

Applications Programming

Repetition (Loop) Statement - 1

Motivation

- The strength of a computer is that it can repeatedly perform a task without feeling tired, bored or making mistakes.
- Repeating same code segment is bad because:
 - it is sometimes simply impossible, e.g., you may not be able to determine exactly how many times to repeat it;
 - it's tedious and time consuming, e.g., if the code segment needs to be repeated 1001 times;
 - it's easy to introduce errors to the program.
- It's not even a good idea to manually execute a program many times to achieve the repetition. Way too boring. We want the computer to manage the repetition autonomously.
- Loop statements have built-in structure to control the repetition.

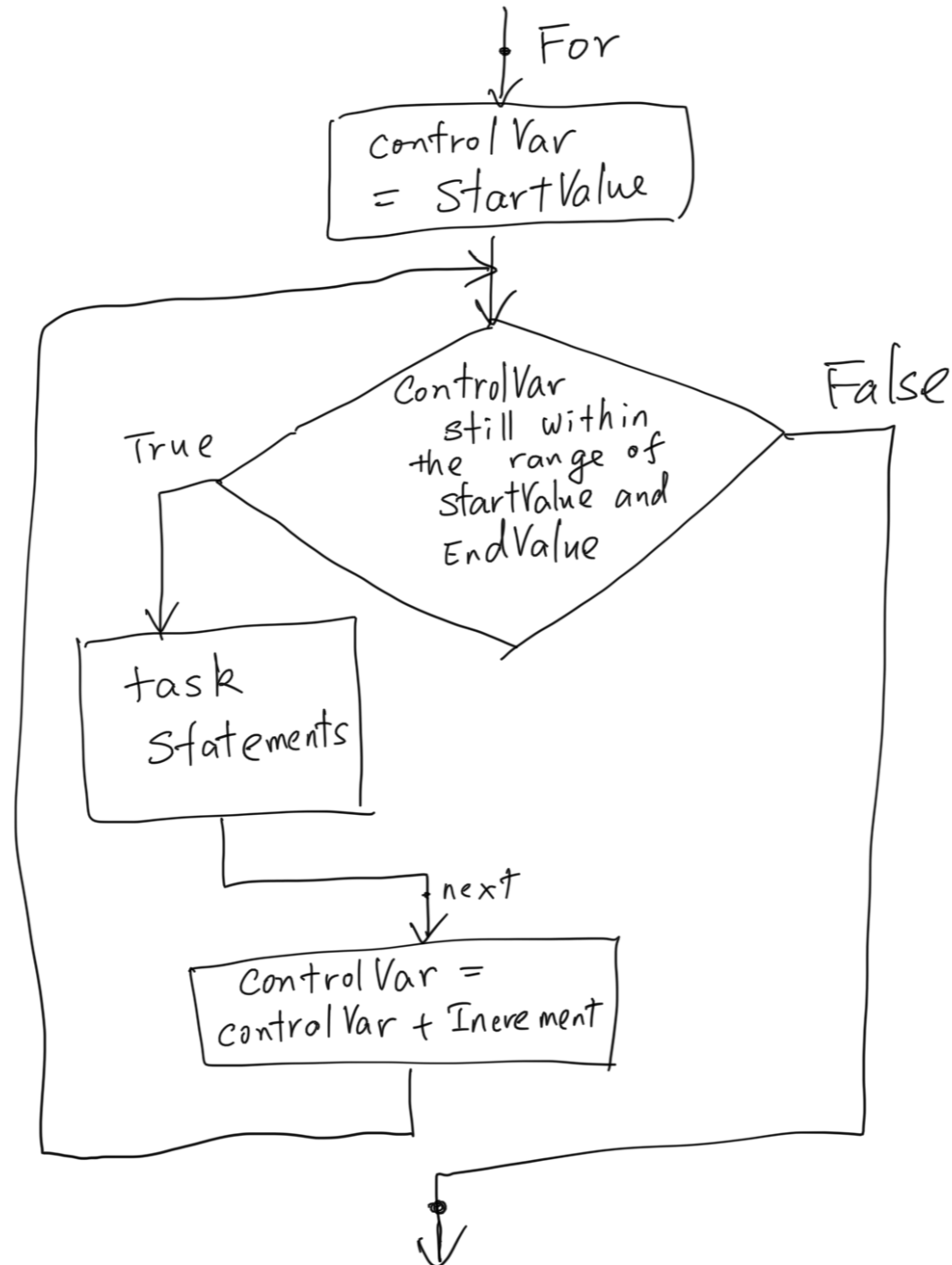
General Structure

- Loop control structure
 - when to start the first round
 - when to end the loop
 - after a fixed number of rounds (how do we determine this?)
 - when a condition becomes false
 - how control variable(s) are updated from one round to the next round
- Tasks to be repeated
 - determined by program logic
 - the procedure (steps) must be the same
 - but the data used could be different

For-Next Statement

- Syntax:
`For controlVar = StartValue To EndValue Step Increment`
 ' task statements
`Next controlVar`
- The [Step Increment] part is optional. If the Increment value is 1, this part can be omitted.
- The range of StartValue and EndValue includes the StartValue and EndValue themselves. The ranged is a closed range
- The control variable after Next can be missing, the computer will try to guess and fill a control variable in its place. But it may cause logical problems if the computer guessed wrong.
- Usually we need to do some preparation before start the For-Next loop.

Control Flow Graph



Example 1

- Add a sequence of numbers from 1 to 1000
- And its variations
 - Add even numbers from 1 to 1000
 - Add odd numbers from 1000 to 1

Example 2

- Process multiple transactions recorded in the transaction data area
- There are fixed start row and end row.
- Pay attention to off by one error