GIFT School of Engineering and Applied Sciences

Spring 2020

CS-124: Introduction to Programming - Lab

Lab-7 Manual

Iterations

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While Loop

Sometimes, it is necessary to repeat a set of statements several times. One way to do this is to type the set of statements in the program over and over. For example, if you want to repeat a set of statements 100 times, you type the set of statements 100 times in the program. However, this way of repeating a set of statements is impractical, if not impossible. Fortunately, there is a simpler approach. Java has three repetition, or looping, structures that allow you to repeat a set of statements until certain conditions are met.

A loop executes instructions repeatedly while a condition is true.

The general format of a while loop

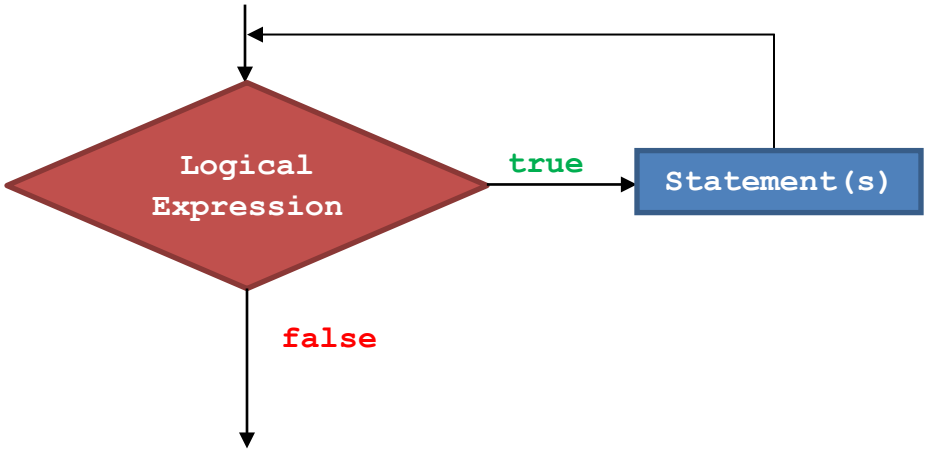
```
while ( logical expression ){

     //statement(s) to be executed till the logical
expression is true

}
```

In Java, **`while`** is a reserved word. The logical expression is called a **`loop condition`** or simply a condition. The statement is called the **`body of the loop`**. Moreover, the statement can be either a simple or compound statement. Also, note that the parentheses around the logical expression are part of the syntax.

Flow of execution of a while loop



Task #1: Writing a while loop

In this task, you are being asked to write a loop in Java.

Write while loops that prints:

i. Numbers from 1 to 100
ii. Numbers from 100 to 1
iii. Number from 0 to 50 with an increment of 5 i.e. (0 5 10 15. . . 50)
iv. Your name 5 times

1. Create a program called **WhileLoopSeriesLab8.java.**
2. Correctly display appropriate messages.

Task #2: Writing a while loop

In this task, you are being asked to write a loop in Java.

Write a while loop that prints:

a. All squares less than n. For example, if n is 100, print 0 1 4 9 16 25 36 49 64 81.

b. All positive numbers that are divisible by 10 and less than n. For example, if n is 100, print 10 20 30 40 50 60 70 80 90.

c. All powers of two less than n. For example, if n is 100, print 1 2 4 8 16 32 64.

1. Create a program called **WhileLoops1Lab8.java.**
2. Correctly display appropriate messages.

Task #3: Writing a while loop

In this task, you are being asked to write a loop in Java.

Write a while loop that computes:

a. The sum of all even numbers between **2** and **100** (inclusive).
b. The sum of all odd numbers between **a** and **b** (inclusive).

1. Create a program called **WhileLoops2Lab8.java.**
2. Create appropriate variables and assign values using a **Scanner** object.
3. Correctly display appropriate messages.

Task #4: Writing a while loop

In this task, you are being asked to write a loop in Java.

Write a loop that asks the user to enter a number. The loop should iterate 10 times and sums the numbers entered.

1. Create a program called **WhileLoops3Lab8.java**
2. Create appropriate variables and assign values using a **Scanner** object.
3. Correctly display appropriate messages.

Task #5: Writing a while loop

In this task, you are being asked to write a loop in Java.

Write a loop that asks the user to enter a number, a start value and an end value. The loop should then display the table of that number starting from the start value and end at the end value.

For example:

```
Enter a number: 5
Enter a start value: 3
Enter an end value: 10

5 x 3 = 15
5 x 4 = 20
.
.
.
5 x 10 = 50
```

NOTE: Make sure that only positive numbers are allowed for all three values.

1. Create a program called **TablesLab8.java.**
2. Create appropriate variables and assign values using a **Scanner** object.
3. Correctly display appropriate messages.

Task #6: Determine the output of a loop without execution

In this task, you are being asked to determine the output of a loop **without executing it in Java**.

Suppose that the input is **10 30 16 25 76 -1**. What is the output of the following code?

```
import java.util.Scanner;

public class LoopExampleLab8 {
     public static void main(String[] args) {

          Scanner read = new Scanner(System.in);

          int num = 0;
          int sum;
          int count = 0;

          System.out.print("Enter a value for sum: ");
          sum = read.nextInt();

          while (count < 3) {
               System.out.print("Enter a value for num: ");
               num = read.nextInt();

               sum = sum + num;
               count++;
          }//while

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

     }//main
}//class
```

1. **Try tracing the output of the code using paper and pen without compiling.**
2. Next, create a program called **LoopExampleLab8.java.**
3. Copy and paste that above code.
4. Compile and run to see the correct output.

Task #7: Writing a while loop

In this task, you are being asked to write a loop in Java.

Write a program that asks the user for a positive nonzero integer value. The program should use a loop to get the sum of all the integers from 1 up to the number entered. For example, if the user enters 50, the loop will find the sum of 1, 2, 3, 4, . . . 50.

1. Create a program called **SumIntegersLab8.java.**
2. Create appropriate variables and assign values using a **Scanner** object.
3. Correctly display appropriate messages.

Task #8: Writing a while loop

In this task, you are being asked to write a loop in Java.

Write a program that asks the user to enter a number. The program should use a while loop to calculate the sum of digits of the number entered by the user.

1. Create a program called **SumOfDigitsLab8.java.**
2. Create appropriate variables and assign values using a **Scanner** object.
3. Correctly display appropriate messages.