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# High Performance Computing for Computational Science – VECPAR 2004

6th International Conference  
Valencia, Spain, June 28-30, 2004  
Revised Selected and Invited Papers



Springer

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# Preface

VECPAR is a series of international conferences dedicated to the promotion and advancement of all aspects of high-performance computing for computational science, as an industrial technique and academic discipline, extending the frontier of both the state of the art and the state of practice. The audience for and participants in VECPar are seen as researchers in academic departments, government laboratories and industrial organizations. There is now a permanent website for the series, <http://vecpar.fe.up.pt>, where the history of the conferences is described.

The sixth edition of VECPar was the first time the conference was celebrated outside Porto – at the Universidad Politecnica de Valencia (Spain), June 28–30, 2004. The whole conference programme consisted of 6 invited talks, 61 papers and 26 posters, out of 130 contributions that were initially submitted. The major themes were divided into large-scale numerical and non-numerical simulations, parallel and grid computing, biosciences, numerical algorithms, data mining and visualization.

This postconference book includes the best 48 papers and 5 invited talks presented during the three days of the conference. The book is organized into 6 chapters, with a prominent position reserved for the invited talks and the Best Student Paper. As a whole it appeals to a wide research community, from those involved in the engineering applications to those interested in the actual details of the hardware or software implementations, in line with what, in these days, tends to be considered as computational science and engineering (CSE).

Chapter 1 is concerned with large-scale computations; the first paper in the chapter, and in the book, was also the opening talk at the conference. Tetsuya Sato gives an overview of the greatest computations being performed on the Earth Simulator in Japan, followed by a series of 7 papers on equally large problems. Patrick Valduriez authors an invited talk on data management in large P2P systems; the companion to 4 more papers put together in Chapter 2.

The Grid technology in the roughly 5 years since it emerged has become one of the major driving forces in computer and also computational science and engineering. Fabrizio Gagliardi and Vincent Breton in the two first papers (invited talks) in chapter 3 present, respectively, the EGEE European Grid Infrastructure and applications of the Grid technology in medical applications. The 8 remaining papers in the chapter are a further example of the impact that the Grid is making in many areas of application.

Chapter 4 is the largest of all and the 12 papers in this chapter are an indication of the importance of cluster computing. Parallel and distributed computing is the title of chapter 5, which, despite its similarity with the previous chapter, includes papers where the emphasis has been put on the physical modelling and not so much on the strictly computing aspects of the simulations. The invited

talk by Michael Heath opens chapter 5 and is a good example of how complex the computer simulation of real-life engineering systems can be. Since its early editions, linear algebra has occupied a relatively large proportion of the conference programme; linear algebra was the topic we chose to bring this book to a closure – Chapter 6.

### Best Student Paper

There were 10 papers of high quality registered for the Best Student Paper competition. The laureate of the prize was German Molto for the paper:

- *Three-Dimensional Cardiac Electrical Activity Simulation on Cluster and Grid Platforms*, by German Molto, and also co-authored by Jose M. Alonso, Jose M. Ferrero, Vicente Hernandez, Marta Monserrat and Javier Saiz, all at Universidad Politecnica de Valencia.

To conclude, we would like to state in writing our gratitude to all the members of the Scientific Committee and the additional referees. Their opinions and comments were essential in the preparation of this book and the conference programme. We hope that the knowledge and the experience of many contributors to this book can be useful to a large number of readers.

December 2004

*Michel Daydé,  
Jack Dongarra,  
Vicente Hernández,  
José M.L.M. Palma*

*VECPAR is a series of conferences organized by the Faculty of Engineering of Porto (FEUP) since 1993*

# Acknowledgments

The sixth edition of the VECPAR conference brought new organizational challenges. The work was split between people in different countries. While the conference was held in Valencia (Spain), both the Web-based submission systems and the conference page were maintained at the Faculty of Engineering of the University of Porto (Portugal). Vitor Carvalho, once again, was responsible for the conference webpage and did an excellent job. Miguel Caballer, Gemma Cabrelles and Gabriel Garcia at the University of Valencia, under the guidance of Vicente Hernandez, did invaluable work on the Organizing Committee.

João Correia Lopes took care of the VECPAR databases and the Web-based submission systems; his collaboration was precious.

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- Tetsuya Sato  
Earth Simulator Center, Japan
- Patrick Valduriez  
INRIA and IRIN, Nantes, France
- Fabrizio Gagliardi  
EGEE, CERN, Switzerland
- Vincent Breton  
LPC Clermont-Ferrand, CNRS-IN2p3, France
- Michael T. Heath  
Computational Science and Engineering  
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- FEUP - Faculdade de Engenharia da Universidade do Porto
- GVA - Generalitat Valenciana Conselleria de Empresa, Universidad y Ciencia



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# Table of Contents

## Chapter 1: Large Scale Computations

Large Scale Simulations	
<i>Sato Tetsuya</i> .....	1
Development and Integration of Parallel Multidisciplinary Computational Software for Modeling a Modern Manufacturing Process	
<i>Brian J. Henz, Dale R. Shires, Ram V. Mohan</i> .....	10
Automatically Tuned FFTs for BlueGene/L's Double FPU	
<i>Franz Franchetti, Stefan Kral, Juergen Lorenz, Markus Püschel,</i> <i>Christoph W. Ueberhuber</i> .....	23
A Survey of High-Quality Computational Libraries and Their Impact in Science and Engineering Applications	
<i>Leroy A. Drummond, Vicente Hernandez, Osni Marques,</i> <i>Jose E. Roman, Vicente Vidal</i> .....	37
A Performance Evaluation of the Cray X1 for Scientific Applications	
<i>Leonid Oliker, Rupak Biswas, Julian Borrill, Andrew Canning,</i> <i>Jonathan Carter, M. Jahed Djomehri, Hongzhang Shan,</i> <i>David Skinner</i> .....	51
Modelling Overhead of Tuple Spaces with Design of Experiments	
<i>Frederic Hancke, Tom Dhaene, Jan Broeckhove</i> .....	66
Analysis of the Interaction of Electromagnetic Signals with Thin-Wire Structures. Multiprocessing Issues for an Iterative Method	
<i>Ester Martín Garzón, Siham Tabik, Amelia Rubio Bretones,</i> <i>Inmaculada García</i> .....	78
A Performance Prediction Model for Tomographic Reconstruction in Structural Biology	
<i>Paula Cecilia Fritzsche, José-Jesús Fernández, Ana Ripoll,</i> <i>Inmaculada García, Emilio Luque</i> .....	90

## Chapter 2: Data Management and Data Mining

Data Management in Large-Scale P2P Systems	
<i>Patrick Valduriez, Esther Pacitti</i> .....	104

A High Performance System for Processing Queries on Distributed Geospatial Data Sets <i>Mahdi Abdelguerfi, Venkata Mahadevan, Nicolas Challier, Maik Flanagan, Kevin Shaw, Jay Ratcliff</i> .....	119
Parallel Implementation of Information Retrieval Clustering Models <i>Daniel Jiménez, Vicente Vidal</i> .....	129
Distributed Processing of Large BioMedical 3D Images <i>Konstantinos Liakos, Albert Burger, Richard Baldock</i> .....	142
Developing Distributed Data Mining Applications in the KNOWLEDGE GRID Framework <i>Giuseppe Bueti, Antonio Congiusta, Domenico Talia</i> .....	156
Scaling Up the Preventive Replication of Autonomous Databases in Cluster Systems <i>Cédric Coulon, Esther Pacitti, Patrick Valduriez</i> .....	170
Parallel Implementation of a Fuzzy Rule Based Classifier <i>Alexandre G. Evsukoff, Myrian C.A. Costa, Nelson F.F. Ebecken</i> ....	184
 <b>Chapter 3: Grid Computing Infrastructure</b>	
The EGEE European Grid Infrastructure Project <i>Fabrizio Gagliardi</i> .....	194
Grid Technology to Biomedical Applications <i>Vincent Breton, Christophe Blanchet, Yannick Legré, Lydia Maigne, Johan Montagnat</i> .....	204
Three-Dimensional Cardiac Electrical Activity Simulation on Cluster and Grid Platforms <i>Jose M. Alonso, Jose M. Ferrero (Jr.), Vicente Hernández, Germán Moltó, Marta Monserrat, Javier Saiz</i> .....	219
2DRMP-G: Migrating a Large-Scale Numerical Mathematical Application to a Grid Environment <i>Terry Harmer, N. Stan Scott, Virginia Faro-Maza, M. Penny Scott, Phil G. Burke, Andrew Carson, P. Preston</i> .....	233
Design of an OGSA-Compliant Grid Information Service Using .NET Technologies <i>Ranieri Baraglia, Domenico Laforenza, Angelo Gaeta, Pierluigi Ritrovato, Matteo Gaeta</i> .....	247

A Web-Based Application Service Provision Architecture for Enabling High-Performance Image Processing <i>Carlos Alfonso, Ignacio Blanquer, Vicente Hernandez, Damià Segrelles</i> .....	260
Influence of Grid Economic Factors on Scheduling and Migration <i>Rafael Moreno-Vozmediano, Ana Belen Alonso-Conde</i> .....	274
Extended Membership Problem for Open Groups: Specification and Solution <i>Mari-Carmen Bañuls, Pablo Galdámez</i> .....	288
Asynchronous Iterative Algorithms for Computational Science on the Grid: Three Case Studies <i>Jacques Bahi, Raphaël Couturier, Philippe Vuillemin</i> .....	302
Security Mechanism for Medical Image Information on PACS Using Invisible Watermark <i>Guan-tack Oh, Yun-Bae Lee, Soon-ja Yeom</i> .....	315
 <b>Chapter 4: Cluster Computing</b>	
Parallel Generalized Finite Element Method for Magnetic Multiparticle Problems <i>Achim Basermann, Igor Tsukerman</i> .....	325
Parallel Model Reduction of Large Linear Descriptor Systems via Balanced Truncation <i>Peter Benner, Enrique S. Quintana-Ortí, Gregorio Quintana-Ortí</i> ...	340
A Parallel Algorithm for Automatic Particle Identification in Electron Micrographs <i>Vivek Singh, Yongchang Ji, Dan C. Marinescu</i> .....	354
Parallel Resolution of the Two-Group Time Dependent Neutron Diffusion Equation with Public Domain ODE Codes. <i>Víctor M. García, Vicente Vidal, G. Verdu, Juan Garayoa, Rafael Miró</i> .....	368
FPGA Implementations of the RNR Cellular Automata to Model Electrostatic Field <i>Joaquín Cerdá-Boluda, Oscar Amoraga-Lechiguero, Ruben Torres-Curado, Rafael Gadea-Gironés, Angel Sebastià-Cortés</i> ..	382

PerWiz: A What-If Prediction Tool for Tuning Message Passing Programs	
<i>Fumihiko Ino, Yuki Kanbe, Masao Okita, Kenichi Hagihara</i> . . . . .	396
Maintaining Cache Coherency for B+ Tree Indexes in a Shared Disks Cluster	
<i>Kyungoh Ohn, Haengrae Cho</i> . . . . .	410
Message Strip-Mining Heuristics for High Speed Networks	
<i>Costin Iancu, Parry Husbands, Wei Chen</i> . . . . .	424
Analysis of the Abortion Rate on Lazy Replication Protocols	
<i>Luis Irún-Briz, Francesc D. Muñoz-Escóí,</i> <i>Josep M. Bernabéu-Aubán</i> . . . . .	438
protoRAID: A User-Level RAID Emulator for Fast Prototyping in Fibre Channel SAN Environment	
<i>Dohun Kim, Chanik Park</i> . . . . .	454
Parallel Computational Model with Dynamic Load Balancing in PC Clusters	
<i>Ricardo V. Dorneles, Rogério L. Rizzi, André L. Martinotto,</i> <i>Delcino Picinin Jr., Philippe O.A. Navaux, Tiarajú A. Diverio</i> . . . . .	468
Dynamically Adaptive Binomial Trees for Broadcasting in Heterogeneous Networks of Workstations	
<i>Silvia M. Figueira, Christine Mendes</i> . . . . .	480
<b>Chapter 5: Parallel and Distributed Computing</b>	
Parallel Simulation of Multicomponent Systems	
<i>Michael T. Heath, Xiangmin Jiao</i> . . . . .	496
Parallel Boundary Elements: A Portable 3-D Elastostatic Implementation for Shared Memory Systems	
<i>Manoel T.F. Cunha, José C.F. Telles, Alvaro L.G.A. Coutinho</i> . . . . .	514
On Dependence Analysis for SIMD Enhanced Processors	
<i>Patricio Bulić, Veselko Guštin</i> . . . . .	527
A Preliminary Nested-Parallel Framework to Efficiently Implement Scientific Applications	
<i>Arturo González Escribano, Arjan J.C. van Gemund,</i> <i>Valentín Cardenoso-Payo, Raúl Portales-Fernández,</i> <i>Jose A. Caminero-Granja</i> . . . . .	541

Exploiting Multilevel Parallelism Within Modern Microprocessors: DWT as a Case Study <i>Christian Tenllado, Carlos Garcia, Manuel Prieto, Luis Piñuel, Francisco Tirado</i> .....	556
Domain Decomposition Methods for PDE Constrained Optimization Problems <i>Ernesto Prudencio, Richard Byrd, Xiao-Chuan Cai</i> .....	569
Parallelism in Bioinformatics Workflows <i>Luiz A.V.C. Meyer, Shaila C. Rössle, Paulo M. Bisch, Marta Mattoso</i> .....	583
Complete Pattern Matching: Recursivity Versus Multi-threading <i>Nadia Nedjah, Luiza de Macedo Mourelle</i> .....	598
Probabilistic Program Analysis for Parallelizing Compilers <i>Iain M. Forsythe, Peter Milligan, Paul P. Sage</i> .....	610
 <b>Chapter 6: Linear and Non-Linear Algebra</b>	
Parallel Acceleration of Krylov Solvers by Factorized Approximate Inverse Preconditioners <i>Luca Bergamaschi, Ángeles Martínez</i> .....	623
Krylov and Polynomial Iterative Solvers Combined with Partial Spectral Factorization for SPD Linear Systems <i>Luc Giraud, Daniel Ruiz, Ahmed Touhami</i> .....	637
Three Parallel Algorithms for Solving Nonlinear Systems and Optimization Problems <i>Jesús Peinado, Antonio M. Vidal</i> .....	657
Numerical Integration of Differential Riccati Equation: A High Performance Computing Approach <i>Enrique Arias, Vicente Hernández</i> .....	671
An Efficient and Stable Parallel Solution for Non-symmetric Toeplitz Linear Systems <i>Pedro Alonso, José M. Badía, Antonio M. Vidal</i> .....	685
Partial Spectral Information from Linear Systems to Speed-Up Numerical Simulations in Computational Fluid Dynamics. <i>Carlos Balsa, José M. Laginha M. Palma, Daniel Ruiz</i> .....	699

Parallel Newton Iterative Methods Based on Incomplete LU  
Factorizations for Solving Nonlinear Systems  
*Josep Arnal, Héctor Migallón, Violeta Migallón, Jose Penadés . . . . .* 716

**Author Index . . . . .** 731