

**Baier, Christel; Katoen, Joost-Pieter****Principles of model checking. Foreword by Kim Guldstrand Larsen.** (English) Zbl 1179.68076  
Cambridge, MA: MIT Press (ISBN 978-0-262-02649-9/hbk). xvii, 975 p. (2008).

Publisher's description: 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, or request-response properties. This automated technique for verification and debugging has developed into a mature and widely used approach with many applications. This book offers a comprehensive introduction to model checking that is not only a text suitable for the 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.

**MSC:**

- [68Q60](#) Specification and verification (program logics, model checking, etc.)
- [68-01](#) Introductory exposition (textbooks, tutorial papers, etc.) pertaining to computer science
- [68-02](#) Research exposition (monographs, survey articles) pertaining to computer science
- [68Q85](#) Models and methods for concurrent and distributed computing (process algebras, bisimulation, transition nets, etc.)

Cited in **281** Documents**Keywords:**[model checking](#); [communicating systems](#); [liveness](#); [fairness](#)**Software:**[Uppaal](#)