Foundations of Component-Based Systems Workshop

Proceedings, Zurich, Switzerland
September 26, 1997

Gary T. Leavens and Murali Sitaraman (editors)

Copyright © 1997 each paper's copyright is held by its author.

Table of Contents

Preface vii
Gary T. Leavens, *Iowa State University*
Murali Sitaraman, *West Virginia University*

Extending the applicability of formal verification techniques 1
Dean Allemang, *Organon Motives, Inc.*

Specifying Dynamism in Software Architectures 11
Robert Allen, *Carnegie Mellon University*
Rémi Douence, *Carnegie Mellon University and INRIA*
David Garlan, *Carnegie Mellon University*

Towards a Model For Composed Extensible Components 23
Uwe Assmann, *Universität Karlsruhe*
Rainer Schmidt, *FZI Karlsruhe*

Context Sensitivity and Ambiguity in Component-based System Design 31
Stephen J. Bespalko, *Sandia National Laboratories*
Alexander Sindt, *Sandia National Laboratories*

A Plea for Grey-Box Components 39
Martin Büchi, *Turku Centre for Computer Science*
Wolfgang Weck, *Turku Centre for Computer Science*

On the Composition and Extension of Software Components 50
Carlos Canal, *University of Málaga*
Ernesto Pimentel, *University of Málaga*
José M. Troya, *University of Málaga*

Specifying component-based software architectures 60
P. Ciancarini, *University of Bologna*
S. Cimato, *University of Bologna*

An Extension of Logical Formalisms to Simulate System Behaviors 71
Alain Cougoulic, *France Télécom*

Automated Analysis of Software Frameworks 81
Matthew B. Dwyer, *Kansas State University*

Reuse by Contract 91
Bernd Fischer, *Technische Universität Braunschweig*
Gregor Snelting, *Technische Universität Braunschweig*

The Convenience for a Notation to Express Non-Functional Characteristics of Software Components 101
Xavier Franch, *Universitat Politècnica de Catalunya*

Semantic Spaces for Specifications and Templates 111
David S. Gibson, *The Ohio State University*
Bruce W. Weide, *The Ohio State University*

Invariants as Design Templates in Object-based Systems 121
S.J. Goldsack, *Imperial College of Science, Technology and Medicine*
K. Lano, *Imperial College of Science, Technology and Medicine*
E. Dürr, *Utrecht University*

Formal Models of Process Components 131
Peter Henderson, *University of Southampton*

Monotonicity and Lattices as a Foundation of Component-Based Systems 141
Philipp Heuberger, *Turku Centre for Computer Science and Åbo Akademi*

Interactive Animation needs Components 151
C. Huizing, *Eindhoven University of Technology*
B. Barenbrug, *Eindhoven University of Technology*

An Approach to an RM-ODP Toolkit in Z 156
D. Randolph Johnson, *National Security Agency*
Haim Kilov, *IBM and Merrill Lynch*

Composition of Reactive System Components 168
K. Lano, *Imperial College*
J. Bicarregui, *Imperial College*
T. Maibaum, *Imperial College*
J. Fiadeiro, *University of Lisbon*

Towards a formal composition language 178
Markus Lumpe, *University of Berne*
Jean-Guy Schneider, *University of Berne*
Oscar Nierstrasz, *University of Berne*
Franz Achermann, *University of Berne*

Developing Provably Correct Programs From Object-Oriented Components 188
Peter Müller, *Fernuniversität*
Arnd Poetzsch-Heffter, *Fernuniversität*

Architectural Issues in Component-Based Software Engineering 198
Michael D. Rice, *Wesleyan University*
Stephen B. Seidman, *Colorado State University*

Component-based systems, composite applications and workflow-management 206
Rainer Schmidt, *FZI Karlsruhe*

Interface Consistency 215
Jørgen Staunstrup, *Technical University of Denmark*

Architectural Jigsaw Patterns 221
Hongyan Sun, *Technical University of Denmark*
Anders P. Ravn, *Technical University of Denmark*

Validation and Verification of Timing Properties of an Architecturally Described System 231
Laurent Thomas, *THOMSON-CSF*

Testing Formal Methods 240
Jeffrey M. Voas, *Reliable Software Technologies*

Toward a Conceptual Foundation for Interoperation 246
Jack Wileden, *University of Massachusetts at Amherst*

Preface

This is the proceedings of the first workshop on *Foundations of Component-Based Systems*, September 26, 1997, held in Zurich, Switzerland. The workshop is affiliated with the *European Software Engineering Conference, ESEC 97*, and the *Fifth ACM SIGSOFT Symposium on the Foundations of Software Engineering, FSE 97*.

Papers in this proceedings are position papers, and are included here based on the reviews of the program committee. Our sincere thanks are due to the following individuals for their detailed and timely reviews:

Gary T. Leavens	Iowa State University, USA
Robyn Lutz	Iowa State University and NASA Jet Propulsion Laboratory, USA
Helen Gill	Defense Advanced Research Projects Agency, USA
Oscar Nierstrasz	University of Berne, Switzerland
Murali Sitaraman	West Virginia University, USA
Bruce W. Weide	The Ohio State University, USA

The objective of the workshop is to explore how formal (mathematical) techniques can be or should be used to establish a suitable foundation for component-based software engineering. It brings together

- researchers and practitioners in component-based software engineering who are interested in better theoretical foundations, and
- researchers and practitioners in formal methods who are interested in bridging the gap between principles and practice.

Our goal is to help make research in both areas more productive. For example, researchers in formal methods have only recently begun to study: object-oriented design, specification, verification, and architectural issues for component-based systems, but other issues are also important in the practice of component-based systems, such as: parameterization and inheritance, performance (time and space), reuse, software composition, and reducing evolution and maintenance costs. We hope to understand both the problems and how formal techniques may be useful in the solving them. The meeting is expected to result in: an outline of collaborative research topics and a list of areas for further exploration. This proceedings will also be available from our web site, at the following URL.

`http://www.cs.wvu.edu/~resolve/FoCBS/`

Following the workshop, we hope to explore other avenues for possible publication as well.

Thanks to Mehdi Jazayeri for helping with getting the workshop organized, and to Mehdi and Oscar Nierstrasz for helping us focus the workshop. Thanks to Oscar and Jean-Guy Schneider for helping with printing of this proceedings. Thanks to Martin Glinz for help with local arrangements.

Gary T. Leavens
Murali Sitaraman