

## **Embedded Software Test: Best Practices for Unit/ Module /Component Testing - Face-to-Face Training**

### **Objectives**

The embedded software test training highlights the development and test process as well as the related dependencies, extensions and interactions. This way, you can exploit synergies and perform tests efficiently.

Numerous hands-on exercises on software and hardware help you implement what you learned in the training.

### **Participants**

Software developers, hardware developers, test engineers

### **Requirements**

Basic knowledge of a higher-level programming language (e.g. C/C++) is of advantage.

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### **Content**

#### **Development and Test Process in the W-Model (V-Model Extension)**

- Development stages: analysis, design, implementation
- Test stages: component test, integration test, system test, acceptance test
- Test types: functional, non-functional, structure-oriented test
- Post test, regression test, maintenance test
- Standards relevant to testing
- Developing testable software
- Definition of terms: unit, module, component
- Difference between debugging and testing

#### **Static Tests**

- Review process: document review, coder review, inspection, walkthrough
- Tool-aided static code analysis

#### **Dynamic Tests**

- Blackbox: equivalence class construction, threshold testing, decision table testing, state transition testing, use case testing
- Whitebox: statement testing/ coverage, decision testing/ coverage, condition testing/ coverage
- Experience-based techniques: error guessing, explorative testing
- Systematic approaches for developing test cases
- Selection criteria for test methods
- Test method assessment

#### **Code Metrics**

- Lines of code, cyclomatic number according to McCabe, Halstead metric
- Using metrics in the test process

#### **Design for Test**

- S.O.L.I.D. principles
- Single responsibility, open closed
- Liskov substitution
- Interface segregation, dependency inversion

**Testing Object-Oriented Software**

- Testing class hierarchies
- Testing methods of a class
- Testing class relations
- Testing inheritance
- Testing polymorphic class hierarchies

**Test-Driven Development, TDD**

- Advantages of TDD
- Embedded TDD strategies
- TDD example

**Integration of System Components - Overview**

- Integration test, system test, acceptance test

**Integration of Hardware and Software**

- Test execution on hardware

**Further Activities in the Test Process - Overview**

- Test management, planning, control
- Risk management, fault and incident management
- Configuration management and version control
- Software quality features according to ISO 9126
- Test documents according to IEEE 829
- Test tools types, selection, implementation

**Hands-on Exercises**

- Exercises on test analysis, test design, test implementation, test execution, test report
- Execution of code Review
- Execution of blackbox and whitebox tests with Tessy, with and without HW
- Test data determination using the classification tree method with CTE
- Determining code metrics using the tools cccc and CMT++
- Using Google Test and Google Mock
- The Arm/ Keil µVision and a Cortex™-M evaluation board are used for tests on HW

**FACE-TO-FACE TRAINING**

| <b>Price *</b>                         | <b>Duration</b> |
|----------------------------------------|-----------------|
| 2.800,00 €                             | 4 days          |
| Training code: E-EMBTST                |                 |
| * Price per attendee, in Euro plus VAT |                 |

**Live Online - English****Duration**

4 days

**Face-To-Face - German**

| <b>Date</b>         | <b>Duration</b> |
|---------------------|-----------------|
| 08.07. – 11.07.2024 | 4 days          |
| 14.10. – 17.10.2024 | 4 days          |

**Live Online - German**

| <b>Date</b>         | <b>Duration</b> |
|---------------------|-----------------|
| 08.07. – 11.07.2024 | 4 days          |
| 27.01. – 30.01.2025 | 4 days          |

**Coaching**

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

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.