

**M.Sc. (Five Year Integrated) in Computer Science
(Artificial Intelligence & Data Science)**

Second Semester

Laboratory Record

21-805-0207: JAVA PROGRAMMING LAB

*Submitted in partial fulfillment
of the requirements for the award of degree in
Master of Science (Five Year Integrated)
in Computer Science (Artificial Intelligence & Data Science) of
Cochin University of Science and Technology (CUSAT)
Kochi*



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*This is to certify that the software laboratory record for **21-805-0207: Java Programming Lab** is a record of work carried out by **OMAL S (80521015)**, in partial fulfillment of the requirements for the award of degree in **Master of Science (Five Year Integrated)** in **Computer Science (Artificial Intelligence & Data Science)** of Cochin University of Science and Technology (CUSAT), Kochi. The lab record has been approved as it satisfies the academic requirements in respect of the second semester laboratory prescribed for the Master of Science (Five Year Integrated) in Computer Science degree.*

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HELLO WORLD

AIM

To print the basic "HELLO WORLD" , to understand the basic coding in JAVA.

PROGRAM

```
public class HelloWorld

{

    public static void main(String[] args)

    {

        System.out.println("Hello World ! !");

    }

}
```

SAMPLE INPUT-OUTPUT

```
Hello World ! !
```

SUM OF TWO HARD CODED VALUES

AIM

To understand the mathematical operations that can be performed on JAVA programming. Here the numbers are hard coded within the program on which the mathematical operation have to be performed.

PROGRAM

```
public class sumhc
{

    public static void main(String[] args)
    {
        int operand1 = 5;

        int operand2 = 5;

        int sum;

        sum = operand1 + operand2;

        System.out.println(" The value a = "+operand1);

        System.out.println(" The value b = "+operand2);

        System.out.println("  Sum = "+sum);

    }
}
```

SAMPLE INPUT-OUTPUT

```
The value a = 5
The value b = 5
      Sum = 10
```

SUM OF TWO USER INPUT VALUES

AIM

To understand the input output coding in JAVA and to demonstrate the mathematical operation on user input values.

PROGRAM

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

        System.out.print(" Enter the operand 1 : ");

        int operand1 = kb.nextInt();

        System.out.print(" Enter the operand 2 : ");

        int operand2 = kb.nextInt();

        int sum;

        sum = operand1 + operand2;

        System.out.println(" Sum = "+sum);
    }
}
```

SAMPLE INPUT-OUTPUT

```
Enter the operand 1 : 5
Enter the operand 2 : 9
Sum = 14
```

ODD OR EVEN NUMBERS

AIM

To understand the conditional statement working in JAVA. Also the working of if and else statement in the programming language.

PROGRAM

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

        System.out.println(" CHECK ODD OR EVEN ");

        System.out.print(" Enter the number : ");

        int number = kb.nextInt();

        if(number%2 == 0)
        {
            System.out.println(" Even");
        }
        else
        {
            System.out.println(" Odd");
        }
    }
}
```

SAMPLE INPUT-OUTPUT

```
CHECK ODD OR EVEN
Enter the number : 14
                Even
```

REVERSE OF NUMBERS

AIM

To understand the iterative statement working in JAVA. Also to demonstrate the reversing of numbers using the java code.

PROGRAM

```
import java.util.*;

import java.lang.Math;

public class reverse
{
    public static void main(String[] args)
    {
        Scanner kb =new Scanner(System.in);

        System.out.println(" REVERSE OF NUMBER");

        System.out.print(" Enter the number : ");

        String str= kb.nextLine();

        int number=Integer.parseInt(str);

        int reverse=0,remainder,temp=number,counte=0,countb=0;

        int np=str.length();

        System.out.println(" length : "+np);

        int p=np-1;

        int power=(int)Math.pow(10,p);

        while(np!=0 & number != 0)
        {
            if(number/power==0)
            {
                power=power-1;
            }
        }
    }
}
```



```
        countb=countb+1;
    }

    if(number%10==0)
    {
        number=number/10;
        counte=counte+1;
    }
    np=np-1;

    p=p-1;

    power=(int)Math.pow(10,p);
}

number=temp;

while(number != 0)
{
    reminder = number%10;

    reverse = reverse*10+reminder;

    number = number/10;
}
System.out.print(" Reverse = ");

if(counte!=0)
{
    for(int i=0;i<counte;i++)
    {
        System.out.print("0");
    }
}

System.out.print(reverse);

power=(int)Math.pow(10,counte);

if(temp%power==0)
{
```

```
        countb=countb-counte;
    }

    if(countb!=0)
    {
        for(int i=0;i<countb;i++)
        {
            System.out.print("0");
        }
    }
    System.out.println();
}
}
```

SAMPLE INPUT-OUTPUT

```
REVERSE OF NUMBER
Enter the number : 10012
length : 5
Reverse = 21001
```

AREA OF SHAPES

AIM

To understand the working of command-line arguments in Java programming so to calculate the area of various shapes.

PROGRAM

```
public class Area
{
    static double computeArea(float radius)
    {
        return (3.1428 * radius);
    }
    static float computeArea(int side)
    {
        return side*side;
    }
    static float computeArea(float length , float width)
    {
        return length*width ;
    }
    public static void main(String args[])
    {
        System.out.println("\t AREA OF SHAPES\n\nShapes used in the program. ");

        System.out.print("1. Circle\n2.Square\n3.Rectangle\n");

        System.out.println("As per the per the choice.\n");

        int choice = Integer.parseInt(args[0]);

        double resultedArea;

        switch(choice)
        {
            case 1:
```

```
{
    System.out.println("Circle : Radius - "+args[1]);

    resultedArea = computeArea(Float.parseFloat(args[1]));

    System.out.println("\t Area - "+resultedArea);
    break;
}
case 2:
{
    System.out.println("Square : Side - "+args[1]);

    resultedArea = computeArea(Integer.parseInt(args[1]));

    System.out.println("\t Area - "+resultedArea);

    break;
}
case 3:
{
    System.out.println("Rectangle : length - "+args[1]+" width //
        - "+args[2]);

    resultedArea = computeArea(Float.parseFloat(args[1]),//
        Float.parseFloat(args[2]));

    System.out.println("\t Area - "+resultedArea);

    break;
}
default:
{

    System.out.println("The first argument does not match with the ");

    break;
}
}
}
```

SAMPLE INPUT-OUTPUT

```
user@user-HP-Laptop-15s-gy0xxx:~$ javac Area.java
user@user-HP-Laptop-15s-gy0xxx:~$ java Area 1 6
      AREA OF SHAPES

Shapes used in the program.
1. Circle
2. Square
3. Rectangle
As per the per the choice.

Circle : Radius - 6
      Area - 18.8568
user@user-HP-Laptop-15s-gy0xxx:~$
```

STUDENT CLASS

AIM

To print the student details from the each object, student stored using the class Student.

PROGRAM

```
import java.util.*;
public class Student
{
    private int roll_No;
    private String name;
    private float mark_1;
    private float mark_2;
    private float mark_3;
    private float total_Mark;

    Student()
    {
        this.roll_No=0;
        this.mark_2 = 0;
        this.mark_2 = 0;
        this.mark_3 = 0;
        this.name = " ";
        this.total_Mark=0;
    }

    public void display()
    {
        System.out.print("    "+this.roll_No+"            "+this.name+"            "//
            +this.mark_1+"            "+this.mark_2+"            "+this.mark_3//
            +"            ");
        calculate();
    }

    public void input()
    {
        Scanner kb = new Scanner(System.in);
        System.out.print("\nRoll Number : ");
        this.roll_No = kb.nextInt();
    }
}
```

```
        System.out.print("Name          : ");
        this.name = kb.next();
        System.out.println("mark of Subjects out of 100");
        System.out.print("Subject 1    : ");
        this.mark_1 = kb.nextFloat();
        System.out.print("Subject 2    : ");
        this.mark_2 = kb.nextFloat();
        System.out.print("Subject 3    : ");
        this.mark_3 = kb.nextFloat();
    }

    void calculate()
    {
        if(mark_1 < 50 || mark_2 <50 || mark_3 <50)
        {
            total_Mark = 0;
        }
        else
            total_Mark = mark_1 + mark_2 + mark_3;
        System.out.println(total_Mark);
    }

    public static void main(String args[])
    {
        Scanner kb = new Scanner (System.in);
        System.out.println(" STUDENTS DETAILS STORAGE");
        System.out.print(" Enter the Number of Students Details to be stored : ");
        int number = kb.nextInt();
        Student[] S = new Student[number];
        System.out.println("Start entering the Details of the Student");
        for (int i=0;i<number;i++)
        {
            S[i] = new Student();
            S[i].input();
        }

        System.out.println("
                                STUDENTS DETAILS");
        System.out.println("Roll Number    Name    Subject-1    Subject-2 //
                                Subject-3    Total Marks");
        for (int i=0;i<number;i++)
        {
```

```
        S[i].display();  
  
    }  
}  
}
```

SAMPLE INPUT-OUTPUT

```
STUDENTS DETAILS STORAGE  
Enter the Number of Students Details to be stored : 2  
Start entering the Details of the Student
```

```
Roll Number : 1002  
Name       : OMAL  
mark of Subjects out of 100  
Subject 1  : 98  
Subject 2  : 88  
Subject 3  : 95
```

```
Roll Number : 1003  
Name       : REYA  
mark of Subjects out of 100  
Subject 1  : 90  
Subject 2  : 89  
Subject 3  : 92
```

STUDENTS DETAILS					
Roll Number	Name	Subject-1	Subject-2	Subject-3	Total Marks
1002	OMAL	98.0	88.0	95.0	281.0
1003	REYA	90.0	89.0	92.0	271.0

ALTERNATE PRIME NUMBERS

AIM

To print the alternate prime numbers which are below the upperlimit.

PROGRAM

```
import java.util.*;
public class prime
{
    public static void main(String args[])
    {
        Scanner kb = new Scanner(System.in);
        System.out.println(" ALTERNATE PRIME NUMBERS");
        System.out.print(" Enter the upper limit : ");
        int limit = kb.nextInt();
        int n=0;
        int count = 0;
        String set = "True";
        while (n<=limit)
        {
            for(int i=1;i<=limit;i++)
            {
                if (n%i == 0)
                {
                    count = count+1;
                }
            }
            if (count <=2)
            {
                if(set == "True")
                {
                    System.out.println(" "+n);
                    set = "False";
                }
                else
                    set = "True";
            }
            n++;
        }
    }
}
```

```
    n = n+1;
    count = 0;
}
System.out.println();
}
}
```

SAMPLE INPUT-OUTPUT

```
ALTERNATE PRIME NUMBERS
Enter the upper limit : 25
1
3
7
13
19
```

LARGEST THIRD NUMBER

AIM

To understand the working in the array and to find the application of sorting technique also to know the basic handling of array.

PROGRAM

```
import java.util.*;
public class large
{
    public static void main(String srgs[])
    {
        Scanner kb = new Scanner(System.in);
        System.out.println(" LARGEST NUMBER IN THE ARRAY");
        System.out.print(" Enter the number of elements in the array : ");
        int n = kb.nextInt();
        int array[];
        array = new int[n];
        System.out.print(" Enter the number in the array : ");
        for(int i=0;i<n;i++)
        {
            array[i] = kb.nextInt();
        }
        n=n-1;

        for (int i = 0 ; i < n; i++)
        {
            for (int j = 0 ; j < n - i ; j++)
            {
                if (array[j] > array[j+1])
                {
                    int temp = array[j+1];
                    array[j+1] = array[j];
                    array[j] = temp;
                }
            }
            n=n+1;
            System.out.println("Third largest Number : "+array[n-3]);
        }
    }
}
```

SAMPLE INPUT-OUTPUT

```
LARGEST NUMBER IN THE ARRAY
Enter the number of elements in the array : 10
Enter the number in the array :
56 23 12 53 76 44 43 87 72 80
Third largest Number : 76
|
```

GUI CALCULATOR

AIM

To understand the GUI application of the java language using the java swing

PROGRAM

```
import java.awt.event.*;
import javax.swing.*;
import java.awt.*;
class calculator extends JFrame implements ActionListener
{
    static JFrame f;
    static JTextField l;
    String s0, s1, s2;
    calculator()
    {
        s0 = s1 = s2 = "";
    }
    public static void main(String args[])
    {
        f = new JFrame("calculator");

        try
        {
            UIManager.setLookAndFeel(UIManager.getSystemLookAndFeelClassName());
        }
        catch (Exception e)
        {
            System.err.println(e.getMessage());
        }
        calculator c = new calculator();
        l = new JTextField(16);
        l.setEditable(false);
        JButton b0, b1, b2, b3, b4, b5, b6, b7, b8, b9, ba, bs, bd, bm, be, beq, beq1;

        b0 = new JButton("0");
        b1 = new JButton("1");
        b2 = new JButton("2");
        b3 = new JButton("3");
        b4 = new JButton("4");
```

```
b5 = new JButton("5");
b6 = new JButton("6");
b7 = new JButton("7");
b8 = new JButton("8");
b9 = new JButton("9");

beq1 = new JButton("=");

ba = new JButton("+");
bs = new JButton("-");
bd = new JButton("/");
bm = new JButton("*");
beq = new JButton("C");

be = new JButton(".");

JPanel p = new JPanel();

bm.addActionListener(c);
bd.addActionListener(c);
bs.addActionListener(c);
ba.addActionListener(c);
b9.addActionListener(c);
b8.addActionListener(c);
b7.addActionListener(c);
b6.addActionListener(c);
b5.addActionListener(c);
b4.addActionListener(c);
b3.addActionListener(c);
b2.addActionListener(c);
b1.addActionListener(c);
b0.addActionListener(c);
be.addActionListener(c);
beq.addActionListener(c);
beq1.addActionListener(c);

p.add(1);
p.add(ba);
p.add(b1);
p.add(b2);
p.add(b3);
```

```
p.add(bs);
p.add(b4);
p.add(b5);
p.add(b6);
p.add(bm);
p.add(b7);
p.add(b8);
p.add(b9);
p.add(bd);
p.add(be);
p.add(b0);
p.add(beq);
p.add(beq1);
p.setBackground(Color.blue);
f.add(p);

f.setSize(200, 220);
f.show();
}

public void actionPerformed(ActionEvent e)
{
    String s = e.getActionCommand();

    if ((s.charAt(0) >= '0' && s.charAt(0) <= '9') || s.charAt(0) == '.')
    {
        if (!s1.equals(""))
            s2 = s2 + s;
        else
            s0 = s0 + s;
        l.setText(s0 + s1 + s2);
    }
    else if (s.charAt(0) == 'C')
    {
        s0 = s1 = s2 = "";

        l.setText(s0 + s1 + s2);
    }
    else if (s.charAt(0) == '=')
    {
        double te;
```

```
        if (s1.equals("+"))
            te = (Double.parseDouble(s0) + Double.parseDouble(s2));
        else if (s1.equals("-"))
            te = (Double.parseDouble(s0) - Double.parseDouble(s2));
        else if (s1.equals("/"))
            te = (Double.parseDouble(s0) / Double.parseDouble(s2));
        else
            te = (Double.parseDouble(s0) * Double.parseDouble(s2));

        l.setText(s0 + s1 + s2 + "=" + te);

        s0 = Double.toString(te);

        s1 = s2 = "";
    }
    else
    {
        if (s1.equals("") || s2.equals(""))
            s1 = s;
        else
        {
            double te;

            if (s1.equals("+"))
                te = (Double.parseDouble(s0) + Double.parseDouble(s2));
            else if (s1.equals("-"))
                te = (Double.parseDouble(s0) - Double.parseDouble(s2));
            else if (s1.equals("/"))
                te = (Double.parseDouble(s0) / Double.parseDouble(s2));
            else
                te = (Double.parseDouble(s0) * Double.parseDouble(s2));

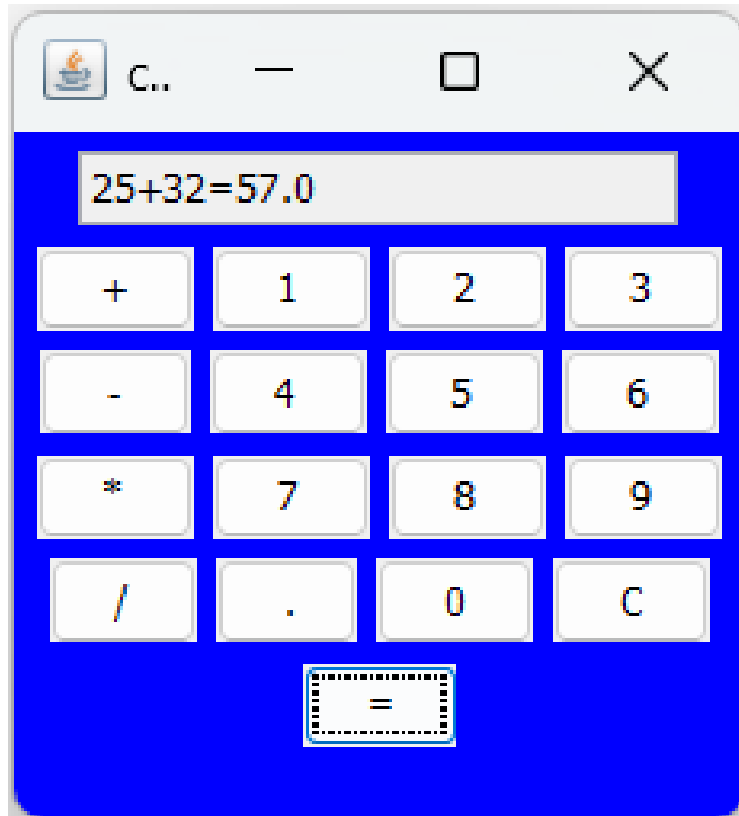
            s0 = Double.toString(te);
            s1 = s;
            s2 = "";
        }

        l.setText(s0 + s1 + s2);
    }
}
```



```
}
```

SAMPLE INPUT-OUTPUT



BANK INTERFACE

AIM

To understand the implementation of interface in Java program using different classes. Also to find the interest calculated according to the input by the user.

PROGRAM

```
import java.util.Scanner;

interface Bank
{
    void print();
    void Data();
    void interest();
    float rateInterest();
}

class SBI implements Bank
{
    String Name;
    int AccNo;
    float AccBal;
    float Interest;
    float Time;
    public void interest()
    {
        Interest = (AccBal*rateInterest()*Time)/100;
    }
    public float rateInterest()
    {
        return 9.15f;
    }
    public void Data()
    {
        Scanner kb = new Scanner (System.in);
        System.out.println(" SBI BANK DETAILS ");
        System.out.print("Enter the Name          : ");
        Name = kb.nextLine();
        System.out.print("Enter the Account Number : ");
```

```
        AccNo = kb.nextInt();
        System.out.print("Enter the Time taken      : ");
        Time = kb.nextFloat();
        System.out.print("Enter the Account Balance : ");
        AccBal = kb.nextFloat();
    }
    public void print()
    {
        System.out.println(" DETAILS OF ACCOUNT HOLDER");
        System.out.println(" NAME                : " + Name);
        System.out.println(" ACCOUNT NUMBER   : " + AccNo);
        System.out.println(" ACCOUNT BALANCE  : " + AccBal);
        System.out.println(" RATE OF INTEREST : " + rateInterest());
        System.out.println(" INTEREST         : " + Interest);
    }
}

class PNB implements Bank
{
    String Name;
    int AccNo;
    float AccBal;
    float Interest;
    float Time;
    public float rateInterest()
    {
        return 9.7f;
    }
    public void interest()
    {
        Interest = (AccBal*rateInterest()*Time)/100;
    }
    public void Data()
    {
        Scanner kb = new Scanner (System.in);
        System.out.println(" PNB BANK DETAILS ");
        System.out.print("Enter the Name          : ");
        Name = kb.nextLine();
        System.out.print("Enter the Account Number : ");
        AccNo = kb.nextInt();
    }
}
```

```
        System.out.print("Enter the Time taken      : ");
        Time = kb.nextFloat();
        System.out.print("Enter the Account Balance : ");
        AccBal = kb.nextFloat();
    }
    public void print()
    {
        System.out.println("\t DETAILS OF ACCOUNT HOLDER");
        System.out.println(" NAME                : " + Name);
        System.out.println(" ACCOUNT NUMBER   : " + AccNo);
        System.out.println(" ACCOUNT BALANCE  : " + AccBal);
        System.out.println(" RATE OF INTEREST : " + rateInterest());
        System.out.println(" INTEREST         : " + Interest);
    }
}

class Main
{
    public static void main(String[] args)
    {
        Scanner kb = new Scanner(System.in);
        System.out.println(" INTEREST CALCULATOR ");
        System.out.println("Enter the Bank working with : ");
        System.out.print("SBI   or   PNB   : ");
        String BName = kb.nextLine();
        if ((BName == "SBI") || (BName == "PNB"))
        {
            Bank SB=new SBI();
            SB.Data();
            SB.interest();
            SB.print();
        }
        else
        {
            Bank PB=new PNB();
            PB.Data();
            PB.interest();
            PB.print();
        }
    }
}
```

SAMPLE INPUT-OUTPUT

```
INTEREST CALCULATOR
Enter the Bank working with :
SBI   or   PNB   : PNB
PNB BANK DETAILS
Enter the Name           : OMAL
Enter the Account Number : 2345
Enter the Time taken     : 5
Enter the Account Balance : 2657

DETAILS OF ACCOUNT HOLDER
NAME           : OMAL
ACCOUNT NUMBER : 345
ACCOUNT BALANCE : 2657.0
RATE OF INTEREST : 9.7
INTEREST       : 1288.645
```

FILE HANDLING

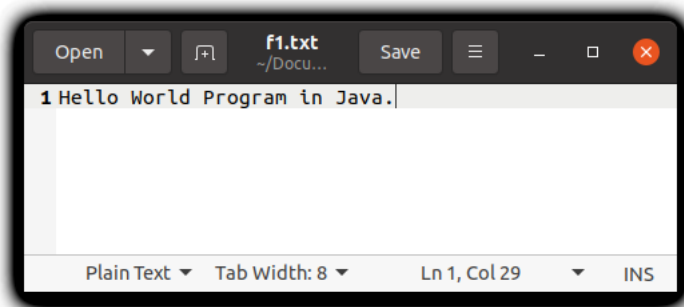
AIM

To understand the handling of the file using java code language

PROGRAM

```
import java.io.*;
public class file
{
    public static void main(String[] args) throws IOException
    {
        PrintWriter pw = new PrintWriter("final.txt");
        BufferedReader br = new BufferedReader(new FileReader("f1.txt"));
        String line = br.readLine();
        while (line != null)
        {
            pw.println(line);
            line = br.readLine();
        }
        br = new BufferedReader(new FileReader("f2.txt"));
        line = br.readLine();
        while(line != null)
        {
            pw.println(line);
            line = br.readLine();
        }
        pw.flush();
        br.close();
        pw.close();
    }
}
```

SAMPLE INPUT-OUTPUT



A screenshot of a text editor window titled "f2.txt" with a dark theme. The window has a menu bar with "Open", "Save", and a hamburger menu icon. Below the menu bar is a toolbar with a file icon and a "Save" button. The main text area contains a single line of text: "1 Java working on the Programs." The status bar at the bottom shows "Plain Text", "Tab Width: 8", "Ln 1, Col 30", and "INS".

A screenshot of a text editor window titled "final.txt" with a dark theme. The window has a menu bar with "Open", "Save", and a hamburger menu icon. Below the menu bar is a toolbar with a file icon and a "Save" button. The main text area contains two lines of text: "1 Hello World Program in Java." and "2 Java working on the Programs." The status bar at the bottom shows "Plain Text", "Tab Width: 8", "Ln 2, Col 30", and "INS".

TOWER OF HANOI

AIM

To understand the problem to handle using methods and to solve the Tower of Hanoi problem

PROGRAM

```
public class tower_ot_hanoi
{

    public static void main(String args[])
    {
        int nDisks = 3;
        doTower(nDisks,'A','B','C');
    }
    public static void doTower(int topN, char from, char inter,char to)
    {
        if(topN == 1)
        {
            System.out.println("Disk 1 from  " + from + " to "+to);
        }
        else
        {
            doTower(topN-1,from,to,inter);
            System.out.println("Disk "+topN+" from "+ from + " to "+to);
            doTower(topN-1,inter,from,to);
        }
    }
}
```

SAMPLE INPUT-OUTPUT

```
Disk 1 from  A to C
Disk 2 from A to B
Disk 1 from  C to B
Disk 3 from A to C
Disk 1 from  B to A
Disk 2 from B to C
Disk 1 from  A to C
```