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# Formal Methods Teaching

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Proceedings



 Springer

# Teaching Formal Methods

**Jeremy Gibbons, Jose Nuno Oliveira**



## **Teaching Formal Methods:**

**Teaching Formal Methods** Jeremy Gibbons, Jose Nuno Oliveira, 2009-10-26 This volume contains the proceedings of TFM2009 the Second International FME Conference on Teaching Formal Methods organized by the Subgroup of Education of the Formal Methods Europe FME association The conference took place as part of the first Formal Methods Week FMWeek held in Eindhoven The Netherlands in November 2009 TFM2009 was a one day forum in which to explore the successes and failures of formal method FM education and to promote cooperative projects to further education and training in FMs The organizers gathered lecturers teachers and industrial partners to discuss their experience present their pedagogical methodologies and explore best practices Interest in FM teaching is growing TFM2009 followed in a series of events on teaching FMs which includes two BCS FACS TFM workshops Oxford in 2003 and London in 2006 the TFM2004 conference Ghent 2004 with proceedings published as Springer LNCS Volume 3294 the FM Ed 2006 workshop Hamilton co located with FM2006 FORMED Budapest at ETAPS2008 and FMET2008 Kitakyushu co located with ICFEM2008 FMs have an important role to play in the development of complex computing systems a role acknowledged in industrial standards such as IEC61508 and ISO IEC15408 and in the increasing use of precise modelling notations semantic markup languages and model driven techniques There is a growing need for software engineers who can work effectively with simple mathematical abstractions and with practical notions of inference and proof

**Teaching Formal Methods** Jeremy Gibbons, Jose Nuno Oliveira, 2009-10-26 This book constitutes the refereed proceedings of the TFM 2009 held in Eindhoven The Netherlands in November 2009 The 10 revised full papers presented together with an abstracts of invited talk were carefully reviewed and selected from 19 submissions The papers presented explore the experiences of teaching FMs both successful and unsuccessful educational resources including the use of books case studies and the internet the education of weak and mathphobic students the integration or otherwise of FMs into the curriculum including contributions to the definition of a Formal Methods Body of Knowledge FMBOK the advantages of FM trained graduates in the workplace changing attitudes towards FMs in students academic staff and practitioners and the necessary mathematical background

**Formal Methods Teaching** João F. Ferreira, Alexandra Mendes, Claudio Menghi, 2021-11-23 This book constitutes the refereed proceedings of the 4th International Workshop and Tutorial FMTea 2021 Held as Part of the 4th World Congress on Formal Methods FM 2021 as a virtual event in November 2021 The 8 full papers presented together with 2 short papers were carefully reviewed and selected from 12 submissions The papers are organized in topical sections named experiences and proposals related with online FM learning and teaching integrating embedding FM teaching thinking within other computer science courses teaching FM for industry and innovative learning and teaching methods for FM

**Formal Methods Teaching** Emil Sekerinski, Leila Ribeiro, 2024-09-04 This book constitutes the proceedings of the 6th International Workshop on Formal Methods Teaching FMTea 2024 which was held in Milan Italy on September 10 2024 The 7 full papers included in these proceedings were carefully reviewed and selected from

9 submissions The book also contains one invited talk in full paper length The papers focus on learning formal methods for the purpose of teaching and self learning      **Teaching Formal Methods** C. Neville Dean,Raymond T. Boute,2004-11-17 This book constitutes the refereed proceedings of the CoLogNet FME Symposium on Teaching Formal Methods TFM 2004 held in Ghent Belgium in November 2004 The 15 revised full papers presented together with an invited paper and 2 abstracts of invited talks were carefully reviewed and selected from numerous submissions The papers presented explore the failures and successes of formal methods education consider how the failures might be resolved evaluate how to learn from the successes and attempt promoting cooperative projects to further the teaching and learning and the usage and acceptance of formal methods      **Formal Methods Teaching** Brijesh Dongol,Luigia Petre,Graeme Smith,2019-09-23 This book constitutes the refereed proceedings of the Third International Workshop and Tutorial FMTea 2019 Held as Part of the Third World Congress on Formal Methods FM 2019 Porto Portugal October 2019 The 14 full papers presented together with 3 abstract papers were carefully reviewed and selected from 22 submissions The papers are organized in topical sections named Tutorial lectures Teaching Program Verification Teaching Program Development and Effective Teaching Techniques      Teaching and Learning Formal Methods C. Neville Dean,Michael G. Hinchey,1996-09-17 As computer systems continue to advance the positions they hold in human society continue to gain power Computers now control the flight of aircraft the cooling systems in chemical plants and feedback loops in nuclear reactors Because of the vital roles these systems play there has been growing concern about the reliability and safety of these advanced computers Formal methods are now widely recognized as the most successful means of assuring the reliability of complex computer systems Because formal methods are being mandated in more and more international standards it is critical that engineers managers and industrial project leaders are well trained and conversant in the application of these methods This book covers a broad range of issues relating to the pedagogy of formal methods The contributors all acknowledged experts have based their contributions on extensive experiences teaching and applying formal methods in both academia and industry The two editors both well known in this area propose various techniques that can help to dismiss myths that formal methods are difficult to use and hard to learn Teaching and Learning Formal Methods will be an indispensable text for educators in the fields of computer science mathematics software engineering and electronic engineering as well as to management and product leaders concerned with training recent graduates Offers proven methods for teaching formal methods even to students who lack a strong background in mathematics Addresses the important role that formal methods play in society and considers their growing future potential Includes contributions from several pioneers in the area Features a foreword written by Edsger W Dijkstra      *Formal Methods Teaching* Catherine Dubois,Pierluigi San Pietro,2023-03-08 This book constitutes the proceedings of the 5th International Workshop on Formal Methods Teaching FMTea 2023 which was held in L beck Germany in March 2023 The 7 full papers presented in this volume were carefully reviewed and selected from 10 submissions FMTea 2023 aim is to support

a worldwide improvement in learning Formal Methods mainly by teaching but also via self learning **Formal Methods – Fun for Everybody** Antonio Cerone, Markus Roggenbach, 2021-03-10 This volume constitutes the post workshop proceedings of the First International Workshop on Formal Methods Fun for Everybody FMFun 2019 held in Bergen Norway in December 2019 The 7 revised full papers and 2 revised short papers presented in this volume were carefully reviewed and selected from 15 submissions A white paper and two keynote papers are also included The papers explore ways of utilizing the pathway to transforming and spreading formal methods The vision of this workshop series is that formal methods ought to be taught in such a way that every student can have fun with it **Teaching Formal Methods** C. Neville Dean, Raymond T. Boute, 2014-03-12 Professional engineers can often be distinguished from other designers by the engineers ability to use mathematical models to describe and 1 analyze their products This observation by Parnas describes the de facto professional standards in all classical engineering disciplines civil mechanical electrical etc Unfortunately it is in sharp contrast with current industrial practice in software design where mathematical models are hardly used at all even by those who 2 in Holloway s words aspire to be engineers The rare exceptions are certain critical applications where mathematical techniques are used under the general name formal methods Yet the same characteristics that make formal methods a necessity in critical applications make them also advantageous in everyday software design at various levels from design efficiency to software quality Why then is education failing with respect to formal methods failing to convince students academics and practitioners alike that formal methods are truly pragmatic failing to overcome a phobia of formality and mathematics failing to provide students with the basic skills and understanding required to adopt more mathematical and logical approach to software development Until education takes these failings seriously formal methods will be an obscure byway in software engineering which in turn will remain severely impoverished as a result

**Leveraging Applications of Formal Methods, Verification and Validation** Tiziana Margaria, Bernhard Steffen, 2008-11-05 This volume contains the conference proceedings of ISO/LA 2008 the Third International Symposium on Leveraging Applications of Formal Methods Verification and Validation which was held in Porto Sani Kassandra Chalkidiki Greece during October 13 15 2008 sponsored by EASST and in cooperation with the IEEE Technical Committee on Complex Systems Following the tradition of its forerunners in 2004 and 2006 in Cyprus and the ISO/LA Workshops in Greenbelt USA in 2005 and in Poitiers France in 2007 ISO/LA 2008 provided a forum for developers users and researchers to discuss issues related to the adoption and use of rigorous tools and methods for the specification analysis verification certification construction test and maintenance of systems from the point of view of their different application domains Thus the ISO/LA series of events serves the purpose of bridging the gap between designers and developers of rigorous tools and users in engineering and in other disciplines and to foster and exploit synergetic relationships among scientists engineers software developers decision makers and other critical thinkers in companies and organizations In particular by providing a venue for

the discussion of common problems requirements algorithms methodologies and practices ISoLA aims at supporting researchers in their quest to improve the utility reliability flexibility and efficiency of tools for building systems and users in their search for adequate solutions to their problems

**NASA Formal Methods** Jyotirmoy V. Deshmukh, Klaus Havelund, Ivan Perez, 2022-05-19 This book constitutes the proceedings of the 14th International Symposium on NASA Formal Methods NFM 2022 held in Pasadena USA during May 24 27 2022 The 33 full and 6 short papers presented in this volume were carefully reviewed and selected from 118 submissions The volume also contains 6 invited papers The papers deal with advances in formal methods formal methods techniques and formal methods in practice The focus on topics such as interactive and automated theorem proving SMT and SAT solving model checking use of machine learning and probabilistic reasoning in formal methods formal methods and graphical modeling languages such as SysML or UML usability of formal method tools and application in industry etc

**Formal Methods for Industrial Critical Systems** Alberto Lluch Lafuente, Anastasia Mavridou, 2021-08-19 This book constitutes the proceedings of the 26th International Workshop on Formal Methods for Industrial Critical Systems FMICS 2021 which was held during August 24 26 2021 The conference was planned to take place in Paris France Due to the COVID 19 pandemic it changed to a virtual event The 10 full papers and 6 short papers presented in this volume were carefully reviewed and selected from 31 submissions The papers are organized in topical sections as follows Verification Program Safety and Education Event B Modeling and Validation Formal Analysis Tools Test Generation and Probabilistic Verification

**Formal Methods in Architecture** Plácido Lizancos Mora, David Leite Viana, Franklim Morais, Jorge Vieira Vaz, 2023-09-02 This book comprises the select proceedings of the 6th International Symposium on Formal Methods in Architecture 6FMA A Coruña 2022 The contents focus on the use of methodologies especially those that have witnessed recent developments stemming from mathematical and computer sciences and are developed in a collaborative way with architecture and related fields This book constitutes a contribution to the debate and to the introduction of new methodologies and tools in the mentioned fields that derive from the application of formal methods in the creation of new explicit languages for problem solving in architecture and urbanism Some of the themes in the book are CAD and BIM mixed realities photogrammetry and 3D scan architectural design automation urban and building performance analysis SCAVA space configuration accessibility and visibility analysis This book proves a valuable resource for those in academia and industry

**Software Engineering and Formal Methods** Dimitra Giannakopoulou, Gwen Salaün, 2014-08-04 This book constitutes the refereed proceedings of the 12th International Conference on Software Engineering and Formal Methods SEFM 2014 held in Grenoble France in September 2014 The 23 full papers presented together with 3 invited and 6 tool papers were carefully reviewed and selected from 106 submissions They are organized in topical section on program verification testing component based systems real time and embedded systems model checking and automata learning program correctness and adaptive and multi agent systems

**Software Engineering and Formal**

**Methods** Domenico Bianculli,Radu Calinescu,Bernhard Rumpe,2016-01-11 This book constitutes revised selected papers from the workshopscollocated with the SEFM 2015 conference on Software Engineering andFormal Methods held in York UK in September 2015 The 25 papers included in this volume were carefully reviewed and selected from 32 submissions The satellite workshops provided a highly interactive and collaborative environment for researchers and practitioners from industry and academia to discuss emerging areas of software engineering and formal methods The four workshops were ATSE 2015 The 6th Workshop on Automating Test Case Design Selection and Evaluation HOFM 2015 The 2nd Human Oriented Formal Methods Workshop MoKMaSD 2015 The 4th International Symposium on Modelling and Knowledge Management Applications Systems and Domains VERY SCART 2015 The 1st International Workshop on the Art of Service Composition and Formal Verification for Self Systems     *Theories of Programming and Formal Methods* Jonathan P. Bowen,Qin Li,Qiwen Xu,2023-09-07 This Festschrift volume dedicated to Jifeng He on the occasion of his 80th birthday includes refereed papers by leading researchers many of them current and former colleagues presented at a dedicated celebration in the Shanghai Science Hall in September 2023 Jifeng was an important researcher on the European ESPRIT ProCoS project and the Working Group on Provably Correct Systems subsequently he collaborated with Tony Hoare on Unifying Theories of Programming Jifeng returned to China in 1998 first to the United Nations University in Macau and then to the East China Normal University in Shanghai He has since founded an Artificial Intelligence research institute that focuses on the application of technology in large scale industrial software systems His scientific contributions have been recognized through his election to membership of the Chinese Academy of Sciences The first paper in the volume provides an overview of Jifeng s research contributions especially in the area of formal methods and the following two papers detail developments in UTP and rCOS refinement calculus of object systems In the next two sections of the book the editors included papers by colleagues and coauthors of Jifeng while he was at the University of Oxford and engaged with the European ProCoS project The section that follows includes papers authored by colleagues from his later research in China and Europe The final section includes a paper related to Jifeng s recent roadmap for UTP     FM 2014: Formal Methods Cliff Jones,Pekka Pihlajasaari,Jun Sun,2014-04-18 This book constitutes the refereed proceedings of the 19th International Symposium on Formal Methods FM 2014 held in Singapore May 2014 The 45 papers presented together with 3 invited talks were carefully reviewed and selected from 150 submissions The focus of the papers is on the following topics Interdisciplinary Formal Methods Practical Applications of Formal Methods in Industrial and Research Settings Experimental Validation of Tools and Methods as well as Construction and Evolution of Formal Methods Tools     **Formal Methods. FM 2019 International Workshops** Emil Sekerinski,Nelma Moreira,José N. Oliveira,Daniel Ratiu,Riccardo Guidotti,Marie Farrell,Matt Luckcuck,Diego Marmsoler,José Campos,Troy Astarte,Laure Gonnord,Antonio Cerone,Luis Couto,Brijesh Dongol,Martin Kutrib,Pedro Monteiro,David Delmas,2020-08-10 This book constitutes the refereed proceedings of the

workshops which complemented the 23rd Symposium on Formal Methods FM 2019 held in Porto Portugal in October 2019 This volume presents the papers that have been accepted for the following workshops Third Workshop on Practical Formal Verification for Software Dependability AFFORD 2019 8th International Symposium From Data to Models and Back DataMod 2019 First Formal Methods for Autonomous Systems Workshop FMAS 2019 First Workshop on Formal Methods for Blockchains FMBC 2019 8th International Workshop on Formal Methods for Interactive Systems FMIS 2019 First History of Formal Methods Workshop HFM 2019 8th International Workshop on Numerical and Symbolic Abstract Domains NSAD 2019 9th International Workshop on Open Community Approaches to Education Research and Technology OpenCERT 2019 17th Overture Workshop Overture 2019 19th Refinement Workshop Refine 2019 First International Workshop on Reversibility in Programming Languages and Automata RPLA 2019 10th International Workshop on Static Analysis and Systems Biology SASB 2019 and the 10th Workshop on Tools for Automatic Program Analysis TAPAS 2019

**Formal Methods for Industrial Critical Systems** María Alpuente, Byron Cook, Christophe Joubert, 2009-11-03 This book constitutes the proceedings of the 14th International Workshop on Formal Methods for Industrial Critical Systems FMICS 2009 held in Eindhoven The Netherlands in November 2009 The 10 papers presented were carefully reviewed and selected from 25 submissions The volume also contains with 4 invited papers and 6 posters The aim of the FMICS workshop series is to provide a forum for researchers who are interested in the development and application of formal methods in industry It also strives to promote research and development for the improvement of formal methods and tools for industrial applications



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