

Contents – Part I

Parallel Architectures and Resilience

Exploring Memory Error Vulnerability for Parallel Programming Models. . . .	3
<i>Isil Oz, Marisa Gil, Gladys Utrera, and Xavier Martorell</i>	
An Approach for Ensuring Reliable Functioning of a Supercomputer Based on a Formal Model	12
<i>Alexander Antonov, Dmitry Nikitenko, Pavel Shvets, Sergey Sobolev, Konstantin Stefanov, Vadim Voevodin, Vladimir Voevodin, and Sergey Zhumatiy</i>	
Sparse Matrix Multiplication on Dataflow Engines	23
<i>Vladimir Simic, Vladimir Ciric, Nikola Savic, and Ivan Milentijevic</i>	
Energy Efficient Calculations of Text Similarity Measure on FPGA-Accelerated Computing Platforms	31
<i>Michał Karwatowski, Paweł Russek, Maciej Wielgosz, Sebastian Koryciak, and Kazimierz Wiatr</i>	

Numerical Algorithms and Parallel Scientific Computing

A Bucket Sort Algorithm for the Particle-In-Cell Method on Manycore Architectures	43
<i>Andreas Jocksch, Farah Hariri, Trach-Minh Tran, Stephan Brunner, Claudio Gheller, and Laurent Villard</i>	
Experience on Vectorizing Lattice Boltzmann Kernels for Multi- and Many-Core Architectures	53
<i>Enrico Calore, Nicola Demo, Sebastiano Fabio Schifano, and Raffaele Tripiccone</i>	
Performance Analysis of the Kahan-Enhanced Scalar Product on Current Multicore Processors	63
<i>Johannes Hofmann, Dietmar Fey, Michael Riedmann, Jan Eitzinger, Georg Hager, and Gerhard Wellein</i>	
Performance Analysis of the Chebyshev Basis Conjugate Gradient Method on the K Computer	74
<i>Yosuke Kumagai, Akihiro Fujii, Teruo Tanaka, Yosuke Hirota, Takeshi Fukaya, Toshiyuki Imamura, and Reiji Suda</i>	

Dense Symmetric Indefinite Factorization on GPU Accelerated Architectures	86
<i>Marc Baboulin, Jack Dongarra, Adrien Rémy, Stanimire Tomov, and Ichitaro Yamazaki</i>	
A Parallel Multi-threaded Solver for Symmetric Positive Definite Bordered-Band Linear Systems	96
<i>Peter Benner, Pablo Ezzatti, Enrique S. Quintana-Ortí, and Alfredo Remón</i>	
Parallel Algorithm for Quasi-Band Matrix-Matrix Multiplication	106
<i>Dharma Teja Vooturi and Kishore Kothapalli</i>	
Comparative Performance Analysis of Coarse Solvers for Algebraic Multigrid on Multicore and Manycore Architectures	116
<i>Alex Druinsky, Pieter Ghysels, Xiaoye S. Li, Osni Marques, Samuel Williams, Andrew Barker, Delyan Kalchev, and Panayot Vassilevski</i>	
LU Preconditioning for Overdetermined Sparse Least Squares Problems	128
<i>Gary W. Howell and Marc Baboulin</i>	
Experimental Optimization of Parallel 3D Overlapping Domain Decomposition Schemes	138
<i>Sofia Guzzetti, Alessandro Veneziani, and Vaidy Sunderam</i>	
Parallel Implementation of the FETI DDM Constraint Matrix on Top of PETSc for the PermonFLLOP Package	150
<i>Alena Vasatova, Martin Cermak, and Vaclav Hapla</i>	
Accelerating Sparse Arithmetic in the Context of Newton’s Method for Small Molecules with Bond Constraints	160
<i>Carl Christian Kjølgaard Mikkelsen, Jesús Alastruey-Benedé, Pablo Ibáñez-Marín, and Pablo García Risueño</i>	
Massively Parallel Approach to Sensitivity Analysis on HPC Architectures by Using Scalarm Platform.	172
<i>Daniel Bachniak, Jakub Liput, Lukasz Rauch, Renata Słota, and Jacek Kitowski</i>	
GPU Implementation of Krylov Solvers for Block-Tridiagonal Eigenvalue Problems	182
<i>Alejandro Lamas Daviña and Jose E. Roman</i>	
Parallel Non-numerical Algorithms	
Comparison of Large Graphs Using Distance Information	195
<i>Wojciech Czech, Wojciech Mielczarek, and Witold Dzwiniel</i>	

Fast Incremental Community Detection on Dynamic Graphs.	207
<i>Anita Zakrzewska and David A. Bader</i>	
A Diffusion Process for Graph Partitioning: Its Solutions and Their Improvement	218
<i>Andreas Jocksch</i>	
A Parallel Algorithm for LZW Decompression, with GPU Implementation. . .	228
<i>Shunji Funasaka, Koji Nakano, and Yasuaki Ito</i>	
Parallel FDFM Approach for Computing GCDs Using the FPGA	238
<i>Xin Zhou, Koji Nakano, and Yasuaki Ito</i>	
Parallel Induction of Nondeterministic Finite Automata	248
<i>Tomasz Jastrzab, Zbigniew J. Czech, and Wojciech Wieczorek</i>	
Parallel BSO Algorithm for Association Rules Mining Using Master/Worker Paradigm	258
<i>Youssef Djenouri, Ahcene Bendjoudi, Djamel Djenouri, and Zineb Habbas</i>	
Tools and Environments for Parallel/Distributed/Cloud Computing	
Distributed Computing Infrastructure as a Tool for e-Science	271
<i>Jacek Kitowski, Kazimierz Wiatr, Łukasz Dutka, Maciej Twardy, Tomasz Szepieniec, Mariusz Sterzel, Renata Słota, and Robert Pająk</i>	
A Lightweight Approach for Deployment of Scientific Workflows in Cloud Infrastructures.	281
<i>Bartosz Balis, Kamil Figiela, Maciej Malawski, Maciej Pawlik, and Marian Bubak</i>	
Distributed Execution of Dynamically Defined Tasks on Microsoft Azure . . .	291
<i>Piotr Wiewiura, Maciej Malawski, and Monika Piwowar</i>	
Scalable Distributed Two-Layer Block Based Datastore	302
<i>Adam Krechowicz, Stanisław Deniziak, Mariusz Bedla, Arkadiusz Chrobot, and Grzegorz Łukawski</i>	
Metadata Organization and Management for Globalization of Data Access with Onedata.	312
<i>Michał Wrzeszcz, Krzysztof Trzepla, Rafał Słota, Konrad Zemek, Tomasz Lichoń, Łukasz Opiola, Darin Nikolow, Łukasz Dutka, Renata Słota, and Jacek Kitowski</i>	
Hypergraph Based Abstraction for File-Less Data Management.	322
<i>Bartosz Kryza and Jacek Kitowski</i>	

Using Akka Actors for Managing Iterations in Multiscale Applications	332
<i>Katarzyna Rycerz and Marian Bubak</i>	

Application of Parallel Computing

Synthetic Signature Program for Performance Scalability	345
<i>Javier Panadero, Alvaro Wong, Dolores Rexachs, and Emilio Luque</i>	

FEniCS-HPC: Automated Predictive High-Performance Finite Element Computing with Applications in Aerodynamics.	356
<i>Johan Hoffman, Johan Jansson, and Niclas Jansson</i>	

Accelerating NWChem Coupled Cluster Through Dataflow-Based Execution.	366
<i>Heike Jagode, Anthony Danalis, George Bosilca, and Jack Dongarra</i>	

Parallelization and Optimization of a CAD Model Processing Tool from the Automotive Industry to Distributed Memory Parallel Computers	377
<i>Luis Ayuso, Juan J. Durillo, Bernhard Kornberger, Martin Schifko, and Thomas Fahringer</i>	

GPU Accelerated Simulations of Magnetic Resonance Imaging of Vascular Structures.	389
<i>Krzysztof Jurczuk, Dariusz Murawski, Marek Kretowski, and Johanne Bezy-Wendling</i>	

Parallel Algorithms for Wireless LAN Planning	399
<i>Andrzej Gnatowski and Jan Kwiatkowski</i>	

Toward Parallel Modeling of Solidification Based on the Generalized Finite Difference Method Using Intel Xeon Phi	411
<i>Lukasz Szustak, Kamil Halbiniak, Adam Kulawik, Joanna Wrobel, and Pawel Gepner</i>	

Optimized Parallel Model of Human Detection Based on the Multi-Scale Covariance Descriptor	423
<i>Nesrine Abid, Tarek Ouni, Kais Loukil, A. Chiheb Ammari, and Mohamed Abid</i>	

Neural Networks, Evolutionary Computing and Metaheuristics

Parallel Extremal Optimization with Guided Search and Crossover Applied to Load Balancing.	437
<i>Eryk Laskowski, Marek Tudruj, Ivanoe De Falco, Umberto Scafuri, Ernesto Tarantino, and Richard Olejnik</i>	

Parallel Differential Evolution in the PGAS Programming Model Implemented with PCJ Java Library	448
<i>Łukasz Górski, Franciszek Rakowski, and Piotr Bala</i>	
Adaptation of Deep Belief Networks to Modern Multicore Architectures	459
<i>Tomasz Olas, Wojciech K. Mleczko, Robert K. Nowicki, and Roman Wyrzykowski</i>	
Implementing Deep Learning Algorithms on Graphics Processor Units	473
<i>Karol Grzegorzczuk, Marcin Kurdziel, and Piotr Iwo Wójcik</i>	
Fuzzy Transducers as a Tool for Translating Noisy Data in Electrical Load Forecast System	483
<i>Mariusz Flasiński, Janusz Jurek, and Tomasz Peszek</i>	
Towards a Scalable Distributed Fitness Evaluation Service	493
<i>Włodzimierz Funika and Paweł Koperek</i>	
Minisymposium on GPU Computing	
Revisiting the Gauss-Huard Algorithm for the Solution of Linear Systems on Graphics Accelerators	505
<i>Peter Benner, Pablo Ezzatti, Enrique S. Quintana-Ortí, and Alfredo Remón</i>	
Increasing Arithmetic Intensity in Multigrid Methods on GPUs Using Block Smoothers	515
<i>Matthias Bolten and Oliver Letterer</i>	
Optimized CUDA-Based PDE Solver for Reaction Diffusion Systems on Arbitrary Surfaces	526
<i>Samira Michèle Descombes, Daljit Singh Dhillon, and Matthias Zwicker</i>	
Comparing Different Programming Approaches for SpMV-Operations on GPUs	537
<i>Jan P. Ecker, Rudolf Berrendorf, Javed Razzaq, Simon E. Scholl, and Florian Mannuss</i>	
IVM-Based Work Stealing for Parallel Branch-and-Bound on GPU	548
<i>Jan Gmys, Mohand Mezmaiz, Nouredine Melab, and Daniel Tuytens</i>	
Massively Parallel Construction of the Cell Graph.	559
<i>Krzysztof Kaczmarski, Paweł Rzążewski, and Albert Wolant</i>	
Benchmarking the Cost of Thread Divergence in CUDA	570
<i>Piotr Bialas and Adam Strzelecki</i>	

**Special Session on Efficient Algorithms for Problems with Matrix
and Tensor Decompositions**

Fast Algorithm for the Fourth-Order Elliptic Problem Based on Orthogonal
Matrix Decomposition 583
Paolo Di Stolfo and Marian Vajteršić

Performance of the Parallel One-Sided Block Jacobi SVD Algorithm
on a Modern Distributed-Memory Parallel Computer 594
Shuhei Kudo, Yusaku Yamamoto, Martin Bečka, and Marian Vajteršić

New Approach to Local Computations in the Parallel One-Sided Jacobi
SVD Algorithm 605
Martin Bečka and Gabriel Okša

Author Index 619

Contents – Part II

The Third Workshop on Models, Algorithms, and Methodologies for Hierarchical Parallelism in New HPC Systems

Virtualizing CUDA Enabled GPGPUs on ARM Clusters	3
<i>Raffaele Montella, Giulio Giunta, Giuliano Laccetti, Marco Lapegna, Carlo Palmieri, Carmine Ferraro, and Valentina Pelliccia</i>	
A Distributed Hash Table for Shared Memory	15
<i>Wytse Oortwijn, Tom van Dijk, and Jaco van de Pol</i>	
Mathematical Approach to the Performance Evaluation of Matrix Multiply Algorithm	25
<i>Luisa D'Amore, Valeria Mele, Giuliano Laccetti, and Almerico Murli</i>	
How to Mitigate Node Failures in Hybrid Parallel Applications	35
<i>Maciej Szpindler</i>	
A Scalable Numerical Algorithm for Solving Tikhonov Regularization Problems	45
<i>Rosella Arcucci, Luisa D'Amore, Simone Celestino, Giuliano Laccetti, and Almerico Murli</i>	

Workshop on Power and Energy Aspects of Computation

Energy Performance Modeling with TIA and EML	57
<i>Francisco Almeida, Javier Arteaga, Vicente Blanco, and Alberto Cabrera</i>	
Considerations of Computational Efficiency in Volunteer and Cluster Computing	66
<i>Paweł Czarnul and Mariusz Matuszek</i>	

Workshop on Scheduling for Parallel Computing (SPC 2015)

Parallel Programs Scheduling with Architecturally Supported Regions	77
<i>Łukasz Maśko and Marek Tudruj</i>	
Adaptive Multi-level Workflow Scheduling with Uncertain Task Estimates . . .	90
<i>Tomasz Dziok, Kamil Figiela, and Maciej Malawski</i>	
Accelerating the Min-Min Heuristic	101
<i>Martín Pedemonte, Pablo Ezzatti, and Álvaro Martín</i>	

Divisible Loads Scheduling in Hierarchical Memory Systems with Time and Energy Constraints	111
<i>Maciej Drozdowski and Jędrzej M. Marszałkowski</i>	

The 6th Workshop on Language-Based Parallel Programming Models (WLPP 2015)

Extending Gustafson-Barsis’s Law for Dual-Architecture Computing.	123
<i>Ami Marowka</i>	
Free Scheduling of Tiles Based on the Transitive Closure of Dependence Graphs.	133
<i>Włodzimierz Bielecki, Marek Palkowski, and Tomasz Klimek</i>	
Semiautomatic Acceleration of Sparse Matrix-Vector Product Using OpenACC	143
<i>Przemysław Stpiczyński</i>	
Multi-threaded Construction of Neighbour Lists for Particle Systems in OpenMP	153
<i>Rene Halver and Godehard Sutmann</i>	
NumCIL and Bohrium: High Productivity and High Performance	166
<i>Kenneth Skovhede and Simon Andreas Frimann Lund</i>	
Parallel Ant Brood Graph Partitioning in Julia	176
<i>Jose Juan Mijares Chan, Yuyin Mao, Ying Ying Liu, Parimala Thulasiraman, and Ruppa K. Thulasiram</i>	

The 5th Workshop on Performance Evaluation of Parallel Applications on Large-Scale Systems

Scalability Model Based on the Concept of Granularity	189
<i>Jan Kwiatkowski and Lukasz Olech</i>	
Performance and Power-Aware Modeling of MPI Applications for Cluster Computing	199
<i>Jerzy Proficz and Paweł Czarnul</i>	
Running Time Prediction for Web Search Queries.	210
<i>Oscar Rojas, Veronica Gil-Costa, and Mauricio Marin</i>	
The Performance Evaluation of the Java Implementation of Graph500.	221
<i>Magdalena Ryczkowska, Marek Nowicki, and Piotr Bala</i>	

Workshop on Parallel Computational Biology (PBC 2015)

Performance Analysis of a Parallel, Multi-node Pipeline for DNA Sequencing.	233
<i>Dries Decap, Joke Reumers, Charlotte Herzeel, Pascal Costanza, and Jan Fostier</i>	
Parallelising the Computation of Minimal Absent Words	243
<i>Carl Barton, Alice Heliou, Laurent Mouchard, and Solon P. Pissis</i>	
Accelerating 3D Protein Structure Similarity Searching on Microsoft Azure Cloud with Local Replicas of Macromolecular Data	254
<i>Dariusz Mrozek, Tomasz Kutyla, and Bożena Małysiak-Mrozek</i>	

Workshop on Applications of Parallel Computation in Industry and Engineering

Modeling and Simulations of Edge-Emitting Broad-Area Semiconductor Lasers and Amplifiers	269
<i>Mindaugas Radziunas</i>	
Application of the Parallel INMOST Platform to Subsurface Flow and Transport Modelling	277
<i>Igor Konshin, Ivan Kapyrin, Kirill Nikitin, and Kirill Terekhov</i>	
Parallel Procedure Based on the Swarm Intelligence for Solving the Two-Dimensional Inverse Problem of Binary Alloy Solidification	287
<i>Edyta Hetmaniok, Damian Słota, and Adam Zielonka</i>	

Minisymposium on HPC Applications in Physical Sciences

A Highly Parallelizable Bond Fluctuation Model on the Body-Centered Cubic Lattice	301
<i>Christoph Jentzsch, Ron Dockhorn, and Jens-Uwe Sommer</i>	
Genetic Algorithm and Exact Diagonalization Approach for Molecular Nanomagnets Modelling	312
<i>Michał Antkowiak, Łukasz Kucharski, and Grzegorz Kamieniarz</i>	
Augmented Symmetry Approach to the DFT Simulations of the Chromium-Based Rings	321
<i>Michał Wojciechowski, Bartosz Brzostowski, and Grzegorz Kamieniarz</i>	
Parallel Monte Carlo Simulations for Spin Models with Distributed Lattice	332
<i>Szymon Murawski, Grzegorz Musiał, and Grzegorz Pawłowski</i>	

The Second Workshop on Applied High Performance Numerical Algorithms in PDEs

Schwarz Preconditioner with Face Based Coarse Space for Multiscale Elliptic Problems in 3D	345
<i>Leszek Marcinkowski and Talal Rahman</i>	
A Compact Parallel Algorithm for Spherical Delaunay Triangulations	355
<i>Florian Prill and Günther Zängl</i>	
On Conforming Local Post-refinement of Adjacent Tetrahedral and Hexahedral Meshes	365
<i>Sergey Korotov and Talal Rahman</i>	
Fast Static Condensation for the Helmholtz Equation in a Spectral-Element Discretization	371
<i>Immo Huisman, Jörg Stiller, and Jochen Fröhlich</i>	
An Iterative Regularization Algorithm for the TV-Stokes in Image Processing	381
<i>Leszek Marcinkowski and Talal Rahman</i>	
Discretization of the Drift-Diffusion Equations with the Composite Discontinuous Galerkin Method	391
<i>Konrad Sakowski, Leszek Marcinkowski, Pawel Strak, Pawel Kempisty, and Stanislaw Krukowski</i>	
Additive Nonoverlapping Schwarz for h-p Composite Discontinuous Galerkin.	401
<i>Piotr Krzyżanowski</i>	

Minisymposium on High Performance Computing Interval Methods

Up-to-date Interval Arithmetic: From Closed Intervals to Connected Sets of Real Numbers.	413
<i>Ulrich Kulisch</i>	
Optimizing Cloud Use Under Interval Uncertainty.	435
<i>Vladik Kreinovich and Esthela Gallardo</i>	
The TOPSIS Method in the Interval Type-2 Fuzzy Setting	445
<i>Ludmila Dymova, Pavel Sevastjanov, and Anna Tikhonenko</i>	
A Study on Vectorisation and Paralellisation of the Monotonicity Approach . . .	455
<i>Iwona Skalna and Jerzy Duda</i>	
Preliminary Experiments with an Interval Model-Predictive-Control Solver. . .	464
<i>Bartłomiej Jacek Kubica</i>	

Interval Nine-Point Finite Difference Method for Solving the Laplace Equation with the Dirichlet Boundary Conditions	474
<i>Malgorzata A. Jankowska</i>	

Workshop on Complex Collective Systems

How Do People Search: A Modelling Perspective	487
<i>Isabella von Sivers, Michael J. Seitz, and Gerta Köster</i>	
A Sandpile Cellular Automata-Based Approach to Dynamic Job Scheduling in Cloud Environment	497
<i>Jakub Gasior and Franciszek Seredynski</i>	
Conflict Solution According to “Aggressiveness” of Agents in Floor-Field-Based Model	507
<i>Pavel Hrabák and Marek Bukáček</i>	
Computer Simulation of Traffic Flow Based on Cellular Automata and Multi-agent System	517
<i>Magda Chmielewska, Mateusz Kotlarz, and Jarosław Wąs</i>	
A Stochastic Optimal Velocity Model for Pedestrian Flow	528
<i>Antoine Tordeux and Andreas Schadschneider</i>	
On the Evacuation Module SigmaEva Based on a Discrete-Continuous Pedestrian Dynamics Model	539
<i>Ekaterina Kirik, Andrey Malyshev, and Maria Senashova</i>	
Towards Effective GPU Implementation of Social Distances Model for Mass Evacuation	550
<i>Adrian Klusek, Paweł Topa, and Jarosław Wąs</i>	
GPU and FPGA Parallelization of Fuzzy Cellular Automata for the Simulation of Wildfire Spreading	560
<i>Vasileios G. Ntinis, Byron E. Moutafis, Giuseppe A. Trunfio, and Georgios Ch. Sirakoulis</i>	
eVolutus: A New Platform for Evolutionary Experiments.	570
<i>Paweł Topa, Maciej Komosinski, Jarosław Tysza, Agnieszka Mensfelt, Sebastian Rokitta, Aleksander Byrski, and Maciej Bassara</i>	

Special Session on Algorithms, Methodologies and Frameworks for HPC in Geosciences and Weather Prediction

Accelerating Extreme-Scale Numerical Weather Prediction	583
<i>Willem Deconinck, Mats Hamrud, Christian Kühnlein, George Mozdzyński, Piotr K. Smolarkiewicz, Joanna Szmelter, and Nils P. Wedi</i>	

Scaling the GCR Solver Using a High-Level Stencil Framework
on Multi- and Many-Core Architectures 594
*Milosz Ciznicki, Michal Kulczewski, Piotr Kopta,
and Krzysztof Kurowski*

Parallel ADI Preconditioners for All-Scale Atmospheric Models 607
*Zbigniew P. Piotrowski, Bartlomiej Matejczyk, Leszek Marcinkowski,
and Piotr K. Smolarkiewicz*

Author Index 619

Parallel Processing and Applied Mathematics
11th International Conference, PPAM 2015, Krakow,
Poland, September 6-9, 2015. Revised Selected
Papers, Part I

Wyrzykowski, R.; Deelman, E.; Dongarra, J.; Karczewski,
K.; Kitowski, J.; Kazimierz, W. (Eds.)

2016, XXIV, 622 p. 229 illus., Softcover

ISBN: 978-3-319-32148-6