

The Sourcebook Of Parallel Computing The Morgan Kaufmann Series In Computer Architecture And Design

The Parallel Programming Guide for Every Software Developer From grids and clusters to next-generation game consoles, parallel computing is going mainstream. Innovations such as Hyper-Threading Technology, HyperTransport Technology, and multicore microprocessors from IBM, Intel, and Sun are accelerating the movement's growth. Only one thing is missing: programmers with the skills to meet the soaring demand for parallel software. That's where Patterns for Parallel Programming comes in. It's the first parallel programming guide written specifically to serve working software developers, not just computer scientists. The authors introduce a complete, highly accessible pattern language that will help any experienced developer "think parallel"-and start writing effective parallel code almost immediately. Instead of formal theory, they deliver proven solutions to the challenges faced by parallel programmers, and pragmatic guidance for using today's parallel APIs in the real world. Coverage includes: Understanding the parallel computing landscape and the challenges faced by parallel developers Finding the concurrency in a software design problem and decomposing it into concurrent tasks Managing the use of data across tasks Creating an algorithm structure that

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effectively exploits the concurrency you've identified Connecting your algorithmic structures to the APIs needed to implement them Specific software constructs for implementing parallel programs Working with today's leading parallel programming environments: OpenMP, MPI, and Java Patterns have helped thousands of programmers master object-oriented development and other complex programming technologies. With this book, you will learn that they're the best way to master parallel programming too.

This book constitutes the thoroughly refereed post-conference proceedings of the 7th International Conference on Parallel Processing and Applied Mathematics, PPAM 2007, held in Gdansk, Poland, in September 2007. The 63 revised full papers of the main conference presented together with 85 revised workshop papers were carefully reviewed and selected from over 250 initial submissions. The papers are organized in topical sections on parallel/distributed architectures and mobile computing, numerical algorithms and parallel numerics, parallel and distributed non-numerical algorithms, environments and tools for as well as applications of parallel/distributed/grid computing, evolutionary computing, meta-heuristics and neural networks. The volume proceeds with the outcome of 11 workshops and minisymposia dealing with novel data formats and algorithms for dense linear algebra computations, combinatorial tools for parallel sparse matrix computations, grid applications and middleware, large scale computations on grids, models, algorithms and methodologies for grid-enabled computing

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environments, scheduling for parallel computing, language-based parallel programming models, performance evaluation of parallel applications on large-scale systems, parallel computational biology, high performance computing for engineering applications, and the minisymposium on interval analysis.

We describe in this book, new methods and applications of hybrid intelligent systems using soft computing techniques. Soft Computing (SC) consists of several intelligent computing paradigms, including fuzzy logic, neural networks, and evolutionary algorithms, which can be used to produce powerful hybrid intelligent systems. The book is organized in five main parts, which contain a group of papers around a similar subject. The first part consists of papers with the main theme of intelligent control, which are basically papers that use hybrid systems to solve particular problems of control. The second part contains papers with the main theme of pattern recognition, which are basically papers using soft computing techniques for achieving pattern recognition in different applications. The third part contains papers with the themes of intelligent agents and social systems, which are papers that apply the ideas of agents and social behavior to solve real-world problems. The fourth part contains papers that deal with the hardware implementation of intelligent systems for solving particular problems. The fifth part contains papers that deal with modeling, simulation and optimization for real-world applications.

Euro-Par 2005 was the eleventh conference in the Euro-Par series. It was organized by the Centre for Informatics

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and Information Technology (CITI) and the Department of Informatics of the Faculty of Science and Technology of Universidade Nova de Lisboa, at the Campus of Monte de Caparica.

This book constitutes the refereed proceedings of the 7th International Conference on Parallel Computing Technologies, PaCT 2003, held in Novosibirsk, Russia in September 2003. The 38 revised full papers presented together with 4 invited papers and 10 poster papers were carefully reviewed and selected from 78 submissions. The papers are organized in topical sections on theory, software, applications, and tools. A broad variety of parallel processing issues and distributed computing in general are addressed.

This book constitutes the refereed proceedings of the Third International Workshop on Applied Reconfigurable Computing, ARC 2007, held in Mangaratiba, Brazil, in March 2007. The 27 full papers and 10 short papers presented together with a late-comer contribution from ARC 2006 are organized in topical sections on architectures, mapping techniques and tools, arithmetic, and applications.

We describe in this book, bio-inspired models and applications of hybrid intelligent systems using soft computing techniques for image analysis and pattern recognition based on biometrics and other information sources. Soft Computing (SC) consists of several intelligent computing paradigms, including fuzzy logic, neural networks, and bio-inspired optimization algorithms, which can be used to produce powerful hybrid intelligent systems. The book is organized in five

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main parts, which contain a group of papers around a similar subject. The first part consists of papers with the main theme of classification methods and applications, which are basically papers that propose new models for classification to solve general problems and applications. The second part contains papers with the main theme of modular neural networks in pattern recognition, which are basically papers using bio-inspired techniques, like modular neural networks, for achieving pattern recognition based on biometric measures. The third part contains papers with the theme of bio-inspired optimization methods and applications to diverse problems. The fourth part contains papers that deal with general theory and algorithms of bio-inspired methods, like neural networks and evolutionary algorithms. The fifth part contains papers on computer vision applications of soft computing methods. In the part of classification methods and applications there are 5 papers that describe different contributions on fuzzy logic and bio-inspired models with application in classification for medical images and other data.

Since the dawn of computing, the quest for a better understanding of Nature has been a driving force for technological development. Groundbreaking achievements by great scientists have paved the way from the abacus to the supercomputing power of today. When trying to replicate Nature in the computer's silicon test tube, there is need for precise and computable process descriptions. The scientific fields of Mathematics and Physics provide a powerful vehicle for such descriptions in terms of Partial Differential Equations

(PDEs). Formulated as such equations, physical laws can become subject to computational and analytical studies. In the computational setting, the equations can be discretized for efficient solution on a computer, leading to valuable tools for simulation of natural and man-made processes. Numerical solution of PDE-based mathematical models has been an important research topic over centuries, and will remain so for centuries to come. In the context of computer-based simulations, the quality of the computed results is directly connected to the model's complexity and the number of data points used for the computations. Therefore, computational scientists tend to use even the largest and most powerful computers they can get access to, either by increasing the size of the data sets, or by introducing new model terms that make the simulations more realistic, or a combination of both. Today, many important simulation problems can not be solved by one single computer, but calls for parallel computing.

OpenMP is an application programming interface (API) that is widely accepted as a standard for high-level shared-memory parallel programming. It is a portable, scalable programming model that provides a simple and flexible interface for developing shared-memory parallel applications in Fortran, C, and C++. Since its introduction in 1997, OpenMP has gained support from the majority of high-performance compiler and hardware vendors. Under the direction of the OpenMP Architecture Review Board (ARB), the OpenMP standard is being further improved. Active research in OpenMP compilers, runtime systems, tools, and environments continues to drive its evolution. To provide a forum for the dissemination and exchange of information about and

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experiences with OpenMP, the community of OpenMP researchers and developers in academia and industry is organized under cOMPunity (www.compunity.org). Workshops on OpenMP have taken place at a variety of venues around the world since 1999: the European Workshop on OpenMP (EWOMP), the North American Workshop on OpenMP Applications and Tools (WOMPAT), and the Asian Workshop on OpenMP Experiences and Implementation (WOMPEI) were each held annually and attracted an audience from both academia and industry. The intended purpose of the new International Workshop on OpenMP (IWOMP) was to consolidate these three OpenMP workshops into a single, yearly international conference. The first IWOMP meeting was held during June 1–4, 2005, in Eugene, Oregon, USA. The second meeting took place during June 12–15, in Reims, France.

"This book provides a compendium of terms, definitions, and explanations of concepts, issues, and trends in grid technology"--Provided by publisher.

Parallel Computing is a compelling vision of how computation can seamlessly scale from a single processor to virtually limitless computing power. Unfortunately, the scaling of application performance has not matched peak speed, and the programming burden for these machines remains heavy. This book represents the collected knowledge and experience of over 30 leading parallel computing researchers. They offer readers a complete sourcebook with solid coverage of parallel computing hardware, programming considerations, algorithms, software and enabling technologies, as well as several parallel application case studies. (Midwest).

An Introduction to Parallel Programming is the first undergraduate text to directly address compiling and running parallel programs on the new multi-core and cluster

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architecture. It explains how to design, debug, and evaluate the performance of distributed and shared-memory programs. The author Peter Pacheco uses a tutorial approach to show students how to develop effective parallel programs with MPI, Pthreads, and OpenMP, starting with small programming examples and building progressively to more challenging ones. The text is written for students in undergraduate parallel programming or parallel computing courses designed for the computer science major or as a service course to other departments; professionals with no background in parallel computing. Takes a tutorial approach, starting with small programming examples and building progressively to more challenging examples Focuses on designing, debugging and evaluating the performance of distributed and shared-memory programs Explains how to develop parallel programs using MPI, Pthreads, and OpenMP programming models

This book constitutes the refereed proceedings of the Third International Conference on High Performance Computing and Communications, HPCC 2007, held in Houston, USA, September 26-28, 2007. The 75 revised full papers presented were carefully reviewed and selected from 272 submissions. The papers address all current issues of parallel and distributed systems and high performance computing and communication as there are: networking protocols, routing, and algorithms, languages and compilers for HPC, parallel and distributed architectures and algorithms, embedded systems, wireless, mobile and pervasive computing, Web services and internet computing, peer-to-peer computing, grid and cluster computing, reliability, fault-tolerance, and security, performance evaluation and measurement, tools and environments for software development, distributed systems and applications, database applications and data mining, biological/molecular computing, collaborative and cooperative

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environments, and programming interfaces for parallel systems.

Numerical software is used to test scientific theories, design airplanes and bridges, operate manufacturing lines, control power plants and refineries, analyze financial derivatives, identify genomes, and provide the understanding necessary to derive and analyze cancer treatments. Because of the high stakes involved, it is essential that results computed using software be accurate, reliable, and robust. Unfortunately, developing accurate and reliable scientific software is notoriously difficult. This book investigates some of the difficulties related to scientific computing and provides insight into how to overcome them and obtain dependable results.

The tools to assess existing scientific applications are described, and a variety of techniques that can improve the accuracy and reliability of newly developed applications is discussed. Accuracy and Reliability in Scientific Computing can be considered a handbook for improving the quality of scientific computing. It will help computer scientists address the problems that affect software in general as well as the particular challenges of numerical computation:

approximations occurring at all levels, continuous functions replaced by discretized versions, infinite processes replaced by finite ones, and real numbers replaced by finite precision numbers. Divided into three parts, it starts by illustrating some of the difficulties in producing robust and reliable scientific software. Well-known cases of failure are reviewed and the what and why of numerical computations are considered. The second section describes diagnostic tools that can be used to assess the accuracy and reliability of existing scientific applications. In the last section, the authors describe a variety of techniques that can be employed to improve the accuracy and reliability of newly developed scientific applications. The authors of the individual chapters are international experts,

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many of them members of the IFIP Working Group on Numerical Software.

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As computing devices proliferate, demand increases for an understanding of emerging computing paradigms and models based on natural phenomena. Neural networks, evolution-based models, quantum computing, and DNA-based computing and simulations are all a necessary part of modern computing analysis and systems development. Vast literature exists on these new paradigms and their implications for a wide array of applications. This comprehensive handbook, the first of its kind to address the connection between nature-inspired and traditional computational paradigms, is a repository of case studies dealing with different problems in computing and solutions to these problems based on nature-inspired paradigms. The "Handbook of Nature-Inspired and Innovative Computing: Integrating Classical Models with Emerging Technologies" is an essential compilation of models, methods, and algorithms for researchers, professionals, and advanced-level students working in all areas of computer science, IT, biocomputing, and network engineering.

The three-volume set LNCS 5101-5103 constitutes the refereed proceedings of the 8th International Conference on Computational Science, ICCS 2008, held in Krakow, Poland in June 2008. The 167 revised papers of the main conference track presented together with the abstracts of 7 keynote talks and the 100 revised papers from 14 workshops were carefully reviewed and selected for inclusion in the three volumes. The main conference track was divided into approximately 20 parallel sessions addressing topics such as e-science applications and systems, scheduling and load balancing, software services and tools, new hardware and its applications, computer networks, simulation of complex

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systems, image processing and visualization, optimization techniques, numerical linear algebra, and numerical algorithms. The second volume contains workshop papers related to various computational research areas, e.g.: computer graphics and geometric modeling, simulation of multiphysics multiscale systems, computational chemistry and its applications, computational finance and business intelligence, physical, biological and social networks, geocomputation, and teaching computational science. The third volume is mostly related to computer science topics such as bioinformatics' challenges to computer science, tools for program development and analysis in computational science, software engineering for large-scale computing, collaborative and cooperative environments, applications of workflows in computational science, as well as intelligent agents and evolvable systems.

The book discusses the fundamentals of high-performance computing. The authors combine visualization, comprehensibility, and strictness in their material presentation, and thus influence the reader towards practical application and learning how to solve real computing problems. They address both key approaches to programming modern computing systems: multithreading-based parallelizing in shared memory systems, and applying message-passing technologies in distributed systems. The book is suitable for undergraduate and graduate students, and for researchers and practitioners engaged with high-performance computing systems. Each chapter begins with a theoretical part, where the relevant terminology is introduced along with the basic theoretical results and methods of parallel programming, and concludes with a list of test questions and problems of varying difficulty. The authors include many solutions and hints, and often sample code. This book constitutes the refereed proceedings of the 19th

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International Conference on Parallel and Distributed Computing, Euro-Par 2013, held in Aachen, Germany, in August 2013. The 70 revised full papers presented were carefully reviewed and selected from 261 submissions. The papers are organized in 16 topical sections: support tools and environments; performance prediction and evaluation; scheduling and load balancing; high-performance architectures and compilers; parallel and distributed data management; grid, cluster and cloud computing; peer-to-peer computing; distributed systems and algorithms; parallel and distributed programming; parallel numerical algorithms; multicore and manycore programming; theory and algorithms for parallel computation; high performance networks and communication; high performance and scientific applications; GPU and accelerator computing; and extreme-scale computing.

This book constitutes the refereed proceedings of the 14th International Conference on Parallel Computing, Euro-Par 2008, held in Las Palmas de Gran Canaria, Spain, in August 2008. The 86 revised papers presented were carefully reviewed and selected from 264 submissions. The papers are organized in topical sections on support tools and environments; performance prediction and evaluation; scheduling and load balancing; high performance architectures and compilers; parallel and distributed databases; grid and cluster computing; peer-to-peer computing; distributed systems and algorithms; parallel and distributed programming; parallel numerical algorithms; distributed and high-performance multimedia; theory and algorithms for parallel computation; and high performance networks.

This concise text is designed to present the recent advances in parallel and distributed architectures and algorithms within an integrated framework. Beginning with an introduction to

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the basic concepts, the book goes on discussing the basic methods of parallelism exploitation in computation through vector processing, super scalar and VLIW processing, array processing, associative processing, systolic algorithms, and dataflow computation. After introducing interconnection networks, it discusses parallel algorithms for sorting, Fourier transform, matrix algebra, and graph theory. The second part focuses on basics and selected theoretical issues of distributed processing. Architectures and algorithms have been dealt in an integrated way throughout the book. The last chapter focuses on the different paradigms and issues of high performance computing making the reading more interesting. This book is meant for the senior level undergraduate and postgraduate students of computer science and engineering, and information technology. The book is also useful for the postgraduate students of computer science and computer application.

This book constitutes the refereed proceedings of the 5th International Conference on Parallel and Distributed Computing, Applications and Technologies; PDCAT 2004, held in Singapore in December 2004. The 173 papers presented were carefully reviewed and selected from 242 submissions. The papers focus on parallel and distributed computing from the perspectives of algorithms, networking and architecture, software systems and technologies, and applications. Besides classical topics from high performance computing, major recent developments are addressed, such as molecular computing, data mining, knowledge discovery, optical networks, secure computing and communications, wireless networks, mobile computing, component-based systems, Internet computing, and Web Technologies.

"The Grid" is an emerging infrastructure that will fundamentally change the way people think about and use computing. The editors reveal the revolutionary impact of

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large-scale resource sharing and virtualization within science and industry, and the intimate relationships between organization and resource sharing structures.

Computational Intelligence: A Compendium presents a well structured overview about this rapidly growing field with contributions from leading experts in Computational Intelligence. The main focus of the compendium is on applied methods, tried-and-proven as being effective to realworld problems, which is especially useful for practitioners, researchers, students and also newcomers to the field. This state-of- handbook-style book has contributions by leading experts.

Geosciences and, in particular, numerical weather prediction are demanding the highest levels of available computer power. The European Centre for Medium-Range Weather Forecasts, with its experience in using supercomputers in this field, organizes every other year a workshop bringing together manufacturers, computer scientists, researchers and operational users to share their experiences and to learn about the latest developments. This volume provides an excellent overview of the latest achievements and plans for the use of new parallel techniques in the fields of meteorology, climatology and oceanography. Contents:Early Experiences with the New IBM P690+ at ECMWF (D Salmond & S Saarinen)Operation Status of the Earth Simulator (A Uno)Intel Architecture Based High-Performance Computing Technologies (H Cornelius)4D-Var: Optimisation and Performance on the NEC SX-6 (S Oxley)Establishment of an Efficient Managing System for NWP Operation in CMA (J-K Hu & W-H Shen)The Next-Generation Supercomputer and NWP System of the JMA (M Narita)A Uniform Memory Model for Distributed Data Objects on Parallel Architectures (V Balaji & R W Numrich)and other papers Readership: Academics and researchers specializing in high performance

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computing, especially meteorological scientists, and supercomputer manufacturers. Keywords:High Performance Computing;Meteorology;Teracomputing;Parallel Processing;Climatology

This book constitutes the refereed proceedings of the 9th International Conference on Parallel Computing Technologies, PaCT 2007, held in Pereslavl-Zalessky, Russia in September 2007 - in conjunction with the the Russian-Taiwan symposium on Methods and Tools of Parallel Programming of Multicomputers. The 37 revised full papers and 24 revised poster papers presented together with 2 invited paper were carefully reviewed and selected from 98 submissions. The papers are organized in topical sections on models and languages, applications, techniques for parallel programming supporting, cellular aut.

Designed for introductory parallel computing courses at the advanced undergraduate or beginning graduate level, Elements of Parallel Computing presents the fundamental concepts of parallel computing not from the point of view of hardware, but from a more abstract view of algorithmic and implementation patterns. The aim is to facilitate the teaching of parallel programming by surveying some key algorithmic structures and programming models, together with an abstract representation of the underlying hardware. The presentation is friendly and informal. The content of the book is language neutral, using pseudocode that represents common programming language models. The first five chapters present core concepts in parallel computing. SIMD, shared memory, and distributed memory machine models are covered, along with a brief discussion of what their execution models look like. The book also discusses decomposition as a fundamental activity in parallel algorithmic design, starting with a naive example, and continuing with a discussion of some key algorithmic structures. Important programming

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models are presented in depth, as well as important concepts of performance analysis, including work-depth analysis of task graphs, communication analysis of distributed memory algorithms, key performance metrics, and a discussion of barriers to obtaining good performance. The second part of the book presents three case studies that reinforce the concepts of the earlier chapters. One feature of these chapters is to contrast different solutions to the same problem, using select problems that aren't discussed frequently in parallel computing textbooks. They include the Single Source Shortest Path Problem, the Eikonal equation, and a classical computational geometry problem: computation of the two-dimensional convex hull. After presenting the problem and sequential algorithms, each chapter first discusses the sources of parallelism then surveys parallel algorithms.

This volume reflects the theme of the INFORMS 2004 Meeting in Denver: Back to OR Roots. Emerging as a quantitative approach to problem-solving in World War II, our founders were physicists, mathematicians, and engineers who quickly found peace-time uses. It is fair to say that Operations Research (OR) was born in the same incubator as computer science, and it has spawned many new disciplines, such as systems engineering, health care management, and transportation science. Although people from many disciplines routinely use OR methods, many scientific researchers, engineers, and others do not understand basic OR tools and how they can help them. Disciplines ranging from finance to bioengineering are the beneficiaries of what we do — we take an interdisciplinary approach to problem-solving. Our strengths are modeling, analysis, and algorithm design. We provide a quantitative foundation for a broad spectrum of problems, from economics to medicine, from environmental control to sports, from e-commerce to

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computational - ometry. We are both producers and consumers because the mainstream of OR is in the interfaces. As part of this effort to recognize and extend OR roots in future probl- solving, we organized a set of tutorials designed for people who heard of the topic and want to decide whether to learn it. The 90 minutes was spent addressing the questions: What is this about, in a nutshell? Why is it important? Where can I learn more? In total, we had 14 tutorials, and eight of them are published here.

This book constitutes the refereed proceedings of the 9th International Conference on Supercomputing, ISUM 2018, held in Mérida, Mexico, in March 2018. The 19 revised full papers presented were carefully reviewed and selected from 64 submissions. The papers are organized in topical sections on scheduling, architecture, and programming; parallel computing; applications and HPC.

This book constitutes the refereed joint proceedings of ten international workshops held in conjunction with the 4th International Symposium on Parallel and Distributed Processing and Applications, ISPA 2006, held in Sorrento, Italy in December 2006. It contains 116 papers that contribute to enlarging the spectrum of the more general topics treated in the ISPA 2006 main conference.

The contributed volume collects cutting-edge research in GeoComputational Analysis of Regional Systems. The contributions emphasize methodological innovations or substantive breakthroughs on many facets of the socio-economic and environmental reality of regional contexts. Real-world problems and modern optimization techniques to solve them Here, a team of international experts brings together core ideas for solving complex problems in optimization across a wide variety of real-world settings, including computer science, engineering, transportation, telecommunications, and bioinformatics. Part One—covers

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methodologies for complex problem solving including genetic programming, neural networks, genetic algorithms, hybrid evolutionary algorithms, and more. Part Two—dives into applications including DNA sequencing and reconstruction, location of antennae in telecommunication networks, metaheuristics, FPGAs, problems arising in telecommunication networks, image processing, time series prediction, and more. All chapters contain examples that illustrate the applications themselves as well as the actual performance of the algorithms. Optimization Techniques for Solving Complex Problems is a valuable resource for practitioners and researchers who work with optimization in real-world settings.

Grid computing is applying the resources of many computers in a network to a single problem at the same time Grid computing appears to be a promising trend for three reasons: (1) Its ability to make more cost-effective use of a given amount of computer resources, (2) As a way to solve problems that can't be approached without an enormous amount of computing power (3) Because it suggests that the resources of many computers can be cooperatively and perhaps synergistically harnessed and managed as a collaboration toward a common objective. A number of corporations, professional groups, university consortiums, and other groups have developed or are developing frameworks and software for managing grid computing projects. The European Community (EU) is sponsoring a project for a grid for high-energy physics, earth observation, and biology applications. In the United States, the

National Technology Grid is prototyping a computational grid for infrastructure and an access grid for people. Sun Microsystems offers Grid Engine software. Described as a distributed resource management tool, Grid Engine allows engineers at companies like Sony and Synopsys to pool the computer cycles on up to 80 workstations at a time. * "the Grid" is a very hot topic generating broad interest from research and industry (e.g. IBM, Platform, Avaki, Entropia, Sun, HP) * Grid architecture enables very popular e-Science projects like the Genome project which demand global interaction and networking * In recent surveys over 50% of Chief Information Officers are expected to use Grid technology this year Grid Computing: * Features contributions from the major players in the field * Covers all aspects of grid technology from motivation to applications * Provides an extensive state-of-the-art guide in grid computing This is essential reading for researchers in Computing and Engineering, physicists, statisticians, engineers and mathematicians and IT policy makers. Containing over 300 entries in an A-Z format, the Encyclopedia of Parallel Computing provides easy, intuitive access to relevant information for professionals and researchers seeking access to any aspect within the broad field of parallel computing. Topics for this comprehensive reference were selected, written, and peer-reviewed by an

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international pool of distinguished researchers in the field. The Encyclopedia is broad in scope, covering machine organization, programming languages, algorithms, and applications. Within each area, concepts, designs, and specific implementations are presented. The highly-structured essays in this work comprise synonyms, a definition and discussion of the topic, bibliographies, and links to related literature. Extensive cross-references to other entries within the Encyclopedia support efficient, user-friendly searchers for immediate access to useful information. Key concepts presented in the Encyclopedia of Parallel Computing include; laws and metrics; specific numerical and non-numerical algorithms; asynchronous algorithms; libraries of subroutines; benchmark suites; applications; sequential consistency and cache coherency; machine classes such as clusters, shared-memory multiprocessors, special-purpose machines and dataflow machines; specific machines such as Cray supercomputers, IBM's cell processor and Intel's multicore machines; race detection and auto parallelization; parallel programming languages, synchronization primitives, collective operations, message passing libraries, checkpointing, and operating systems. Topics covered: Speedup, Efficiency, Isoefficiency, Redundancy, Amdahls law, Computer Architecture Concepts, Parallel Machine Designs, Benmarks, Parallel Programming concepts

& design, Algorithms, Parallel applications. This authoritative reference will be published in two formats: print and online. The online edition features hyperlinks to cross-references and to additional significant research. Related Subjects:

supercomputing, high-performance computing, distributed computing

Parallel processing has been an enabling technology in scientific computing for more than 20 years. This book is the first in-depth discussion of parallel computing in 10 years; it reflects the mix of topics that mathematicians, computer scientists, and computational scientists focus on to make parallel processing effective for scientific problems.

Presently, the impact of parallel processing on scientific computing varies greatly across disciplines, but it plays a vital role in most problem domains and is absolutely essential in many of them. Parallel Processing for Scientific Computing is divided into four parts: The first concerns performance modeling, analysis, and optimization; the second focuses on parallel algorithms and software for an array of problems common to many modeling and simulation applications; the third emphasizes tools and environments that can ease and enhance the process of application development; and the fourth provides a sampling of applications that require parallel computing for scaling to solve larger and realistic models that can advance science and

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This computational aerodynamics textbook is written at the undergraduate level, based on years of teaching focused on developing the engineering skills required to become an intelligent user of aerodynamic codes. This is done by taking advantage of CA codes that are now available and doing projects to learn the basic numerical and aerodynamic concepts required. This book includes a number of unique features to make studying computational aerodynamics more enjoyable. These include:

- The computer programs used in the book's projects are all open source and accessible to students and practicing engineers alike on the book's website, www.cambridge.org/aerodynamics. The site includes access to images, movies, programs, and more
- The computational aerodynamics concepts are given relevance by CA Concept Boxes integrated into the chapters to provide realistic asides to the concepts
- Readers can see fluids in motion with the Flow Visualization Boxes carefully integrated into the text.

This book discusses questions of numerical solutions of applied problems on parallel computing systems. Nowadays, engineering and scientific computations are carried out on parallel computing systems, which provide parallel data processing on a few computing nodes. In the development of up-to-date applied software, this feature of computers

must be taken into account for the maximum efficient usage of their resources. In constructing computational algorithms, we should separate relatively independent subproblems in order to solve them on a single computing node.

A comprehensive guide for students and practitioners to parallel computing models, processes, metrics, and implementation in MPI and OpenMP.

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