# Mathematics Of Software Construction

Ralf Hinze,Janis Voigtländer

**Mathematics Of Software Construction:**

**Mathematics of Software Construction** Allan Norcliffe,Gil Slater,1991 <u>Mathematics of Software Construction</u> Allan Norcliffe,Gil Slater,1991 <u>The Correctness-by-Construction Approach to Programming</u> Derrick G. Kourie,Bruce W. Watson,2012-04-12 The focus of this book is on bridging the gap between two extreme methods for developing software On the one hand there are texts and approaches that are so formal that they scare off all but the most dedicated theoretical computer scientists On the other there are some who believe that any measure of formality is a waste of time resulting in software that is developed by following gut feelings and intuitions Kourie and Watson advocate an approach known as correctness by construction a technique to derive algorithms that relies on formal theory but that requires such theory to be deployed in a very systematic and pragmatic way First they provide the key theoretical background like first order predicate logic or refinement laws that is needed to understand and apply the method They then detail a series of graded examples ranging from binary search to lattice cover graph construction and finite automata minimization in order to show how it can be applied to increasingly complex algorithmic problems The principal purpose of this book is to change the way software developers approach their task at programming in the small level with a view to improving code quality Thus it coheres with both the IEEE s Guide to the Software Engineering Body of Knowledge SWEBOK recommendations which identifies themes covered in this book as part of the software engineer s arsenal of tools and methods and with the goals of the Software Engineering Method and Theory SEMAT initiative which aims to refound software engineering based on a solid theory

**Mathematics of Program Construction** ,1994 **Mathematical Software** John R. Rice,2014-05-27 Mathematical Software deals with software designed for mathematical applications such as Fortran CADRE SQUARS and DESUB The distribution and sources of mathematical software are discussed along with number representation and significance monitoring User modifiable software and non standard arithmetic programs are also considered Comprised of nine chapters this volume begins with a historical background in the form of a chronological list of events that trace the development of computing in general and mathematical software in particular The next chapter examines where and how mathematical software is being created and how it is being disseminated to eventual consumers A number of important shortcomings are identified The future of mathematical software and the challenges facing mathematical software are then discussed Subsequent chapters focus on the point of view of people outside the professional community of mathematical software the monitoring of significance in computation and its relation to number representation libraries of mathematical software and the automation of numerical analysis Eleven algorithms for numerical quadrature are also compared This book should be of considerable interest to students and specialists in the fields of mathematics and computer science *Mathematical Software - ICMS 2006* Andres Iglesias,Nobuki Takayama,2006-08-24 This book constitutes the refereed proceedings of the Second International Congress on Mathematical Software ICMS 2006 The book presents 45 revised full papers carefully

reviewed and selected for presentation The papers are organized in topical sections on new developments in computer algebra packages interfacing computer algebra in mathematical visualization software for algebraic geometry and related topics number theoretical software methods in computational number theory free software for computer algebra and general issues **Software Essentials** Adair Dingle,2014-07-07 Winner of a 2015 Alpha Sigma Nu Book Award Software Essentials Design and Construction explicitly defines and illustrates the basic elements of software design and construction providing a solid understanding of control flow abstract data types ADTs memory type relationships and dynamic behavior This text evaluates the benefits and overhe *Mathematics of Program Construction* Graham Hutton,2019-10-19 This book constitutes the refereed proceedings of the 13th International Conference on Mathematics of Program Construction MPC 2019 held in Porto Portugal in October 2019 The 15 revised full papers presented together with an invited paper were carefully reviewed and selected from 22 submissions The papers deal with mathematical principles and techniques for constructing computer programs They range from algorithmics to support for program construction in programming languages and systems Some typical areas are type systems program analysis and transformation programming language semantics security and program logics Program Construction Roland Backhouse,2003-05-07 Unique approach tackles what most books don t why maths and logic are fundamental tools for a programmer This comprehensive guide is a balanced combination of mathematical theory and the practice of programming Straightforward presentation of construction principles inlcuding assignment axiom sequential composition case analysis use of invariants and bound functions Includes a wide range of entertaining and challenging examples and exercises *Mathematics of Program Construction* Bernhard Möller,1995-07-10 This volume constitutes the proceedings of the Third International Conference on the Mathematics of Program Construction held at Kloster Irsee Germany in July 1995 Besides five invited lectures by distinguished researchers there are presented 19 full revised papers selected from a total of 58 submissions The general theme is the use of crisp clear mathematics in the discovery and design of algorithms and in the development of corresponding software and hardware among the topics addressed are program transformation program analysis program verification as well as convincing case studies Mathematics of Program Construction Ralf Hinze,Janis Voigtländer,2015 This book constitutes the refereed proceedings of the 12th International Conference on Mathematics of Program Construction MPC 2015 held in K nigswinter Germany in June July 2015 The 15 revised full papers presented together with two invited talks were carefully reviewed and selected from 20 submissions The papers are about mathematical methods and tools put to use in program construction They range from algorithmics to support for program construction in programming languages and systems Some typical areas are type systems program analysis and transformation programming language semantics security and program logics Mathematical Software Arjeh M. Cohen,Xiao-Shan Gao,Nobuki Takayama,2002 Annotation The advent of mathematical software has been one of the most important events in mathematics Mathematical software systems are used to construct

examples to prove theorems and to find new mathematical phenomena On the other hand mathematical research often motivates developments of new algorithms and new systems Mathematical software systems rely on the cooperation of mathematicians designers of algorithms and mathematical programmers This book is aimed at software developers in mathematics and programming mathematicians but it also provides opportunities to discuss the topics with mathematicians

  *Software Development and Reality Construction* Christiane Floyd,Heinz Züllighoven,Reinhard Budde,Reinhard Keil-Slawik,2012-12-06 The present book is based on the conference Software Development and Reality Construction held at SchloB Eringerfeld in Germany September 25 30 1988 This was organized by the Technical University of Berlin TUB in cooperation with the German National Research Center for Computer Science GMD Sankt Augustin and sponsored by the Volkswagen Foundation whose financial support we gratefully acknowledge The conference was an interdisciplinary scientific and cultural event aimed at promoting discussion on the nature of computer science as a scientific discipline and on the theoretical foundations and systemic practice required for human oriented system design In keeping with the conversational style of the conference the book comprises a series of individual contributions arranged so as to form a coherent whole Some authors reflect on their practice in computer science and system design Others start from approaches developed in the humanities and the social sciences for understanding human learning and creativity individual and cooperative work and the interrelation between technology and organizations Thus each contribution makes its specific point and can be read on its own merit But at the same time it takes its place as a chapter in the book along with all the other contributions to give what seemed to us a meaningful overall line of argumentation This required careful editorial coordination and we are grateful to all the authors for bearing with us throughout the slow genesis of the book and for complying with our requests for extensive revision of some of the manuscripts    **Software Engineering Mathematics** Janet Woodcock,2014 This book makes the mathematical basis of formal methods accessible both to the student and to the professional It is motivated in the later chapters by examples and exercises Throughout the premise is that mathematics is as essential to design and construction in software engineering as it is to other engineering disciplines The exercises range from simple drills intended to provide familiarity with concepts and notation to advanced material The first four chapters of the book are devoted to foundations with an introduction to formal systems then the propositional and predicate calculi concluding with a chapter on theories in general The second part of the book builds upon the foundations by covering in detail the theory of sets relations functions and sequences The mathematical data types then presented are powerful enough to describe many aspects of software systems and small case studies are included as examples of their use in the modelling of software a configuration manager a storage allocator and a simple backing store interface The concrete syntax of the Z notation has been adopted The third part of the book presents two detailed case studies in the use of mathematics in software engineering The first is the specification of the behaviour of a telephone exchange and the second illustrates the

importance of the development of a mathematical theory in gaining an understanding of a system Both case studies stress the roles of modelling and of proof in the construction of specifications The final part describes the algebraic approach to specification and then summarizes and compares the various formal techniques **Mathematics of Program Construction** Graham Hutton,2019-10-20 This book constitutes the refereed proceedings of the 13th International Conference on Mathematics of Program Construction MPC 2019 held in Porto Portugal in October 2019 The 15 revised full papers presented together with an invited paper were carefully reviewed and selected from 22 submissions The papers deal with mathematical principles and techniques for constructing computer programs They range from algorithmics to support for program construction in programming languages and systems Some typical areas are type systems program analysis and transformation programming language semantics security and program logics *Mathematics of Program Construction* Johan Jeuring,1998-05-27 This book consitutes the refereed proceedings of the 4th International Conference on Mathematics of Program Construction MPC 98 held in Marstrand near Goteborg Sweden in June 1998 The 17 revised full papers presented were selected from 57 submissions also included are three invited contributions The volume is devoted to the use of crisp clear mathematics in the discovery and design of algorithms and in the development of corresponding software and hardware varoius approaches to formal methods for systems design and analysis are covered *Rigorous Methods for Software Construction and Analysis* Jean-Raymond Abrial,Uwe Glässer,2009 This Festschrift volume published in honor of Egon B rger contains 14 papers from a Dagstuhl Seminar which was organized as a Festkolloquium on the occasion of his 60th birthday in May 2006 Focusing on applied formal methods the volume covers a wide range of applied research spanning from theoretical and methodological foundations to practical applications of Abstract State Machines B and beyond emphasizing universal methods and tools that regardless of their applicational orientation are still committed to the ideal of mathematical rigor In particular the papers address the following central topics methodological foundations of requirements specification and verification characterization of specification languages and their logical foundations advanced tool environments and systematic integration of tools machine assisted validation and verification distributed algorithms and concurrent protocols novel applications in public safety security and privacy industrial case studies and experience reports and the role of formal methods in computer science education **Mathematics of Models** Hubert Brian Griffiths,Adrian James Oldknow,1993 **Mathematics of Program Construction** Jan L.A. van de Snepscheut,1989-06-07 The papers included in this volume were presented at the Conference on Mathematics of Program Construction held from June 26 to 30 1989 The conference was organized by the Department of Computing Science Groningen University The Netherlands at the occasion of the University s 375th anniversary The creative inspiration of the modern computer has led to the development of new mathematics the mathematics of program construction Initially concerned with the posterior verification of computer programs the mathematics have now matured to the point where they are actively being used for the discovery of elegant

solutions to new programming problems Initially concerned specifically with imperative programming the application of mathematical methodologies is now established as an essential part of all programming paradigms functional logic and object oriented programming modularity and type structure etc Initially concerned with software only the mathematics are also finding fruit in hardware design so that the traditional boundaries between the two disciplines have become blurred The varieties of mathematics of program construction are wide ranging They include calculi for the specification of sequential and concurrent programs program transformation and analysis methodologies and formal inference systems for the construction and analysis of programs The mathematics of specification implementation and analysis have become indispensable tools for practical programming     Tools and Algorithms for the Construction and Analysis of Systems Hubert Garavel,John Hatcliff,2003-07-01 This book constitutes the refereed proceedings of the 9th International Conference on Tools and Algorithms for the Construction and Analysis of Systems TACAS 2003 held in Warsaw Poland in April 2003 The 43 revised full papers presented were carefully reviewed and selected from 160 submissions The papers are organized in topical sections on bounded model checking and SAT based methods mu calculus and temporal logics verification of parameterized systems abstractions and counterexamples real time and scheduling security and cryptography modules and compositional verification symbolic state spaces and decision diagrams performance and mobility state space reductions constraint solving and decision procedures and testing and verification

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