Art of Computer Programming, Volume 2: Seminumerical Algorithms (3rd Edition)

By Donald E. Knuth

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The bible of all fundamental algorithms and the work that taught many of today's software developers most of what they know about computer programming.

–*Byte*, September 1995

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–Jonathan Laventhol

The second volume offers a complete introduction to the field of seminumerical algorithms, with separate chapters on random numbers and arithmetic. The book summarizes the major paradigms and basic theory of such algorithms, thereby providing a comprehensive interface between computer programming and numerical analysis. Particularly noteworthy in this third edition is Knuth's new treatment of random number generators, and his discussion of calculations with formal power series.

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Editorial Review

Amazon.com Review
Volume 2 of Donald Knuth's classic series *The Art of Computer Programming* covers seminumerical algorithms, with topics ranging from random number generators to floating point operations and other optimized arithmetic algorithms. Truly comprehensive and meticulously written, this book (and series) is that rarest of all creatures--a work of authoritative scholarship in classical computer science, but one that can be read and used profitably by virtually all working programmers.

The book begins with fundamental questions regarding random numbers and how to use algorithms to generate them. Subsequent chapters demonstrate efficient computation of single-precision and double-precision arithmetic calculations and modular arithmetic. The text then presents prime factorization (which can be used in cryptography, for instance) and algorithms for calculating fractions. This volume ends with algorithms for polynomial arithmetic and manipulation of power-series topics, which will benefit those with some knowledge of calculus.

Throughout this beautifully presented edition, Knuth incorporates hundreds of useful exercises for trying out the algorithms. These range from simple problems to larger research project topics. (The book provides answers, where appropriate, at the end of the book.) The result is a text that's suitable for college or graduate-level computer science courses or individual study by programmers. Volume 2 is an indispensable part of any working programmer's library.

From the Back Cover

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About the Author

Donald E. Knuth is known throughout the world for his pioneering work on algorithms and programming techniques, for his invention of the Tex and Metafont systems for computer typesetting, and for his prolific and influential writing. Professor Emeritus of The Art of Computer Programming at Stanford University, he currently devotes full time to the completion of these fascicles and the seven volumes to which they belong.

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