

ADVANCES IN FORMAL METHODS

Software Engineering with OBJ

Algebraic Specification in Action

Edited by
Joseph A. Goguen and Grant Malcolm

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Software Engineering With Obj Algebraic Specification In Action

Peter Müller



Software Engineering With Obj Algebraic Specification In Action:

Software Engineering with OBJ Joseph A. Goguen, Grant Malcolm, 2013-11-11 Software Engineering with OBJ Algebraic Specification in Action is a comprehensive introduction to OBJ the most widely used algebraic specification system As a formal specification language OBJ makes specifications and designs more precise and easier to read as well as making maintenance easier and more accurate OBJ differs from most other specification languages not just in having a formal semantics but in being executable either through symbolic execution with term rewriting or more generally through theorem proving One problem with specifications is that they are often wrong OBJ can help validate specifications by executing test cases and by proving properties As well as providing a detailed introduction to the language and the OBJ system that implements it Software Engineering with OBJ Algebraic Specification in Action provides case studies by leading practitioners in the field in areas such as computer graphics standards hardware design and parallel computation The case studies demonstrate that OBJ can be used in a wide variety of ways to achieve a wide variety of practical aims in the system development process The papers on various OBJ systems also demonstrate that the language is relatively easy to understand implement and use and that it supports formal reasoning in a straightforward but powerful way Software Engineering with OBJ Algebraic Specification in Action will be of interest to students and teachers in the areas of data types programming languages semantics theorem proving and algebra as well as to researchers and practitioners in software engineering

Specification, Algebra, and Software Shusaku Iida, José Meseguer, Kazuhiro Ogata, 2014-03-01 This Festschrift volume published in honor of Kokichi Futatsugi contains 31 invited contributions from internationally leading researchers in formal methods and software engineering Prof Futatsugi is one of the founding fathers of the field of algebraic specification and verification and is a leading researcher in formal methods and software engineering He has pioneered and advanced novel algebraic methods and languages supporting them such as OBJ and CafeOBJ and has worked tirelessly over the years to bring such methods and tools in contact with software engineering practice This volume contains contributions from internationally leading researchers in formal methods and software engineering

Formal Methods and Software Engineering Jin Song Dong, Huibiao Zhu, 2010-10-29 Each paper was reviewed by at least three program committee members

Semantics and Algebraic Specification Jens Palsberg, 2009-08-28 This Festschrift volume published to honor Peter D Mosses on the occasion of his 60th birthday includes 17 invited chapters by many of Peter's coauthors collaborators close colleagues and former students Peter D Mosses is known for his many contributions in the area of formal program semantics In particular he developed action semantics a combination of denotational operational and algebraic semantics The presentations given on a symposium in his honor in Udine Italy on September 10 2009 were on subjects related to Peter's many technical contributions and they were a tribute to his lasting impact on the field Topics addressed by the papers are action semantics security policy design colored petri nets order sorted parameterization and induction object oriented action

semantics structural operational semantics model transformations the scheme programming language type checking action algebras and denotational semantics *Algebra, Meaning, and Computation* Kokichi Futatsugi, Jean-Pierre Jouannaud, José Meseguer, 2006-06-21 This volume honoring the computer science pioneer Joseph Goguen on his 65th Birthday includes 32 refereed papers by leading researchers in areas spanned by Goguen's work The papers address a variety of topics from meaning meta logic specification and composition behavior and formal languages as well as models deduction and computation by key members of the research community in computer science and other fields connected with Joseph Goguen's work *Models, Algebras and Logic of Engineering Software* Manfred Broy, Markus Pizka, 2003 This volume focuses on the education of researchers teachers students and practitioners As usual in engineering a study and application of the relevant branches of mathematics is crucial both in education and practice **Modular Specification and Verification of Object-Oriented Programs** Peter Müller, 2003-07-31 Software systems play an increasingly important role in modern societies Smart cards for personal identification e banking software controlled mechanical tools airbags in cars and autopilots for aircraft control are only some examples that illustrate how everyday life depends on the good behavior of software Consequently techniques and methods for the development of high quality dependable software systems are a central research topic in computer science A fundamental approach to this area is to use formal specification and verification Specification languages allow one to describe the crucial properties of software systems in an abstract mathematically precise and implementation independent way By formal verification one can then prove that an implementation really has the desired specified properties Although this formal methods approach has been a research topic for more than 30 years its practical success is still restricted to domains in which development costs are of minor importance Two aspects are crucial to widen the application area of formal methods Formal specification techniques have to be smoothly integrated into the software and program development process The techniques have to be applicable to reusable software components This way the quality gain can be exploited for more than one system thereby justifying the higher development costs Starting from these considerations Peter Muller has developed new techniques for the formal specification and verification of object oriented software The specification techniques are declarative and implementation independent They can be used for object oriented design and programming **Logic, Rewriting, and Concurrency** Narciso Martí-Oliet, Peter Csaba Ölveczky, Carolyn Talcott, 2015-08-26 This Festschrift volume contains 28 refereed papers including personal memories essays and regular research papers by close collaborators and friends of José Meseguer to honor him on the occasion of his 65th birthday These papers were presented at a symposium at the University of Illinois at Urbana Champaign on September 23-25 2015 The symposium also featured invited talks by Claude and Hilarie Kirchner and by Patrick Lincoln The foreword of this volume adds a brief overview of some of José's many scientific achievements followed by a bibliography of papers written by José

Rewriting Techniques and Applications Sophie Tison, 2003-08-02 This book constitutes the refereed proceedings of the

13th International Conference on Rewriting Techniques and Applications RTA 2002 held in Copenhagen Denmark in July 2002 The 20 regular papers two application papers and four system descriptions presented together with three invited contributions were carefully reviewed and selected from 49 submissions All current aspects of rewriting are addressed

Rewriting Logic and Its Applications Santiago Escobar, Narciso Martí-Oliet, 2020-12-10 This book constitutes selected papers from the 12th International Workshop on Rewriting Logic and Its Applications WRLA 2020 held in Dublin Ireland in April 2020 Due to the COVID 19 pandemic the workshop took place virtually The 11 full papers presented in this volume were carefully reviewed and selected from 16 submissions Rewriting logic is a natural model of computation and an expressive semantic framework for concurrency parallelism communication and interaction It can be used for specifying a wide range of systems and languages in various application fields

New Trends in Software Methodologies, Tools and Techniques Hamido Fujita, Paul Johannesson, 2003

Logic-Based Program Synthesis and Transformation Michael Hanus, 2009-03-04 This book constitutes the thoroughly refereed post conference proceedings of the 18th International Symposium on Logic Based Program Synthesis and Transformation LOPSTR 2008 held in Valencia Spain during July 17 18 2008 The 11 revised full papers presented together with one invited talk were carefully reviewed and selected for inclusion in the book LOPSTR traditionally solicits papers in the areas of specification synthesis verification transformation analysis optimization composition security reuse applications and tools component based software development software architectures agent based software development and program refinement

Logic Based Program Synthesis and Transformation Sandro Etalle, 2005-06-13 This volume contains a selection of the papers presented at LOPSTR 2004 the 14th International Symposium on Logic Based Program Synthesis and Transformation LOPSTR 2004 took place in Verona Italy and was co located with the International Static Analysis Symposium SAS 2004 the ACM SIGPLAN 2004 Workshop on Partial Evaluation and Semantics Based Program Manipulation PEPM 2004 and the 6th ACM SIGPLAN International Conference on Principles and Practice of Declarative Programming PPDP 2004

Conceptual Structures: Common Semantics for Sharing Knowledge Marie-Laure Mugnier, 2005-07-06 This book constitutes the refereed proceedings of the 13th International Conference on Conceptual Structures ICCS 2005 held in Kassel Germany in July 2005 The 23 revised full papers presented together with 9 invited papers were carefully reviewed and selected from 66 submissions The papers are organized in topical sections on theoretical foundations knowledge engineering and tools and knowledge acquisition and ontologies

Membrane Computing Giancarlo Mauri, Gheorghe Paun, Mario J. Pérez-Jiménez, Grzegorz Rozenberg, Arto Salomaa, 2008-01-04 This book constitutes the thoroughly refereed extended postproceedings of the 5th International Workshop on Membrane Computing WMC 2004 held in Milan Italy in June 2004 The 20 revised full papers presented together with 6 invited papers went through two rounds of reviewing and improvement All current topics in the area of membrane computing are addressed ranging from mathematics and theoretical computer science to applications in biology

linguistics and computer graphics Issues related to computational power and complexity classes new classes of P systems fuzzy approaches and reversibility and energy consumption are dealt with as well *Adapting Proofs-as-Programs* Iman Poernomo, John N. Crossley, Martin Wirsing, 2007-04-27 This monograph details several important advances in the direction of a practical proofs as programs paradigm which constitutes a set of approaches to developing programs from proofs in constructive logic with applications to industrial scale complex software engineering problems One of the books central themes is a general abstract framework for developing new systems of programs synthesis by adapting proofs as programs to new contexts

Algebraic Foundations of Systems Specification Egidio Astesiano, Hans-Jörg Kreowski, Bernd Krieg-Brückner, 2012-12-06 The aim of software engineering is the provision and investigation of methods for the development of software systems of high quality with correctness as a key issue A system is called correct if it does what one wants if it meets the requirements To achieve and to guarantee correct systems the need of formal methods with rigorous semantics and the possibility of verification is widely accepted Algebraic specification is a software engineering approach of this perspective When Liskov and Zilles Guttag and the ADJ group with Goguen Thatcher Wagner and Wright introduced the basic ideas of algebraic specification in the mid seventies in the U S A and Canada they initiated a very successful and still flourishing new area In the late seventies algebraic specification became a major research topic also in many European countries Originally the algebraic framework was intended for the mathematical foundation of abstract data types and the formal development of first order applicative programs Meanwhile the range of applications has been extended to the precise specification of complete software systems the uniform definition of syntax and semantics of programming languages and to the stepwise development of correct systems from the requirement definitions to the running programs The activities in the last 25 years have led to an abundance of concepts methods approaches theories languages and tools which are mathematically founded in universal algebra category theory and logic

Term Rewriting and Applications Jürgen Giesl, 2005-03-31 This volume contains the proceedings of the 16th International Conference on Rewriting Techniques and Applications RTA2005 which was held on April 19-21 2005 at the Nara Ken New Public Hall in the center of the Nara National Park in Nara Japan RTA is the major forum for the presentation of research on all aspects of rewriting Previous RTA conferences were held in Dijon 1985 Bordeaux 1987 Chapel Hill 1989 Como 1991 Montreal 1993 Kaiserslautern 1995 Rutgers 1996 Sitges 1997 Tsukuba 1998 Trento 1999 Norwich 2000 Utrecht 2001 Copenhagen 2002 Valencia 2003 and Aachen 2004 This year there were 79 submissions from 20 countries of which 31 papers were accepted for publication 29 regular papers and 2 system descriptions The submissions came from France 10 accepted papers of the 23 1 submitted papers USA 5 6 of 11 7 Japan 4 of 9 Spain 2 7 of 6 5 UK 2 7 of 4 7 The Netherlands 1 7 of 3 8 Germany 1 3 of 2 3 Austria 1 of 1 Poland 1 of 1 Israel 0 5 of 0 8 Denmark 0 5 of 0 5 China 0 of 4 Korea 0 of 4 Taiwan 0 of 1 3 Australia 0 of 1 Brazil 0 of 1 Russia 0 of 1 Switzerland 0 of 1 Sweden 0 of 1 and Italy 0 of 0 3 Each submission was assigned to at least three Program

Committee members who carefully reviewed the papers with the help of 111 external referees

Developments in Language Theory Masami Ito, Masafumi Toyama, 2003-08-02 The refereed proceedings of the 6th International Conference on Developments in Language Theory DLT 2002 held in Kyoto Japan in September 2002 The 28 revised full papers presented together with 8 invited papers were carefully reviewed and selected from 63 submissions Among the topics addressed are grammars and acceptors for strings graphs arrays etc efficient algorithms for languages combinatorial and algebraic properties of languages decision problems relations to complexity theory logic picture description and analysis DNA computing cryptography concurrency quantum computing and algebraic systems

Computer-Aided Reasoning Matt Kaufmann, Panagiotis Manolios, J Strother Moore, 2012-12-06 Computer Aided Reasoning An Approach is a textbook introduction to computer aided reasoning It can be used in graduate and upper division undergraduate courses on software engineering or formal methods It is also suitable in conjunction with other books in courses on hardware design discrete mathematics or theory especially courses stressing formalism rigor or mechanized support It is also appropriate for courses on artificial intelligence or automated reasoning and as a reference for business and industry Current hardware and software systems are often very complex and the trend is towards increased complexity Many of these systems are of critical importance therefore making sure that they behave as expected is also of critical importance By modeling computing systems mathematically we obtain models that we can prove behave correctly The complexity of computing systems makes such proofs very long complicated and error prone To further increase confidence in our reasoning we can use a computer program to check our proofs and even to automate some of their construction In this book we present A practical functional programming language closely related to Common Lisp which is used to define functions which can model computing systems and to make assertions about defined functions A formal logic in which defined functions correspond to axioms the logic is first order includes induction and allows us to prove theorems about the functions The computer aided reasoning system ACL2 which includes the programming language the logic and mechanical support for the proof process The ACL2 system has been successfully applied to projects of commercial interest including microprocessor modeling hardware verification microcode verification and software verification This book gives a methodology for modeling computing systems formally and for reasoning about those models with mechanized assistance The practicality of computer aided reasoning is further demonstrated in the companion book Computer Aided Reasoning ACL2 Case Studies Approximately 140 exercises are distributed throughout the book Additional material is freely available from the ACL2 home page on the Web including solutions to the exercises additional exercises case studies from the companion book research papers and the ACL2 system with detailed documentation

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