

Chapter 3 - Processing and Interactive Input

At a Glance

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Chapter Notes

Overview

Chapter 3 provides an introduction to processing and interactive input in C. You learn how assignment statements work and how to use mathematical library functions. You learn to use the `scanf()` function for interactive input, and how to accomplish complex formatted output. In this chapter, you also learn how to create and use symbolic constants. The chapter case study has you practice creating a program with interactive input. Finally, the common programming and compiler errors related to this chapter are reviewed.

Objectives

- Assignment
- Mathematical library functions
- Interactive input
- Formatted output

- Symbolic constants
- Case study: Interactive input
- Common programming and compiler errors

Topic Tips

Assignment

Topic Tip	Explore the meaning of the terms <i>lvalue</i> and <i>rvalue</i> , as described in the Programming Note on page 107.
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Mathematical Library Functions

Topic Tip	Besides <code>math.h</code> , ANSI C provides other standard library header files. For more information, see http://en.wikipedia.org/wiki/C_standard_library .
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Quick Quiz 1

1. In C, the _____ symbol is called the assignment operator.
2. The automatic conversion across an assignment operator is referred to as a(n) _____ type conversion.
3. What is a garbage value?
4. What is the prefix increment operator?

Interactive Input

Topic Tip	Note that there are two other solutions for the problem described above: 1) Replace the last <code>scanf()</code> call in Program 3.11 with the statement <code>scanf("\n%c", &skey);</code> , 2) Place the statement <code>fflush(stdin);</code> after accepting a one-character input. The <code>fflush()</code> function flushes the input buffer of any remaining characters.
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Quick Quiz 2

1. A(n) _____ is a message that tells the person at the screen what should be typed.
2. On most computer systems, characters read by the keyboard are stored in a temporary holding area called a(n) _____ immediately after they are pressed.
3. What are robust programs?
4. What is user-input validation?

Formatted Output

Topic Tip	The <code>#define</code> preprocessor directive can also be used to create useful macros. For more information, see: http://en.wikipedia.org/wiki/C_preprocessor .
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Quick Quiz 3

1. The format of numbers displayed by `printf()` can be controlled by _____ included as part of each conversion control sequence.
2. What are magic numbers?
3. `#define` statements are also called _____ statements.
4. What does the term “literal data” mean?

Additional Resources

1. `math.h`:
www.cplusplus.com/ref/cmath/
2. `scanf`:
www.cplusplus.com/ref/cstdio/scanf.html
3. C Tutorial - Lesson 3: Constants:
<http://cplus.about.com/od/beginnerctutorial1/l/aa031002a.htm>
4. C Macros:
http://en.wikipedia.org/wiki/C_preprocessor

Key Terms

抽象数据类型	➤ User-defined data types are formally referred to as abstract data types .
赋值运算符	➤ In C, the = symbol is called the assignment operator .
缓存	➤ On most computer systems, characters read by the keyboard are stored in a temporary holding area called a buffer immediately after they are pressed.
强制转换	➤ The operator used to force the conversion of a value to another type is the cast operator.
计数语句	➤ A special type of assignment statement that is very similar to the accumulating statement is the counting statement .
等价	➤ #define statements are also called equivalence statements.
域宽说明符	➤ The format of numbers displayed by printf() can be controlled by field width specifiers included as part of each conversion control sequence.
垃圾值	➤ A previously stored number, if it has not been initialized to a specific and known value, is frequently referred to as a garbage value .
隐形类型转换	➤ The automatic conversion across an assignment operator is referred to as an implicit type conversion .
增量运算符	➤ Using the increment operator , ++, the expression variable = variable + 1 can be replaced by either the expression variable++ or ++variable.
字面数据	➤ Literal data refers to any data within a program that explicitly identifies itself.
左值	➤ The term lvalue refers to any quantity that is valid on the left side of an assignment operator.
魔幻数	➤ Literal values that appear many times in the same program are referred to by programmers as magic numbers .
后缀增量运算符	➤ When the -- operator appears after a variable, it is called a postfix decrement operator .
	➤ When the ++ operator appears after a variable, it is called a postfix increment operator .
前缀增量运算符	➤ When the -- operator appears before a variable, it is called a prefix decrement operator .
	➤ When the ++ operator appears before a variable, it is called a prefix increment operator .
过程式抽象	➤ The assigning of a name to a function or procedure in such a way that the function is invoked by simply using a name with appropriate arguments is formally referred to as procedural abstraction .
提示	➤ A prompt is a message that tells the person at the screen what should be typed.
健壮	➤ Programs that detect and respond effectively to unexpected user input are formally referred to as robust programs and informally as “bullet-proof” programs.
右值	➤ An rvalue refers to any quantity that is valid on the right side of an assignment operator.
符号常量, 命名常量	➤ Other terms for symbolic names are symbolic constants and named constants .
	➤ C provides the programmer with the capability to define a value (that will be used throughout a program) once by equating the number to a symbolic name .
符号名	➤ The basic approach to handling invalid data input is referred to as user-input validation , which means validating the entered data either during or immediately after the data have been entered, and then providing the user with a way of reentering any invalid data.
用户输入验证	
验证	➤ The term validate means checking that the entered value matches the data type of the variable that the value is assigned to within a scanf() function call, and that the value is within an acceptable range of values appropriate to the application.