Advanced C Programming Training

Duration: **4 Day**

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This course is designed for the practising software developer and allows delegates to gain a better understanding of the language, run-time library, and software engineering techniques available with the C language.

'Advanced C' increases delegate's knowledge and understanding of the language, including the recent ISO 9899:1999 (C99) standard changes, and helps delegates to gain experience in areas of C that previous work may not have covered. Delegates will also be better equipped to write and maintain large C programs, and will also gain a better understanding of the way the language works and is implemented.

Prerequisites

- Between three and six months of concentrated C programming experience Experience of structured data types
- Experience of the declaration and use of pointers
- The course will also benefit self-taught C programmers wishing to gain a formal education in the language.

Please note: Before attending this class delegates must have a Microsoft account (signing up one is free). The instructions on how to set up a Microsoft account can be found here.

What You Will Learn

At the end of this course you will be able to:

- Read and write complex data declarations and type definitions
- Use advanced pointer techniques to construct and work with complex data structures Use advanced standard library functions, including process control, searching and sorting Handle memory allocation
- Exploit features of C99

Training Outline

Chapter 1: C Standards

- Review of C standards
- K&R1 and STDC functions
- C99 inline functions
- Enumeration
- const, volatile, Boolean, and floating point types
- Limits

Chapter 2: The Preprocessor

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- Predefined macros
- Conditional compilation
- Advanced directives (including assert)
- Trigraphs and C99 digraphs
- C99 Variadic macros

Chapter 3: Declarations

- Reading and writing declarations
- Using typedefs effectively
- Using casts

Chapter 4: Advanced Pointers

- Levels of indirection
- Void pointers
- Defining and using function pointers
- C99 restricted pointers

Chapter 5: Advanced Arrays

- Arrays and functions
- Pointers and arrays
- C99 Variable Length Arrays
- memset

Chapter 6: Arrays of Arrays

- Declarations
- Initialisation
- Arrays of arrays as function arguments

Chapter 7: Advanced Structures

- Declaring and defining structures
- C99 changes
- Bitfields
- Packing and padding
- Reading and writing structs to files

Chapter 8: Dynamic Memory Management

- Allocating arrays
- Allocating structures
- Error detection and debugging techniques
- Writing your own error detection library

Chapter 9: Standard Library - Process Control

- Running another process
- Process termination
- Exception handling (setjmp/longjmp)
- Environment variables

Chapter 10: Standard Library - Useful Functions

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- Calling conventions
- Writing variadic functions
- Date and time functions
- Random numbers

Chapter 11: Sorting and Searching

- qsort
- Comparison functions
- Indirect sorting (pointers)
- bsearch

Chapter 12: Linked Lists

- Linked list principles
- Using recursive functions
- Implementing a circular list
- Implementing a self-adjusting list

Chapter 13: Binary Trees

- Binary tree principles
- Using trees for sorted data
- Insertion
- Deletion