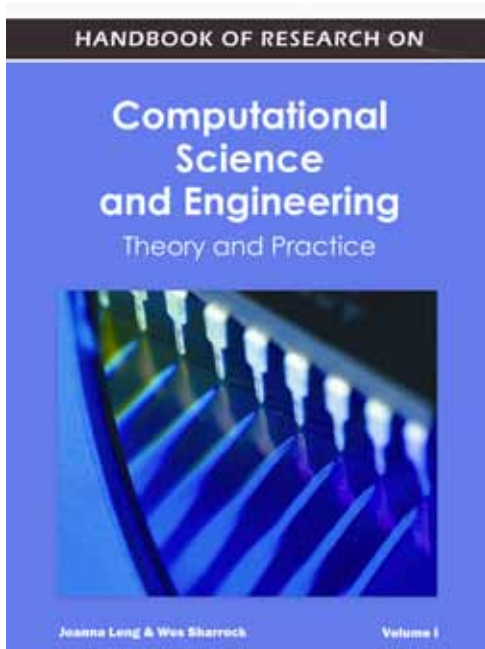


Handbook of Research on Computational Science and Engineering: Theory and Practice (2 vols)



Edited By: J. Leng (Visual Conclusions, UK)
and Wes Sharrock (University of Manchester, UK)

By using computer simulations in research and development, computational science and engineering (CSE) allows empirical inquiry where traditional experimentation and methods of inquiry are difficult, inefficient, or prohibitively expensive.

The Handbook of Research on Computational Science and Engineering: Theory and Practice is a reference for interested researchers and decision-makers who want a timely introduction to the possibilities in CSE to advance their ongoing research and applications or to discover new resources and cutting-edge developments. Rather than reporting results obtained using CSE models, this comprehensive survey captures the architecture of the cross-disciplinary field, explores the long term implications of technology choices, alerts readers to the hurdles facing CSE, and identifies trends in future development.

ISBN: 978-1-61350-116-0; © 2012; 968 pp.

Hard Cover: US \$495

Online Perpetual Access: US \$745

Print + Online Perpetual Access: US \$990

Pre-pub Price:*

Hard Cover: US \$470; **Online Perpetual Access:** US \$710

* Pre-pub price is good through one month after publication date.

Topics Covered:

- Computational Applications
- Computational Science and Engineering (CSE)
- Hardware Trends in CSE
- High Performance Computing
- Numerical Methods in CSE
- Organizational and Sociological Issues in CSE
- Programming Paradigms in CSE
- Software Development Tools In CSE
- Visualization

Market:

This premier publication is essential for all academic and research library reference collections. It is a crucial tool for academicians, researchers, and practitioners and is ideal for classroom use.

"This handbook identifies the fundamental elements making up [Computational Science and Engineering] and showing their interdependence in a way that (a) reviews the state of the art and current achievements; (b) explores imminent developments advancing the state of play; (c) makes these accessible to as wide an audience of interested parties as possible. The handbook gives an organised survey of cogent topics. It is placed at a level that does not assume considerable prior familiarity with or facility in the heavily technical details of specific areas of CSE. "

-Joanna Leng, Visual Conclusions, UK and Wes Sharrock, University of Manchester, UK

Excellent addition to your library! Recommend to your acquisitions librarian.

www.igi-global.com

Section 1: Hardware and Software

- Chapter 1
Hardware Trends and Implications for Programming Models
Gabriele Jost, The University of Texas at Austin, USA
Alice E. Koniges, Lawrence Berkeley National Laboratory, USA
- Chapter 2
Multi-threaded Architectures: Evolution, Costs, Opportunities
Ivan Giroto, Irish Centre for High-End Computing / NUI Galway, Republic of Ireland
Robert M. Farber, Pacific Northwest National Laboratory, USA
- Chapter 3
High-Performance Customizable Computing
Domingo Benitez, University of Las Palmas de Gran Canaria - SIANI Institute, Spain
- Chapter 4
High-Performance Computing for Theoretical Study of Nanoscale and Molecular Interconnects
Rasit O. Topaloglu, GLOBALFOUNDRIES, USA
Swati R. Manjari, Rensselaer Polytechnic Institute, USA
Saroj K. Nayak, Rensselaer Polytechnic Institute, USA
- Chapter 5
Effective Open-Source Performance Analysis Tools
Prashobh Balasundaram, IBM Dublin Software Laboratories, Republic of Ireland
- Chapter 6
Pragmatic Software Engineering for Computational Science
David Worth, Software Engineering Group – STFC, UK
Chris Greenough, Software Engineering Group – STFC, UK
Shawn Chin, Software Engineering Group – STFC, UK
- Chapter 7
A Framework for Testing Code in Computational Applications
Diane Kelly, Royal Military College, Canada
Daniel Hook, Engineering Seismology Group, Canada
Rebecca Sanders, EA Pogo, Canada
- Chapter 8
Developing Software for a Scientific Community: Some Challenges and Solutions
Judith Segal, The Open University, UK
Chris Morris, STFC Daresbury Laboratory, UK
- Chapter 9
Opportunities and Challenges in Porting a Parallel Code from a Tightly-Coupled System to the Distributed EU Grid, Enabling Grids for E-scienc
Fumie Costen, The University of Manchester, UK
Akos Balaskó, Academy of Sciences, Hungary
- Section 2: Applications**
- Chapter 10
Development of an Efficient and Secure Mobile Communication System with New Future Directions
Abid Yahya, Universiti Malaysia Perlis, Malaysia
Farid Ghani, Universiti Malaysia Perlis, Malaysia
R. Badlishah Ahmad, Universiti Malaysia Perlis, Malaysia
Mostafijur Rahman, Universiti Malaysia Perlis, Malaysia
Aini Syuhada, Universiti Malaysia Perlis, Malaysia
Othman Sidek, Collaborative Microelectronic Design Excellence Center, Malaysia
M. F. M. Salleh, Universiti Sains Malaysia, Malaysia
- Chapter 11
Parallel Quantum Chemistry At the Cross Roads
Hubertus J. J. van Dam, Pacific Northwest National Laboratory, USA
- Chapter 12
Stochastic Simulations in Systems Biology
Marc Hafner, Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland
Heinz Koeppel, Swiss Federal Institute of Technology Zurich (ETHZ), Switzerland
- Chapter 13
Some Illustrations of Information Geometry Applications in Biology and Physics
C.T.J. Dodson, University of Manchester, UK
- Chapter 14
DQ Based Methods: Theory and Application to Engineering and Physical Sciences
Stefania Tomasiello, University of Basilicata, Italy
- Chapter 15
Mesh Morphing and Smoothing by Means of Radial Basis Function (RBF): A Practical Example Using Fluent and RBF Morph
Marco Evangelos Biancolini, University of Rome, Italy
- Chapter 16
Visualization: Future Technology and Practices for Computational Science and Engineering
Joanna Leng, Visual Conclusions, UK
Theresa-Marie Rhyne, Visualization Consultant, USA
Theresa-Marie Rhyne Viewpoint, USA
Wes Sharrock, University of Manchester, UK
- Chapter 17
Visualizing Indicators of Debt Crises in a Lower Dimension: A Self-Organizing Maps Approach
Peter Sarlin, Åbo Akademi University, Finland
- Chapter 18
Improving Computational Models and Practices: Scenario Testing and Forecasting the Spread of Infectious Disease
Iain Barrass, Health Protection Agency, UK
Joanna Leng, Visual Conclusions, UK
- Chapter 19
Artificial Neural Network Modelling of Sequencing Batch Reactor Performance
Eldon Raj Rene, University of La Coruña, Spain
Sung Joo Kim, University of Ulsan, South Korea
Dae Hee Lee, University of Ulsan, South Korea
Woo Bong Je, University of Ulsan, South Korea
Mirian Estefanía López, University of La Coruña, Spain
Hung Suck Park, University of Ulsan, South Korea
- Section 3: Organisational and Practical Issues**
- Chapter 20
The State of Development of CSE
Joanna Leng, Visual Conclusions, UK
Wes Sharrock, University of Manchester, UK
- Chapter 21
Integrating Data Management and Collaborative Sharing with Computational Science Research Processes
Kerstin Kleese van Dam, Pacific Northwest National Laboratory, USA
Mark James, University of California, USA
Andrew M. Walker, University of Bristol, UK
- Chapter 22
Security and Trust in a Global Research Infrastructure
Jens Jensen, Science and Technology Facilities Council (STFC), UK
David L. Groep, Nikhef (National Institute for Subatomic Physics), The Netherlands
- Chapter 23
CSE as Epistemic Technologies: Computer Modelling and Disciplinary Difference in the Humanities
Matt Ratto, University of Toronto, Canada
- Chapter 24
Science Communication with Dinosaurs
Phillip L. Manning, School of Earth, Atmospheric & Environmental Science, University of Manchester, UK; The Manchester Museum, University of Manchester, UK; and Department of Earth and Environmental Science, University of Pennsylvania, USA
Peter L. Falkingham, School of Earth, Atmospheric & Environmental Science, University of Manchester, UK; and The Manchester Museum, University of Manchester, UK