Software Architecture Using Model-Based Engineering for Real-Time and Embedded Systems

Duration: 3 days
Audience: Software architects, development team managers, project managers, product managers

Pre-requisites: Participants should be familiar with principles of software engineering and have some experience with programming

Brief Description: This course teaches the essentials of modern model-based engineering techniques and technologies and how these can be used in the architectural design and specifications of complex systems, with a special focus on real-time and embedded systems.

Description:
Provide attendees with the foundations for specifying architectures (with special focus on embedded and real-time systems) by combining the most recent results from two convergent disciplines: software architecture design and model-based engineering methods. This includes both an understanding of the theoretical underpinnings as well as their practical application to industrial-scale problems.

Target Audience
Software architects, development team managers, project managers, product managers

Course Level
Intermediate

Course Pre-requisites
Participants should be familiar with principles of software engineering and have some experience with programming

Course Objectives
This is a hands on workshop intended to familiarize the participant with basic use of model-based methods and technologies to define and document the architecture of complex real-time and embedded systems:

- Understanding what constitutes a software architecture and why architecture is so important
- Understanding the basics of modern model-based methods
- Introduction to standard architectural description languages
• An introduction to the UML modeling language and its application as an architectural description language
• Architectures and architectural patterns for complex systems (with focus on real-time and embedded)
• Introduction to current trends in architectural specification

Course Outline:
• Introduction to the Course
• On Architecture
  o What is Software Architecture?
  o Why Architecture Matters
  o Why Platforms Matter to Architects
  o Key Problems of Software Architectures
  o The System of Systems Design Problem
  o The Process of Architectural Design
  o Key Architectural Design Patterns
  o Specifying Architectures – ADLs
• On Model-Based Software Engineering
  o General Introduction to MBSE
  o On Modeling Languages and Their Design
  o An Overview of the Unified Modeling Language – version 2
  o Using UML to design Modeling Languages – the Profile Mechanism
  o The UML MARTE Profile
  o UML-based ADLs and SysML
• Designing Architectures the Model Based Way
  o The Recursive Control Pattern
  o The Acceptable Platform Pattern
  o Model Transforms
• Trends and Research Issues