

Marian Bubak
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Peter M.A. Sloot
Jack J. Dongarra (Eds.)

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Computational Science – ICCS 2004

4th International Conference
Kraków, Poland, June 2004
Proceedings, Part III

3 Part III



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Preface

The International Conference on Computational Science (ICCS 2004) held in Kraków, Poland, June 6–9, 2004, was a follow-up to the highly successful ICCS 2003 held at two locations, in Melbourne, Australia and St. Petersburg, Russia; ICCS 2002 in Amsterdam, The Netherlands; and ICCS 2001 in San Francisco, USA.

As computational science is still evolving in its quest for subjects of investigation and efficient methods, ICCS 2004 was devised as a forum for scientists from mathematics and computer science, as the basic computing disciplines and application areas, interested in advanced computational methods for physics, chemistry, life sciences, engineering, arts and humanities, as well as computer system vendors and software developers. The main objective of this conference was to discuss problems and solutions in all areas, to identify new issues, to shape future directions of research, and to help users apply various advanced computational techniques. The event harvested recent developments in computational grids and next generation computing systems, tools, advanced numerical methods, data-driven systems, and novel application fields, such as complex systems, finance, econo-physics and population evolution.

Keynote lectures were delivered by David Abramson and Alexander V. Bogdanov, *From ICCS 2003 to ICCS 2004 – Personal Overview of Recent Advances in Computational Science*; Iain Duff, *Combining Direct and Iterative Methods for the Solution of Large Sparse Systems in Different Application Areas*; Chris Johnson, *Computational Multi-field Visualization*; John G. Michopoulos, *On the Pathology of High Performance Computing*; David De Roure, *Semantic Grid*; and Vaidy Sunderam, *True Grid: What Makes a Grid Special and Different?* In addition, three invited lectures were delivered by representatives of leading computer system vendors, namely: Frank Baetke from Hewlett Packard, Eng Lim Goh from SGI, and David Harper from the Intel Corporation.

Four tutorials extended the program of the conference: Paweł Płaszczak and Krzysztof Wilk, *Practical Introduction to Grid and Grid Services*; Grzegorz Młynarczyk, *Software Engineering Methods for Computational Science*; the *CrossGrid Tutorial* by the CYFRONET CG team; and the Intel tutorial.

We would like to thank all keynote, invited and tutorial speakers for their interesting and inspiring talks.

Aside of plenary lectures, the conference included 12 parallel oral sessions and 3 poster sessions. Ever since the first meeting in San Francisco, ICCS has attracted an increasing number of more researchers involved in the challenging field of computational science. For ICCS 2004, we received 489 contributions for the main track and 534 contributions for 41 originally-proposed workshops. Of these submissions, 117 were accepted for oral presentations and 117 for posters in the main track, while 328 papers were accepted for presentations at 30 workshops. This selection was possible thanks to the hard work of the Program

Committee members and 477 reviewers. The author index contains 1395 names, and almost 560 persons from 44 countries and all continents attended the conference: 337 participants from Europe, 129 from Asia, 62 from North America, 13 from South America, 11 from Australia, and 2 from Africa.

The ICCS 2004 proceedings consists of four volumes, the first two volumes, LNCS 3036 and 3037 contain the contributions presented in the main track, while volumes 3038 and 3039 contain the papers accepted for the workshops. Parts I and III are mostly related to pure computer science, while Parts II and IV are related to various computational research areas. For the first time, the ICCS proceedings are also available on CD. We would like to thank Springer-Verlag for their fruitful collaboration. During the conference the best papers from the main track and workshops as well as the best posters were nominated and presented on the ICCS 2004 Website. We hope that the ICCS 2004 proceedings will serve as a major intellectual resource for computational science researchers, pushing back the boundaries of this field. A number of papers will also be published as special issues of selected journals.

We owe thanks to all workshop organizers and members of the Program Committee for their diligent work, which ensured the very high quality of the event. We also wish to specifically acknowledge the collaboration of the following colleagues who organized their workshops for the third time: Nicoletta Del Buono (New Numerical Methods) Andres Iglesias (Computer Graphics), Dieter Kranzlmüller (Tools for Program Development and Analysis), Youngsong Mun (Modeling and Simulation in Supercomputing and Telecommunications).

We would like to express our gratitude to Prof. Ryszard Tadeusiewicz, Rector of the AGH University of Science and Technology, as well as to Prof. Marian Noga, Prof. Kazimierz Jeleń, Dr. Jan Kulka and Prof. Krzysztof Zieliński, for their personal involvement. We are indebted to all the members of the Local Organizing Committee for their enthusiastic work towards the success of ICCS 2004, and to numerous colleagues from ACC CYFRONET AGH and the Institute of Computer Science for their help in editing the proceedings and organizing the event. We very much appreciate the help of the Computer Science and Computational Physics students during the conference. We owe thanks to the ICCS 2004 sponsors: Hewlett-Packard, Intel, IBM, SGI and ATM, SUN Microsystems, Polish Airlines LOT, ACC CYFRONET AGH, the Institute of Computer Science AGH, the Polish Ministry for Scientific Research and Information Technology, and Springer-Verlag for their generous support.

We wholeheartedly invite you to once again visit the ICCS 2004 Website (<http://www.cyfronet.krakow.pl/iccs2004/>), to recall the atmosphere of those June days in Kraków.

June 2004

Marian Bubak, Scientific Chair 2004
on behalf of the co-editors:
G. Dick van Albada
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Organization

ICCS 2004 was organized by the Academic Computer Centre CYFRONET AGH University of Science and Technology (Kraków, Poland) in cooperation with the Institute of Computer Science AGH, the University of Amsterdam (The Netherlands) and the University of Tennessee (USA).

All the members of the Local Organizing Committee are the staff members of CYFRONET and/or ICS. The conference took place at the premises of the Faculty of Physics and Nuclear Techniques AGH and at the Institute of Computer Science AGH.

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OpenMP for Large Scale Applications

B. Chapman (University of Houston, USA)

Tools for Program Development and Analysis in Computational Science

D. Kranzlmüller (Johannes Kepler University Linz, Austria)
 R. Wismüller (TU München, Germany)
 A. Bode (Technische Universität München, Germany)
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Modern Technologies for Web-Based Adaptive Systems

N. Thanh Nguyen (Wrocław University of Technology, Poland)
 J. Sobecki (Wrocław University of Technology, Poland)

Agent Day 2004 – Intelligent Agents in Computing Systems

E. Nawarecki (AGH University of Science and Technology, Poland)
 K. Cetnarowicz (AGH University of Science and Technology, Poland)
 G. Dobrowolski (AGH University of Science and Technology, Poland)
 R. Schaefer (Jagiellonian University, Poland)
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 S. Raczynski (Universidad Panamericana, Mexico)

Dynamic Data Driven Application Systems

F. Darema (NSF/CISE, USA)

HLA-Based Distributed Simulation on the Grid

S. J. Turner (Nanyang Technological University, Singapore)

Interactive Visualisation and Interaction Technologies

E. Zudilova (University of Amsterdam, The Netherlands)

T. Adriaansen (CSIRO, ICT Centre, Australia)

Computational Modeling of Transport on Networks

B. Tadic (Jozef Stefan Institute, Slovenia)

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Modeling and Simulation in Supercomputing and Telecommunications

Y. Mun (Soongsil University, Korea)

QoS Routing

H. Choo (Sungkyunkwan University, Korea)

Evolvable Hardware

N. Nedjah (State University of Rio de Janeiro, Brazil)

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Advanced Methods of Digital Image Processing

B. Smolka (Silesian University of Technology, Laboratory of Multimedia Communication, Poland)

Computer Graphics and Geometric Modelling (CGGM 2004)

A. Iglesias Prieto (University of Cantabria, Spain)

Computer Algebra Systems and Applications (CASA 2004)

A. Iglesias Prieto (University of Cantabria, Spain)

A. Galvez (University of Cantabria, Spain)

New Numerical Methods for DEs: Applications to Linear Algebra, Control and Engineering

N. Del Buono (University of Bari, Italy)

L. Lopez (University of Bari, Italy)

Parallel Monte Carlo Algorithms for Diverse Applications in a Distributed Setting

V. N. Alexandrov (University of Reading, UK)

A. Karaivanova (Bulgarian Academy of Sciences, Bulgaria)

I. Dimov (Bulgarian Academy of Sciences, Bulgaria)

Modelling and Simulation of Multi-physics Multi-scale Systems

- V. Krzhizhanovskaya (University of Amsterdam, The Netherlands)
- B. Chopard (University of Geneva, CUI, Switzerland)
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Gene, Genome and Population Evolution

- S. Cibrat (University of Wrocław, Poland)
- D. Stauffer (Cologne University, Germany)
- A. Maksymowicz (AGH University of Science and Technology, Poland)

Computational Methods in Finance and Insurance

- A. Janicki (University of Wrocław, Poland)
- J.J. Korczak (University Louis Pasteur, Strasbourg, France)

Computational Economics and Finance

- X. Deng (City University of Hong Kong, Hong Kong)
- S. Wang (Chinese Academy of Sciences, ROC)
- Y. Shi (University of Nebraska at Omaha, USA)

GeoComputation

- Y. Xue (Chinese Academy of Sciences, ROC)
- C. Yarrowos (University of Athens, Greece)

Simulation and Modeling of 3D Integrated Circuits

- I. Balk (R3Logic Inc., USA)

Computational Modeling and Simulation on Biomechanical Engineering

- Y.H. Kim (Kyung Hee University, Korea)

Information Technologies Enhancing Health Care Delivery

- M. Duplaga (Jagiellonian University Medical College, Poland)
- D. Ingram (University College London, UK)
- K. Zieliński (AGH University of Science and Technology, Poland)

Computing in Science and Engineering Academic Programs

- D. Donnelly (Siena College, USA)