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Formal Methods for Components and Objects

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Preface

Large and complex software systems provide the necessary infrastructure in all industries today. In order to construct such large systems in a systematic manner, the focus in the development methodologies has switched in the last two decades from functional issues to structural issues: both data and functions are encapsulated into software units which are integrated into large systems by means of various techniques supporting reusability and modifiability. This encapsulation principle is essential to both the object-oriented and the more recent component-based software engineering paradigms.

Formal methods have been applied successfully to the verification of medium-sized programs in protocol and hardware design. However, their application to the development of large systems requires more emphasis on specification, modeling and validation techniques supporting the concepts of reusability and modifiability and their implementation in new extensions of existing programming languages like Java.

The new format of FMCO 2005 consisted of invited keynote lectures and tutorial lectures selected through a corresponding open call. The latter provide a tutorial perspective on recent developments. In contrast to existing conferences, about half of the program consisted of invited keynote lectures by top researchers sharing their interest in the application or development of formal methods for large-scale software systems (object or component oriented). FMCO does not focus on specific aspects of the use of formal methods, but rather it aims at a systematic and comprehensive account of the expanding body of knowledge on modern software systems.

This volume contains the contributions submitted after the symposium by both invited and selected lecturers. The proceedings of FMCO 2002, FMCO 2003, and FMCO 2004 have already been published as volumes 2852, 3188, and 3657 of Springer's *Lecture Notes in Computer Science*. We believe that these proceedings provide a unique combination of ideas on software engineering and formal methods which reflect the expanding body of knowledge on modern software systems.

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Organization

The FMCO symposia are organized in the context of the project Mobi-J, a project founded by a bilateral research program of The Dutch Organization for Scientific Research (NWO) and the Central Public Funding Organization for Academic Research in Germany (DFG). The partners of the Mobi-J projects are: the Centrum voor Wiskunde en Informatica, the Leiden Institute of Advanced Computer Science, and the Christian-Albrechts-Universität Kiel.

This project aims at the development of a programming environment which supports component-based design and verification of Java programs annotated with assertions. The overall approach is based on an extension of the Java language with a notion of component that provides for the encapsulation of its internal processing of data and composition in a network by means of mobile asynchronous channels.

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The Dutch Organization for Scientific Research (NWO)
The Royal Netherlands Academy of Arts and Sciences (KNAW)
The Dutch Institute for Programming research and Algorithmics (IPA)
The Centrum voor Wiskunde en Informatica (CWI), The Netherlands
The Leiden Institute of Advanced Computer Science (LIACS), The Netherlands

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