Repetition

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Introduction
- ❖ The programs developed so far have used sequence and/or selection.
- ❖ The logical flow of the program is from top to bottom.
- ❖ If selection is used then some of the steps may be omitted.

- ❖ Many problems require that steps be repeated.
- ❖ This is commonly known as **looping**, **repetition** or **iteration**.

- ❖ It is called looping because logically it forms a loop as instructions are executed one after the other in the forward direction then control jumps back to the start of the loop and this is repeated again, and again.

- ❖ To perform repetition successfully we need to know two things:
  - ➢ The instructions are to be repeated (e.g. lines 5 through 10)
  - ➢ When to stop looping.

- ❖ There are three different loop constructs that can be used:
  1. The Pre-Test Loop (while loop).
  2. The Post-Test Loop (do while loop).
  3. Counted Loops (for loop).

The Pre-Test Loop (while loop):
- ❖ The key feature of the pre-test loop is that we test to see whether or not to continue before executing the body of the loop. The effect of this is that we might not execute the body at all.
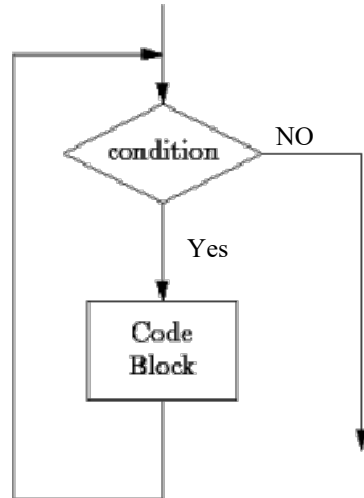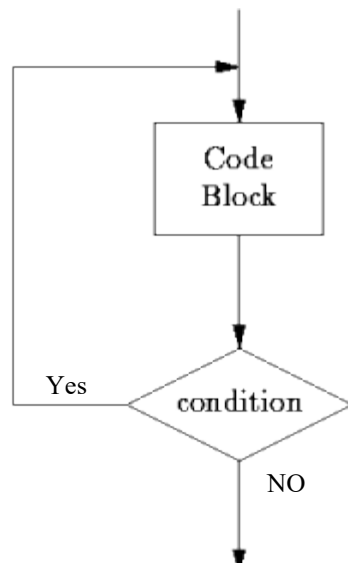
While (condition)
    Statement
    …
    Statement
EndLoop

- ❖ So, if we're designing a program that has a section which might be executed 0 or more time (that is we're not guaranteed that it will be executed at all), a pre-test structure is what we want.

The Post-Test Loop (do while loop).

- ❖ The key feature of the Post-test loop is that we execute the body of the loop one time before test to see whether or not to continue. The effect of this is that we will execute the body of the loop one time at least even if the condition is false.

Do
    Statement
    …
    Statement
While (condition)

- ❖ As you might expect, if we don't test to determine whether or not to continue until after we've executed the block, the loop body will always be executed at least once. This is the different from the pre-test loop.

Counted Loops (for loop)

* ❖ **For loop** allows a statement to be executed a specified number of times.
* ❖ It is begin with a loop control variable: assigned a specific initial value.
* ❖ This control variable in then incremented (or decremented) by a specified amount each time around the loop until a specified terminating value is reached at which time the statement following the loop is then executed.
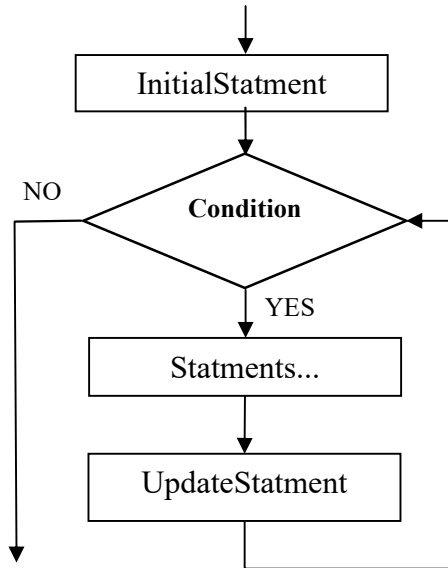
For <u>initial value</u> **to** <u>final value</u>

     Statements

     UpdateStatment

EndLoop

* ❖ For loop is a very powerful tool to use with arrays (a topic covered later).
* ❖ This loop is a specialized construct for iterating a specific number of times, often called a "counted loop".
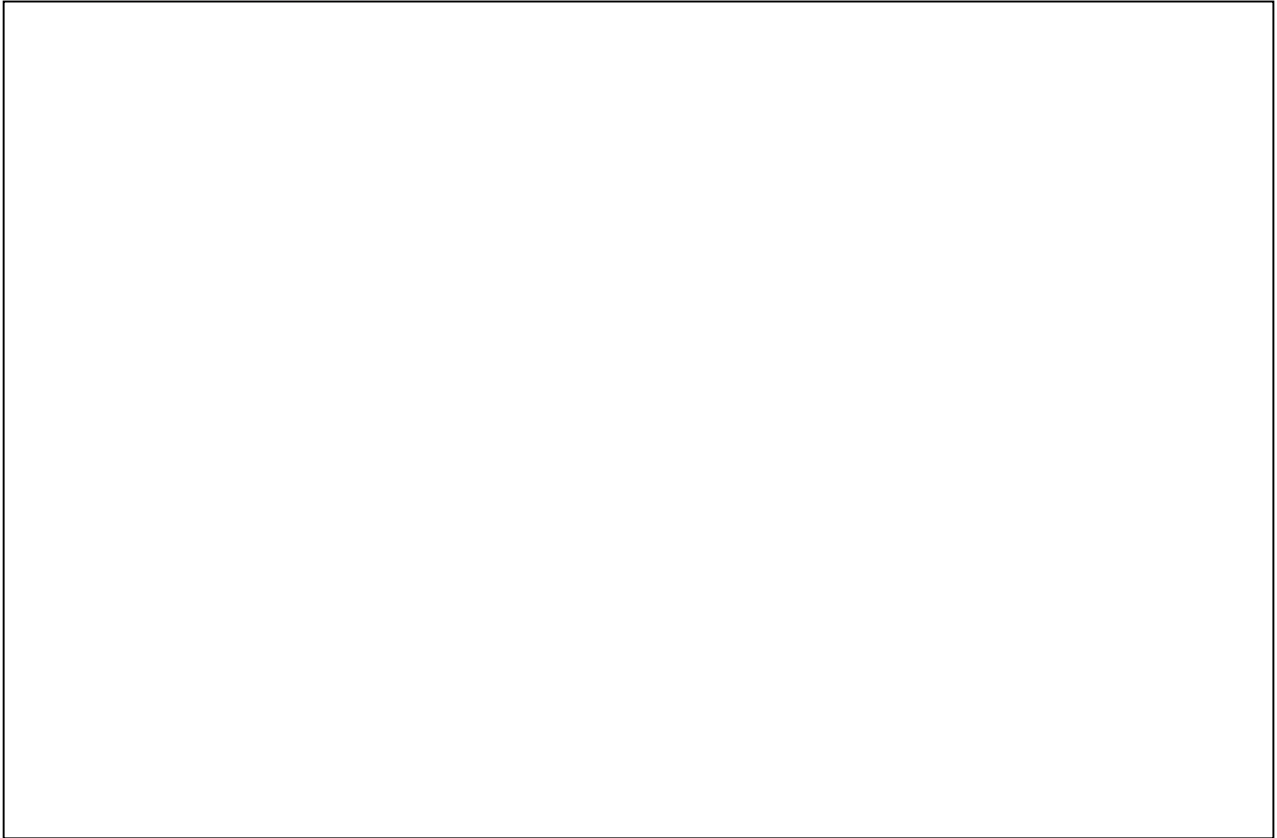
Example:

     Write a program that output number from 1 to 10 using the all alternative solutions (The Pre-Test Loop, the Post-Test Loop and Counted loop):

The Pre-Test Loop:
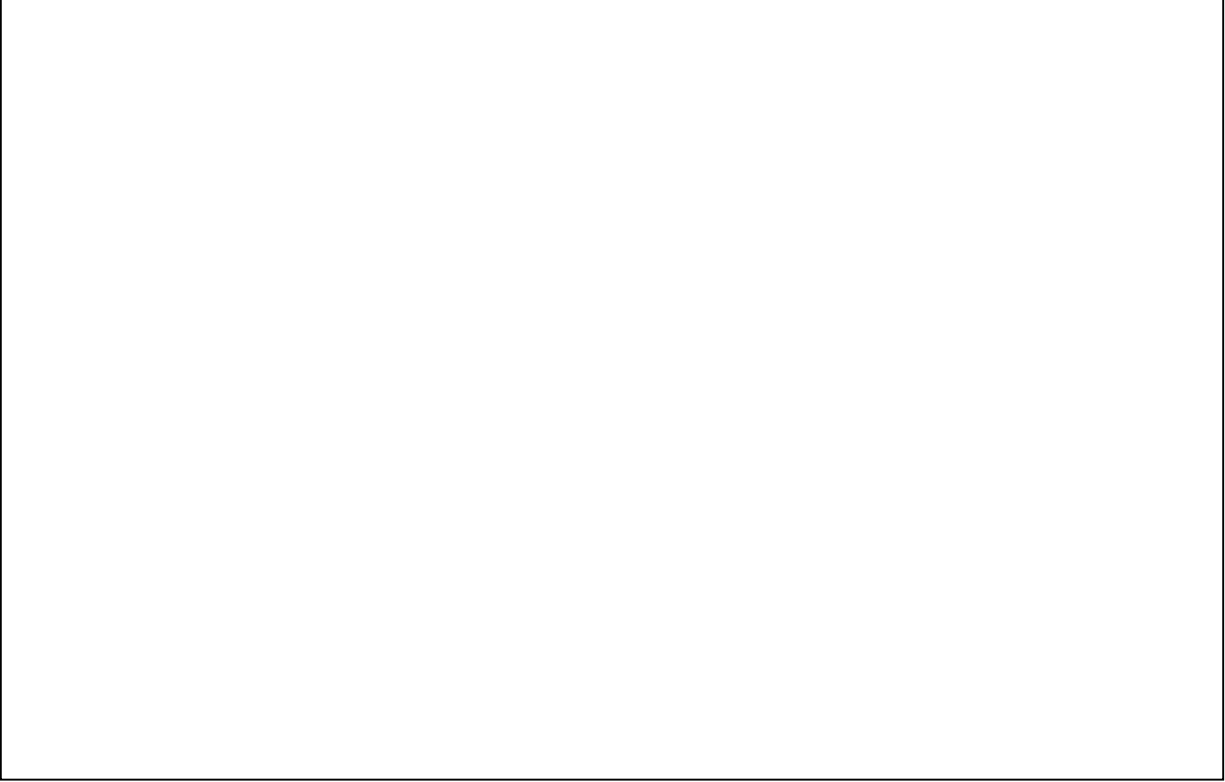
The Post-Test Loop:

The Counted Loop:

Homework number (4) delivered next week

1. By using for loop write pseudo code print line of five stars, after that draw flowchart.
2. Write a program that output number from 1 to 10 every number followed by star, using all alternative solutions (The Pre-Test Loop, the Post-Test Loop and Counted loop)
3. Write pseudo code ask user to enter number from keyboard, then print stars with the same numbers that user entered.

                        Example of output is:
                              Enter number: 5
                                      *****

4. Write a program ask user to enter his name, program count the number of character and print it.
                        Example of output is:
                        Enter your name: Ali Ahmed
                        You have 9 characters in your name