```
/* Program(Code):
   Program no.1 :Java Program on Basic programming constructs like branching and
looping */

public class bl
{
        public static void main(String args[])
        {
                int a=5,b=12,i;
                int choice;
                System.out.println("Enter your choice " );
                choice=Integer.parseInt(args[0]);
                System.out.println("Menu " );
                System.out.println("1.simple if 2.if else 3.nested if else if 4.
else if ladder");
                System.out.println("5.continue 6.while 7.do while ");

                switch(choice)
                {
                        case 1:
                        System.out.println("simple if statement " );

                        if(a<b)
                                System.out.println("a is small" );
                                System.out.println("BYe" );
                        break;

                        case 2:
                        System.out.println(" if else statement " );

                        if(a<b)
                                System.out.println("a is small" );
                        else
                                System.out.println("b is small" );
                                System.out.println("BYe" );
                        break;

                        case 3:
                        System.out.println(" Nested if else statement " );

                        if( a == 5 )
                        {
                                if( b == 12 )
                                        System.out.println("a = 5 and b = 12");
                                else
                                        System.out.println("a=5" );
                        }
                        else
                                System.out.println("bye" );
                        break;
```

```
case 4:
System.out.println(" else if ladder statement " );
int marks=65;

if(marks<50)
{
        System.out.println("fail");
}
else if(marks>=50 && marks<60)
{
        System.out.println("D grade");
}
else if(marks>=60 && marks<70)
{
        System.out.println("C grade");
}
else if(marks>=70 && marks<80)
{
        System.out.println("B grade");
}
else if(marks>=80 && marks<90)
{
        System.out.println("A grade");
}
else if(marks>=90 && marks<100)
{
        System.out.println("A+ grade");
}
else
{
        System.out.println("Invalid!");
}
break;

case 5:
System.out.println(" Continue statement " );
for(i=1;i<=10;i++)
{
        if(i==5)
        {
                continue;
        }
        System.out.println(i);
}
break;

case 6:
System.out.println(" while loop " );
i=15;
```

```
                        while(i>10)
                        {
                                System.out.println(i);
                                i--;
                        }
                        break;

                        case 7:
                        System.out.println(" do while loop " );
                        i=1;
                        do
                        {
                                System.out.println(i);
                                i++;
                        }while(i<=10);
                        break;

                        default:
                        System.out.println("End of the program ");
                        break;
                }
        }
}


/*      Output
C:\Users\>cd Downloads\coding\java

C:\Users\Downloads\Coding\Java>set path = "C:\Program Files\Java\jdk-22\bin";

C:\Users\Downloads\Coding\Java>javac bl.java

C:\Users\Downloads\Coding\Java>java bl 5
Enter your choice
Menu
1.simple if 2.if else 3.nested if else if 4. else if ladder
5.continue 6.while 7.do while
 Continue statement
1
2
3
4
6
7
8
9
10      */
```

```
public class Student
{
        int id;
        String name;
        Student()
        {
                System.out.println("this a default constructor");
        }
        Student(int i, String n)
        {
                id = i;
                name = n;
        }
                public static void main(String[] args)
                {
                        Student s = new Student();
                        System.out.println("\nDefault Constructor values: \n");
                        System.out.println("Student Id : "+s.id + "\nStudent Name : 
"+s.name);System.out.
                        println("\nParameterized Constructor values: \n");
                        Student student = new Student(10, "David");
                        System.out.println("Student Id : "+student.id + "\nStudent 
Name : "+student.name);
                }
}


/*      Output
C:\Users>cd Downloads\coding\java

C:\Users\Downloads\Coding\Java>set path = "C:\Program Files\Java\jdk-22\bin";

C:\Users\Downloads\Coding\Java>javac Student.java

C:\Users\Downloads\Coding\Java>java Student
this a default constructor

Default Constructor values:

Student Id : 0
Student Name : null

Parameterized Constructor values:

Student Id : 10
Student Name : David    */
```

```
class Employee
{
        int id;
        String name;
        float salary;
        void insert(int i, String n, float s)
        {
                id=i;
                name=n;
                salary=s;
        }
        void display()
        {
                System.out.println(id+" "+name+" "+salary);
        }
}
public class TestEmployee
{
        public static void main(String[] args)
        {
                Employee e1=new Employee();
                Employee e2=new Employee();
                Employee e3=new Employee();
                e1.insert(101,"ajeet",45000);
                e2.insert(102,"irfan",25000);
                e3.insert(103,"nakul",55000);
                e1.display();
                e2.display();
                e3.display();
        }
}


/*      Output
C:\Users>cd Downloads\coding\java

C:\Users\Downloads\Coding\Java>set path = "C:\Program Files\Java\jdk-22\bin";

C:\Users\Downloads\Coding\Java>javac TestEmployee.java

C:\Users\Downloads\Coding\Java>java TestEmployee
101 ajeet 45000.0
102 irfan 25000.0
103 nakul 55000.0       */
```

```
import java.util.*;

public class ScannerExample
{
        public static void main(String args[])
        {
                Scanner in = new Scanner(System.in);
                System.out.print("Enter your name: ");
                String name = in.nextLine();
                System.out.println("Name is: " + name);
                in.close();
        }
}


/*      Output

C:\Users>cd Downloads\coding\java

C:\Users\Downloads\Coding\Java>set path = "C:\Program Files\Java\jdk-22\bin";

C:\Users\Downloads\Coding\Java>javac ScannerExample.java

C:\Users\Downloads\Coding\Java>java ScannerExample
Enter your name: Ayush
Name is: Ayush          */
```

```java
// Save this file as MyProgram.java in a folder named com/mycompany/myapp

package com.mycompany.myapp;

import java.util.Scanner;  // Import the Scanner class

public class MyProgram {
    public static void main(String[] args) {
        // Create a Scanner object for reading input
        Scanner myObj = new Scanner(System.in);

        // Prompt the user for input
        System.out.println("Enter username");

        // Read the user input
        String userName = myObj.nextLine();

        // Print the input
        System.out.println("Username is: " + userName);
    }
}

/*

OUTPUT

C:\Users\Ayush>cd Downloads\Coding\Java

C:\Users\Ayush\Downloads\Coding\Java>javac com\mycompany\myapp\MyProgram.java

C:\Users\Ayush\Downloads\Coding\Java>java com.mycompany.myapp.MyProgram
Enter username
Ayush
Username is: Ayush

*/
```

```
import java.util.Scanner;

public class TwoDArray
{
        public static void main(String[] args)
        {
                int[][] arr = new int[3][3];
                Scanner sc = new Scanner(System.in);
                for (int i = 0; i < 3; i++)
                {
                        for (int j = 0; j < 3; j++)
                        {
                                System.out.print("Enter Element: ");
                                arr[i][j] = sc.nextInt();
                                System.out.println();
                        }
                }
                System.out.println("Printing Elements...");
                for (int i = 0; i < 3; i++)
                {
                        System.out.println();
                        for (int j = 0; j < 3; j++)
                        {
                                System.out.print(arr[i][j] + "\t");
                        }
                }
        }
}

/*

OUTPUT


C:\Users\Ayush>cd Downloads\Coding\Java

C:\Users\Ayush\Downloads\Coding\Java>set path ="";

C:\Users\Ayush\Downloads\Coding\Java>set path ="C:\Program Files\Java\jdk-22\bin";

C:\Users\Ayush\Downloads\Coding\Java>javac TwoDArray.java

C:\Users\Ayush\Downloads\Coding\Java>java TwoDArray
Enter Element: 22

Enter Element: 14

Enter Element: 33

Enter Element: 22
Enter Element: 66

Enter Element: 44

Enter Element: 44

Enter Element: 99

Enter Element: 13

Printing Elements...

22      14      33
22      66      44
44      99      13

*/
```

```
import java.util.*;

public class VectorExample2{
        public static void main(String args[]){
                Vector<Integer> in = new Vector<>();
                in.add(100);
                in.add(200);
                in.add(300);
                in.add(200);
                in.add(400);
                in.add(500);
                in.add(600);
                in.add(700);

                System.out.println("Values in vector: " +in);

                System.out.println("Remove first occourence of element 200: 
"+in.remove((Integer)200));

                System.out.println("Values in vector: " +in);

                System.out.println("Remove element at index 4: " +in.remove(4));
                System.out.println("New Value list in vector: " +in);

                in.removeElementAt(5);

                System.out.println("Vector element after removal: " +in);

                System.out.println("Hash code of this vector = "+in.hashCode());

                System.out.println("Element at index 1 is = "+in.get(1));
        }
}
```

Output:

```
Values in vector: [100, 200, 300, 200, 400, 500, 600, 700]
Remove first occourence of element 200: true
Values in vector: [100, 300, 200, 400, 500, 600, 700]
Remove element at index 4: 500
New Value list in vector: [100, 300, 200, 400, 600, 700]
Vector element after removal: [100, 300, 200, 400, 600]
Hash code of this vector = 130123751
Element at index 1 is = 300
```

Program:

```
class Animal{
        void eat(){System.out.println("eating...");}
}

class Dog extends Animal{
        void bark(){System.out.println("barking...");}
}

class Cat extends Animal{
        void meow(){System.out.println("meowing...");}
}

class TestInheritance3{
        public static void main(String args[]){
        Cat c=new Cat();
        c.meow();
        c.eat();

        //c.bark();//C.T.Error

        }
}
```

Output:

```
        meowing...
        eating...
```

Program:

```
interface Printable{
        void print();
}

interface Showable{
        void show();
}

class A7 implements Printable,Showable{
        public void print(){System.out.println("Hello");}
        public void show(){System.out.println("Welcome");
}

        public static void main(String args[]){
                A7 obj = new A7();
                obj.print();
                obj.show();
        }
}
```

Output:

```
        Hello
        Welcome
```

Program:

```
abstract class Bank{
        abstract int getRateOfInterest();
}

class SBI extends Bank{
        int getRateOfInterest(){return 7;}
}

class PNB extends Bank{
        int getRateOfInterest(){return 8;}
}

class TestBank{
        public static void main(String args[]){
                Bank b;
                b=new SBI();
                System.out.println("Rate of Interest is: "+b.getRateOfInterest()+"
%");
                b=new PNB();
                System.out.println("Rate of Interest is: "+b.getRateOfInterest()+"
%");
        }
}
```

Output:

```
        Rate of Interest is: 7 %
        Rate of Interest is: 8 %
```

```
public class JavaExceptionExample {
   public static void main(String args[]) {
      try {
         int data = 100 / 0;
      } catch (ArithmeticException e) {
         System.out.println(e);
      }
      System.out.println("rest of the code...");
   }
}
```

Output:

```
F:\Engineering\3rd Sem Engg>javac JavaExceptionExample.java
F:\Engineering\3rd Sem Engg>java JavaExceptionExample

java.lang.ArithmeticException: / by zero
rest of the code…
```

```
class InvalidAgeException extends Exception {
    public InvalidAgeException(String str) {
        super(str);
    }
}

public class TestCustomException1 {
    static void validate(int age) throws InvalidAgeException {
        if (age < 18) {
            throw new InvalidAgeException("age is not valid to vote");
        } else {
            System.out.println("welcome to vote");
        }
    }

    public static void main(String args[]) {
        try {
            validate(13);
        } catch (InvalidAgeException ex) {
            System.out.println("Caught the exception");
            System.out.println("Exception occured: " + ex);
        }
        System.out.println("Rest of the code...");
    }
}
```

Output:

```
F:\Engineering\3rd Sem Engg>javac  TestCustomException1.java
F:\Engineering\3rd Sem Engg>java  TestCustomException1
Caught the exception
Exception occurred: InvalidAgeException: age is not valid to vote
Rest of the code…
```

```java
class RunnableDemo implements Runnable {
   private Thread t;
   private String threadName;

   RunnableDemo(String name) {
      threadName = name;
      System.out.println("Creating " + threadName);
   }

   public void run() {
      System.out.println("Running " + threadName);
      try {
         for (int i = 4; i > 0; i--) {
            System.out.println("Thread: " + threadName + ", " + i);
            // Let the thread sleep for a while.
            Thread.sleep(50);
         }
      } catch (InterruptedException e) {
         System.out.println("Thread " + threadName + " interrupted.");
      }
      System.out.println("Thread " + threadName + " exiting.");
   }

   public void start() {
      System.out.println("Starting " + threadName);
      if (t == null) {
         t = new Thread(this, threadName);
         t.start();
      }
   }
}

public class TestThread {
   public static void main(String args[]) {
      RunnableDemo R1 = new RunnableDemo("Thread-1");
      R1.start();
      RunnableDemo R2 = new RunnableDemo("Thread-2");
      R2.start();
   }
}
```

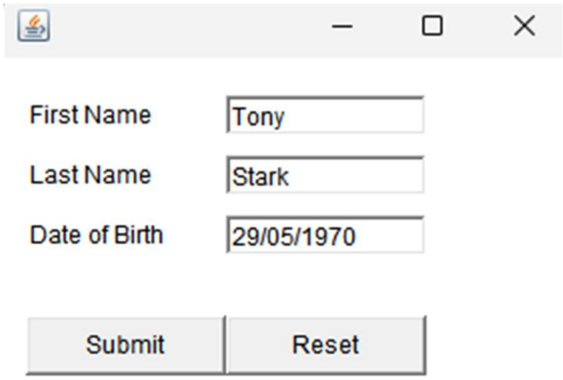
Output:

```
F:\Engineering\3rd Sem Engg>javac TestThread.java
F:\Engineering\3rd Sem Engg>java TestThread
Creating Thread-1
Starting Thread-1
Creating Thread-2
Starting Thread-2
Running Thread-1
Thread: Thread-1, 4
Running Thread-2
Thread: Thread-2, 4
Thread: Thread-1, 3
Thread: Thread-2, 3
Thread: Thread-1, 2
Thread: Thread-2, 2
Thread: Thread-1, 1
Thread: Thread-2, 1
Thread Thread-1 exiting.
Thread Thread-2 exiting
```

```
import java.awt.*;

public class AwtApp extends Frame {
    AwtApp() {
        Label firstName = new Label("First Name");
        firstName.setBounds(20, 50, 80, 20);
        Label lastName = new Label("Last Name");
        lastName.setBounds(20, 80, 80, 20);
        Label dob = new Label("Date of Birth");
        dob.setBounds(20, 110, 80, 20);
        TextField firstNameTF = new TextField();
        firstNameTF.setBounds(120, 50, 100, 20);
        TextField lastNameTF = new TextField();
        lastNameTF.setBounds(120, 80, 100, 20);
        TextField dobTF = new TextField();
        dobTF.setBounds(120, 110, 100, 20);
        Button sbmt = new Button("Submit");
        sbmt.setBounds(20, 160, 100, 30);
        Button reset = new Button("Reset");
        reset.setBounds(120, 160, 100, 30);
        add(firstName);
        add(lastName);
        add(dob);
        add(firstNameTF);
        add(lastNameTF);
        add(dobTF);
        add(sbmt);
        add(reset);
        setSize(300, 300);
        setLayout(null);
        setVisible(true);
    }

    public static void main(String[] args) {
        // TODO Auto-generated method stub
        AwtApp awt = new AwtApp();
    }
}
```

Output:

```
F:\Engineering\3rd Sem Engg>javac AwtApp.java

F:\Engineering\3rd Sem Engg>java AwtApp
```



First Name Tony

Last Name Stark

Date of Birth 29/05/1970