

# Chapter 5 - Repetition

## At a Glance

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## Chapter Notes

### Overview

Chapter 5 introduces the use of repetition statements in C. You learn about the basic loop structures and how to use `while` and `for` statements. Computing sums and averages using a `while` loop is studied in detail. Some case studies are explored that introduce you to several loop programming techniques. You also learn about nested loops and how to use the `do-while` statement. Finally, some common programming and compiler errors are reviewed.

### Objectives

- Basic loop structures
- The `while` statement
- Computing sums and averages using a `while` loop
- The `for` statement
- Case studies: Loop programming techniques
- Nested loops
- The `do-while` statement

- Common programming and compiler errors

## Basic Loop Structures

<b>Topic Tip</b>	The Programming Note in page 220 explains how to control a loop with a symbolic constant.
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## Quick Quiz 1

1. What is a loop?
2. In a(n)\_\_\_\_\_loop, which is also known as a fixed-count loop, the condition is used to keep track of the number of repetitions that have occurred.
3. What is a program loop?
4. A(n)\_\_\_\_\_loop is a condition-controlled loop where one specific value is required to terminate the loop.

## Computing Sums and Averages Using a **while** Loop

<b>Topic Tip</b>	Note that sentinels are sometimes called flags or flag values. For more information, see: <a href="http://en.wikipedia.org/wiki/Sentinel_value">http://en.wikipedia.org/wiki/Sentinel_value</a> .
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## The **for** Statement

<b>Topic Tip</b>	The Programming Note on page 242 discusses whether a programmer should use a <b>for</b> loop or a <b>while</b> loop.
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<b>Topic Tip</b>	Remember that there are different styles of writing braces in C programs. Stress that which style is chosen is not that important, as long as the style is consistent throughout a program (or group of programs). For more information, see the Programming Note on page 244.
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## Quick Quiz 2

1. In computer programming, data values used to signal either the start or end of a data series are called\_\_\_\_\_.

2. On IBM-compatible computers, the EOF mark is generated whenever the \_\_\_\_\_ keys are pressed simultaneously.
3. How does a `break` statement work?
4. What happens if you omit the tested expression in a `for` loop?

## The `do-while` Statement

### Quick Quiz 3

1. What is a nested loop?
2. The second loop of a nested loop is called the \_\_\_\_\_ loop.
3. A(n) \_\_\_\_\_ statement always creates a posttest loop.
4. What type of application is ideally suited for a posttest loop?

### Additional Resources

1. C Tutorial: Looping:  
<https://www.guru99.com/c-loop-statement.html>
2. While Loop:  
[http://en.wikipedia.org/wiki/While\\_loop](http://en.wikipedia.org/wiki/While_loop)
3. For Loop:  
[http://en.wikipedia.org/wiki/For\\_loop](http://en.wikipedia.org/wiki/For_loop)
4. Do While Loop:  
[http://en.wikipedia.org/wiki/Do\\_while\\_loop](http://en.wikipedia.org/wiki/Do_while_loop)
5. How C Programming Works: Branching and Looping:  
<http://computer.howstuffworks.com/c8.htm>

### Key Terms

- Lists in C, where commas are required to separate individual expressions in the list, are referred to as **comma-separated** 逗号分隔 lists.
- In a **condition-controlled loop** 条件控制循环, the tested condition does not depend on a count being achieved, but rather on a specific value being encountered.

- In a **counter-controlled loop**计数控制循环, which is also known as a **fixed-count loop**固定计数循环, the condition is used to keep track of the number of repetitions that have occurred.
- Pretest loops are also referred to as **entrance-controlled loops**入口控制循环.
- The second loop of a nested loop is called the **inner loop**内循环.
- The **input data validation application**输入数据验证应用 is ideally suited for a posttest loop.
- Each repetition in a loop is referred to as an **iteration**迭代 or **pass through the loop**.
- A section of code that is repeated is referred to as 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.
- **Nested loops**嵌套循环 have a loop contained within another loop.
- A **null statement**空语句 is a do-nothing statement that is used where a statement is syntactically required, but no action is called for.
- The first loop of a nested loop is called the **outer loop**外循环.
- A loop that evaluates a condition at the end of the repeating section of code is referred to as a **posttest loop**后测试循环 or **exit-controlled loop**出口控制循环.
- This type of loop is referred to as a **pretest loop**前测试循环 because the condition is tested before any statements within the loop are executed.
- In computer programming, data values used to signal either the start or end of a data series are called **sentinels**岗哨值.