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John Fitzgerald, Peter Gorm Larsen, Marcel Verhoef (Eds.)

Collaborative Design for Embedded Systems

Co-modelling and Co-simulation

- Presents a novel approach for the co-design and co-simulation of embedded and cyber-physical systems
- Combines theoretical foundations with several case studies of industrial applications
- Complemented by a web site offering tools, examples, videos, and teaching material

One of the most significant challenges in the development of embedded and cyber-physical systems is the gap between the disciplines of software and control engineering. In a marketplace, where rapid innovation is essential, engineers from both disciplines need to be able to explore system designs collaboratively, allocating responsibilities to software and physical elements, and analyzing trade-offs between them. To this end, this book presents a framework that allows the very different kinds of design models – discrete-event (DE) models of software and continuous time (CT) models of the physical environment – to be analyzed and simulated jointly, based on common scenarios. The individual chapters provide introductions to both sides of this co-simulation technology, and give a step-by-step guide to the methodology for designing and analyzing co-models. They are grouped into three parts: Part I introduces the technical basis for collaborative modeling and simulation with the Crescendo technology. Part II continues with different methodological guidelines for creating co-models and analyzing them in different ways using case studies. Part III then delves into more advanced topics and looks into the potential future of this technology in the area of cyber-physical systems. Finally various appendices provide summaries of the VDM and 20-sim technologies, a number of valuable design patterns applicable for co-models, and an acronym list along with indices and references to other literature. By combining descriptions of the underlying theory with records of real engineers' experience in using the framework on a series of case studies the book appeals to scientists and practitioners alike. It is complemented by tools, examples, videos, and other material on www.crescendotool.org.

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