

# Arm7/ Arm9/ Arm10/ Arm11™: Architecture and Embedded Programming - Face-to-Face Training

#### Objectives

You know the Arm architecture and can write software in C and Assembler. You can locate programs in memory and test them. This is the perfect start for designing Arm based systems.

#### **Participants**

Software and hardware developers

#### Requirements

A basic understanding of ANSI-C and microcontrollers.

# Arm7/ Arm9/ Arm10/ Arm11<sup>™</sup>: Architecture and Embedded Programming - Face-to-Face Training

# Content

#### **Arm Processor Architecture**

- Operating modes, states, pipeline, register organization
- User mode, fast interrupt (FIQ) mode, interrupt (IRQ) mode
- Supervisor mode, system mode, undefined mode
- Thumb-2 state, Arm state, Thumb state, Jazelle state
- Arm register file
- Status register

#### Arm Processor Cores: Overview

- Arm7 / Arm9 / Arm10 / Arm11 processor core
- Cortex®-M, Cortex®-R, Cortex®-A processor cores

#### Arm, Thumb and DSP Instruction Sets

- v4, v4T, v5, v6 instructions
- v7 Thumb-2 instruction set overview
- Arm/Thumb interworking
- Assembler directives

# **Exception Handling**

- FIQ, IRQ, ABORT, UNDEF, SVC
- Vector table
- Exception handler templates
- Vectored interrupt controller (VIC)

#### System Control Coprocessor, CP15

- Arm coprocessor concept
- Overall system control & configuration
- Cache configuration and cache management
- Memory management unit (MMU) configuration
- System performance monitoring

# VFP2 Floating Point Unit

- VFP2 architecture
- VFP2 instruction set overview

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### Level 1 Memory Interface

- Tightly coupled memory
- Cache architecture
- DMA interface

# Level 2 Memory System

- Advanced microprocessor bus architecture (AXI)
- AXI bus masters
- AXI bus slaves
- Second level caches
- On-chip RAM, peripherals
- External memory

# Memory Management Unit (MMU)

- Translation lookaside buffer (TLB)
- Page tables, attributes

# Memory Protection Unit (MPU) for Embedded Systems

#### **Clock, Reset and Power Control**

# Arm Debug Support

- Embedded trace macrocell (ETM)
- Performance monitoring unit (PMU)
- CoreSight debug components
- Debug coprocessor, CP14

#### **Embedded Software Development**

- Adjustment of library routines to HW (retargeting)
- Locating code and data in memory (scatter loading)
- Linker description file
- Reset, start-up, start-up file

#### Efficient C Programming for the Arm Architecture

- Compiler optimization, compiler options
- Interface C assembler
- Programming guidelines for Arm compilers
- Efficient use of local and global variables

#### Hardware-near C

- C statements and their execution in Assembler
- Access to peripherals in C
- Software architecture for embedded systems
- Structured (object oriented) description of peripherals

#### Practical Exercises with Arm RealView Tools

- Different tools can be used on request
- All programs are tested on an evaluation board

# **FACE-TO-FACE TRAINING**

# Price \* Duration

2.800,00 € 4 days Training code: E-ARM-7/9 \* Price per attendee, in Euro plus VAT

# Face-To-Face - German

# Duration

4 days

# Coaching

Our coaching services offer a major advantage: our specialists introduce their expertise and experience directly in

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your solution process, thus contributing to the success of your projects.

We will be happy to provide you with further information or submit a quotation tailored to your requirements.