

Contents

Parallel Models, Algorithms and Programming Methods

Software System for Maximal Parallelization of Algorithms on the Base of the Conception of Q -determinant.	3
<i>Valentina N. Aleeva, Ilya S. Sharabura, and Denis E. Suleymanov</i>	
Highly Parallel Multigrid Solvers for Multicore and Manycore Processors . . .	10
<i>Oleg Bessonov</i>	
Hierarchical Optimization of MPI Reduce Algorithms	21
<i>Khalid Hasanov and Alexey Lastovetsky</i>	
On Parallel Computational Technologies of Augmented Domain Decomposition Methods.	35
<i>Y.L. Gurieva and V.P. Il'in</i>	
A Modular-Positional Computation Technique for Multiple-Precision Floating-Point Arithmetic.	47
<i>Konstantin Isupov and Vladimir Knyazkov</i>	
Creation of Data Mining Algorithms as Functional Expression for Parallel and Distributed Execution	62
<i>Ivan Kholod and Ilya Petukhov</i>	
Dynamic Parallelization Strategies for Multifrontal Sparse Cholesky Factorization.	68
<i>Sergey Lebedev, Dmitry Akhmedzhanov, Evgeniy Kozinov, Iosif Meyerov, Anna Pirova, and Alexander Sysoyev</i>	
Distributed Algorithm of Data Allocation in the Fragmented Programming System LuNA.	80
<i>Victor E. Malyshkin, Vladislav A. Perepelkin, and Georgy A. Schukin</i>	
Control Flow Usage to Improve Performance of Fragmented Programs Execution.	86
<i>V.E. Malyshkin, V.A. Perepelkin, and A.A. Tkacheva</i>	
Towards Application Energy Measurement and Modelling Tool Support	91
<i>Kenneth O'Brien, Alexey Lastovetsky, Ilia Pietri, and Rizos Sakellariou</i>	
The Mathematical Model and the Problem of Optimal Partitioning of Shared Memory for Work-Stealing Deques.	102
<i>Andrew Sokolov and Eugene Barkovsky</i>	

Dynamic Load Balancing Based on Rectilinear Partitioning in Particle-in-Cell Plasma Simulation	107
<i>Igor Surmin, Alexei Bashinov, Sergey Bastrakov, Evgeny Efimenko, Arkady Gonoskov, and Iosif Meyerov</i>	
Unconventional Computing - Cellular Automata	
A Behavioral Analysis of Cellular Automata	123
<i>Jan M. Baetens and Bernard De Baets</i>	
Contradiction Between Parallelization Efficiency and Stochasticity in Cellular Automata Models of Reaction-Diffusion Phenomena	135
<i>Olga Bandman</i>	
A Parallel Genetic Algorithm to Adjust a Cardiac Model Based on Cellular Automaton and Mass-Spring Systems	149
<i>Ricardo Silva Campos, Bernardo Martins Rocha, Luis Paulo da Silva Barra, Marcelo Lobosco, and Rodrigo Weber dos Santos</i>	
Hexagonal Bravais–Miller Routing by Cellular Automata Agents	164
<i>Dominique Désérable and Rolf Hoffmann</i>	
The Influence of Cellular Automaton Topology on the Opinion Formation. . .	179
<i>Tomasz M. Gwizdała</i>	
Cellular Automata Model of Electrons and Holes Annihilation in an Inhomogeneous Semiconductor.	191
<i>A.E. Kireeva and K.K. Sabelfeld</i>	
Constructions Used in Associative Parallel Algorithms for Directed Graphs. . . .	201
<i>Anna Nepomniaschaya</i>	
Oscillatory Network Based on Kuramoto Model for Image Segmentation. . . .	210
<i>Andrei Novikov and Elena Benderskaya</i>	
Using Monte Carlo Method for Searching Partitionings of Hard Variants of Boolean Satisfiability Problem	222
<i>Alexander Semenov and Oleg Zaikin</i>	
A Class of Non-optimum-time $3n$ -Step FSSP Algorithms - A Survey	231
<i>Hiroshi Umeo, Masashi Maeda, Akihiro Sousa, and Kiyohisa Taguchi</i>	
CA - Model of Autowaves Formation in the Bacterial MinCDE System	246
<i>Anton Vitvitsky</i>	

Distributed Computing

Agent-Based Approach to Monitoring and Control of Distributed Computing Environment	253
<i>Igor Bychkov, Gennady Oparin, Alexei Novopashin, and Ivan Sidorov</i>	
Virtual Screening in a Desktop Grid: Replication and the Optimal Quorum . . .	258
<i>Ilya Chernov and Natalia Nikitina</i>	
Partition Algorithm for Association Rules Mining in BOINC-Based Enterprise Desktop Grid.	268
<i>Evgeny Ivashko and Alexander Golovin</i>	
Task Scheduling in a Desktop Grid to Minimize the Server Load	273
<i>Vladimir V. Mazalov, Natalia N. Nikitina, and Evgeny E. Ivashko</i>	
An HPC Upgrade/Downgrade that Provides Workload Stability	279
<i>Alexander Rumyantsev</i>	
Job Ranking and Scheduling in Utility Grids VOs.	285
<i>Victor Toporkov, Anna Toporkova, Alexey Tselishchev, Dmitry Yemelyanov, and Petr Potekhin</i>	
Congestion Elimination on Data Storages Network Interfaces in Datacenters.	298
<i>P.M. Vdovin, I.A. Zotov, V.A. Kostenko, and A.V. Plakunov</i>	

Special Processors Programming Techniques

Use of Xeon Phi Coprocessor for Solving Global Optimization Problems. . . .	307
<i>Konstantin Barkalov, Victor Gergel, and Ilya Lebedev</i>	
Increasing Efficiency of Data Transfer Between Main Memory and Intel Xeon Phi Coprocessor or NVIDIA GPUS with Data Compression	319
<i>Konstantin Y. Besedin, Pavel S. Kostenetskiy, and Stepan O. Prikazchikov</i>	
Parallelizing Branch-and-Bound on GPUs for Optimization of Multiproduct Batch Plants	324
<i>Andrey Borisenko, Michael Haidl, and Sergei Gorlatch</i>	
Optimal Dynamic Data Layouts for 2D FFT on 3D Memory Integrated FPGA.	338
<i>Ren Chen, Shreyas G. Singapura, and Viktor K. Prasanna</i>	

High-Performance Reconfigurable Computer Systems Based on Virtex FPGAs	349
<i>Alexey I. Dordopulo, Ilya I. Levin, Yuri I. Doronchenko, and Maxim K. Raskladkin</i>	
Parallelizing Biochemical Stochastic Simulations: A Comparison of GPUs and Intel Xeon Phi Processors	363
<i>P. Cazzaniga, F. Ferrara, M.S. Nobile, D. Besozzi, and G. Mauri</i>	
Cost of Bandwidth-Optimized Sparse Mesh Layouts	375
<i>Martti Forsell, Ville Leppänen, and Martti Penttonen</i>	
Toward a Core Design to Distribute an Execution on a Manycore Processor	390
<i>Bernard Goossens, David Parello, Katarzyna Porada, and Djallal Rahmoune</i>	
Heuristic Algorithms for Optimizing Array Operations in Parallel PGAS-programs	405
<i>Ivan Kulagin, Alexey Paznikov, and Mikhail Kurnosov</i>	
Progressive Transactional Memory in Time and Space.	410
<i>Petr Kuznetsov and Srivatsan Ravi</i>	
Wavelet-Based Local Mesh Adaptation with Application to Gas Dynamics. . . .	426
<i>Kirill Merkulov</i>	
On Implementation High-Scalable CFD Solvers for Hybrid Clusters with Massively-Parallel Architectures.	436
<i>Pavel Pavlukhin and Igor Menshov</i>	
Parallelization of 3D MPDATA Algorithm Using Many Graphics Processors.	445
<i>Krzysztof Rojek and Roman Wyrzykowski</i>	
Performance Evaluation of a Human Immune System Simulator on a GPU Cluster	458
<i>Thiago M. Soares, Micael P. Xavier, Alexandre B. Pigozzo, Ricardo Silva Campos, Rodrigo W. dos Santos, and Marcelo Lobosco</i>	
HPC Hardware Efficiency for Quantum and Classical Molecular Dynamics	469
<i>Vladimir V. Stegailov, Nikita D. Orekhov, and Grigory S. Smirnov</i>	
Automatic High-Level Programs Mapping onto Programmable Architectures. . . .	474
<i>Boris Ya. Steinberg, Denis V. Dubrov, Yury Mikhailuts, Alexander S. Roshal, and Roman B. Steinberg</i>	

Applications

Implementation of a Three-Phase Fluid Flow (“Oil-Water-Gas”) Numerical Model in the LuNA Fragmented Programming System	489
<i>Darkhan Akhmed-Zaki, Danil Lebedev, and Vladislav A. Perepelkin</i>	
Development of a Distributed Parallel Algorithm of 3D Hydrodynamic Calculation of Oil Production on the Basis of MapReduce Hadoop and MPI Technologies.	498
<i>Darkhan Akhmed-Zaki, Madina Mansurova, Timur Imankulov, Bazargul Matkerim, and Ekaterina Dadykina</i>	
A Two-Level Parallel Global Search Algorithm for Solution of Computationally Intensive Multiextremal Optimization Problems	505
<i>Victor Gergel and Sergey Sidorov</i>	
Efficient Parallel Implementation of Coherent Stacking Algorithms in Seismic Data Processing.	516
<i>Maxim Gorodnichev, Anton Duchkov, and Alexander Kupchishin</i>	
Accurate Parallel Algorithm for Tracking Inertial Particles in Large-Scale Direct Numerical Simulations of Turbulence.	522
<i>Takashi Ishihara, Kei Enohata, Koji Morishita, Mitsuo Yokokawa, and Katsuya Ishii</i>	
Treating Complex Geometries with Cartesian Grids in Problems for Fluid Dynamics	528
<i>Igor Menshov</i>	
Architecture, Implementation and Performance Optimization in Organizing Parallel Computations for Simulation Environment	536
<i>Maria Nasyrova, Yury Shornikov, and Dmitry Dostovalov</i>	
Author Index	547

Parallel Computing Technologies
13th International Conference, PaCT 2015,
Petrozavodsk, Russia, August 31-September 4, 2015,
Proceedings
Malyshkin, V. (Ed.)
2015, XIV, 548 p. 204 illus., Softcover
ISBN: 978-3-319-21908-0