



CRaG Systems Modelling Training and Consultancy

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Embedded C/C++ with UML and Enterprise Architect Hands-On Workshop Training Course - 2-5 Days

This UML workshop training course is aimed at system architects and developers who want to develop a UML model of their embedded C/C++ software in Enterprise Architect. The course uses a real-life case study to show how use case based requirements of real-time and embedded systems can be traced through a detailed implementation-free analysis model into a layered, component-based, real-time system architecture and into code. The detailed design model that results is fully integrated with the libraries and frameworks of the target device and round-trip code engineering performed either from within the IDE of the Enterprise Architect tool or through a fully integrated external code development environment.

As part of the workshop a model of your own system can be started at whatever level you require including reverse engineering of your existing source code. This can be extended to using the development of your custom model as the primary vehicle for the workshop delivery in place of the provided case study.

Students are given the opportunity during the course to experiment with the integration between the modelling in the Enterprise Architect tool, the C/C++ code, a GCC compiler and provided hardware environments including AVR and ARM based hardware (Arduino and RPi), embedded unix, custom operating system and custom hardware. The industry best practice modelling techniques are based on the Unified Modelling Language v2.5 and are taught as required as the case study is developed.

Delegates will learn some or all of the following UML modelling skills as required:

- The basics and the necessary detail of the Unified Modelling Language
- The basics and the detail of Object Orientation
- How to model requirements and make them traceable all the way through the model to code
- How to model tests and relate them to requirements, components and code
- How to create a first cut overview of functional requirements for real-time and embedded systems with actors and use cases on a use case diagram
- How to restructure the use case diagram to handle complex relationships between use cases without bloating the use case model
- How to integrate the use case model with non-functional requirements, data requirements and screen prototyping
- How to create a detailed model of system structure and data using classes and their relationships
- How to recognise complex structures and to use the appropriate syntax to model them
- How to map the functionality of the system requirements onto the object model using sequence diagrams
- How to structure the modelling in the form of a use case implementation
- How to model the dynamics of system data and functionality using state machine diagrams
- How to model at a consistent level of abstraction
- How the modelling performed during system analysis fits into an incremental model-driven development process
- How to develop a flexible real-time system architecture from an object oriented analysis model
- How to develop component and deployment models for the system
- How to model the design of a component using sub-systems and interfaces
- How to build libraries of re-useable real-time and embedded classes using generalisation and inheritance
- How to model the use of technology and frameworks as series of design patterns
- How to integrate libraries and frameworks into the design of components
- How to generate frame code and keep the design and code models synchronised

- How to specify, analyse, architect, design, build, test and deliver real-time and embedded systems as part of an incremental model-driven development process

Delegates will learn some or all of the following Enterprise Architect skills as required:

- The basics and the necessary detail of the use of Enterprise Architect
- How to generate and maintain documents from the different parts of the model
- How to link the model with externally maintained documents and data
- How to integrate the Enterprise Architect model with both internal and external coding environments for round-trip engineering
- How multiple users can work concurrently within the same Enterprise Architect model
- How to manage the Enterprise Architect model with internal baselining or an external change management system such as Subversion
- How to use the project management capabilities available within Enterprise Architect

Suitable for:



Embedded System Architects, System Designers, Developers and Analyst/Programmers with at least 2 years of embedded systems development experience, preferably in C/C++. This course is not suitable for those seeking certification as a step towards a qualification. See the Certification Policy for a detailed discussion.

On-Site Workshop Logistics:



Workshops are delivered at the clients' site and attendance is normally limited to 12 students. Workshops normally start at 9.30am on the first day and 9.00am on subsequent days with an hour for lunch and a 15 minute break in the morning and again the afternoon. Workshops normally finish at 5.00pm each day. The client is expected to provide an appropriate venue, equipment and refreshments. Required equipment includes an XGA/WXGA projector and screen, whiteboard or flipchart and at least one computer per two students loaded with either the evaluation version of Enterprise Architect or a recent licenced copy. For a full discussion of on-site workshop issues please see On-Site Course and Workshop Logistics.

Pricing:



Please use the On-Site Workshop Price Calculator to get a firm quotation for us to provide this workshop on-site at your premises.

Suggested Daily Workshop Outline

AM	PM
<p>Outline</p> <p>Review of case study/model development so far - scope modelling aspects for today</p> <p>Modelling</p> <p>Consultant led case study development and theory of technique - Consultant led initial development of chosen modelling area - Assignment of modelling tasks - Consultant supported team/individual development of assigned modelling tasks</p>	<p>Modelling</p> <p>Consultant led case study development and theory of technique - Consultant led initial development of chosen modelling area - Assignment of modelling tasks - Consultant supported team/individual development of assigned modelling tasks</p> <p>Review</p> <p>Consolidation and review of the days modelling work</p>

Should the content of any Real-Time (RT) UML with Enterprise Architect workshop training course not fit your exact requirements, then CRaG Systems can create a custom course for you. Please either email or call us to discuss your particular needs.

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