Computational Models/ Formal Languages/Computational Complexity

Models of Computation
Exploring the Power of Computing
John E. Savage, Brown University

"This is an impressive book. The subject has been thoroughly researched and carefully presented. All the machine models central to the modern theory of computation are covered in depth; many for the first time in textbook form. Readers will learn a great deal from the wealth of interesting material presented."

–Andrew C. Yao, Professor of Computer Science, Princeton University

In *Models of Computation: Exploring the Power of Computing*, John Savage reexamines theoretical computer science, offering a fresh approach that gives priority to resource tradeoffs and complexity classifications over the structure of machines and their relationships to languages. This viewpoint reflects a pedagogy motivated by the growing importance of computational models that are more realistic than the abstract ones studied in the 1950s, 60s and early 70s.

Assuming a student has only some background in computer organization, *Models of Computation* uses circuits to simulate machines with memory, thereby making possible an early discussion of P-complete and NP-complete problems. Circuits are also used to demonstrate that tradeoffs between parameters of computation, such as space and time, regulate all computations by machines with memory. Full coverage of formal languages and automata is included along with a substantive treatment of computability. Topics such as space–time tradeoffs, parallel computation, and circuit complexity, are integrated throughout the text with an emphasis on finite problems and concrete computational models

FEATURES

- Includes introductory material for a first course on theoretical computer science.
- Builds on computer organization to provide an early introduction to P-complete and NP-complete problems.
- Includes a concise, modern presentation of regular, context-free and phrase-structure grammars, parsing, finite automata, pushdown automata, and computability.
- Includes an extensive, modern coverage of complexity classes.
- Provides an introduction to the advanced topics of space–time tradeoffs, memory hierarchies, parallel computation, the VLSI model, and circuit complexity, with parallelism integrated throughout.
- Contains over 200 figures and over 400 exercises along with an extensive bibliography.

ABOUT THE AUTHOR

John E. Savage is a professor of Computer Science at Brown University. He is a Guggenheim Fellow, a Fellow of the IEEE, ACM, and the AAAS, and a recipient of a Fulbright-Hayes grant. Professor Savage is also the author of *The Complexity of Computing* (Wiley and Sons, 1976) and a co-author of *The Mystical Machine* (Addison-Wesley, 1986).

9 780201 895391 90000
ISBN 0-201-89539-0