Chapter 9 - Character Strings

At a Glance

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Chapter Notes

Overview

In Chapter 9, you learn how to create, use and manipulate strings in C. You learn how to use several useful library functions for string and character manipulation. You also learn how to use strings for input data validation. An optional section covers how to format strings using `printf()`, `scanf()`, `sprintf()` and `sscanf()`. The case study shows how to process strings character-by-character to be able to count characters and words in a string. Finally, several common programming and compiler errors are reviewed.

Objectives

- String fundamentals
- Library functions
- Input data validation
- Formatting strings (optional)
- Case study: Character and word counting
- Common programming and compiler errors

String Fundamentals

Topic Tip	Some languages have a special `String` or `string` data type. You can find more information about strings in several languages in: **http://en.wikipedia.org/wiki/String_%28computer_science%29**.

Topic Tip	Refer to the Programming Note on page 449 to help explain the difference between `'\n'` and `"\n"`.

Topic Tip	You may be wondering why the `char` data type uses integer values. The Programming Note on page 451 provides a good explanation on this issue.

Quick Quiz 1

1. What is a string literal?
2. What other terms are used to refer to a string literal?
3. The NULL character is _____.
4. The newline character is_____.

Library Functions

Topic Tip	You learned how to initialize strings in Chapter 8, but it is possible you may have forgotten by now. The Programming Note on page 456 summarizes the issues involved in initializing strings.

Quick Quiz 2

1 How does `strcpy(str1, str2)` work?

2 How does `int toupper(char)` work?

3 `isalpha()` is included in the_____header file.

4 `atoi()` is included in the_____header file.

Formatting Strings

Topic Tip	A very easy way to convert from character data to numerical data in C is to correctly use the `sscanf()` function. The Programming Note on page 472 explains how to use `sscanf()` to extract the month, day, and year from the string 07/01/94.

Quick Quiz 3

1. What is the difference between the angle brackets and the double quotes in a `#include` statement?

2. The statement `printf("|%25s|","Have a Happy Day");` displays the message `Have a Happy Day`,_____-justified, in a field of 25 characters.

3. What is the result of using the statement `printf("|%-25.12s|","Have a Happy Day");`?

4. True/False: When you use any of the four functions, `printf()`, `scanf()`, `sprintf()`, or `sscanf()`, the control string containing the conversion control sequences need not be explicitly contained within the function.

Additional Resources

1. String (computer science):
   http://en.wikipedia.org/wiki/String_%28computer_science%29

2. C Tutorial : Strings:
   https://www.cprogramming.com/tutorial/c/lesson9.html

3. Secure Coding in C and C++: Strings and Buffer Overflows:
   https://www.informit.com/articles/article.aspx?p=2036582&seqNum=2

4. How C Programming Works: Strings:
   http://computer.howstuffworks.com/c35.htm

Key Terms

- A string literal is also referred to as a **string constant** and **string value**, and more conventionally as a **string**.

- A **string literal** is any sequence of characters enclosed in double quotes.