C PROGRAMMING: JUST THE FAQS

Paul S. R. Chisholm David Hanley Michael Jones Michael Lindner Lloyd Work



201 West 103rd Street Indianapolis, Indiana 46290

Copyright © 1995 by Sams Publishing

FIRST EDITION

All rights reserved. No part of this book shall be reproduced, stored in a retrieval system, or transmitted by any means, electronic, mechanical, photocopying, recording, or otherwise, without written permission from the publisher. No patent liability is assumed with respect to the use of the information contained herein. Although every precaution has been taken in the preparation of this book, the publisher and author assume no responsibility for errors or omissions. Neither is any liability assumed for damages resulting from the use of the information contained herein. For information, address Sams Publishing, 201 W. 103rd St., Indianapolis, IN 46290.

International Standard Book Number: 0-672-30561-5

Library of Congress Catalog Card Number: 94-66635

98 97 96 95 4 3 2

Interpretation of the printing code: the rightmost double-digit number is the year of the book's printing; the rightmost single-digit, the number of the book's printing. For example, a printing code of 95-1 shows that the first printing of the book occurred in 1995.

Composed in AGaramond and MCPdigital by Macmillan Computer Publishing

Printed in the United States of America

Trademarks

All terms mentioned in this book that are known to be trademarks or service marks have been appropriately capitalized. Sams Publishing cannot attest to the accuracy of this information. Use of a term in this book should not be regarded as affecting the validity of any trademark or service mark.

Publisher
Richard K. Swadley

Acquisitions Manager Greg Wiegand

Development Manager

Dean Miller

Managing Editor

Cindy Morrow

Acquisitions Editor

Chris Denny

Development Editor

Brad Jones

Production Editor

Cheri Clark

Editorial Coordinator

Bill Whitmer

Editorial Assistants

Carol Ackerman

Sharon Cox

Lynette Quinn

Technical Reviewer Greg Guntle Marketing Manager Gregg Bushyeager

Assistant Marketing Manager

Michelle Milner

Cover Designer

Book Designer

Alyssa Yesh

Vice President of Manufacturing and Production *Jeff Valler*

Manufacturing Coordinator

Paul Gilchrist

Imprint Manager Kelly Dobbs

Team Supervisor Katy Bodenmiller

Support Services Manager Juli Cook

Support Services Supervisor Mary Beth Wakefield

Production Analysts

Angela Bannan Dennis Clay Hager Bobbi Satterfield Page Layout
Carol Bowers
Charlotte Clapp
Mary Ann Cosby
Aleata Howard
Louisa Klucznik
Casey Price
Jill Tompkins
Mark Walche
Dennis Wesner

Proofreading Georgiana Briggs Mona Brown Michael Brumitt Donna Harbin Michael Henry

Kevin Laseau Donna Martin

Indexer

Cheryl Dietsch

Greg Eldred

Overview

	Introduction	xxix
I	The C Language	
II	Variables and Data Storage	
Ш	Sorting and Searching Data	
IV	Data Files	
V	Working with the Preprocessor	
•		
VI	Working with Strings	
VII	Pointers and Memory Allocation	
VIII	Functions	159
IX	Arrays	175
X	Bits and Bytes	
XI	Debugging	197
XII	Standard Library Functions	215
XIII	Times and Dates	243
XIV	System Calls	255
XV	Portability	275
XVI	ANSI/ISO Standards	
XVII	User Interface—Screen and Keyboard	293
VIII	Writing and Compiling Your Programs	
XIX	Programming Style and Standards	331
XX	Miscellaneous	349
XXI	Windows	385
	Index	415

Contents

Introductionx	xix
The C Language	. 1
I.1: What is a local block?	1
Answer:	
Cross Reference:	
I.2: Should variables be stored in local blocks?	
Answer:	
Cross Reference:	
I.3: When is a <i>switch</i> statement better than multiple <i>if</i> statements?	
Answer:	
Cross Reference:	
I.4: Is a default case necessary in a switch statement?	
Answer:	
Cross Reference:	
I.5: Can the last case of a <i>switch</i> statement skip including the <i>break</i> ?	
Answer:	
Cross Reference:	
I.6: Other than in a <i>for</i> statement, when is the comma	
operator used?	6
Answer:	
Cross Reference:	
I.7: How can you tell whether a loop ended prematurely?	
Answer:	
Cross Reference:	
I.8: What is the difference between <i>goto</i> and <i>longjmp()</i> and <i>setjmp()</i> ?	
Answer:	
Cross Reference:	
I.9: What is an Ivalue?	
Answer:	
Cross Reference:	11
I.10: Can an array be an Ivalue?	
Answer:	
Cross Reference:	
I.11: What is an rvalue?	
Answer:	
Cross Reference:	
I.12: Is left-to-right or right-to-left order guaranteed for	
operator precedence?	12
Answer:	
Cross Reference:	

	I.13: What is the difference between ++var and var++?	. 13
	Answer:	. 13
	Cross Reference:	. 14
	I.14: What does the modulus operator do?	. 14
	Answer:	. 14
	Cross Reference:	. 14
II	Variables and Data Storage	.15
	II.1: Where in memory are my variables stored?	. 16
	Answer:	
	Cross Reference:	
	II.2: Do variables need to be initialized?	
	Answer:	
	Cross Reference:	
	II.3: What is page thrashing?	
	Answer:	
	Cross Reference:	
	II.4: What is a <i>const</i> pointer?	
	Answer:	
	Cross Reference:	
	II.5: When should the register modifier be used? Does it really help?	
	Answer:	
	Cross Reference:	
	II.6: When should the <i>volatile</i> modifier be used?	
	Answer:	
	Cross Reference:	
	II.7: Can a variable be both <i>const</i> and <i>volatile</i> ?	
	Answer:	
	Cross Reference:	
	II.8: When should the <i>const</i> modifier be used?	
	Answer:	
	Cross Reference:	
	II.9: How reliable are floating-point comparisons?	
	Answer:	
	Cross Reference:	
	II.10: How can you determine the maximum value that a numeric	. 23
	variable can hold?	99
	Answer:	
	Cross Reference:	. 24
	II.11: Are there any problems with performing mathematical operations on	9.4
	different variable types?	
	Answer:	
	Cross Reference:	
	II.12: What is operator promotion?	
	Answer:	
	Cross Reference:	. 26

	II.13: When should a type cast be used?	26
	Answer:	26
	Cross Reference:	26
	II.14: When should a type cast not be used?	27
	Answer:	27
	Cross Reference:	27
	II.15: Is it acceptable to declare/define a variable in a C header?	27
	Answer:	27
	Cross Reference:	27
	II.16: What is the difference between declaring a variable and defining a	
	variable?	28
	Answer:	28
	Cross Reference:	
	II.17: Can static variables be declared in a header file?	28
	Answer:	28
	Cross Reference:	28
	II.18: What is the benefit of using const for declaring constants?	29
	Answer:	29
	Cross Reference:	29
III	Sorting and Searching Data	31
	Sorting	
	Searching	
	Performance of Sorting or Searching	
	Some Code to Get Started With	
	III.1: What is the easiest sorting method to use?	
	Answer:	
	Cross Reference:	
	III.2: What is the quickest sorting method to use?	
	Answer:	
	Cross Reference:	
	III.3: How can I sort things that are too large to bring into memory?	
	Answer:	
	Cross Reference:	
	III.4: What is the easiest searching method to use?	
	Answer:	
	Cross Reference:	50
	III.5: What is the quickest searching method to use?	
	Answer:	
	Cross Reference:	
	III.6: What is hashing?	
	Answer:	
	Cross Reference:	
	III.7: How can I sort a linked list?	
	Answer:	
	Cross Reference:	57

	III.8: How can I search for data in a linked list?	57
	Answer:	. 57
	Cross Reference:	. 57
	Sample Code	. 57
IV	Data Files	. 63
	IV.1: If <i>errno</i> contains a nonzero number, is there an error?	63
	Answer:	
	Cross Reference:	
	IV.2: What is a stream?	
	Answer:	
	Cross Reference:	
	IV.3: How do you redirect a standard stream?	
	Answer:	
	Cross Reference:	
	IV.4: How can you restore a redirected standard stream?	
	Answer:	
	Cross Reference:	
	IV.5: Can <i>stdout</i> be forced to print somewhere other than the screen?	
	Answer:	
	Cross Reference:	
	IV.6: What is the difference between text and binary modes?	
	Answer:	
	Cross Reference:	. 67
	IV.7: How do you determine whether to use a stream function or a	
	low-level function?	. 68
	Answer:	. 68
	Cross Reference:	
	IV.8: How do you list files in a directory?	
	Answer:	. 68
	Cross Reference:	
	IV.9: How do you list a file's date and time?	
	Answer:	
	Cross Reference:	
	IV.10: How do you sort filenames in a directory?	
	Answer:	
	Cross Reference:	
	IV.11: How do you determine a file's attributes?	
	Answer:	
	Cross Reference:	
	IV.12: How do you view the <i>PATH</i> ?	
	Answer:	
	Cross Reference:	. 77
	IV.13: How can I open a file so that other programs can update it at	
	the same time?	
	Answer:	
	Cross Reference	79

	IV.14: How can I make sure that my program is the only one	
	accessing a file?	
	Answer:	79
	Cross Reference:	79
	IV.15: How can I prevent another program from modifying part of a	
	file that I am modifying?	
	Answer:	79
	Cross Reference:	
	IV.16: How can I have more than 20 files open at once?	81
	Answer:	81
	Cross Reference:	
	IV.17: How can I avoid the Abort, Retry, Fail messages?	
	Answer:	81
	Cross Reference:	
	IV.18: How can I read and write comma-delimited text?	83
	Answer:	
	Cross Reference:	85
V	Working with the Preprocessor	87
	V.1: What is a macro, and how do you use it?	88
	Answer:	
	Cross Reference:	
	V.2: What will the preprocessor do for a program?	
	Answer:	
	Cross Reference:	
	V.3: How can you avoid including a header more than once?	92
	Answer:	
	Cross Reference:	
	V.4: Can a file other than a .h file be included with #include?	93
	Answer:	93
	Cross Reference:	93
	V.5: What is the benefit of using #define to declare a constant?	93
	Answer:	
	Cross Reference:	94
	V.6: What is the benefit of using <i>enum</i> to declare a constant?	94
	Answer:	
	Cross Reference:	94
	V.7: What is the benefit of using an <i>enum</i> rather than a #define constant?	95
	Answer:	95
	Cross Reference:	96
	V.8: How are portions of a program disabled in demo versions?	97
	Answer:	97
	Cross Reference:	
	V.9: When should you use a macro rather than a function?	
	Answer:	97
	Cross Reference	

V.10: Is it better to use a macro or a function?	98
Answer:	98
Cross Reference:	98
V.11: What is the best way to comment out a section of code that	
contains comments?	98
Answer:	
Cross Reference:	
V.12: What is the difference between #include <file2> and #include "file"?</file2>	
Answer:	
Cross Reference:	
V.13: Can you define which header file to include at	00
compile time?	100
Answer:	
Cross Reference:	
V.14: Can include files be nested?	
Answer:	
Cross Reference:	
V.15: How many levels deep can include files be nested?	
Answer:	
Cross Reference:	
V.16: What is the concatenation operator?	
•	
Answer:	
V.17: How can type-insensitive macros be created?	
Answer:	
Answer: Cross Reference:	
V.18: What are the standard predefined macros?	
Answer:	
Cross Reference:	103
V.19: How can a program be made to print the line number where an	101
error occurs?	
Answer:	
Cross Reference:	104
V.20: How can a program be made to print the name of a source file	105
where an error occurs?	
Answer:	
Cross Reference:	105
V.21: How can you tell whether a program was compiled using	
C versus C++?	
Answer:	
Cross Reference:	
V.22: What is a pragma?	
Answer:	
Cross Reference:	
V.23: What is #line used for?	
Answer:	
Cross Reference:	100

Cross Reference: V.25: How can I print the name of the source file in a program? Answer: Cross Reference: V.26: What is theLINE preprocessor command? Answer: Cross Reference: V.27: How can I print the current line number of the source file in a program? Answer: Cross Reference: V.28: What are theDATE andTIME preprocessor commands? Answer: Cross Reference: V.29: How can I print the compile date and time in a program? Answer: Cross Reference: V.30: How can I print the compile date and time in a program? Answer: Cross Reference: V.31: How can you be sure that a program follows the ANSI C standard? . I Answer: Cross Reference: V.31: How do you override a defined macro? Answer: Cross Reference: V.32: How can you check to see whether a symbol is defined? Answer: Cross Reference: V.33: What common macros are available? Answer: Cross Reference: V.33: What common macros are available? Answer: Cross Reference: V.31: What is the difference between a string copy (strcpp) and a memory copy (memopy)? When should each be used? Answer: Cross Reference: VI.1: What is the difference between a string copy (strcpp) and a memory copy (memopy)? When should each be used? Answer: Cross Reference: VI.2: How can I remove the trailing spaces from a string? Answer: Cross Reference: VI.3: How can I remove the leading spaces from a string? Answer: Cross Reference: VI.4: How can I right-justify a string? Answer: Cross Reference: VI.4: How can I right-justify a string?		V.24: What is theFILE preprocessor command?	108
V.25: How can I print the name of the source file in a program?		Answer:	
Answer: Cross Reference: V.26: What is theLINE preprocessor command? Answer: Cross Reference: V.27: How can I print the current line number of the source file in a program? Answer: Cross Reference: V.28: What are theDATE andTIME preprocessor commands? Answer: Cross Reference: V.29: How can I print the compile date and time in a program? Answer: Cross Reference: V.30: How can you be sure that a program follows the ANSI C standard? Answer: Cross Reference: V.31: How do you override a defined macro? Answer: Cross Reference: V.32: How can you check to see whether a symbol is defined? Answer: Cross Reference: V.33: What common macros are available? Answer: Cross Reference: V.33: What common macros are available? Answer: Cross Reference: V.31: Working with Strings VI.1: What is the difference between a string copy (strcpy) and a memory copy (memcpy)? When should each be used? Answer: Cross Reference: VI.2: How can I remove the trailing spaces from a string? Answer: Cross Reference: VI.3: How can I remove the leading spaces from a string? Answer: Cross Reference: VI.3: How can I remove the leading spaces from a string? Answer: Cross Reference: VI.4: How can I right-justify a string? Answer: Cross Reference: VI.4: How can I right-justify a string?			
Cross Reference: V.26: What is theLINE preprocessor command? Answer: Cross Reference: V.27: How can I print the current line number of the source file in a program? Answer: Cross Reference: V.28: What are theDATE andTIME preprocessor commands? Answer: Cross Reference: V.29: How can I print the compile date and time in a program? Answer: Cross Reference: V.30: How can you be sure that a program follows the ANSI C standard? Answer: Cross Reference: V.31: How do you override a defined macro? Answer: Cross Reference: V.32: How can you check to see whether a symbol is defined? Answer: Cross Reference: V.33: What common macros are available? Answer: Cross Reference: V.33: What tommon macros are available? Answer: Cross Reference: V.31: Working with Strings VI.1: What is the difference between a string copy (strcpy) and a memory copy (memcpy)? When should each be used? Answer: Cross Reference: VI.2: How can I remove the trailing spaces from a string? Answer: Cross Reference: VI.3: How can I remove the leading spaces from a string? Answer: Cross Reference: VI.4: How can I right-justify a string? Answer: Cross Reference: VI.4: How can I right-justify a string?			
V.26: What is theLINE preprocessor command? Answer: Cross Reference: V.27: How can I print the current line number of the source file in a program? Answer: 1			
Answer:			
Cross Reference:			
V.27: How can I print the current line number of the source file in a program? Answer: Cross Reference: V.28: What are theDATE andTIME preprocessor commands? Answer: Cross Reference: V.29: How can I print the compile date and time in a program? Answer: Cross Reference: V.30: How can you be sure that a program follows the ANSI C standard? Answer: Cross Reference: V.31: How do you override a defined macro? Answer: Cross Reference: V.32: How can you check to see whether a symbol is defined? Answer: Cross Reference: V.33: What common macros are available? Answer: Cross Reference: VI Working with Strings VI.1: What is the difference between a string copy (strcpy) and a memory copy (memcpy)? When should each be used? Answer: Cross Reference: VI.2: How can I remove the trailing spaces from a string? Answer: Cross Reference: VI.3: How can I remove the leading spaces from a string? Answer: Cross Reference: VI.4: How can I right-justify a string? Answer: Cross Reference: VI.4: How can I right-justify a string?			
in a program?			109
Answer:			100
Cross Reference: V.28: What are theDATE andTIME preprocessor commands? Answer: Cross Reference: V.29: How can I print the compile date and time in a program? Answer: Cross Reference: V.30: How can you be sure that a program follows the ANSI C standard? I Answer: Cross Reference: V.31: How do you override a defined macro? Answer: Cross Reference: V.32: How can you check to see whether a symbol is defined? Answer: Cross Reference: V.33: What common macros are available? Answer: Cross Reference: VI.1: What is the difference between a string copy (strcpy) and a memory copy (memcpy)? When should each be used? Answer: Cross Reference: VI.2: How can I remove the trailing spaces from a string? Answer: Cross Reference: VI.3: How can I remove the leading spaces from a string? Answer: Cross Reference: VI.4: How can I right-justify a string? Answer:			
V.28: What are theDATE andTIME preprocessor commands?			
commands?			109
Answer:			
Cross Reference:			
V.29: How can I print the compile date and time in a program? Answer:			
Answer:			
Cross Reference:			
V.30: How can you be sure that a program follows the ANSI C standard?			
Answer:			
Cross Reference: 1 V.31: How do you override a defined macro? 1 Answer: 1 Cross Reference: 1 V.32: How can you check to see whether a symbol is defined? 1 Answer: 1 Cross Reference: 1 V.33: What common macros are available? 1 Answer: 1 Cross Reference: 1 VI Working with Strings 1 VI.1: What is the difference between a string copy (strcpy) and a memory copy (memcpy)? When should each be used? 1 Answer: 1 Cross Reference: 1 VI.2: How can I remove the trailing spaces from a string? 1 Answer: 1 Cross Reference: 1 VI.3: How can I remove the leading spaces from a string? 1 Answer: 1 Cross Reference: 1 VI.4: How can I right-justify a string? 1 Answer: 1 Cross Reference: 1			
V.31: How do you override a defined macro?			
Answer:			
Cross Reference:			
V.32: How can you check to see whether a symbol is defined?			
Answer:			
Cross Reference:			
V.33: What common macros are available? Answer: Cross Reference: VI Working with Strings VI.1: What is the difference between a string copy (strcpy) and a memory copy (memcpy)? When should each be used? Answer: Cross Reference: VI.2: How can I remove the trailing spaces from a string? Answer: Cross Reference: VI.3: How can I remove the leading spaces from a string? Answer: Cross Reference: 1 VI.3: How can I remove the leading spaces from a string? Answer: 1 Cross Reference: 1 VI.4: How can I right-justify a string? Answer:			
Answer:			
Cross Reference: 1 VI Working with Strings 1 VI.1: What is the difference between a string copy (strcpy) and a memory copy (memcpy)? When should each be used? 1 Answer: 1 Cross Reference: 1 VI.2: How can I remove the trailing spaces from a string? 1 Answer: 1 Cross Reference: 1 VI.3: How can I remove the leading spaces from a string? 1 Answer: 1 Cross Reference: 1 VI.4: How can I right-justify a string? 1 Answer: 1			
VI Working with Strings VI.1: What is the difference between a string copy (strcpy) and a memory copy (memcpy)? When should each be used? Answer: Cross Reference: VI.2: How can I remove the trailing spaces from a string? Answer: Cross Reference: VI.3: How can I remove the leading spaces from a string? Answer: Cross Reference: VI.4: How can I right-justify a string? Answer:			
VI.1: What is the difference between a string copy (strcpy) and a memory copy (memcpy)? When should each be used?			
memory copy (memcpy)? When should each be used? Answer: Cross Reference: VI.2: How can I remove the trailing spaces from a string? Answer: Cross Reference: VI.3: How can I remove the leading spaces from a string? Answer: Cross Reference: 1 VI.4: How can I right-justify a string? Answer:	VI	Working with Strings	115
Answer: 1 Cross Reference: 1 VI.2: How can I remove the trailing spaces from a string? 1 Answer: 1 Cross Reference: 1 VI.3: How can I remove the leading spaces from a string? 1 Answer: 1 Cross Reference: 1 VI.4: How can I right-justify a string? 1 Answer: 1		VI.1: What is the difference between a string copy (strcpy) and a	
Cross Reference: 1 VI.2: How can I remove the trailing spaces from a string? 1 Answer: 1 Cross Reference: 1 VI.3: How can I remove the leading spaces from a string? 1 Answer: 1 Cross Reference: 1 VI.4: How can I right-justify a string? 1 Answer: 1			115
VI.2: How can I remove the trailing spaces from a string?		Answer:	115
Answer:		Cross Reference:	117
Cross Reference: 1 VI.3: How can I remove the leading spaces from a string? 1 Answer: 1 Cross Reference: 1 VI.4: How can I right-justify a string? 1 Answer: 1		VI.2: How can I remove the trailing spaces from a string?	117
VI.3: How can I remove the leading spaces from a string?		Answer:	117
Answer:		Cross Reference:	118
Answer:			
VI.4: How can I right-justify a string?			
VI.4: How can I right-justify a string?		Cross Reference:	120
Answer: 1			
C1 000 1V0101000		Cross Reference:	

	VI.5: How can I pad a string to a known length?	
	Answer:	
	Cross Reference:	
	VI.6: How can I copy just a portion of a string?	
	Answer:	
	Cross Reference:	
	VI.7: How can I convert a number to a string?	
	Answer:	124
	Cross Reference:	
	VI.8: How can I convert a string to a number?	126
	Answer:	126
	Cross Reference:	
	VI.9: How do you print only part of a string?	128
	Answer:	128
	Cross Reference:	
	VI.10: How do you remove spaces from the end of a string?	129
	Answer:	
	Cross Reference:	129
	VI.11: How can you tell whether two strings are the same?	129
	Answer:	
	Cross Reference:	130
VII	Pointers and Memory Allocation	131
	VII.1: What is indirection?	
	Answer:	
	Cross Reference:	
	VII.2: How many levels of pointers can you have?	
	Answer:	
	Cross Reference:	
	VII.3: What is a null pointer?	
	Answer:	
	Cross Reference:	
	VII.4: When is a null pointer used?	
	Answer:	
	Using a Null Pointer to Stop Indirection or Recursion	
	Using a Null Pointer As an Error Value	
	Using a Null Pointer As an Error Value Using a Null Pointer As a Sentinel Value	
	Cross Reference:	
	VII.5: What is a <i>void</i> pointer?	
	Answer:	
	Cross Reference:	
	VII.6: When is a <i>void</i> pointer used?	
	Answer:	
	Cross Reference:	
		139
	VII.7: Can you subtract pointers from each other?	120
	Why would you?	
	Cross Reference:	
	V109 IVEREIGIUE	141

VII.8: When you add a value to a pointer, what is really added?	1/11
Answer:	141 141
Cross Reference:	
VII.9: Is <i>NULL</i> always defined as 0?	
Answer:	
Cross Reference:	
VII.10: Is NULL always equal to 0?	
Answer:	
Cross Reference:	
VII.11: What does it mean when a pointer is used in an <i>if</i> statement?	
Answer:	
Cross Reference:	
VII.12: Can you add pointers together? Why would you?	
Answer:	
Cross Reference	
VII.13: How do you use a pointer to a function?	
Answer:	
Cross Reference:	
VII.14: When would you use a pointer to a function?	
Answer:	
Cross Reference:	
VII.15: Can the size of an array be declared at runtime?	
Answer:	
Cross Reference:	
VII.16: Is it better to use <i>malloc()</i> or <i>calloc()</i> ?	
Answer:	
Cross Reference:	
VII.17: How do you declare an array that will hold more than	1 10
64KB of data?	150
Answer:	
Cross Reference:	
VII.18: What is the difference between <i>far</i> and <i>near</i> ?	
Answer:	
Cross Reference:	
VII.19: When should a <i>far</i> pointer be used?	
Answer:	
Cross Reference:	
VII.20: What is the stack?	
Answer:	
Cross Reference:	
VII.21: What is the heap?	
Answer:	
Cross Reference:	
VII.22: What happens if you free a pointer twice?	
Answer:	
Cross Reference:	

	VII.23: What is the difference between <i>NULL</i> and <i>NUL</i> ?	
	Answer:	
	Cross Reference:	
	VII.24: What is a "null pointer assignment" error? What are bus error	S,
	memory faults, and core dumps?	
	Answer:	
	Cross Reference:	156
	VII.25: How can you determine the size of an allocated portion of	
	memory?	
	Answer:	
	Cross Reference:	
	VII.26: How does free() know how much memory to release?	
	Answer:	
	Cross Reference:	
	VII.27: Can math operations be performed on a <i>void</i> pointer?	157
	Answer:	157
	Cross Reference:	157
	VII.28: How do you print an address?	157
	Answer:	
	Cross Reference:	158
VIII	Functions	159
	VIII.1: When should I declare a function?	159
	Answer:	
	Cross Reference:	
	VIII.2: Why should I prototype a function?	
	Answer:	
	Cross Reference:	
	VIII.3: How many parameters should a function have?	
	Answer:	
	Cross Reference:	
	VIII.4: What is a static function?	
	Answer:	
	Cross Reference:	
	VIII.5: Should a function contain a <i>return</i> statement if it does not	100
	return a value?	166
	Answer:	
	Cross Reference:	
	VIII.6: How can you pass an array to a function by value?	
	Answer:	
	Cross Reference:	169
	VIII.7: Is it possible to execute code even after the program exits the	400
	main() function?	
	Answer:	
	Cross Reference:	
	VIII.8: What does a function declared as <i>PASCAL</i> do differently?	
	Answer:	
	Cross Reference:	171

	VIII.9: Is using exit() the same as using return?	171
	Answer:	171
	Cross Reference:	
IX	Arrays	
	IX.1: Do array subscripts always start with zero?	
	Answer:	
	Cross Reference:	
	IX.2: Is it valid to address one element beyond the end of an array?	
	Answer:	
	Cross Reference:	
	IX.3: Why worry about the addresses of the elements beyond the	
	end of an array?	178
	Answer:	
	Cross Reference:	179
	IX.4: Can the <i>sizeof</i> operator be used to tell the size of an array passed	
	to a function?	179
	Answer:	179
	Cross Reference:	180
	IX.5: Is it better to use a pointer to navigate an array of values, or is it	
	better to use a subscripted array name?	181
	Answer:	
	Cross Reference:	
	IX.6: Can you assign a different address to an array tag?	
	Answer:	
	Cross Reference:	
	IX.7: What is the difference between array_name and &array_name?	
	Answer:	
	Cross Reference:	
	IX.8: Why can't constant values be used to define an array's initial size?	
	Answer:	
	Cross Reference:	
	IX.9: What is the difference between a string and an array?	
	Answer:	
	Cross Reference:	
X	Bits and Bytes	
	X.1: What is the most efficient way to store flag values?	
	Answer:	
	Cross Reference:	
	X.2: What is meant by "bit masking"?	
	Answer:	
	Cross Reference:	
	X.3: Are bit fields portable?	
	Answer:	
	Cross Reference:	194

	X.4: Is it better to bitshift a value than to multiply by 2?	194
	Answer:	
	Cross Reference:	195
	X.5: What is meant by high-order and low-order bytes?	195
	Answer:	
	Cross Reference:	195
	X.6: How are 16- and 32-bit numbers stored?	196
	Answer:	196
	Cross Reference:	196
ΧI	Debugging	197
	XI.1: My program hangs when I run it. What should I do?	
	Answer:	
	Infinite Loops	
	Taking Longer Than Expected to Execute	
	Waiting for Correct Input	
	Cross Reference:	
	XI.2: How can I detect memory leaks?	
	Answer:	
	Cross Reference:	
	XI.3: What is the best way to debug my program?	
	Answer:	
	What Tools Should Be Used to Debug a Program?	
	What Methods Can Be Used to Find Bugs in a Program?	
	How Can Bugs Be Avoided in the First Place?	208
	Cross Reference:	
	XI.4: How can I debug a TSR program?	
	Answer:	
	Cross Reference:	
	XI.5: How do you get a program to tell you when (and where) a	~ 1 ~
	condition fails?	212
	Answer:	
	Cross Reference:	
XII	Standard Library Functions	
ΛП	· · · · · · · · · · · · · · · · · · ·	213
	XII.1: Why should I use standard library functions instead of writing	910
	my own?	
	Answer:	
	Cross Reference:	216
	XII.2: What header files do I need in order to define the standard library functions I use?	010
	Answer:	
	Cross Reference:	223
	XII.3: How can I write functions that take a variable number	000
	of arguments?	
	Answer:	
	Cross Reference:	225

	XII.4: What is the difference between a free-standing and a hosted	
	environment?	. 225
	Answer:	. 225
	Cross Reference:	. 225
	XII.5: What standard functions are available to manipulate strings?	
	Answer:	
	Cross Reference:	
	XII.6: What standard functions are available to manipulate memory?	
	Answer:	
	Cross Reference:	
	XII.7: How do I determine whether a character is numeric, alphabetic,	. 201
	and so on?	232
	Answer:	
	Cross Reference:	
	XII.8: What is a "locale"?	
	Answer:	
	Cross Reference:	
	XII.9: Is there a way to jump out of a function or functions?	
	Answer:	
	Cross Reference:	
	XII.10: What's a signal? What do I use signals for?	
	e e	
	Answer:	
	XII.11: Why shouldn't I start variable names with underscores?	
	Answer:	
	Cross Reference:	
	XII.12: Why does my compiler provide two versions of <i>malloc()</i> ?	
	Answer:	
	Cross Reference:	
	XII.13: What math functions are available for integers? For floating point?	
	Answer:	
	Cross Reference:	
	XII.14: What are multibyte characters?	
	Answer:	
	Cross Reference:	
	XII.15: How can I manipulate strings of multibyte characters?	
	Answer:	
	Cross Reference:	. 241
XIII	Times and Dates	. 243
	XIII.1: How can I store a date in a single number? Are there any	
	standards for this?	. 243
	Answer:	
	Cross Reference:	. 247
	XIII.2: How can I store time as a single integer? Are there any standards	
	for this?	. 248
	Answer:	
	Cross Reference:	. 251

	XIII.3: Why are so many different time standards defined?	251
	Answer:	251
	Cross Reference:	251
	XIII.4: What is the best way to store the date?	252
	Answer:	252
	Cross Reference:	252
	XIII.5: What is the best way to store the time?	252
	Answer:	252
	Cross Reference:	253
XIV	System Calls	255
	XIV.1: How can environment variable values be retrieved?	256
	Answer:	
	Cross Reference:	
	XIV.2: How can I call DOS functions from my program?	
	Answer:	
	Cross Reference:	
	XIV.3: How can I call BIOS functions from my program?	
	Answer:	
	Cross Reference:	
	XIV.4: How can I access important DOS memory locations from my	
	program?	260
	Answer:	
	Cross Reference:	
	XIV.5: What is BIOS?	262
	Answer:	262
	Cross Reference:	262
	XIV.6: What are interrupts?	263
	Answer:	263
	Cross Reference:	264
	XIV.7: Which method is better, ANSI functions or BIOS functions?	264
	Answer:	
	Cross Reference:	265
	XIV.8: Can you change to a VGA graphics mode using the BIOS?	265
	Answer:	265
	Cross Reference:	269
	XIV.9: Does operator precedence always work (left to right, right to left)?.	269
	Answer:	269
	Cross Reference:	271
	XIV.10: Should a variable's type be declared within the header of a	
	function or immediately following? Why?	271
	Answer:	
	Cross Reference:	271
	XIV.11: Should programs always include a prototype for main()?	
	Answer:	
	Cross Rafaranca	971

	XIV.12: Should main() always return a value?	272
	Answer:	
	Cross Reference:	272
	XIV.13: Can I control the mouse using the BIOS?	272
	Answer:	272
	Cross Reference:	273
XV	Portability	275
	XV.1: Should C++ additions to a compiler be used in a C program?	277
	Answer:	
	Cross Reference:	
	XV.2: What is the difference between C++ and C?	277
	Answer:	277
	Cross Reference:	
	XV.3: Is it valid to use //for comments in a C program?	279
	Answer:	
	Cross Reference:	
	XV.4: How big is a char? A short? An int? A long?	279
	Answer:	279
	Cross Reference:	280
	XV.5: What's the difference between big-endian and	
	little-endian machines?	280
	Answer:	280
	Cross Reference:	281
XVI	ANSI/ISO Standards	283
	XVI.1: Does operator precedence always work?	284
	Answer:	284
	Cross Reference:	287
	XVI.2: Should function arguments' types be declared in the argument	
	list of a function or immediately following?	288
	Answer:	
	Cross Reference:	
	XVI.3: Should programs include a prototype for main()?	
	Answer:	
	Cross Reference:	
	XVI.4: Should main() always return a value?	
	Answer:	
	Cross Reference:	
XVII	User Interface—Screen and Keyboard	
	XVII.1: Why don't I see my screen output until the program ends?	293
	Answer:	293
	Cross Reference:	
	XVII.2: How do I position the cursor on the screen?	294
	Answer:	294
	Cross Reference:	295

XVII.3: What is the easiest way to write data to the screen?	295
Answer:	
Cross Reference:	296
XVII.4: What is the fastest way to write text to the screen?	296
Answer:	296
Choosing Print Functions with a Lower Overhead	297
Using a Package or Library with Faster Print Features	297
Bypassing the Operating System and Writing Directly to the Screen	
Cross Reference:	
XVII.5: How can I prevent the user from breaking my program with	
Ctrl-Break?	300
Answer:	300
Cross Reference:	301
XVII.6: How can you get data of only a certain type, for example, only	
characters?	302
Answer:	
Cross Reference:	302
XVII.7: Why shouldn't scanf be used to accept data?	302
Answer:	
Cross Reference:	
XVII.8: How do I use function keys and arrow keys in my programs?	304
Answer:	
Cross Reference:	305
XVII.9: How do I prevent the user from typing too many characters in	
a field?	305
Answer:	305
Cross Reference:	307
XVII.10: How do you zero-pad a number?	307
Answer:	307
Cross Reference:	307
XVII.11: How do you print a dollars-and-cents value?	307
Answer:	307
Cross Reference:	309
XVII.12: How do I print a number in scientific notation?	310
Answer:	310
Cross Reference:	310
XVII.13: What is the ANSI driver?	310
Answer:	310
Cross Reference:	311
XVII.14: How do you clear the screen with the ANSI driver?	
Answer:	311
Cross Reference:	311
XVII.15: How do you save the cursor's position with the ANSI driver?	311
Answer:	
Cross Reference:	

Answer: Cross Reference: XVII.17: How do you change the screen color with the ANSI driver? Answer: Cross Reference: XVII.18: How do you write text in color with the ANSI driver? Answer: Cross Reference: XVII.19: How do I move the cursor with the ANSI driver? Answer: Cross Reference: XVIII Writing and Compiling Your Programs XVIII.1: Should my program be written in one source file or several source files? Answer: Cross Reference: XVIII.2: What are the differences between the memory models? Answer: Cross Reference: XVIII.3: What are the most commonly used memory models? Answer: Cross Reference: XVIII.4: Which memory model should be used? Answer: Cross Reference: XVIII.5: How do you create a .COM file? Answer: Cross Reference: XVIII.6: What is the benefit of a .COM file over an .EXE file? Answer: Cross Reference: XVIII.7: Are all the functions in a library added to an .EXE file when the library is linked to the objects? Answer: Cross Reference: XVIII.8: Can multiple library functions be included in the same source file? Answer: Cross Reference: XVIII.9: Why should I create a library? Answer: Cross Reference: XVIII.10: My program has several files in it. How do I keep them all straight? Answer:			
Cross Reference: XVII.17: How do you change the screen color with the ANSI driver? Answer: Cross Reference: XVII.18: How do you write text in color with the ANSI driver? Answer: Cross Reference: XVII.19: How do I move the cursor with the ANSI driver? Answer: Cross Reference: XVIII.9: How do I move the cursor with the ANSI driver? Answer: Cross Reference: XVIII.1: Should my programs XVIII.1: Should my program be written in one source file or several source files? Answer: Cross Reference: XVIII.2: What are the differences between the memory models? Answer: Cross Reference: XVIII.3: What are the most commonly used memory models? Answer: Cross Reference: XVIII.4: Which memory model should be used? Answer: Cross Reference: XVIII.5: How do you create a .COM file? Answer: Cross Reference: XVIII.6: What is the benefit of a .COM file over an .EXE file? Answer: Cross Reference: XVIII.7: Are all the functions in a library added to an .EXE file when the library is linked to the objects? Answer: Cross Reference: XVIII.8: Can multiple library functions be included in the same source file? Answer: Cross Reference: XVIII.9: Why should I create a library? Answer: Cross Reference: XVIII.9: Why should I create a library? Answer: Cross Reference: XVIII.9: Why should I create a library? Answer: Cross Reference: XVIII.9: Why should I create a library? Answer: Cross Reference:		XVII.16: How do you restore the cursor's position with the ANSI driver?	
XVII.17: How do you change the screen color with the ANSI driver? Answer: Cross Reference: XVII.18: How do you write text in color with the ANSI driver? Answer: Cross Reference: XVII.19: How do I move the cursor with the ANSI driver? Answer: Cross Reference: XVIII Writing and Compiling Your Programs XVIII.1: Should my program be written in one source file or several source files? Answer: Cross Reference: XVIII.2: What are the differences between the memory models? Answer: Cross Reference: XVIII.3: What are the most commonly used memory models? Answer: Cross Reference: XVIII.4: Which memory model should be used? Answer: Cross Reference: XVIII.5: How do you create a .COM file? Answer: Cross Reference: XVIII.6: What is the benefit of a .COM file over an .EXE file? Answer: Cross Reference: XVIII.7: Are all the functions in a library added to an .EXE file when the library is linked to the objects? Answer: Cross Reference: XVIII.8: Can multiple library functions be included in the same source file? Answer: Cross Reference: XVIII.9: Why should I create a library? Answer: Cross Reference: XVIII.10: My program has several files in it. How do I keep them all straight? Answer: Cross Reference:			
Answer: Cross Reference: XVII.18: How do you write text in color with the ANSI driver?			
Cross Reference: XVII. 18: How do you write text in color with the ANSI driver? Answer: Cross Reference: XVII. 19: How do I move the cursor with the ANSI driver? Answer: Cross Reference: XVIII Writing and Compiling Your Programs XVIII. 1: Should my program be written in one source file or several source files? Answer: Cross Reference: XVIII. 2: What are the differences between the memory models? Answer: Cross Reference: XVIII. 3: What are the most commonly used memory models? Answer: Cross Reference: XVIII. 4: Which memory model should be used? Answer: Cross Reference: XVIII. 5: How do you create a .COM file? Answer: Cross Reference: XVIII. 6: What is the benefit of a .COM file over an .EXE file? Answer: Cross Reference: XVIII. 7: Are all the functions in a library added to an .EXE file when the library is linked to the objects? Answer: Cross Reference: XVIII. 8: Can multiple library functions be included in the same source file? Answer: Cross Reference: XVIII. 9: Why should I create a library? Answer: Cross Reference: XVIII. 9: Why should I create a library? Answer: Cross Reference: XVIII. 10: My program has several files in it. How do I keep them all straight? Answer:			
XVII.18: How do you write text in color with the ANSI driver?			
Answer: Cross Reference: XVII. 19: How do I move the cursor with the ANSI driver? Answer: Cross Reference: XVIII Writing and Compiling Your Programs XVIII. 1: Should my program be written in one source file or several source files? Answer: Cross Reference: XVIII. 2: What are the differences between the memory models? Answer: Cross Reference: XVIII. 3: What are the most commonly used memory models? Answer: Cross Reference: XVIII. 4: Which memory model should be used? Answer: Cross Reference: XVIII. 5: How do you create a .COM file? Answer: Cross Reference: XVIII. 6: What is the benefit of a .COM file over an .EXE file? Answer: Cross Reference: XVIII. 7: Are all the functions in a library added to an .EXE file when the library is linked to the objects? Answer: Cross Reference: XVIII. 8: Can multiple library functions be included in the same source file? Answer: Cross Reference: XVIII. 9: Why should I create a library? Answer: Cross Reference: XVIII. 9: Why should I create a library? Answer: Cross Reference: XVIII. 10: My program has several files in it. How do I keep them all straight? Answer:			
Cross Reference: XVII.19: How do I move the cursor with the ANSI driver?			
XVII.19: How do I move the cursor with the ANSI driver?			
Answer: Cross Reference: XVIII Writing and Compiling Your Programs. XVIII.1: Should my program be written in one source file or several source files? Answer: Cross Reference: XVIII.2: What are the differences between the memory models? Answer: Cross Reference: XVIII.3: What are the most commonly used memory models? Answer: Cross Reference: XVIII.4: Which memory model should be used? Answer: Cross Reference: XVIII.5: How do you create a .COM file? Answer: Cross Reference: XVIII.6: What is the benefit of a .COM file over an .EXE file? Answer: Cross Reference: XVIII.7: Are all the functions in a library added to an .EXE file when the library is linked to the objects? Answer: Cross Reference: XVIII.8: Can multiple library functions be included in the same source file? Answer: Cross Reference: XVIII.9: Why should I create a library? Answer: Cross Reference: XVIII.9: Why should I create a library? Answer: Cross Reference: XVIII.10: My program has several files in it. How do I keep them all straight? Answer:			
Cross Reference: XVIII Writing and Compiling Your Programs			
XVIII Writing and Compiling Your Programs XVIII.1: Should my program be written in one source file or several source files? Answer: Cross Reference: XVIII.2: What are the differences between the memory models? Answer: Cross Reference: XVIII.3: What are the most commonly used memory models? Answer: Cross Reference: XVIII.4: Which memory model should be used? Answer: Cross Reference: XVIII.5: How do you create a .COM file? Answer: Cross Reference: XVIII.6: What is the benefit of a .COM file over an .EXE file? Answer: Cross Reference: XVIII.7: Are all the functions in a library added to an .EXE file when the library is linked to the objects? Answer: Cross Reference: XVIII.8: Can multiple library functions be included in the same source file? Answer: Cross Reference: XVIII.9: Why should I create a library? Answer: Cross Reference: XVIII.9: Why should I create a library? Answer: Cross Reference: XVIII.10: My program has several files in it. How do I keep them all straight? Answer:			
XVIII.1: Should my program be written in one source file or several source files? Answer: Cross Reference: XVIII.2: What are the differences between the memory models? Answer: Cross Reference: XVIII.3: What are the most commonly used memory models? Answer: Cross Reference: XVIII.4: Which memory model should be used? Answer: Cross Reference: XVIII.5: How do you create a .COM file? Answer: Cross Reference: XVIII.6: What is the benefit of a .COM file over an .EXE file? Answer: Cross Reference: XVIII.7: Are all the functions in a library added to an .EXE file when the library is linked to the objects? Answer: Cross Reference: XVIII.8: Can multiple library functions be included in the same source file? Answer: Cross Reference: XVIII.9: Why should I create a library? Answer: Cross Reference: XVIII.9: My program has several files in it. How do I keep them all straight? Answer:	XVIII		
source files? Answer: Cross Reference: XVIII.2: What are the differences between the memory models? Answer: Cross Reference: XVIII.3: What are the most commonly used memory models? Answer: Cross Reference: XVIII.4: Which memory model should be used? Answer: Cross Reference: XVIII.5: How do you create a .COM file? Answer: Cross Reference: XVIII.6: What is the benefit of a .COM file over an .EXE file? Answer: Cross Reference: XVIII.7: Are all the functions in a library added to an .EXE file when the library is linked to the objects? Answer: Cross Reference: XVIII.8: Can multiple library functions be included in the same source file? Answer: Cross Reference: XVIII.9: Why should I create a library? Answer: Cross Reference: XVIII.9: My program has several files in it. How do I keep them all straight? Answer:			
Answer: Cross Reference: XVIII.2: What are the differences between the memory models? Answer: Cross Reference: XVIII.3: What are the most commonly used memory models? Answer: Cross Reference: XVIII.4: Which memory model should be used? Answer: Cross Reference: XVIII.5: How do you create a .COM file? Answer: Cross Reference: XVIII.6: What is the benefit of a .COM file over an .EXE file? Answer: Cross Reference: XVIII.7: Are all the functions in a library added to an .EXE file when the library is linked to the objects? Answer: Cross Reference: XVIII.8: Can multiple library functions be included in the same source file? Answer: Cross Reference: XVIII.9: Why should I create a library? Answer: Cross Reference: XVIII.9: Why should I create a library? Answer: Cross Reference: XVIII.10: My program has several files in it. How do I keep them all straight? Answer:			316
XVIII.2: What are the differences between the memory models?		Answer:	
XVIII.2: What are the differences between the memory models?		Cross Reference:	316
Answer: Cross Reference: XVIII.3: What are the most commonly used memory models? Answer: Cross Reference: XVIII.4: Which memory model should be used? Answer: Cross Reference: XVIII.5: How do you create a .COM file? Answer: Cross Reference: XVIII.6: What is the benefit of a .COM file over an .EXE file? Answer: Cross Reference: XVIII.7: Are all the functions in a library added to an .EXE file when the library is linked to the objects? Answer: Cross Reference: XVIII.8: Can multiple library functions be included in the same source file? Answer: Cross Reference: XVIII.9: Why should I create a library? Answer: Cross Reference: XVIII.10: My program has several files in it. How do I keep them all straight? Answer:		XVIII.2: What are the differences between the memory models?	
XVIII.3: What are the most commonly used memory models? Answer: Cross Reference: XVIII.4: Which memory model should be used? Answer: Cross Reference: XVIII.5: How do you create a .COM file? Answer: Cross Reference: XVIII.6: What is the benefit of a .COM file over an .EXE file? Answer: Cross Reference: XVIII.7: Are all the functions in a library added to an .EXE file when the library is linked to the objects? Answer: Cross Reference: XVIII.8: Can multiple library functions be included in the same source file? Answer: Cross Reference: XVIII.9: Why should I create a library? Answer: Cross Reference: XVIII.9: My program has several files in it. How do I keep them all straight? Answer:		Answer:	
Answer: Cross Reference: XVIII.4: Which memory model should be used? Answer: Cross Reference: XVIII.5: How do you create a .COM file? Answer: Cross Reference: XVIII.6: What is the benefit of a .COM file over an .EXE file? Answer: Cross Reference: XVIII.7: Are all the functions in a library added to an .EXE file when the library is linked to the objects? Answer: Cross Reference: XVIII.8: Can multiple library functions be included in the same source file? Answer: Cross Reference: XVIII.9: Why should I create a library? Answer: Cross Reference: XVIII.9: Why should I create a library? Answer: Cross Reference: XVIII.9: Why should I create a library? Answer: Cross Reference:		Cross Reference:	317
Cross Reference: XVIII.4: Which memory model should be used? Answer: Cross Reference: XVIII.5: How do you create a .COM file? Answer: Cross Reference: XVIII.6: What is the benefit of a .COM file over an .EXE file? Answer: Cross Reference: XVIII.7: Are all the functions in a library added to an .EXE file when the library is linked to the objects? Answer: Cross Reference: XVIII.8: Can multiple library functions be included in the same source file? Answer: Cross Reference: XVIII.9: Why should I create a library? Answer: Cross Reference: XVIII.10: My program has several files in it. How do I keep them all straight? Answer:		XVIII.3: What are the most commonly used memory models?	317
XVIII.4: Which memory model should be used? Answer: Cross Reference: XVIII.5: How do you create a .COM file? Answer: Cross Reference: XVIII.6: What is the benefit of a .COM file over an .EXE file? Answer: Cross Reference: XVIII.7: Are all the functions in a library added to an .EXE file when the library is linked to the objects? Answer: Cross Reference: XVIII.8: Can multiple library functions be included in the same source file? Answer: Cross Reference: XVIII.9: Why should I create a library? Answer: Cross Reference: XVIII.10: My program has several files in it. How do I keep them all straight? Answer:		Answer:	
Answer: Cross Reference: XVIII.5: How do you create a .COM file? Answer: Cross Reference: XVIII.6: What is the benefit of a .COM file over an .EXE file? Answer: Cross Reference: XVIII.7: Are all the functions in a library added to an .EXE file when the library is linked to the objects? Answer: Cross Reference: XVIII.8: Can multiple library functions be included in the same source file? Answer: Cross Reference: XVIII.9: Why should I create a library? Answer: Cross Reference: XVIII.9: Why program has several files in it. How do I keep them all straight? Answer:		Cross Reference:	318
Cross Reference: XVIII.5: How do you create a .COM file? Answer: Cross Reference: XVIII.6: What is the benefit of a .COM file over an .EXE file? Answer: Cross Reference: XVIII.7: Are all the functions in a library added to an .EXE file when the library is linked to the objects? Answer: Cross Reference: XVIII.8: Can multiple library functions be included in the same source file? Answer: Cross Reference: XVIII.9: Why should I create a library? Answer: Cross Reference: XVIII.9: Why should I create a library? Answer: Cross Reference: XVIII.10: My program has several files in it. How do I keep them all straight? Answer:		XVIII.4: Which memory model should be used?	318
XVIII.5: How do you create a .COM file? Answer: Cross Reference: XVIII.6: What is the benefit of a .COM file over an .EXE file? Answer: Cross Reference: XVIII.7: Are all the functions in a library added to an .EXE file when the library is linked to the objects? Answer: Cross Reference: XVIII.8: Can multiple library functions be included in the same source file? Answer: Cross Reference: XVIII.9: Why should I create a library? Answer: Cross Reference: XVIII.10: My program has several files in it. How do I keep them all straight? Answer:		Answer:	
Answer: Cross Reference: XVIII.6: What is the benefit of a .COM file over an .EXE file?		Cross Reference:	
Cross Reference: XVIII.6: What is the benefit of a .COM file over an .EXE file?			
XVIII.6: What is the benefit of a .COM file over an .EXE file?			
Answer: Cross Reference: XVIII.7: Are all the functions in a library added to an .EXE file when the library is linked to the objects? Answer: Cross Reference: XVIII.8: Can multiple library functions be included in the same source file? Answer: Cross Reference: XVIII.9: Why should I create a library? Answer: Cross Reference: XVIII.9: Why should I create a library? Answer: Cross Reference: XVIII.10: My program has several files in it. How do I keep them all straight? Answer:			
Cross Reference: XVIII.7: Are all the functions in a library added to an .EXE file when the library is linked to the objects? Answer: Cross Reference: XVIII.8: Can multiple library functions be included in the same source file? Answer: Cross Reference: XVIII.9: Why should I create a library? Answer: Cross Reference: XVIII.10: My program has several files in it. How do I keep them all straight? Answer:			
XVIII.7: Are all the functions in a library added to an .EXE file when the library is linked to the objects? Answer: Cross Reference: XVIII.8: Can multiple library functions be included in the same source file? Answer: Cross Reference: XVIII.9: Why should I create a library? Answer: Cross Reference: XVIII.10: My program has several files in it. How do I keep them all straight? Answer:			
the library is linked to the objects? Answer: Cross Reference: XVIII.8: Can multiple library functions be included in the same source file? Answer: Cross Reference: XVIII.9: Why should I create a library? Answer: Cross Reference: XVIII.10: My program has several files in it. How do I keep them all straight? Answer:			319
Answer: Cross Reference: XVIII.8: Can multiple library functions be included in the same source file? Answer: Cross Reference: XVIII.9: Why should I create a library? Answer: Cross Reference: XVIII.10: My program has several files in it. How do I keep them all straight? Answer:			000
Cross Reference: XVIII.8: Can multiple library functions be included in the same source file? Answer: Cross Reference: XVIII.9: Why should I create a library? Answer: Cross Reference: XVIII.10: My program has several files in it. How do I keep them all straight? Answer:			
XVIII.8: Can multiple library functions be included in the same source file? Answer: Cross Reference: XVIII.9: Why should I create a library? Answer: Cross Reference: XVIII.10: My program has several files in it. How do I keep them all straight? Answer:			
source file? Answer: Cross Reference: XVIII.9: Why should I create a library? Answer: Cross Reference: XVIII.10: My program has several files in it. How do I keep them all straight? Answer:			321
Answer: Cross Reference: XVIII.9: Why should I create a library? Answer: Cross Reference: XVIII.10: My program has several files in it. How do I keep them all straight? Answer:			391
Cross Reference: XVIII.9: Why should I create a library? Answer: Cross Reference: XVIII.10: My program has several files in it. How do I keep them all straight? Answer:			
XVIII.9: Why should I create a library? Answer: Cross Reference: XVIII.10: My program has several files in it. How do I keep them all straight? Answer:			
Answer:			
Cross Reference: XVIII.10: My program has several files in it. How do I keep them all straight? Answer:			
XVIII.10: My program has several files in it. How do I keep them all straight?			
all straight?Answer:			
Answer:		all straight?	322
Cross Reference:		Answer:	
		Cross Reference:	323

	XVIII.11: I get the message DGROUP: group exceeds 64K during	
	my link. What's wrong?	323
	Answer:	323
	Cross Reference:	323
	XVIII.12: How can I keep my program from running out of memory?	324
	Answer:	324
	Cross Reference:	324
	XVIII.13: My program is too big to run under DOS. How can I make	
	it fit?	324
	Answer:	324
	Cross Reference:	325
	XVIII.14: How can I get more than 640KB of memory available to	
	my DOS program?	325
	Answer:	
	Cross Reference:	326
	XVIII.15: What is the difference between near and far?	327
	Answer:	327
	Cross Reference:	329
XIX	Programming Style and Standards	331
	XIX.1: Should the underscore be used in variable names?	
	Answer:	
	Cross Reference:	
	XIX.2: Can a variable's name be used to indicate its data type?	
	Answer:	
	Cross Reference:	333
	XIX.3: Does the use of comments affect program speed, executable size,	
	or efficiency?	333
	Answer:	
	Cross Reference:	334
	XIX.4: Does the use of white space affect program speed, executable size,	
	or efficiency?	334
	Answer:	
	Cross Reference:	336
	XIX.5: What is camel notation?	
	Answer:	336
	Cross Reference:	
	XIX.6: Do longer variable names affect the speed, executable size, or	
	efficiency of a program?	336
	Answer:	336
	Cross Reference:	337
	XIX.7: What is the correct way to name a function?	337
	Answer:	
	Cross Reference:	338
	XIX.8: What is the correct way to use braces?	338
	Answer:	
	Chara Defension	220

	XIX.9: How many letters long should variable names be? What is the ANSI standard for significance?	339
	Answer:	
	Cross Reference:	
	XIX.10: What is Hungarian notation, and should I use it?	
	· ·	
	Answer:	
	Cross Reference:	
	XIX.11: What is iterative processing?	
	Answer:	
	Cross Reference:	
	XIX.12: What is recursion, and how do you use it?	
	Answer:	
	Cross Reference:	
	XIX.13: What is the best way to represent true and false in C?	344
	Answer:	344
	Cross Reference:	345
	XIX.14: What is the difference between a null loop and an infinite loop?	
	Answer:	
	Cross Reference:	
	XIX.15: What is the difference between <i>continue</i> and <i>break</i> ?	
	Answer:	
	Cross Reference:	
3737		
XX	Miscellaneous	
	XX.1: How are command-line parameters obtained?	349
	Answer:	349
	Cross Reference:	351
	XX.2: Should programs always assume that command-line parameters	
	can be used?	351
	Answer:	351
	Cross Reference:	
	XX.3: What is the difference between "exception handling" and	
	"structured exception handling"?	352
	Answer:	
	Cross Reference:	
	XX.4: How do you create a delay timer in a DOS program?	
	Answer:	
	Cross Reference:	
	XX.5: Who are Kernighan and Ritchie?	
	Answer:	
	Cross Reference:	
	XX.6: How do you create random numbers?	354
	Answer:	
	Cross Reference:	
	XX.7: When should a 32-bit compiler be used?	356
	Answer:	356
	Cross Pafaranca	357

XX.8: How do you interrupt a Windows program?	357
Answer:	357
Cross Reference:	360
XX.9: Why should I use static variables?	
Answer:	
Cross Reference:	
XX.10: How can I run another program after mine?	
Answer:	
Cross Reference:	
XX.11: How can I run another program during my program's execution?	
Answer:	362
Cross Reference:	
XX.12: How can I pass data from one program to another?	
Answer:	
Cross Reference:	
XX.13: How can I determine which directory my program is	
running from?	368
Answer:	
Cross Reference:	
XX.14: How can I locate my program's important files (databases,	000
configuration files, and such)?	369
Answer:	
Cross Reference:	
XX.15: Some of your examples are not very efficient. Why did you write	010
them so badly?	370
Answer:	
Cross Reference:	
XX.16: How do you disable Ctrl-Break?	
Answer:	
Cross Reference:	
XX.17: Can you disable warm boots (Ctrl-Alt-Delete)?	
Answer:	
Cross Reference:	
XX.18: How do you tell whether a character is a letter of the alphabet?	
Answer:	
Cross Reference:	
XX.19: How do you tell whether a character is a number?	
Answer:	
Cross Reference:	
XX.20: How do you assign a hexadecimal value to a variable?	
Answer:	
Cross Reference:	
XX.21: How do you assign an octal value to a number?	
Answer:	
Cross Reference:	
CIUM INCIGIUE	311

	XX.22: What is binary?	377
	Answer:	
	Cross Reference:	379
	XX.23: What is octal?	379
	Answer:	
	Cross Reference:	379
	XX.24: What is hexadecimal?	
	Answer:	
	Cross Reference:	381
	XX.25: What are escape characters?	
	Answer:	
	Cross Reference:	
XXI	Windows	
	XXI.1: Can printf() be used in a Windows program?	386
	Answer:	
	Cross Reference:	
	XXI.2: How do you create a delay timer in a Windows program?	
	Answer:	
	Cross Reference:	
	XXI.3: What is a handle?	
	Answer:	
	Cross Reference:	
	XXI.4: How do you interrupt a Windows program?	
	Answer:	
	Cross Reference:	
	XXI.5: What is the GDI and how is it accessed?	
	Answer:	
	Cross Reference:	
	XXI.6: Why is windows.h important?	
	Answer:	
	Cross Reference:	
	XXI.7: What is the Windows SDK?	
	Answer:	
	Cross Reference:	
	XXI.8: Do you need Microsoft's Windows SDK to write Windows	001
	programs?	392
	Answer:	
	Cross Reference:	
	XXI.9: What is the difference between Windows functions and standard	552
	DOS functions?	302
	Answer:	
	Cross Reference:	
	XXI.10: What is dynamic linking?	
	Answer:	
	Cross Reference	აჟა ՉႳՉ

XXI.11: What are the differences among HANDLE, HWND, and HDC?	394
Answer:	
Cross Reference:	394
XXI.12: Are Windows programs compatible from one compiler	
to the next?	
Answer:	394
Cross Reference:	
XXI.13: Will Windows always save and refresh your program's windows?	395
Answer:	395
Cross Reference:	
XXI.14: How do you determine a Windows program's client area size?	396
Answer:	396
Cross Reference:	397
XXI.15: What are OEM key codes?	397
Answer:	397
Cross Reference:	397
XXI.16: Should a Windows program care about the OEM key codes?	
Answer:	
Cross Reference:	
XXI.17: What are virtual key codes?	398
Answer:	
Cross Reference:	
XXI.18: What is a dead key?	
Answer:	
Cross Reference:	
XXI.19: What is the difference between the caret and the cursor?	
Answer:	
Cross Reference:	
XXI.20: Can a mouse click be captured in an area outside your	. 102
program's client area?	402
Answer:	
Cross Reference:	
XXI.21: How do you create an animated bitmap?	
Answer:	
Cross Reference:	
XXI.22: How do you get the date and time in a Windows program?	
Answer:	
Cross Reference:	
XXI.23: How do you update the title bar in a Windows program?	
Answer:	
Cross Reference:	
XXI.24: How do you access the system colors in a Windows program?	
Answer:	
Cross Reference:	

XXI.25: What are the system color constants?	406
Answer:	
Cross Reference:	
XXI.26: How do you create your own buttons or controls?	407
Answer:	
Cross Reference:	
XXI.27: What is a static child window?	408
Answer:	408
Cross Reference:	408
XXI.28: What is window subclassing?	
Answer:	
Cross Reference:	409
XXI.29: What is the edit class?	410
Answer:	410
Cross Reference:	411
XXI.30: What is the listbox class?	411
Answer:	411
Cross Reference:	412
XXI.31: How is memory organized in Windows?	412
Answer:	
Cross Reference:	413
XXI.32: How is memory allocated in a Windows program?	413
Answer:	
Cross Reference:	414
XXI.33: What is the difference between modal and modeless	
dialog boxes?	414
Answer:	
Cross Reference:	414
Index	415

Introduction

What is a *FAQ*? It's a Frequently Asked Question. You can see FAQs just about everywhere in the online community. They originated in the USENET groups on the Internet as a way to answer users' most common questions regarding the groups. The FAQs files were efficient. Instead of answering the same questions over and over, one file was written that contained all the frequently asked questions and answers to those questions.

This book is a comprehensive list of FAQs, assembled by a group of professional C programmers. This book contains the FAQs most often posed by our readers over our many years of publishing programming books. You won't find a FAQ list that goes into as much detail as this book does. (Have you ever seen a 400-page FAQ list?)

Our team of expert programmers has tackled the toughest topics, including variables and data storage, sorting data, pointers and memory allocation, tables and arrays, debugging, portability, ANSI standards, and Windows concerns. If something in C is stumping you, odds are you'll find an answer in this book. In addition, the extensive cross referencing in this book will help you find the answer you need—even if you start out looking in the wrong spot.