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Soggetti	Computers Software engineering Logic, Symbolic and mathematical Computer science—Mathematics Computer software—Reusability Quality control Reliability Industrial safety Theory of Computation Software Engineering/Programming and Operating Systems Mathematical Logic and Foundations Mathematics of Computing Performance and Reliability Quality Control, Reliability, Safety and Risk
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Nota di contenuto	Introduction to Model Checking -- Temporal Logic and Fair Discrete Systems -- Modeling for Verification -- Automata Theory and Model Checking -- Explicit-State Model Checking -- Partial-Order Reduction -- Binary Decision Diagrams -- BDD-Based Symbolic Model Checking -- Propositional SAT Solving -- SAT-Based Model Checking -- Satisfiability Modulo Theories -- Compositional Reasoning -- Abstraction and Abstraction Refinement -- Interpolation and Model

Checking -- Predicate Abstraction for Program Verification -- Combining Model Checking and Data-Flow Analysis -- Model Checking Procedural Programs -- Model Checking Concurrent Programs -- Combining Model Checking and Testing -- Combining Model Checking and Deduction -- Model Checking Parameterized Systems -- Model Checking Security Protocols -- Transfer of Model Checking to Industrial Practice -- Functional Specification of Hardware via Temporal Logic -- Symbolic Trajectory Evaluation -- The mu-calculus and Model Checking -- Graph Games and Reactive Synthesis -- Model Checking Probabilistic Systems -- Model Checking Real-Time Systems -- Verification of Hybrid Systems -- Symbolic Model Checking in Non-Boolean Domains -- Process Algebra and Model Checking.

Sommario/riassunto

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. "This handbook is an authoritative, comprehensive description of the state of the art in model checking. It belongs on the bookshelf of every researcher and practitioner in computer-aided verification." [Moshe Y. Vardi, George Distinguished Service Professor in Computational Engineering, Rice University] "With chapters written by the world’s leading experts from academia and industry, this authoritative book on model checking should be on the shelf of every computer science graduate student and every hardware and software engineer. As the scale and complexity of digital systems grow, and they must work in the presence of uncertainty in the physical world, verification techniques such as model checking will become increasingly important to ensure system reliability, safety, and security." [Jeannette Wing, Corporate Vice President, Microsoft Research].