

Introduction to C Programming

Course Summary

Description

This course uses a practical, problem-solving approach to provide a thorough introduction to programming in the C language. This course is not platform specific, so it can be taught on a variety of platforms, including Windows, UNIX, and Mainframe.

Topics

- Introduction
- Operators in C
- Control flow
- Functions
- Pointers
- Arrays in C
- Structures in C
- Reading C declarations
- Handling files in C
- Miscellaneous things
- C and the heap

Audience

This course is designed for programmers who wish to learn to program in C.

Prerequisites

The student should have a good working knowledge of programming techniques. No prior use of C is assumed, but limited exposure to the product would help.

Duration

Five days

Introduction to C Programming

Course Outline

- I. Introduction**
 - A. Welcome to C
 - B. Course objectives
 - C. Practical exercises
 - D. Features of C
 - E. The history of C
 - F. Standard C vs. K&R C
 - G. A C program
 - H. The format of C
 - I. Another example
 - J. Variables
 - K. printf and scanf
 - L. Integer types in C
 - M. Integer example
 - N. Character example
 - O. Integers with different bases
 - P. Real types in C
 - Q. Real example
 - R. Constants
 - S. Warning!
 - T. Named constants
 - U. Preprocessor constants
 - V. Take care with printf and scanf!

- II. Operators in C**
 - A. Operators in C
 - B. Arithmetic operators
 - C. Using arithmetic operators
 - D. The cast operator
 - E. Increment and decrement
 - F. Prefix and postfix
 - G. Truth in C
 - H. Comparison operators
 - I. Logical operators
 - J. Bitwise operators
 - K. Bitwise example
 - L. Assignment
 - M. Other assignment operators
 - N. sizeof operator
 - O. Conditional expression operator
 - P. Precedence of operators
 - Q. Associativity
 - R. Precedence/associativity table

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III. Control Flow

- A. Control flow
- B. Decisions if then
- C. if then else
- D. Nesting ifs
- E. switch
- F. More about switch
- G. while loop
- H. Semicolon warning!
- I. while, not until!
- J. do while
- K. for loop
- L. for is not until either!
- M. Stepping with for
- N. Extending the for loop
- O. break
- P. continue

IV. Functions

- A. The rules
- B. Writing a function
- C. Calling a function
- D. Prototypes
- E. Prototyping is not really optional
- F. Writing prototypes
- G. Take care with semicolons
- H. Example prototypes
- I. Example calls
- J. Rules of visibility
- K. Call by value
- L. C and the stack
- M. Stack example
- N. Storage
- O. auto
- P. static
- Q. register
- R. Global variables

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Course Outline (cont'd)

V. Pointers

- A. Pointers
- B. Declaring pointers
- C. Example pointer declarations
- D. The "&" operator
- E. Rules
- F. The "*" operator
- G. Writing down pointers
- H. Initialization warning!
- I. Initialize pointers!
- J. NULL
- K. Fill in the gaps
- L. Type mismatch
- M. Call by value
- N. Reminder
- O. Call by reference
- P. Pointers to pointers

VI. Arrays in C

- A. Declaring arrays
- B. Accessing elements
- C. Array names
- D. Passing arrays to functions
- E. Using pointers
- F. Pointers to go backwards too
- G. Pointers may be subtracted
- H. Using pointers
- I. * and ++
- J. Which notation?
- K. Strings
- L. Printing strings
- M. Null really does mark the end!
- N. Assigning to strings
- O. Pointing to strings
- P. Multidimensional arrays

VII. Structures in C

- A. Concepts
- B. Setting up the template
- C. Creating instances
- D. Initializing instances
- E. Structures within structures
- F. Accessing members
- G. Unusual properties
- H. Instances may be assigned
- I. Passing instances to functions
- J. Pointers to structures
- K. Why (*p).name?
- L. Using p->name
- M. Pass by reference
- N. Returning structure instances
- O. Linked lists
- P. Example
- Q. Printing the list

VIII. Reading C Declarations

- A. Introduction
- B. SOAC
- C. typedef

IX. Handling Files in C

- A. Introduction
- B. Streams
- C. What is a stream?
- D. Why stdout and stderr?
- E. stdin is line buffered
- F. Opening files
- G. Dealing with errors
- H. File access problem
- I. Copying files
- J. Convenience problem
- K. Accessing the command line
- L. Useful routines
- M. Binary files

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Course Outline (cont'd)

- X. Miscellaneous Things**
 - A. Unions
 - B. Remembering
 - C. Enumerated types
 - D. Using different constants
 - E. The preprocessor
 - F. Including files
 - G. Pathnames
 - H. Preprocessor constants
 - I. Avoid temptation!
 - J. Preprocessor macros
 - K. A debugging aid
 - L. Working with large projects
 - M. Data sharing example
 - N. Data hiding example
 - O. Use header files
 - P. Getting it right

- XI. C and the Heap**
 - A. What is the heap?
 - B. How much memory?
 - C. Dynamic arrays
 - D. Using dynamic arrays
 - E. calloc/malloc example
 - F. realloc example
 - G. realloc can do it all
 - H. Allocating arrays of arrays
 - I. Dynamic data structures
 - J. Linking the list