Principles of Object-Oriented Modeling and Simulation of Dynamic Systems with Modelica

Course plan

Lectures

28 hours

Recommended for

Ph.D. students or practitioners in computer science or systems engineering.

The course was last given.

The course was last given 2009, and as shorter tutorials more recently.

Goals

The course has the following goals:
- Being easily accessible for people who do not previously have a background in modeling, simulation.
- Introducing the concepts of physical modeling, object-oriented modeling and component-based modeling and simulation.
- Providing a not too formal reference on the Modelica language.
- Demonstrating modeling examples from a wide range of application areas.
- Providing an understanting of the compilation techniques used for equation-based languages as well as an understanding of the of the mathematical aspects of dynamic systems.
- Introduction to meta-programming with Modelica, used for model transformation and model compilation.

Prerequisites

Some elementary knowledge in programming languages

Contents

Object-Oriented modeling is a fast-growing area of modeling and simulation that provides a structured, computer-supported way of doing mathematical and equation-based modeling. Modelica is today the most promising modeling and simulation language in that it effectively unifies and generalizes previous object-oriented modeling languages and provides a sound basis for the basic concepts.

The course presents an object-oriented component-based approach to computer supported mathematical modeling and simulation through the powerful Modelica language and its associated technology. Modelica can be viewed as an almost universal approach to high level computational modeling and simulation, by being able to represent a range of application areas and providing general notation as well as powerful abstractions and efficient implementations.

The course gives an introduction to the Modelica language to people who are familiar with basic programming concepts. It gives a basic introduction to the concepts of modeling and simulation, as well as the basics of object-oriented component-based modeling for the novice, and a an overview of modeling and simulation in a number of application areas.

Organization

Lectures and hands-on exercises
usually organized in 5 full days of teaching simplify attendance by external students.

Literature

Fritzson Peter. (2003). Principles of Object-Oriented Modeling and Simulation - with Modelica 2.1. IEEE Press and John Willey, 2004.

Relevant papers will be distributed during the course as needed.

Lecturers

Peter Fritzson
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Examiner

Peter Fritzson

Examination

Examination will be in form of 24 hour homework. It will include theoretical questions and practical model design.

Credit

7 hp

Comments

Course webpage