

SECOND EDITION

THE

C



PROGRAMMING
LANGUAGE

BRIAN W. KERNIGHAN
DENNIS M. RITCHIE

SOFTWARE SERIES

THE
C
PROGRAMMING
LANGUAGE

Second Edition

C Programming Language

Table of Contents

Cover

Half Title

Title Page

Copyright Page

Contents

Preface

Preface to the First Edition

Introduction

Chapter 1. A Tutorial Introduction

1.1 Getting Started

1.2 Variables and Arithmetic Expressions

1.3 The For Statement

1.4 Symbolic Constants

1.5 Character Input and Output

1.6 Arrays

1.7 Functions

1.8 Arguments Call by Value

1.9 Character Arrays

1.10 External Variables and Scope

Chapter 2. Types, Operators, and Expressions

Table of Contents

- 2.1 Variable Names
- 2.2 Data Types and Sizes
- 2.3 Constants
- 2.4 Declarations
- 2.5 Arithmetic Operators
- 2.6 Relational and Logical Operators
- 2.7 Type Conversions
- 2.8 Increment and Decrement Operators
- 2.9 Bitwise Operators
- 2.10 Assignment Operators and Expressions
- 2.11 Conditional Expressions
- 2.12 Precedence and Order of Evaluation

Chapter 3. Control Flow

- 3.1 Statements and Blocks
- 3.2 If-Else
- 3.3 Else-If
- 3.4 Switch
- 3.5 LoopsWhile and For
- 3.6 LoopsDo-while
- 3.7 Break and Continue
- 3.8 Goto and Labels

Chapter 4. Functions and Program Structure

- 4.1 Basics of Functions
- 4.2 Functions Returning Non-integers
- 4.3 External Variables

Table of Contents

- 4.4 Scope Rules
- 4.5 Header Files
- 4.6 Static Variables
- 4.7 Register Variables
- 4.8 Block Structure
- 4.9 Initialization
- 4.10 Recursion
- 4.11 The C Preprocessor

Chapter 5. Pointers and Arrays

- 5.1 Pointers and Addresses
- 5.2 Pointers and Function Arguments
- 5.3 Pointers and Arrays
- 5.4 Address Arithmetic
- 5.5 Character Pointers and Functions
- 5.6 Pointer Arrays; Pointers to Pointers
- 5.7 Multi-dimensional Arrays
- 5.8 Initialization of Pointer Arrays
- 5.9 Pointers vs. Multi-dimensional Arrays
- 5.10 Command-line Arguments
- 5.11 Pointers to Functions
- 5.12 Complicated Declarations

Chapter 6. Structures

- 6.1 Basics of Structures
- 6.2 Structures and Functions
- 6.3 Arrays of Structures

Table of Contents

6.4 Pointers to Structures

6.5 Self-referential Structures

6.6 Table Lookup

6.7 Typedef

6.8 Unions

6.9 Bit-fields

Chapter 7. Input and Output

7.1 Standard Input and Output

7.2 Formatted OutputPrintf

7.3 Variable-length Argument Lists

7.4 Formatted InputScanf

7.5 File Access

7.6 Error HandlingStderr and Exit

7.7 Line Input and Output

7.8 Miscellaneous Functions

Chapter 8. The UNIX System Interface

8.1 File Descriptors

8.2 Low Level I/ORead and Write

8.3 Open, Creat, Close, Unlink

8.4 Random AccessLseek

8.5 ExampleAn Implementation of Fopen and Getc

8.6 ExampleListing Directories

8.7 ExampleA Storage Allocator

Appendix A. Reference Manual

A1 Introduction

Table of Contents

A2 Lexical Conventions

A3 Syntax Notation

A4 Meaning of Identifiers

A5 Objects and Lvalues

A6 Conversions

A7 Expressions

A8 Declarations

A9 Statements

A10 External Declarations

A11 Scope and Linkage

A12 Preprocessing

A13 Grammar

Appendix B. Standard Library

B1 Input and Output: <stdio.h>

B2 Character Class Tests: <ctype.h>

B3 String Functions: <string.h>

B4 Mathematical Functions: <math.h>

B5 Utility Functions: <stdlib.h>

B6 Diagnostics: <assert.h>

B7 Variable Argument Lists: <stdarg.h>

B8 Non-local Jumps: <setjmp.h>

B9 Signals: <signal.h>

B10 Date and Time Functions: <time.h>

B11 Implementation-defined Limits: <limits.h> and <float.h>

Appendix C. Summary of Changes

Table of Contents

Index