

Module no : 4

## Loops in Java

15/10/2023

Definition :-

Loop allow us to repeat some kind of behavior in our programming logic.

Agenda :-

- ① for loops
- ② while loops
- ③ do while loops.
- ④ break statement.
- ⑤ Continue statement.

## For loop :-

Definition :- Java for loop is used to execute a block of code for a certain number of times. It is recommended to use for loop when the exact number of iterations is known beforehand.

Syntax :-

```
for (initialization; condition; update) {
    // Body of the loop
}
```

## Sample program :-

```
class Main {
    public static void main (String args[]) {
        for (int i = 0; i <= 5; i++) {
            System.out.println (i);
        }
    }
}
```

## **For Loop:**

### Program:

```
package com.company;

public class Main{
    public static void main(String[] args) {
        for (int i = 0; i <= 5; i++){
            System.out.println(i);
        }
    }
}
```

### Output:

"C:\Program Files\Java\jdk-21\bin\java.exe"

0  
1  
2  
3  
4  
5

Process finished with exit code 0

---

Problem - Largest of N numbers :-

Task :- Given an integer  $N$  i.e. the size of the input, followed by  $N$  more integers find the largest of those  $N$  numbers. ~~Sample input~~

Sample input :-

5

10 -3 2 12 7

Sample Output :-

12

## **For Loop – Largest of Numbers:**

### **Program:**

```
package com.company;
import java.util.Scanner;
public class Main{
    public static void main(String[] args){
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the number of integers:");
        int numberofIntegers = sc.nextInt();
        int result = 0;
        for (int i = 0; i < numberofIntegers; i++){
            System.out.print("Enter the "+(i+1)+"th number:");
            int number = sc.nextInt();
            if (number >= result){
                result = number;
            } else {
                result = result;
            }
        }
        System.out.println("The Greatest number is ==> "+result);
    }
}
```

### **Output:**

```
"C:\Program Files\Java\jdk-21\bin\java.exe"
Enter the number of integers:
5
Enter the 1th number:10
Enter the 2th number:-3
Enter the 3th number:2
Enter the 4th number:12
Enter the 5th number:7
The Greatest number is ==> 12

Process finished with exit code 0
```

---

## For Loop – Largest of Numbers – Using some inbuild functions for Optimization:

### Program:

```
package com.company;

import java.util.Scanner;
public class Main{
    public static void main(String[] args){
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the number of integers:");
        int numberofIntegers = sc.nextInt();
        int result = Integer.MIN_VALUE; //minimum value assigned to it
        for (int i = 0; i < numberofIntegers; i++){
            System.out.print("Enter the "+(i+1)+"th number:");
            int number = sc.nextInt();
            result = Math.max(result, number); //inbuild function to compare largest number
        }
        System.out.println("The Greatest number is ==> "+result);
    }
}
```

### Output:

```
"C:\Program Files\Java\jdk-21\bin\java.exe"
Enter the number of integers:
5
Enter the 1th number:10
Enter the 2th number:-3
Enter the 3th number:2
Enter the 4th number:12
Enter the 5th number:7
The Greatest number is ==> 12
```

---

```
Process finished with exit code 0
```

## While Loops:-

Definition :- The Java while loop is used to execute a specific block of code until a certain condition is met.

Syntax :-

```
while (Condition) {  
    // Body of Loop  
}
```

Sample program :-

```
class Main {  
    public static void main (String args[]) {  
        boolean flag = true;  
        while (flag) {  
            for (int a = 1; a <= 100; a++) {  
                if (a > 5) {  
                    flag = false  
                } else { System.out.println(a); }  
            }  
        }  
    }  
}
```

## While Loop:

### Program:

```
package com.company;

public class Main{
    public static void main(String[] args){
        boolean flag = true;
        // while loop
        while (flag){
            for (int a = 1; a <= 100; a++){
                if (a > 5){
                    flag = false;
                } else {
                    System.out.println(a);
                }
            }
        }
    }
}
```

### Output:

"C:\Program Files\Java\jdk-21\bin\java.exe"

1  
2  
3  
4  
5

Process finished with exit code 0

Problem: Count digits of a number:

Question: Given an integer N, count and print its number of digits.

Sample input: 35493

Sample output: 5

Hint: 35493 should be repeatedly divided by 10 till it becomes 0.

(x) No decimal is taken.

1. logic:

$$\begin{array}{r} 10 ) 35493 \\ 10 ) 3549 \\ 10 ) 354 \\ 10 ) 35 \\ 10 ) 3 \\ \hline 0 & \rightarrow \text{Halt here.} \end{array}$$

## **While Loop:**

### Program:

```
package com.company;

import java.util.Scanner;
public class Main{
    public static void main(String[] args){
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter any number to count the digits:");
        int num = sc.nextInt();
        int digits = 0;
        while (num > 0){
            num /= 10;
            digits++;
        }
        System.out.println("There are "+digits+" digits in given number..!");
    }
}
```

### Output:

"C:\Program Files\Java\jdk-21\bin\java.exe"

Enter any number to count the digits:

35493

There are 5 digits in given number..!

Process finished with exit code 0

## Do-while Loop :-

Definition :- The do-while loop is similar to the while loop. However the body of the do-while loop is executed one before the condition is checked.

Syntax :-

do {	// Body of Loop	} while (Condition);	→ Exit Control Loop.
------	-----------------	----------------------	----------------------

## Sample program :-

```
class Main {  
    public static void main (String args[]) {  
        int i i = 5;  
        do {  
            System.out.println (i);  
            i --;  
        } while (i > 0);  
    }  
}
```

## While Loop:

### Program:

```
package com.company;

import java.util.Scanner;
public class Main{
    public static void main(String[] args){
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter any number to count the digits:");
        int num = sc.nextInt();
        int digits = 0;
        do{
            num /= 10;
            digits++;
        }while (num > 0);
        System.out.println("There are "+digits+" digits in given number..!");
    }
}
```

### Output:

"C:\Program Files\Java\jdk-21\bin\java.exe"

Enter any number to count the digits:

8484648

There are 7 digits in given number..!

Process finished with exit code 0

## Problem - Sum of Positive Numbers :-

Task : Given a stream of Numbers, read the numbers till you have a -ve integer and print their sum of numbers so far.

Sample input :-

5 3 2 -4 2 0 9...

Sample output :-

6.

### **Problem – Sum of Positive Numbers:**

#### Program:

```
package com.company;

import java.util.Scanner;
public class Main{
    public static void main(String[] args){
        Scanner sc = new Scanner(System.in);
        int sumOfPositive = 0;
        int current;
        do{
            current = sc.nextInt();
            sumOfPositive += current;
        }while(current >= 0);
        System.out.println("Therefore the Sum of Positive integers in the give numbers is ==> "+sumOfPositive);
    }
}
```

#### Output:

```
"C:\Program Files\Java\jdk-21\bin\java.exe" "-javaagent:C:\Program File
```

```
5
```

```
3
```

```
2
```

```
-4
```

```
Therefore the Sum of Positive integers in the give numbers is ==> 6
```

```
Process finished with exit code 0
```

## Break statement :

Definition: The break statement is used to terminate a loop it is enclosed inside. The program resumes control at the next statement following the loop.

## Sample program:

```
class Main {  
    public static void main (String args[]) {  
        for (int i = 1; i <= 10; i++) {  
            if (i == 5) {  
                break;  
            } System.out.println(i);  
        } System.out.println ("After the loop");  
    } }
```

### **Break Statement:**

#### Program:

```
package com.company;

public class Main{
    public static void main(String[] args){
        for (int i = 0; i <= 10 ; i++){
            if(i==5){
                break;
            }
            System.out.println(i);
        }
        System.out.println("After the Loop");
    }
}
```

#### Output:

"C:\Program Files\Java\jdk-21\bin\java.exe"

0

1

2

3

4

After the Loop

Process finished with exit code 0

---

Problem - A Random Game :-

Task : Write a program to generate random numbers between [1, 10] and print them to the output.

Terminate when you get 5.

### **Problem - A Random Game:**

#### Program:

```
package com.company;

import java.util.Scanner;
import java.util.Random;
public class Main{
    public static void main(String[] args){
        Random rand = new Random();
        while(true){
            int randomInteger = rand.nextInt(10) + 1;
            System.out.println(randomInteger);
            if (randomInteger == 5){
                break;
            }
        }
    }
}
```

#### Output:

"C:\Program Files\Java\jdk-21\bin\java.exe"

10  
7  
9  
1  
6  
7  
5

Process finished with exit code 0

---