



CRaG Systems Modelling Training and Consultancy

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Real-time System Analysis, Architecture and Design using UML Training Course - 5 Days

This Real-time UML training course is aimed at systems engineers, system architects, designers and developers who want to define the requirements for real-time and embedded systems, develop a detailed implementation-free analysis model from those requirements and a layered, component-based, real-time system architecture and design model. Industry best practice modelling techniques are based on the Unified Modelling Language v2.5 and are taught within the context of a model-driven development process.

The modelling used is applicable to a wide variety of technologies, sufficiently detailed for code generation and traceable from requirements through to code. The advantage that using these techniques have for estimation, test development and management is discussed. Each technique is taught to the level required for competence on a real project. Understanding is tested with exercises based on a real-world project example either using Sparx Systems Enterprise Architect, another suitable UML modelling tool or on paper.

Delegates will learn:

- The basics and the necessary detail of the Unified Modelling Language
- The basics and the detail of Object Orientation
- 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 write an effective use case description in a way that satisfies both non-technical and technical stakeholders
- 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, business rules and screen prototyping
- How to create a detailed model of system structure and data using classes and their relationships
- How to recognise complex constructs 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 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

Suitable for:



Systems Engineers, System Architects, System Designers, Developers and Analyst/Programmers with at least 2 years experience, preferably in a real-time or embedded environment. This course is not suitable for those seeking certification as a step towards a qualification. See the Certification Policy for a detailed discussion.

Course Logistics:



Course attendance is normally limited to 12 students. Courses start at 9.30am on the first day, 9.00am on subsequent days and finish at 5.00pm each day. Students normally use a computer for the exercises, but these can be performed on paper if required. For a discussion on using a UML modelling tool please see Modelling Tool Use on Courses. Printed course manuals for each student with copies of all presentations, exercises and solutions are provided.

On-Site (In-House) Courses:



The client is expected to provide an appropriate venue, refreshments, XGA/WXGA projector and screen, whiteboard or flipchart and at least one computer per two students loaded with a suitable UML modelling tool, unless exercises are to be performed on paper. For a full discussion of on-site course issues please see On-Site Course Logistics.

Scheduled Public Courses:



CRaG Systems no longer provide scheduled public training. However, we continue to provide on-site (in-house) training for any number of students with special discounts for small classes. You will find our pricing competitive with most public courses for just 2 or 3 students. Please use the On-Site Course Pricing page to get a firm, downloadable quotation for on-site training.

Pricing:



On-site (in-house) course pricing is available from the On-Site Course Price Calculator page. For consultancy pricing please see the On-Site Consultancy Price Calculator.

Training Course Outline

Day 1	Day 2
<p>Introduction</p> <p>People - Course Structure - Object Orientation - Unified Modelling Language - Use Cases and System Analysis - An Incremental Process for Modelling</p> <p>Specifying Functional Requirements with Use Cases</p> <p>Actors and Use Cases - Primitive Use Cases and the Basic Flow - Writing Effective Use Case Descriptions - Writing Sub-flows and Alternate Flows - 'Include' and 'Extend' Relationships - Modelling Timing Constraints</p> <p>Use Case Workshop</p> <p>Requirements Gathering</p> <p>Collecting Requirements Information - Proof of Concept Prototypes - Requirements Documents - Estimation and Traceability - Incremental Development - Gaining Agreement</p>	<p>Objects and Classes</p> <p>What is an Object? - Classes and Objects - Attributes - Operations and Methods - Designing Good Classes - Choosing the Best Classes</p> <p>Object and Class Workshop</p> <p>Object Modelling with Class Diagrams</p> <p>Associations and Links - Navigability and Naming - Multiplicity and Other Adornments - Association Classes and N-arys - Aggregation and Composition</p> <p>Class Diagram Workshop</p>

Day 3

Interaction Modelling with Sequence Diagrams

Interactions and Messages - Operations and Methods -
Sequence Diagrams - Selection and Iteration -
Activation - Communication Diagrams - Timing

Sequence Diagram Workshop

State Modelling with State Machine Diagrams

The Meaning of the State Model - States and
Transitions - Events and Conditions - Actions and
Activities - Consistency with Other Diagrams -
Advanced Syntax - Implementation

State Machine Diagram Workshop

System Analysis

Creating the Initial Object Model - The Analysis Cycle -
Iterative Modelling - Interface Prototyping - Completing
the Model

Day 4

Architecture, Components and Implementation Diagrams

Packages and Dependencies - Stereotypes - Control
Objects - Layered Real-time Architectures - Interfaces,
Subsystems and Components - Tasking - Component
Diagrams - Deployment Diagrams

System Architecture Workshop

Class Relationships and Inheritance

Class Similarities and Differences - Generalisation
Syntax - Generalisation Hierarchies - Multiple
Inheritance - Libraries - Class Dependency

Generalisation Workshop

Day 5

Design Patterns

Recursive Aggregate - Collection Class - Observer -
State Machine - Meta-model - Modelling Patterns

Design Patterns Workshop

Detailed Design

Subsystem Design - Architectural Patterns - Linking to
Libraries and Frameworks - Visibility and Other
Properties - Completing the Model - Incremental
Development - Traceability and Review

Detailed Design Workshop

Should the content of the available Real-Time (RT) Systems UML training courses 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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