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Model Checking, second edition *2018-12-04*

an expanded and updated edition of a comprehensive presentation of the theory and practice of model checking a technology that automates the analysis of complex systems model checking is a verification technology that provides an algorithmic means of determining whether an abstract model representing for example a hardware or software design satisfies a formal specification expressed as a temporal logic formula if the specification is not satisfied the method identifies a counterexample execution that shows the source of the problem today many major hardware and software companies use model checking in practice for verification of vlsi circuits communication protocols software device drivers real time embedded systems and security algorithms this book offers a comprehensive presentation of the theory and practice of model checking covering the foundations of the key algorithms in depth the field of model checking has grown dramatically since the publication of the first edition in 1999 and this second edition reflects the advances in the field reorganized expanded and updated the new edition retains the focus on the foundations of temporal logic model while offering new chapters that cover topics that did not exist in 1999 propositional satisfiability sat based model checking counterexample guided abstraction refinement and software model checking the book serves as an introduction to the field suitable for classroom use and as an essential guide for researchers

Principles of Model Checking *2008-04-25*

a comprehensive introduction to the foundations of model checking a fully automated technique for finding flaws in hardware and software with extensive examples and both practical and theoretical exercises our growing dependence on increasingly complex computer and software systems necessitates the development of formalisms techniques and tools for assessing functional properties of these systems one such technique that has emerged in the last twenty years is model checking which systematically and automatically checks whether a model of a given system satisfies a desired property such as deadlock freedom invariants and request response properties this automated technique for verification and debugging has developed into a mature and widely used approach with many applications principles of model checking offers a comprehensive introduction to model checking that is not only a text suitable for classroom use but also a valuable reference for researchers and practitioners in the field the book begins with the basic principles for modeling concurrent and communicating systems introduces different classes of properties including safety and liveness presents the notion of fairness and provides automata based algorithms for these properties it introduces the temporal logics ltl and ctl compares them and covers algorithms for verifying these logics discussing real time systems as well as systems subject to random phenomena separate chapters treat such efficiency improving techniques as abstraction and symbolic manipulation the book includes an extensive set of examples most of which run through several chapters and a complete set of basic results accompanied by detailed proofs each chapter concludes with a summary bibliographic notes and an extensive list of exercises of both practical and theoretical nature

Model Checking, second edition *2018-12-04*

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Systems and Software Verification *2013-04-17*

model checking is a powerful approach for the formal verification of software it automatically provides complete proofs of correctness or explains via counter examples why a system is not correct here the author provides a well written and basic introduction to the new technique the first part describes in simple terms the theoretical basis of model checking transition systems as a formal model of systems temporal logic as a formal language for behavioral properties and model checking algorithms the second part explains how to write rich and structured temporal logic specifications in practice while the third part surveys some of the major model checkers available

Handbook of Model Checking *2018-05-18*

model checking is a computer assisted method for the analysis of dynamical systems that can be modeled by state transition systems drawing from research traditions in mathematical logic programming languages hardware design and theoretical computer science model checking is now widely used for the verification of hardware and software in industry the editors and authors of this handbook are among the world s leading researchers in this domain and the 32 contributed chapters present a thorough view of the origin theory and application of model checking in particular the editors classify the advances in this domain and the chapters of the handbook in terms of two recurrent themes that have driven much of the research agenda the algorithmic challenge that is designing model checking algorithms that scale to real life problems and the modeling challenge that is extending the formalism beyond kripke structures and temporal logic the book will be valuable for researchers and graduate students engaged with the development of formal methods and verification tools

25 Years of Model Checking *2008-06-17*

this festschrift volume published in celebration of the 25th anniversary of model checking features papers based on talks at the symposium 25 years of model checking 25mc which was part of the 18th international conference on computer aided verification

Symbolic Model Checking *2012-12-06*

formal verification means having a mathematical model of a system a language for specifying desired properties of the system in a concise comprehensible and unambiguous way and a method of proof to verify that the specified properties are satisfied when the method of proof is carried out substantially by machine we speak of automatic verification symbolic model checking deals with methods of automatic verification as applied to computer hardware the practical motivation for study in this area is the high and increasing cost of correcting design errors in vlsi technologies there is a growing demand for design methodologies that can yield correct designs on the first fabrication run moreover design errors that are discovered before fabrication can also be quite costly in terms of engineering effort required to correct the error and the resulting impact on development schedules aside from pure cost considerations there is also a need on the theoretical side to provide a sound mathematical basis for the design of computer systems especially in areas that have received little theoretical attention

25 Years of Model Checking *2008*

this book constitutes the refereed proceedings of the 8th international spin workshop held in toronto canada in may 2001 the spin model checker is one of the most powerful and popular systems for the analysis and verification of distributed and concurrent systems the 13 revised full papers presented together with one invited survey paper and three invited industrial experience

reports were carefully reviewed and selected from 26 submissions besides foundational issues of program analysis and formal verification the papers focus on tools for model checking and practical applications in a variety of fields

Model Checking Software *2003-06-29*

this book constitutes the refereed proceedings of the 16th international spin workshop on model checking software spin 2009 held in grenoble france in june 2009 the 15 revised full papers presented together with 3 tool papers and 4 invited talks were carefully reviewed and selected from 41 submissions the papers cover theoretical and algorithmic foundations as well as tools for software model checking by addressing theoretical advances and empirical evaluations related to state space and path exploration techniques as implemented in software verification tools

Model Checking Software 2009-06-19

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Model Checking Software *2003-06-29*

annotation this book constitutes the refereed proceedings of the 17th internationalspin workshop on model checking software spin 2010 held at theuniversity of twente in enschede the netherlands in september 2010 the 13 revised full papers presented together with 2 tool papers and 3invited talks were carefully reviewed and selected from 33 submissions the papers are organized in topical sections on satisfiability modulotheories for model checking model checking in context simulation testing uml implementation and performance of model checking ltl and b chi automata extensions to infinite state systems and concurrentsoftware

Model Checking Software *2010-09-21*

this book constitutes the refereed proceedings of the 18th international spin workshop on model checking software spin 2011 held in snowbird ut usa in july 2011 the 10 revised full papers presented together with 2 tool demonstration papers and 1 invited contribution were carefully reviewed and selected from 29 submissions the papers are organized in topical sections on abstractions and state space reductions search strategies promela encodings and extensions and applications of model checking

Model Checking Software *2011-07-05*

since 1995 when the spin workshop series was instigated spin workshops have been held on an annual basis in montr eal 1995 new brunswick 1996 enschede 1997 paris 1998 trento 1999 toulouse 1999 stanford 2000 toronto 2001 grenoble 2002 and portland 2003 all but the rst spin workshop were organized as satellite events of larger conferences in particular of cav 1996 tacas 1997 forte pstv 1998 floc 1999 the world congress on formal methods 1999 fmoods 2000 icse 2001 2003 and etaps 2002 this year again spin was held as a satellite event of etaps 2004 the co location of spin workshops with conferences has proven to be very successful and has helped to disseminate spin model checking technology to wider audiences since 1999 the proceedings of the spin workshops have appeared in springer verlag s lecture notes in computer science series the history of successful spin workshops is evidence for the maturing of model checking technology not only in the hardware domain but increasingly also in the software area while in earlier years algorithms and tool development aroundthespinmodelcheckerwerethefocusofthisworkshopseries forseveral years now the scope has been widened to include more general approaches to software

model checking techniques and tools as well as applications the spin workshop has become a forum for all practitioners and researchers interested in model checking based techniques for the validation and analysis of communication protocols and software systems

Model Checking Software *2004-02-27*

the spin workshop series brings together researchers and practitioners int ested in explicit state model checking technology as it is applied to the veri tion of software systems since 1995 when the spin workshop series was instigated spin workshops have been held on an annual basis at montr eal 1995 new brunswick 1996 enschede 1997 paris 1998 trento 1999 toulouse 1999 stanford 2000 andtoronto 2001 whilethe rstspinworkshopwasastand aloneevent later workshopshavebeenorganizedasmoreorlesscloselya liatedeventswithlarger conferences in particular with cav 1996 tacas 1997 forte pstv 1998 floc 1999 world congress on formal methods 1999 fmoods 2000 and icse 2001 this year spin 2002 was held as a satellite event of etaps 2002 the european joint conferences on theory and practice of software the co location of spin workshops with conferences has proven to be very successful and has helped to disseminate spin model checking technology to wider audiences since 1999 the proceedings of the spin workshops have appeared in springer verlag s lecture notes in computer science series the history of successful spin workshops is evidence for the maturing of model checking technology not only in the hardware domain but increasingly also in the software area while in earlier years algorithms and tool development 1 around the spin model checker were the focus of this workshop series the scopehasrecentlywidenedtoincludemoregeneralapproachestosoftwaremodel checking current research in this area concentrates not so much on completely verifyingsystemmodels butratheronanalyzingsourcecodeinordertodiscover software faults

Regular Model Checking *2000*

this book constitutes the refereed proceedings of the 10th international spin workshop on model checking of software spin 2003 held in portland or usa in may 2003 as an icse 2003 satellite workshop the 14 revised full papers and 3 revised tool papers presented were carefully reviewed and selected from 30 submissions the book presents state of the art results on the analysis and verification of distributed software systems using the spin model checker as one of the most powerful and widely applied systems

Model Checking Software *2003-08-01*

in this book the authors introduce unfoldings an approach to model checking which alleviates the state explosion problem by means of concurrency theory they offer an introduction to the basics of the method and detail an unfolding based algorithm for model checking concurrent systems against properties specified as formulas of linear temporal logic ltl the book will be of value to researchers and graduate students engaged in automatic verification and concurrency theory

Model Checking Software *2003-04-28*

this book constitutes the refereed proceedings of the 15th international spin workshop on model checking software spin 2008 held in los angeles ca usa in august 2008 the 17 revised full papers presented together with 1 tool paper and 4 invited talks were carefully reviewed and selected from 41 submissions the main focus of the workshop series is software systems including models and programs the papers cover theoretical and algorithmic foundations as well as tools for software model checking and foster interactions and exchanges of ideas with related areas in software engineering such as static analysis dynamic analysis and testing

Unfoldings *2008-03-12*

this book constitutes the thoroughly refereed proceedings of the 19th international spin workshop on model checking software spin 2012 held in oxford uk in july 2012 the 11 revised full papers presented together with 5 tool papers and 4 invited talks were carefully reviewed and selected

from 30 submissions the papers are grouped in topical sections on model checking techniques parallel model checking case studies model checking for concurrency and tool demonstrations

Model Checking Software *2008-08-17*

increasing the designer s con dence that a piece of software or hardwareis c pliant with its speci cation has become a key objective in the design process for software and hardware systems many approaches to reaching this goal have been developed including rigorous speci cation formal veri cation automated validation and testing finite state model checking as it is supported by the explicit state model checkerspin is enjoying a constantly increasingpopularity in automated property validation of concurrent message based systems spin has been in large parts implemented and is being maintained by gerard ho mann and is freely available via ftp fromnetlib bell labs comor from url cm bell labs com cm cs what spin man readme html the beauty of nite state model checking lies in the possibility of building push button validation tools when the state space is nite the state space traversal will eventually terminate with a de nite verdict on the property that is being validated equally helpful is the fact that in case the property is inv idated the model checker will return a counterexample a feature that greatly facilitates fault identi cation on the downside the time it takes to obtain a verdict may be very long if the state space is large and the type of properties that can be validated is restricted to a logic of rather limited expressiveness

Model Checking Software *2012-07-18*

this book constitutes the refereed proceedings of the 22nd international symposium on model checking software spin 2015 held in stellenbosch south africa in august 2015 the 18 papers presented 14 regular papers and 4 tool or new idea papers were carefully reviewed and selected from 27 submissions they cover the field between theoretical advances and practical considerations and are organized in topical sections such as abstraction refinement translation büchi automata and hashing embedded systems heuristics and benchmarks sat smt based approaches software validation and verification

Model Checking Nondeterministic and Randomly Timed Systems 2010

this book summarizes recent research on abstraction techniques for model checking large digital system considering the size of today s digital systems and the capacity of state of the art verification algorithms abstraction is the only viable solution for the successful application of model checking techniques to industrial scale designs the suite of algorithms presented here represents significant improvement over prior art some have already been adopted by the eda companies in their commercial in house verification tools

Theoretical and Practical Aspects of SPIN Model Checking 1999-09-08

the spin workshop is a forum for researchers interested in the subject of automata based explicit state model checking technologies for the analysis and veri cation of asynchronous concurrent and distributed systems the spin del checker netlib bell labs com netlib spin whatispin html developed by gerard holzmann is one of the best known systems of this kind and has attracted a large user community this can likely be attributed to its e cient state exploration algorithms the fact that spin s modeling language promela resembles a programming language has probably also contributed to its success traditionally the spin workshops present papers on extensions and uses of spin as an experiment this year s workshop was broadened to have a slightly wider focus than previous workshops in that papers on software veri cation were encouraged consequently a small collection of papers describe attempts to analyze and verify programs written in conventional programming languages solutions include translations from source code to promela as well as specially designed model checkers that accept source code we believe that this is an teresting research direction for the formal methods community and that it will result in a new set of challenges and solutions of course abstraction becomes the key solution to deal with very large

state spaces however we also see tential for integrating model checking with techniques such as static program analysis and testing papers on these issues have therefore been included in the proceedings

Model Checking Software *2015-08-26*

the first book introducing computer aided verification techniques for quantum systems with quantum computing and communication hardware

Abstraction Refinement for Large Scale Model Checking 2006-09-15

this book constitutes the refereed proceedings of the 13th international spin workshop on model checking software spin 2006 held in vienna austria in march april 2006 as satellite event of etaps 2006 the 16 revised full papers presented together with three tool presentation papers were carefully reviewed and selected from 44 submissions the papers are organized in topical sections

SPIN Model Checking and Software Verification 2006-12-31

this book presents revised versions of selected papers from the 6th workshop on model checking and artificial intelligence mochart 2010 held in atlanta ga usa in july 2010 as well as papers contributed subsequent to the workshop the 7 papers presented were carefully reviewed and selected for inclusion in this book in addition the book also contains an extended abstract of the invited talk held at the workshop the topics covered by these papers are general search algorithms application of ai techniques to automated program verification multiagent systems and epistemic logic abstraction epistemic model checking and theory of model checking

Model Checking Quantum Systems 2021-02-04

the use of stochastic models in computer science is wide spread for instance in performance modeling analysis of randomized algorithms and communication protocols which form the structure of the internet stochastic model checking is an important field in stochastic analysis it has rapidly gained popularity due to its powerful and systematic methods to model and analyze stochastic systems this book presents 7 tutorial lectures given by leading scientists at the rocks autumn school on stochastic model checking held in vahrn italy in october 2012 the 7 chapters of this tutorial went through two rounds of reviewing and improvement and are summarizing the state of the art in the field centered around the tree areas of stochastic models abstraction techniques and stochastic model checking

Model Checking Software *2006-03-15*

this book is devoted to the study of the semantics and assuring the efficient execution of database query languages where the database contains semistructured and time varying information the primary focus of the work presented is the definition of an effective graph based approach to the formalization of query languages for semistructured and temporal information as a result query execution can be reduced to searching the database for subgraphs that are similar to the given query graph and thus can be supported through bisimualtion by integrating and refining graph based methods and bisimulation the author develops a powerful and flexible paradigm the second research challenge solved is that of efficient implementation by modeling graphical queries as formulas in modal logic and interpreting database instance graphs as kripke transition systems

Model Checking and Artificial Intelligence *2011-04-21*

the refereed post proceedings of the 4th workshop on model checking and artificial intelligence are presented in this volume eight full workshop papers are presented along with three post proceedings papers papers are organized into topical sections covering planning and model checking heuristics for real time model checking verification of multi agent systems and logics

for model checking and artificial intelligence

Model Checking Software 2003

this book constitutes the refereed proceedings of the 5th international conference on verification model checking and abstract interpretation vmcai 2004 held in venice italy in january 2004 the 22 revised full papers presented together with 4 invited contributions were carefully reviewed and selected from 68 submissions the papers are organized in topical sections on security formal methods model checking software checking liveness and completeness and miscellaneous

Stochastic Model Checking *2014-11-03*

this book constitutes the refereed proceedings of the 20th international symposium on model checking software spin 2013 held in stony brook ny usa in july 2013 the 18 regular papers 2 tool demonstration papers and 2 invited papers were carefully reviewed and selected from 40 submissions the traditional focus of spin has been on explicit state model checking techniques as implemented in spin and other related tools while such techniques are still of key interest to the workshop its scope has broadened over recent years to include techniques for the verification and formal testing of software systems in general

Model-Checking Based Data Retrieval 2004-02-06

this book constitutes the refereed proceedings of the 12th international conference on verification model checking and abstract interpretation vmcai 2011 held in austin tx usa in january 2011 co located with the symposium on principles of programming languages popl 2011 the 24 revised full papers presented together with 4 invited talks were carefully reviewed and selected from 71 initial submissions the papers showcases state of the art research in areas such as verification model checking abstract interpretation and address any programming paradigm including concurrent constraint functional imperative logic and object oriented programming further topics covered are static analysis deductive methods program certification debugging techniques abstract domains type systems and optimization

Model Checking and Artificial Intelligence *2007-08-28*

this book constitutes the refereed proceedings of the 17th international conference on verification model checking and abstract interpretation vmcai 2016 held in st petersburg fl usa in january 2016 the 24 full papers together with 2 invited talks and 1 abstract presented were carefully reviewed and selected from 67 submissions vmcai provides topics including program verification model checking abstractinterpretation and abstract domains program synthesis static analysis type systems deductive methods program certification debugging techniques program transformation optimization hybrid and cyber physical systems

VMCAI 2004 2004-01-07

this book constitutes the refereed proceedings of the 18th international conference on verification model checking and abstract interpretation vmcai 2017 held in paris france in january 2017 the 27 full papers together with 3 invited keynotes presented were carefully reviewed and selected from 60 submissions vmcai provides topics including program verification model checking abstract interpretation and abstract domains program synthesis static analysis type systems deductive methods program certification debugging techniques program transformation optimization hybrid and cyber physical systems

Model Checking Software 2013-07-19

this book constitutes the refereed proceedings of the 19th international conference on verification model checking and abstract interpretation vmcai 2018 held in los angeles ca usa in

january 2018 the 24 full papers presented together with the abstracts of 3 invited keynotes and 1 invited tutorial were carefully reviewed and selected from 43 submissions vmcai provides topics including program verification model checking abstract interpretation program synthesis static analysis type systems deductive methods program certification decision procedures theorem proving program certification debugging techniques program transformation optimization and hybrid and cyber physical systems

Verification, Model Checking, and Abstract Interpretation *2011-01-11*

this book constitutes the refereed proceedings of the 20th international conference on verification model checking and abstract interpretation vmcai 2019 held in cascais portugal in january 2019 the 27 full papers presented together with the abstracts of 3 invited keynote talks were carefully reviewed and selected from 62 submissions vmcai provides topics including program verification model checking abstract interpretation program synthesis static analysis type systems deductive methods program certification decision procedures theorem proving program certification debugging techniques program transformation optimization and hybrid and cyber physical systems

Verification, Model Checking, and Abstract Interpretation 2015-12-29

this book constitutes the refereed proceedings of the 17th international spin workshop on model checking software spin 2010 held at the university of twente in enschede the netherlands in september 2010 the 13 revised full papers presented together with 2 tool papers and 3 invited talks were carefully reviewed and selected from 33 submissions the papers are organized in topical sections on satisfiability modulo theories for model checking model checking in context simulation testing uml implementation and performance of model checking ltl and büchi automata extensions to infinite state systems and concurrent software

Verification, Model Checking, and Abstract Interpretation 2017-01-09

Verification, Model Checking, and Abstract Interpretation *2018-01-03*

Verification, Model Checking, and Abstract Interpretation 2019-01-10

Model Checking Software *2010-09-27*

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