As of 28.05.2024

Embedded C Training: Programming Methods and Tools for Embedded Applications - Live Online Training

This training focuses on the hardware-near C-programming of 8, 16 or 32 bit microcontroller architectures. It shows you how to identify and avoid the pitfalls of C programming .You learn how to program a HW abstraction layer according to an architecture model. Operating system mechanisms and services are explained by programming a scheduler. You get an overview of the whole lifecycle of a product - from the idea to project planning, software development process, test planning, quality planning, acceptance, commissioning, operation and decommissioning.

Objectives

This training focuses on the hardware-near C-programming of 8, 16 or 32 bit microcontroller architectures.

You learn how to program a HW abstraction layer according to an architecture model. OS mechanisms and services are explained by programming a scheduler.

You get an overview of the entire lifecycle of a product - from the idea to project planning, SW development process, test planning, quality planning, acceptance, commissioning, operation and decommissioning.

You are able to efficiently develop programs for an embedded system in "C" according to the guidelines of modernsoftware engineering.

You are familiar with using pointers, function pointers and structures.

Based on your knowledge of programming/coding guidelines and software quality features, functional and non-functional requirements as well as internal quality and generate software that is reusable, extendable and easily tested.

In addition, you know all stages of a software development process, from the idea to system acceptance.

Participants

Software developers, software architects

Requirements

A good understanding of ANSI-C and microcontroller architectures.

Live-Online-Training

17.06. – 20.06.2024	2.400,00 €	4 Days
03.02. – 06.02.2025	2.400,00 €	4 Days

* Price per attendee, in Euro plus VAT

Training code: LE-EMB-C

Face-To-Face - English

Date	Duration
26.08. – 29.08.2024	4 days

31.03. – 03.04.2025	4 days

Live Online - German

Date	Duration
17.06. – 20.06.2024	4 days
03.02. – 06.02.2025	4 days

Face-To-Face - German

Date	Duration
17.06. – 20.06.2024	4 days
26.08. – 29.08.2024	4 days
11.11. – 14.11.2024	4 days
31.03. – 03.04.2025	4 days

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Content

Essentials of Hardware-near C Programming

- Data types
- Pointers, function pointers
- Structures, linked lists
- Circular buffer, queues, FIFO, LIFO
- Programming rules and guidelines
- Pitfalls and stumbling blocks in C

Software Architecture

- Selection of a layered model based on requirements
- Communication between layers
- Synchronous and asynchronous interfaces

Driver Programming

- HW abstraction, driver programming: access to HW registers in "C"
- Interfaces, callback interfaces, queues
- Interrupt handling / service routines, callback function

Using Pointers, Function Pointers and Linked Lists

- Example: scheduler programming
- Task management as linked list

Programming a Finite State Machine FSM

- Philosophy and implementation of an FSM in C

Locating Code and Data in (µC) Memory (Flash, RAM Address Space)

- Sectioning (.text, .data, .bss)
- Linker description file

Library Management

- Adapting standard library functions to HW
- User library creation and management

Overview: Real-time Operating Systems (RTOS)

- Types, services, selection criteria

Outlook: OOP Techniques

- Advantages and issues of object oriented programming
- Most important UML diagrams

Introduction: Structured Methods for Project Planning

- Preliminary study, project start, project plan, project implementation

Software Development Process Models

- V-model, spiral model, RUP, COPES
- Interactive-incremental
- Agile software development, XP

Quality of Embedded Systems

- How to design and develop quality
- Overview: Standards (MISRA, IEC61508)

Overview: Software Test Process for Developers

- Test phases and test methods
- Static test, dynamic test
- Review, whitebox test, blackbox test

MicroConsult PLUS:

- Extensive exercises on a target hardware
- Programs are developed with Keil µVision and Arm RealView tools or with IAR Workbench and tested on Arm-7 or Cortex®-M3 based HW.