Systems Modeling Language (SysML)

Duration	1 day
Audience:	Practicing systems engineers; Software engineers interested in learning about systems development; and Managers responsible for systems development
Pre-requisites:	None
Brief Description:	This is an overview course on the systems modeling language, SysML, adopted as a standard by the Object Management Group (OMG). SysML is intended to be used by systems engineers, who seek to transition from traditional, document-centric systems engineering processes to model-based engineering (MBE) processes.

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Course Level

Beginner

Course Pre-requisites

None

Course Objectives

The intent of the course is to provide attendees with a basic understanding of SysML and related technologies (the closely-related UML language, MBE tools) and how they can be used in practical situations. Because significant emphasis is placed on explaining the rationale behind the language and its constructs (the course instructor was one of the earliest contributors to the definition of SysML), attendees are likely to come away with a much deeper insight than can be obtained from reading most popular textbooks.

1. UNIT: Introduction to Model-Based Engineering (MBE) (cca. 40 min.)

This context-setting unit introduces the basic concepts of model-based engineering and describes how these are applied to the development of modern complex software-intensive systems. The role of MBE in both traditional software development processes and more recent agile methods is discussed. Relevant technologies (languages and tools) and standards are also discussed. Finally, a brief overview of industrial experience with MBE is also provided.

2. UNIT: Introduction to SysML (cca. 5 hours)

This unit covers the core of the SysML language, using practical real-world examples to illustrate their use.

- UML and SysML
- Core SysML perspectives (structure, behaviour, requirements, parametrics)
- SysML diagram categories
  - Diagram conventions
  - Diagram types overview
- Model organization:
  - Package diagrams
- Modeling requirements:
  - Requirements diagrams
  - Use-case diagrams
- Modeling structure:
  - The concept of blocks and classes
  - Block definition diagrams
  - Internal block diagrams
- Behavior modeling
  - Behavioral semantics: continuous and discrete behaviors
  - State machine diagrams
  - Activity diagrams
  - Sequence diagrams
- Modeling constraints and functional relationships
  - Parametrics diagrams
  - Specifying constraints using the Object Constraint Language

- Putting it all together: allocations

3. UNIT: Modeling Tools (cca. 45 min.)

This is a brief overview of the role of tools in model-based engineering. It covers not only SysML authoring tools and their capabilities, but also other tool categories such as model analysis, simulation, testing, requirements, and other tools. The role of each tool category in the overall design process is explained. Practical guidelines for selecting tools are discussed.

An example SysML authoring tool is used to illustrate the general approach behind this category of tools.

4. UNIT: Pragmatics (cca. 30 min.)

This unit deals with core issues related to the use of SysML in industrial practice:

- The role of models and tools in system development
- Strategies for deploying MBE in engineering organizations

5. Summary