



Jiangxi University of Science and Technology

Chapter 5 Repetition

Lecture0501 Basic loop Structures

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5.1 Basic loop Structures

➤ Introduction

- A **section of code** that is repeated is called a *loop*,
- because *after the last statement* in the code is executed, the program branches, or loops, *back to the first statement* and starts another repetition through the code
- Each repetition* is also called an *iteration* 迭代 or *pass through the loop* 通过循环

5.1 Basic loop Structures

➤ Constructing a repeating section of code requires that *four elements* be present:

- ① *Repetition statement*: **while**, **for**, **do-while** statement
- ② *Loop Condition*
- ③ *Loop control variable* initialization: A statement that initially sets the condition being tested
- ④ Modifying *Loop control variable*: A statement within the repeating section of code that alters the condition so that it eventually becomes false

5.1 Basic loop Structures

➤ Pretest and Posttest Loops 前测循环与后测循环

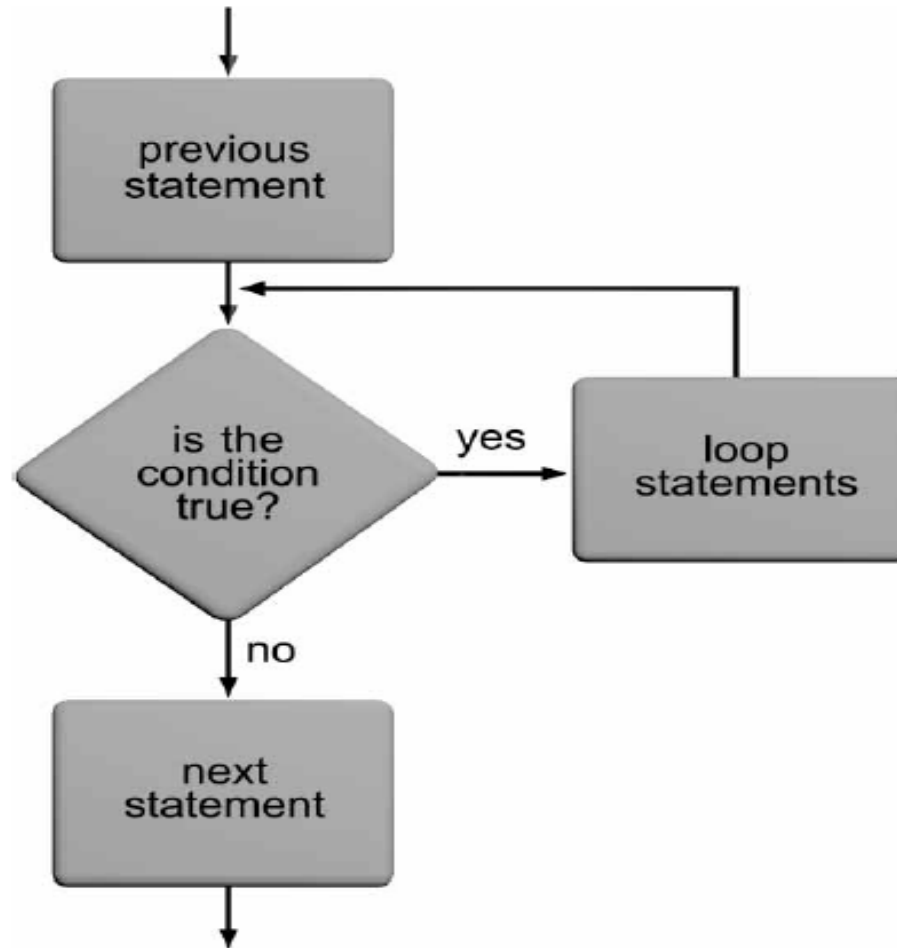


Figure 5.1 A pretest (entrance-controlled) loop

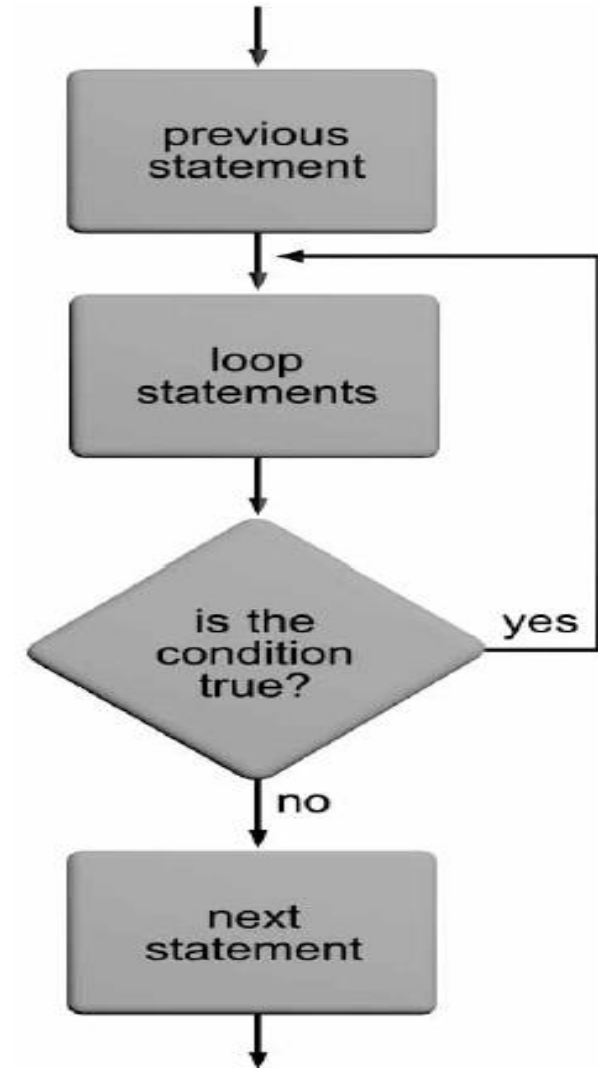


Figure 5.2 A posttest (exit-controlled) loop

5.1 Basic loop Structures

- **Counter-controlled loop**(计数器控制的循环):
 - the condition is used to keep track of the number of repetitions
 - Also known as a **fixed-count loop**
- **Condition-controlled loop**(条件控制的循环):
 - the tested condition does not depend on a count being achieved, but rather on a specific value being encountered

5.1 Basic loop Structures

Table 5.1 Comparison of loop types

Type of Loop	Description
Counter-controlled (Fixed-count)	The number of repetitions is known before the loop executes.
Condition-controlled	The number of repetitions is not known before the loop executes. The loop is terminated when one or more specific values are encountered.
Sentinel-controlled	This is a condition-controlled loop where one specific value is required to terminate the loop.
Input-validation	This is a condition-controlled loop that terminates when a value within a valid range is entered.

哨兵控制的
循环

输入验证

5.2 The while Statement

- The general form of the while statement is
- **while** (**expression**)
 - **statement**;
 - the statement following the expression is executed repeatedly as long as **the expression evaluates to a non-zero value**.
 - Naturally, this means that somewhere in the while statement must be a statement **altering the tested expression's value**.

5.2 The while Statement

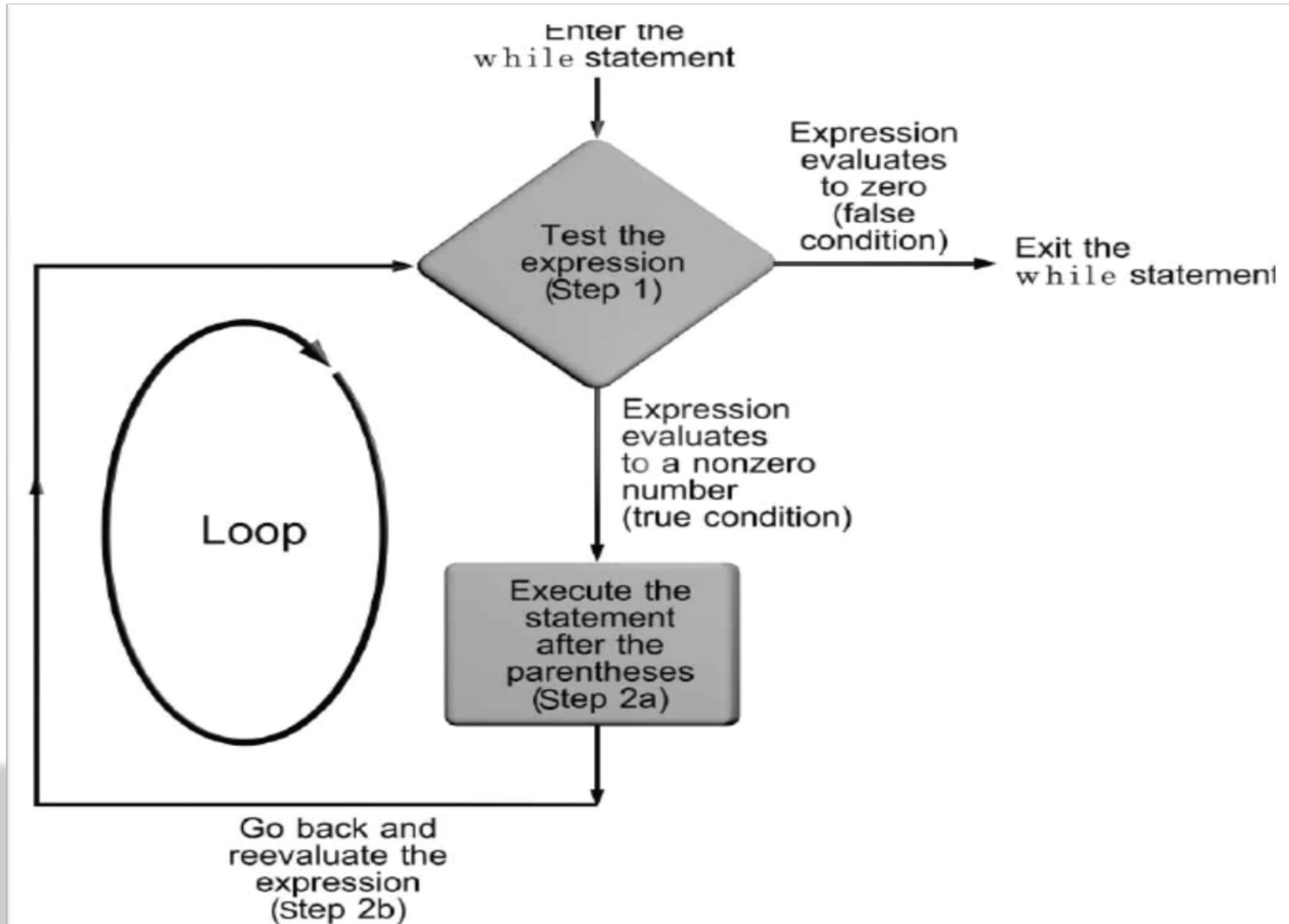


Figure 5.3 Anatomy of a while loop

Reference



➤ BOOK

➤ Some part of this PPT given by Prof 欧阳城添

(Prof: **Chengtian Ouyang**)

➤ with special thank

➤ <https://www.codingunit.com/c-tutorial-first-c-program-hello-world>

