Christine Parent
Klaus-Dieter Schewe
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Bernhard Thalheim (Eds.)

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Conceptual Modeling - ER 2007

26th International Conference on Conceptual Modeling
Auckland, New Zealand, November 2007
Proceedings

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Proceedings

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Preface

Conceptual modeling is fundamental to the development of complex systems, because it provides the key communication means between systems developers, end-users and customers. Conceptual modeling provides languages, methods and tools to understand and represent the application domain; to elicitate, conceptualize and formalize system requirements and user needs; to communicate systems designs to all stakeholders; to formally verify and validate system designs on high levels of abstractions; and to minimize ambiguities in system development. Initially, conceptual modeling mainly addressed data-intensive information systems and contributed to data modeling and database application engineering. The area of conceptual modeling has now matured to encompass all kinds of application areas such as e-applications (including e-business and e-learning), web-based systems (including the semantic web and ubiquitous systems), life science and geographic applications.

The annual International Conference on Conceptual Modeling serves as the premiere forum for presenting and discussing research and applications in all areas associated with conceptual modeling. This year, the Call for Papers solicited contributions dealing with logical and philosophical foundations of conceptual modeling, information modeling concepts including ontologies, correctness in modeling, web-based and mobile information systems, semi-structured data and XML, information and database integration, information retrieval, organization and evaluation, design methodologies and tools, reuse, re-engineering and reverse engineering, quality assurance in conceptual modeling, conceptual change and evolution, data warehousing and data mining, spatial and temporal modeling, business process and workflow modeling, knowledge management, requirements elicitation, and advanced applications.

This Call for Papers attracted 167 submissions from authors from 28 countries. Each paper was carefully reviewed by at least three members of the program committee. Finally, the program committee accepted 37 research papers, giving an acceptance rate of 22.2%. This volume contains these papers, presented at the 26th International Conference on Conceptual Modeling (ER 2007), which was held in Auckland, New Zealand, on November 5–8, 2007.

In addition, following a separate Call for Workshops, six workshops were selected as co-located ER-workshops. A total of 43 research papers, including three invited papers, were presented at the workshops. The average acceptance rate for the co-located workshops was 33.3%. The workshop papers have been published in a separate LNCS volume: LNCS 4802. Furthermore, the conference program included 4 systems demonstrations, 1 panel, 6 tutorials, 32 poster presentations, and 3 keynotes.

We are very happy that Profs. Egon Börger from the University of Pisa, Enrico Franconi from the Free University of Bolzano-Bozen, and Peter Hunter

from the University of Auckland accepted our invitations to present keynotes to this year's conference.

Prof. Börger gave a presentation on *The Abstract State Machine System Design and Analysis Method: An Illustration by Modeling Workflow Patterns from First Principles*, in which he first surveyed the basic ingredients of the Abstract State Machine method and its applications for the design and the validation of complex computer-based systems, and then illustrated the method by the definition of a small set of parameterized abstract models for workflow patterns.

Prof. Franconi gave a presentation on *Conceptual Schemas and Ontologies for Database Access: Myths and Challenges*, in which he argued that well-founded conceptual modeling and ontology design is required to support intelligent information access, and then demonstrated which are the technical consequences of such choices, and the foundational and computational problems to be faced.

Prof. Hunter gave a presentation on *Heart Modeling, Computational Physiology and the IUPS Physiome Project*, in which he outlined the major goal of the Physiome project to use computational modeling to analyze integrative biological function in terms of underlying structure and molecular mechanisms. He argued for the need to develop supporting XML markup languages (CellML & FieldML) for encoding models, and software tools for creating, visualizing and executing these models, focusing in particular on the development of the Auckland heart model.

Many people contributed to the success of ER 2007. We are most grateful to all keynote speakers, authors of submitted papers, posters, tutorials and panels, and members of the program committees of the main ER conference and its associated workshops. Thanks are due to the chairs of the workshops, tutorials, panels, and posters and demonstrations, and the industry chair: Jean-Luc Hainaut, Elke Rundensteiner, Sven Hartmann, Alberto Laender, John Roddick, Leszek Maciaszek, and John Grundy, whose efforts contributed to the creation of an attractive program at a very high quality level. We would like to express our thanks to the local organizers Gill Dobbie and Patricia Rood and their collaborators, without whom this conference would not have come to life. Thanks are also due to Tok Wang Ling and Steve Liddle, who supported the conference from the steering committee. Finally, we offer our special thanks to our publicity chair and webmaster Markus Kirchberg, who maintained the conference website and the conference reviewing system, took care of all communication with the public, the program committee members and authors, and finally composed this proceedings volume as well as all other documentation associated with the conference.

November 2007

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Modeling Workflow Patterns from First Principles

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Abstract. We propose a small set of parameterized abstract models for workflow patterns, starting from first principles for sequential and distributed control. Appropriate instantiations yield the 43 workflow patterns that have been listed recently by the Business Process Modeling Center. The resulting structural classification of those patterns into eight basic categories, four for sequential and four for parallel workflows, provides a semantical foundation for a rational evaluation of workflow patterns.

1 Introduction

In [3] we have provided Abstract State Machine (ASM) models for the 43 workflow pattern descriptions that have been presented recently in [8] by the Business Process Modeling Center. Our goal there was to make the underlying relevant questions and implicit parameters explicit and to turn the patterns into a precise and truly abstract form. To easen the validation of these ASM ground models, in the sense defined in [1], we esssentially followed the order of presentation adopted in [8] and only hinted at the most obvious streamlining the ASM models offer for the classification presented in [8].

In this paper we revisit those workflow pattern ASMs and define eight basic workflow patterns, four for sequential and four for distributed control, from which all the other patterns can be derived by parameter instantiation.[1] This provides a conceptual basis for a rational workflow pattern classification that can replace the partly repetitive listing presented in [8].

We use again the ASM method to provide a high-level, both state-based and process-oriented view of workflow patterns. This provides a solid semantic foundation for reasoning about workflow functionality. In the ASM models the behavioral interface is defined through actions performed with the help of submachines that remain largely abstract. The parameterization exploits the possibility the ASM method offers the specifier to build 'models with holes', that is to leave

[1] We omit here the four so-called State-Based Patterns in [10], which concern "business scenarios where an explicit notion of state is required" and are only loosely connected to workFLOW. Exploiting the most general character of the ASM notion of state, these four state-based patterns can be expressed by rather simple ASMs.

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