Time Converter
Enter your choice:
2
```

Distance Conversion
Menu For Distance Conversion
1. Meter to Km
2. Km to Meter
3. Miles to Km
4. Km to Miles
Enter your choice:
1
Enter meters to convert to Km:4000
4000.0 Meters are converted to 4.0 Km.
Do You want to go to Distance Conversion Menu?(y/n)
n
Do you want to go back to Main Menu?(y/n)
N

```java
/*
QUE: Design a calculator using event-driven programming paradigm of Java
with the following options.
a) Decimal manipulations
b) Scientific manipulations
*/
import java.awt.*;
import javax.swing.*;
import java.awt.event.*;
import javax.swing.event.*;
public class calci extends JFrame implements ActionListener
{
    Container contentpane;
    JPanel DisplayPanel,ControlPanel;
    JTextField txt;
    JButton one, two,three, four, five, six, seven, eight, nine, zero;
    JButton plus, min,mul, div, log,CLR,exp;
    JButton eq, addSub, dot, memread, memcancel, memplus;
    JButton sqrt, sin, cos, tan,onebyx;
    double tempnum, tempnextnum, result, ans;
    static double ValueInMem;
    int num1 = 0,num2 = 0;
    int MemPlusFlag = 1, RepeatFlag = 0;
    char ch;
    calci()
    {
        contentpane = getContentPane();
        contentpane.setLayout(new BorderLayout());
        JPanel DisplayPanel = new JPanel();
        txt = new JTextField(30);
        txt.setHorizontalAlignment(SwingConstants.RIGHT);
        txt.addKeyListener(
                new KeyAdapter()
                {
                    public void keyTyped(KeyEvent keyevent)
                    {
                        char ch = keyevent.getKeyChar();// user can enter the number using
// keyboard
                        if (ch >= '0' && ch <= '9') //do not read other than numbers
                        { }
                        else
```

```
                        {
                            keyevent.consume();//read the character typed using keyboard
                        }
                    }
                });
        DisplayPanel.add(txt);
        ControlPanel = new JPanel();
        contentpane.add("Center", ControlPanel);//For Border Layout
        contentpane.add("North", DisplayPanel);
        ControlPanel.setLayout(new GridLayout(7,4,5,5));
//setting grid layout for buttons
        memcancel = new JButton("MC");//memory cancel button
        ControlPanel.add(memcancel);
        memcancel.addActionListener(this);//when user clicks it event handler is called
        one = new JButton("1"); //number button
        ControlPanel.add(one);
        one.addActionListener(this);
        two = new JButton("2");
        ControlPanel.add(two);
        two.addActionListener(this);
        three = new JButton("3");
        ControlPanel.add(three);
        three.addActionListener(this);
        memread = new JButton("MR");
        ControlPanel.add(memread);
        memread.addActionListener(this);
        four = new JButton("4");
        ControlPanel.add(four);
        four.addActionListener(this);
        five = new JButton("5");
        ControlPanel.add(five);
        five.addActionListener(this);
        six = new JButton("6");
        ControlPanel.add(six);
        six.addActionListener(this);
        memplus = new JButton("M+");
        ControlPanel.add(memplus);
        memplus.addActionListener(this);
        seven = new JButton("7");
        ControlPanel.add(seven);
        seven.addActionListener(this);
        eight = new JButton("8");
        ControlPanel.add(eight);
```

```
        eight.addActionListener(this);
        nine = new JButton("9");
        ControlPanel.add(nine);
        nine.addActionListener(this);
        zero = new JButton("0");
        ControlPanel.add(zero);
        zero.addActionListener(this);
        addSub = new JButton("+/-");
        ControlPanel.add(addSub);
        addSub.addActionListener(this);
        dot = new JButton(".");//represents decimal point
        ControlPanel.add(dot);
        dot.addActionListener(this);
        eq = new JButton("=");//get an answer
        ControlPanel.add(eq);
        eq.addActionListener(this);
        plus = new JButton("+");
        ControlPanel.add(plus);
        plus.addActionListener(this);
        min = new JButton("-");
        ControlPanel.add(min);
        min.addActionListener(this);
        mul = new JButton("*");
        ControlPanel.add(mul);
        mul.addActionListener(this);
        div = new JButton("/");
        div.addActionListener(this);
        ControlPanel.add(div);
        sqrt = new JButton("Sqrt");
        ControlPanel.add(sqrt);
        sqrt.addActionListener(this);
        log = new JButton("LOG");
        ControlPanel.add(log);
        log.addActionListener(this);
        sin = new JButton("SIN");
        ControlPanel.add(sin);
        sin.addActionListener(this);
        cos = new JButton("COS");
        ControlPanel.add(cos);
        cos.addActionListener(this);
        tan = new JButton("TAN");
        ControlPanel.add(tan);
        tan.addActionListener(this);
        exp = new JButton("Exp");
        exp.addActionListener(this);
        ControlPanel.add(exp);
        onebyx = new JButton("1/x");
```

```
        onebyx.addActionListener(this);
        ControlPanel.add(onebyx);
        CLR = new JButton("AC");
        ControlPanel.add(CLR);
        CLR.addActionListener(this);
        setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
    }
    public void actionPerformed(ActionEvent e)
    {
        String s = e.getActionCommand();
        if (s.equals("1"))
        {
            if (RepeatFlag == 0) //Flag represents that this number is entered initially
            {
                txt.setText(txt.getText() + "1");//displaying the value 1 on the display
            }
            else //after performing some operation 1 is clicked for any other operation
            {
                txt.setText("");//previous contents are cleared
                txt.setText(txt.getText() + "1");//then displaying 1
                RepeatFlag = 0;
            }
        }
        if (s.equals("2"))
        {
            if (RepeatFlag == 0)
            {
                txt.setText(txt.getText() + "2");
            }
            else
            {
                txt.setText("");
                txt.setText(txt.getText() + "2");
                RepeatFlag = 0;
            }
        }
        if (s.equals("3"))
        {
            if (RepeatFlag == 0)
            {
                txt.setText(txt.getText() + "3");
            }
```

```
            else
            {
                txt.setText("");
                txt.setText(txt.getText() + "3");
                RepeatFlag = 0;
            }
        }
        if (s.equals("4"))
        {
            if (RepeatFlag == 0)
            {
                txt.setText(txt.getText() + "4");
            }
            else
            {
                txt.setText("");
                txt.setText(txt.getText() + "4");
                RepeatFlag = 0;
            }
        }
        if (s.equals("5"))
        {
            if (RepeatFlag == 0)
            {
                txt.setText(txt.getText() + "5");
            }
            else
            {
                txt.setText("");
                txt.setText(txt.getText() + "5");
                RepeatFlag = 0;
            }
        }
        if (s.equals("6"))
        {
            if (RepeatFlag == 0)
            {
                txt.setText(txt.getText() + "6");
            }
            else
            {
                txt.setText("");
                txt.setText(txt.getText() + "6");
                RepeatFlag = 0;
            }
        }
        if (s.equals("7"))
```

```
        {
            if (RepeatFlag == 0)
            {
                txt.setText(txt.getText() + "7");
            }
            else
            {
                txt.setText("");
                txt.setText(txt.getText() + "7");
                RepeatFlag = 0;
            }
        }
        if (s.equals("8"))
        {
            if (RepeatFlag == 0)
            {
                txt.setText(txt.getText() + "8");
            }
            else
            {
                txt.setText("");
                txt.setText(txt.getText() + "8");
                RepeatFlag = 0;
            }
        }
        if (s.equals("9"))
        {
            if (RepeatFlag == 0)
            {
                txt.setText(txt.getText() + "9");
            }
            else
            {
                txt.setText("");
                txt.setText(txt.getText() + "9");
                RepeatFlag = 0;
            }
        }
        if (s.equals("0"))
        {
            if (RepeatFlag == 0)
            {
                txt.setText(txt.getText() + "0");
            }
            else
            {
                txt.setText("");
```

```
                txt.setText(txt.getText() + "0");
                RepeatFlag = 0;
            }
        }
        if (s.equals("AC")) //This means clear all the contents
        {
            txt.setText("");
            num1 = 0;
            num2 = 0;
            RepeatFlag = 0;
        }
        if (s.equals("+/-"))
        {
            if (num1 == 0)
            {
                txt.setText("-" + txt.getText());
                num1 = 1;
            }
            else
            {
                txt.setText(txt.getText());
            }
        }
        if (s.equals("."))
        {
            if (num2 == 0)
            {
                txt.setText(txt.getText() + ".");
                num2 = 1;
            }
            else
            {
                txt.setText(txt.getText());
            }
        }
        if(s.equals("+"))
        {
            if(txt.getText().equals(""))
            {
                txt.setText("");
                tempnum = 0;
                ch = '+';
            }
            else
            {
                tempnum = Double.parseDouble(txt.getText
```

```
313 ());
314                 txt.setText("");
315                 ch = '+';
316                 num2 = 0;
317                 num1 = 0;
318             }
319             txt.requestFocus();
320         }
321         if (s.equals("-"))
322         {
323             if (txt.getText().equals(""))
324             {
325                 txt.setText("");
326                 tempnum = 0;
327                 ch = '-';
328             }
329             else
330             {
331                 num1 = 0;
332                 num2 = 0;
333                 tempnum = Double.parseDouble(txt.getText
    ());
334                 txt.setText("");
335                 ch = '-';
336             }
337             txt.requestFocus();
338         }
339         if (s.equals("/"))
340         {
341             if (txt.getText().equals(""))
342             {
343                 txt.setText("");
344                 tempnum = 1;
345                 ch = '/';
346             }
347             else
348             {
349                 num1 = 0;
350                 num2 = 0;
351                 tempnum = Double.parseDouble(txt.getText
    ());
352                 ch = '/';
353                 txt.setText("");
354             }
355             txt.requestFocus();
356         }
357         if (s.equals("*"))
```

```
        {
            if (txt.getText().equals(""))
            {
                txt.setText("");
                tempnum = 1;
                ch = '*';
            }
            else
            {
                num1 = 0;
                num2 = 0;
                tempnum = Double.parseDouble(txt.getText());
                ch = '*';
                txt.setText("");
            }
            txt.requestFocus();
        }
        if (s.equals("MC"))
        {
            ValueInMem = 0;
            txt.setText("");
        }
        if (s.equals("MR"))
        {
            txt.setText("");
            txt.setText(txt.getText() + ValueInMem);
        }
        if (s.equals("M+"))
        {
            if (MemPlusFlag == 1)
            {
                ValueInMem = Double.parseDouble(txt.getText());
                MemPlusFlag++;
            }
            else
            {
                ValueInMem += Double.parseDouble(txt.getText());
                txt.setText("" + ValueInMem);
            }
        }
        if (s.equals("LOG"))
        {
            if (txt.getText().equals(""))
            {
```

```
                    txt.setText("");
                }
                else
                {
                    ans = Math.log(Double.parseDouble(txt.getText()));
                    txt.setText("");
                    txt.setText(txt.getText() + ans);
                }
            }
            if (s.equals("1/x"))
            {
                if (txt.getText().equals(""))
                {
                    txt.setText("");
                }
                else
                {
                    ans = 1 / Double.parseDouble(txt.getText());
                    txt.setText("");
                    txt.setText(txt.getText() + ans);
                }
            }
            if (s.equals("Exp"))
            {
                if (txt.getText().equals(""))
                {
                    txt.setText("");
                }
                else
                {
                    ans = Math.exp(Double.parseDouble(txt.getText()));
                    txt.setText("");
                    txt.setText(txt.getText() + ans);
                }
            }
            if (s.equals("Sqrt"))
            {
                if (txt.getText().equals(""))
                {
                    txt.setText("");
                }
                else
                {
                    ans = Math.sqrt(Double.parseDouble(txt.
```

```
getText()));
                txt.setText("");
                txt.setText(txt.getText() + ans);
            }
        }
        if (s.equals("SIN"))
        {
            if (txt.getText().equals(""))
            {
                txt.setText("");
            }
            else
            {
                ans = Math.sin(Double.parseDouble(txt.getText()));
                txt.setText("");
                txt.setText(txt.getText() + ans);
            }
        }
        if (s.equals("COS"))
        {
            if (txt.getText().equals(""))
            {
                txt.setText("");
            }
            else
            {
                ans = Math.cos(Double.parseDouble(txt.getText()));
                txt.setText("");
                txt.setText(txt.getText() + ans);
            }
        }
        if (s.equals("TAN"))
        {
            if (txt.getText().equals(""))
            {
                txt.setText("");
            }
            else
            {
                ans = Math.tan(Double.parseDouble(txt.getText()));
                txt.setText("");
                txt.setText(txt.getText() + ans);
            }
        }
```

```
        if (s.equals("="))
        {
            if (txt.getText().equals(""))
            {
                txt.setText("");
            }
            else
            {
                tempnextnum = Double.parseDouble(txt.getText());
                switch (ch)
                {
                    case '+':
                        result = tempnum + tempnextnum;
                        break;
                    case '-':
                        result = tempnum - tempnextnum;
                        break;
                    case '/':
                        result = tempnum / tempnextnum;
                        break;
                    case '*':
                        result = tempnum * tempnextnum;
                        break;
                }
                txt.setText("");
                txt.setText(txt.getText() + result);
                RepeatFlag = 1;
            }
        }
        txt.requestFocus();
    }
    public static void main(String args[])
    {
        calci c= new calci();
        c.setTitle("My Calculator");
        c.pack();
        c.setVisible(true);
    }
}
```

Run - electricitybill.java

Run: calci

```
C:\Users\piyus\.jdks\openjdk-16\bin\java.exe "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2021.1\lib\idea_rt.jar=54662:C:\Pro
```

```java
/*
QUE: Java Program to print Right Triangle Star Pattern.
*/
public class Right_Triangle_Star_Pattern
{
    public static void main(String args[])
    {
        int i, j, row=6;
        for(i=0; i<row; i++)
        {
            for(j=0; j<=i; j++)
            {
                System.out.print("* ");
            }
            System.out.println();
        }
    }
}

```

Run - electricitybill.java

Run: Right_Triangle_Star_Pattern

```
C:\Users\piyus\.jdks\openjdk-16\bin\java.exe "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2021.1\lib\idea_rt.jar=54706:C:\Pro
*
* *
* * *
* * * *
* * * * *
* * * * * *

Process finished with exit code 0
```

```java
/*
QUE: Java Program to print Pyramid Star Pattern.
*/
public class Pyramid_Star_Pattern
{
    public static void main(String args[])
    {
        int i, j, row = 6;
        for (i=0; i<row; i++)
        {
            for (j=row-i; j>1; j--)
            {
                System.out.print(" ");
            }
            for (j=0; j<=i; j++ )
            {
                System.out.print("* ");
            }
            System.out.println();
        }
    }
}

```

Run - electricitybill.java

Run: Pyramid_Star_Pattern

```
C:\Users\piyus\.jdks\openjdk-16\bin\java.exe "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2021.1\lib\idea_rt.jar=54708:C:\Pro
     *
    * *
   * * *
  * * * *
 * * * * *
* * * * * *

Process finished with exit code 0
```

```java
/*
QUE: Java Program to print Diamond Shape Pattern.
*/
import java.util.Scanner;
public class Diamond_Shape_Pattern
{
    public static void main(String args[])
    {
        int row, i, j, space = 1;
        System.out.print("Enter the number of rows you want to print: ");
        Scanner sc = new Scanner(System.in);
        row = sc.nextInt();
        space = row - 1;
        for (j = 1; j<= row; j++)
        {
            for (i = 1; i<= space; i++)
            {
                System.out.print(" ");
            }
            space--;
            for (i = 1; i <= 2 * j - 1; i++)
            {
                System.out.print("*");
            }
            System.out.println("");
        }
        space = 1;
        for (j = 1; j<= row - 1; j++)
        {
            for (i = 1; i<= space; i++)
            {
                System.out.print(" ");
            }
            space++;
            for (i = 1; i<= 2 * (row - j) - 1; i++)
            {
                System.out.print("*");
            }
            System.out.println("");
        }
    }
}
```

Run - electricitybill.java

Run: Diamond_Shape_Pattern

```
C:\Users\piyus\.jdks\openjdk-16\bin\java.exe "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2021.1\lib\idea_rt.jar=54710:C:\Pro
Enter the number of rows you want to print: 5
    *
   ***
  *****
 *******
*********
 *******
  *****
   ***
    *

Process finished with exit code 0
```

```java
/*
QUE: Java Program to print Right Pascal's Triangle Pattern.
*/
import java.util.Scanner;
public class Right_Pascal_Triangle_Pattern
{
    public static void main(String[] args)
    {
        int i, j, rows;
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter the number of rows you want to print: ");
        rows = sc.nextInt();
        for (i= 0; i<= rows-1; i++)
        {
            for (j=0; j<=i; j++)   {
                System.out.print("*"+ " ");
            }
            System.out.println("");
        }
        for (i=rows-1; i>=0; i--)  {
            for(j=0; j <= i-1;j++)  {
                System.out.print("*"+ " ");
            }
            System.out.println("");
        }
    }
}

```

Run - electricitybill.java

Run: Right_Pascal_Triangle_Pattern

```
C:\Users\piyus\.jdks\openjdk-16\bin\java.exe "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2021.1\lib\idea_rt.jar=54713:C:\Pro
Enter the number of rows you want to print: 5
*
* *
* * *
* * * *
* * * * *
* * * *
* * *
* *
*


Process finished with exit code 0
```