Advanced Computational Infrastructures for Parallel and Distributed Adaptive Applications

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📖 DESCRIPTION

A unique investigation of the state of the art in design, architectures, and implementations of advanced computational infrastructures and the applications they support

Emerging large-scale adaptive scientific and engineering applications are requiring an increasing amount of computing and storage resources to provide new insights into complex systems. Due to their runtime adaptivity, these applications exhibit complicated behaviors that are highly dynamic, heterogeneous, and unpredictable—and therefore require full-fledged computational infrastructure support for problem solving, runtime management, and dynamic partitioning/balancing. This book presents a comprehensive study of the design, architecture, and implementation of advanced computational infrastructures as well as the adaptive applications developed and deployed using these infrastructures from different perspectives, including system architects, software engineers, computational scientists, and application scientists. Providing insights into recent research efforts and projects, the authors include descriptions and experiences pertaining to the realistic modeling of adaptive applications on parallel and distributed systems.

The first part of the book focuses on high-performance adaptive scientific applications and includes chapters that describe high-impact, real-world application scenarios in order to motivate the need for advanced computational engines as well as to outline their requirements. The second part identifies popular and widely used adaptive computational infrastructures. The third part focuses on the more specific partitioning and runtime management schemes underlying these computational toolkits.

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Presents representative problem-solving environments and infrastructures, runtime management strategies, partitioning and decomposition methods, and adaptive and dynamic applications

- Provides a unique collection of selected solutions and infrastructures that have significant impact with sufficient introductory materials

- Includes descriptions and experiences pertaining to the realistic modeling of adaptive applications on parallel and distributed systems

The cross-disciplinary approach of this reference delivers a comprehensive discussion of the requirements, design challenges, underlying design philosophies, architectures, and implementation/deployment details of advanced computational infrastructures. It makes it a valuable resource for advanced courses in computational science and software/systems engineering for senior undergraduate and graduate students, as well as for computational and computer scientists, software developers, and other industry professionals.

⛰ ABOUT THE AUTHOR

Manish Parashar, PhD, is Professor of Electrical and Computer Engineering at Rutgers University, where he is also the director of the Applied Software Systems Laboratory and director of the NSF Center for Autonomic Computing. He has received numerous awards, including the Rutgers Board of Trustees Award for Excellence in Research (2004-2005) and the NSF CAREER Award (1999).

Xiaolin Li, PhD, is Assistant Professor of Computer Science at Oklahoma State University.

👥 NEW TO EDITION

For courses on Parallel Architecture. Prerequisites include courses on computer systems, programming methodology, and numerical analysis.

Previous Works by Author:

• Hariri and Parashar: **Tools and Environments for Parallel and Distributed Computing**; Wiley 2004; 232 pages; US $99.95; ISBN: 0-471-33288-7; 454 copies sold to date.

Related Wiley titles:

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    Berman: **Grid Computing: Making The Global Infrastructure a Reality**; Wiley 2003; 1080 pages; US $145; ISBN: 0-470-85319-0; 3,367 copies sold to date.

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    Yang: **High Performance Computing: Paradigm and Infrastructure**, Wiley October 2005; 816 pages; US $125.00; ISBN: 0-471-65471-X ; 396 copies sold to date.

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    El-Rewini and Abd-El-Barr: **Advanced Computer Architecture and Parallel Processing**; Wiley January 2005; 288 pages; US $98.95; ISBN: 0-471-46740-5; 811 copies sold to date.

📖 FEATURES

• Advanced computational infrastructures provide programming, execution and runtime management support for large-scale adaptive implementations

• Investigates the design, architectures and implementations of advanced computational infrastructures.

• Cross-disciplinary approach delivers comprehensive discussion of the requirements, design challenges, underlying design philosophies, architectures, and implementation/deployment details of these infrastructures

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