

Table of Contents

Invited Talk

Energy to Solution: A New Mission for Parallel Computing	1
<i>Arndt Bode</i>	

Topic 1: Support Tools and Environments

Introduction	3
<i>Bronis R. de Supinski, Bettina Krammer, Karl F�rlinger, Jesus Labarta, and Dimitrios S. Nikolopoulos</i>	
Synchronization Identification through On-the-Fly Test	4
<i>Xiang Yuan, Zhenjiang Wang, Chenggang Wu, Pen-Chung Yew, Wenwen Wang, Jianjun Li, and Di Xu</i>	
Fast Full-System Execution-Driven Performance Simulator for Blue Gene/Q	16
<i>Diego S. Gallo, Jose R. Brunheroto, and Kyung Dong Ryu</i>	

Topic 2: Performance Prediction and Evaluation

Introduction	28
<i>Adolfy Hoisie, Michael Gerndt, Shajulin Benedict, Thomas Fahringer, Vladimir Getov, and Scott Pakin</i>	
Alignment-Based Metrics for Trace Comparison	29
<i>Matthias Weber, Kathryn Mohror, Martin Schulz, Bronis R. de Supinski, Holger Brunst, and Wolfgang E. Nagel</i>	
Validation and Uncertainty Assessment of Extreme-Scale HPC Simulation through Bayesian Inference	41
<i>Jeremiah J. Wilke, Khachik Sargsyan, Joseph P. Kenny, Bert Debusschere, Habib N. Najm, and Gilbert Hendry</i>	
Dynamic Thread Pinning for Phase-Based OpenMP Programs	53
<i>Abdelhafid Mazouz, Sid-Ahmed-Ali Touati, and Denis Barthou</i>	

Topic 3: Scheduling and Load Balancing

Introduction 65
Zhihui Du, Ramin Yahyapour, Yuxiong He, Nectarios Koziris, Bilha Mendelson, Veronika Sonigo, Achim Streit, and Andrei Tchernykh

Energy-Efficient Scheduling with Time and Processors Eligibility Restrictions 66
Xibo Jin, Fa Zhang, Ying Song, Liya Fan, and Zhiyong Liu

A $(2 + \varepsilon)$ -Approximation for Scheduling Parallel Jobs in Platforms 78
Pierre-François Dutot, Klaus Jansen, Christina Robenek, and Denis Trystram

Scheduling Jobs with Multiple Non-uniform Tasks 90
Venkatesan T. Chakaravarthy, Anamitra Roy Choudhury, Sambuddha Roy, and Yogish Sabharwal

Workflow Fairness Control on Online and Non-clairvoyant Distributed Computing Platforms 102
Rafael Ferreira da Silva, Tristan Glatard, and Frédéric Desprez

How to be a Successful Thief: Feudal Work Stealing for Irregular Divide-and-Conquer Applications on Heterogeneous Distributed Systems 114
Vladimir Janjic and Kevin Hammond

Scheduling HPC Workflows for Responsiveness and Fairness with Networking Delays and Inaccurate Estimates of Execution Times 126
Andrew Burkimsher, Iain Bate, and Leandro Soares Indrusiak

FLEX-MPI: An MPI Extension for Supporting Dynamic Load Balancing on Heterogeneous Non-dedicated Systems 138
Gonzalo Martín, Maria-Cristina Marinescu, David E. Singh, and Jesús Carretero

Enhancing Concurrency in Distributed Transactional Memory through Commutativity 150
Junwhan Kim, Roberto Palmieri, and Binoy Ravindran

Topic 4: High-Performance Architectures and Compilers

Introduction 162
Denis Barthou, Wolfgang Karl, Ramón Doallo, Evelyn Duesterwald, and Sami Yehia

Adaptive Granularity Control in Task Parallel Programs Using Multiversioning	164
<i>Peter Thoman, Herbert Jordan, and Thomas Fahringer</i>	
Towards Efficient Dynamic LLC Home Bank Mapping with NoC-Level Support	178
<i>Mario Lodde, José Flich, and Manuel E. Acacio</i>	
Online Dynamic Dependence Analysis for Speculative Polyhedral Parallelization	191
<i>Alexandra Jimborean, Philippe Clauss, Juan Manuel Martinez, and Aravind Sukumaran-Rajam</i>	
VGTS: Variable Granularity Transactional Snoop	203
<i>Ehsan Atoofian</i>	

Topic 5: Parallel and Distributed Data Management

Introduction	215
<i>Maria S. Perez-Hernandez, André Brinkmann, Stergios Anastasiadis, Sandro Fiore, Adrien Lébre, and Kostas Magoutis</i>	
Multi-level Clustering on Metric Spaces Using a Multi-GPU Platform	216
<i>Ricardo J. Barrientos, José I. Gómez, Christian Tenllado, Manuel Prieto Matias, and Pavel Zezula</i>	
A Contention-Friendly Binary Search Tree	229
<i>Tyler Crain, Vincent Gramoli, and Michel Raynal</i>	

Topic 6: Grid, Cluster and Cloud Computing

Introduction	241
<i>Erwin Laure, Odej Kao, Rosa M. Badia, Laurent Lefevre, Beniamino Di Martino, Radu Prodan, Matteo Turilli, and Daniel Warneke</i>	
Scheduling Jobs in the Cloud Using On-Demand and Reserved Instances	242
<i>Siqi Shen, Kefeng Deng, Alexandru Iosup, and Dick Epema</i>	
On-Line, Non-clairvoyant Optimization of Workflow Activity Granularity on Grids	255
<i>Rafael Ferreira da Silva, Tristan Glatard, and Frédéric Desprez</i>	
Application-Centric Resource Provisioning for Amazon EC2 Spot Instances	267
<i>Sunirmal Khatua and Nandini Mukherjee</i>	

PonIC: Using Stratosphere to Speed Up Pig Analytics	279
<i>Vasiliki Kalavri, Vladimir Vlassov, and Per Brand</i>	
MROrder: Flexible Job Ordering Optimization for Online MapReduce Workloads	291
<i>Shanjiang Tang, Bu-Sung Lee, and Bingsheng He</i>	
Leveraging Collaborative Content Exchange for On-Demand VM Multi-deployments in IaaS Clouds	305
<i>Bogdan Nicolae and M. Mustafa Rafique</i>	
Energy and Carbon-Efficient Placement of Virtual Machines in Distributed Cloud Data Centers	317
<i>Atefeh Khosravi, Saurabh Kumar Garg, and Rajkumar Buyya</i>	
Reconfiguration Stability of Adaptive Distributed Parallel Applications through a Cooperative Predictive Control Approach	329
<i>Gabriele Mencagli, Marco Vanneschi, and Emanuele Vespa</i>	
On the Use of a Proportional-Share Market for Application SLO Support in Clouds	341
<i>Stefania Costache, Nikos Parlavantzas, Christine Morin, and Samuel Kortas</i>	
 Topic 7: Peer-to-Peer Computing	
Introduction	353
<i>Damiano Carra, Thorsten Strufe, György Dán, and Marcel Karnstedt</i>	
Design and Implementation of a Scalable Membership Service for Supercomputer Resiliency-Aware Runtime	354
<i>Yoav Tock, Benjamin Mandler, José Moreira, and Terry Jones</i>	
 Topic 8: Distributed Systems and Algorithms	
Introduction	367
<i>Achour Mostefaoui, Andreas Polze, Carlos Baquero, Paul Ezhilchelvan, and Lars Lundberg</i>	
On the Scalability of Snapshot Isolation	369
<i>Masoud Saeida Ardekani, Pierre Sutra, Marc Shapiro, and Nuno Preguiça</i>	
Efficient Event Prewarning for Sensor Networks with Multi Microenvironments	382
<i>Yinglong Li, Hong Chen, Suyun Zhao, and Shangfeng Mo</i>	
Efficient Parallel Block-Max WAND Algorithm	394
<i>Oscar Rojas, Veronica Gil-Costa, and Mauricio Marin</i>	

Gunther: Search-Based Auto-Tuning of MapReduce	406
<i>Guangdeng Liao, Kushal Datta, and Theodore L. Willke</i>	
Multi-criteria Checkpointing Strategies: Response-Time versus Resource Utilization	420
<i>Aurelien Bouteiller, Franck Cappello, Jack Dongarra, Amina Guermouche, Thomas Hérault, and Yves Robert</i>	

Topic 9: Parallel and Distributed Programming

Introduction	432
<i>José Cunha, Michael Philippsen, Domenico Talia, and Ana Lucia Varbanescu</i>	
Examining the Expert Gap in Parallel Programming	434
<i>Sebastian Nanz, Scott West, and Kaue Soares da Silveira</i>	
Programming with BSP Homomorphisms	446
<i>Joeffrey Legaux, Zhenjiang Hu, Frédéric Loulergue, Kiminori Matsuzaki, and Julien Tesson</i>	
Giraphx: Parallel Yet Serializable Large-Scale Graph Processing	458
<i>Serafettin Tasci and Murat Demirbas</i>	
Hugh: A Semantically Aware Universal Construction for Transactional Memory Systems	470
<i>Craig Sharp and Graham Morgan</i>	

Topic 10: Parallel Numerical Algorithms

Introduction	482
<i>Julien Langou, Matthias Bolten, Laura Grigori, and Marian Vajteršić</i>	
Cluster Optimization and Parallelization of Simulations with Dynamically Adaptive Grids	484
<i>Martin Schreiber, Tobias Weinzierl, and Hans-Joachim Bungartz</i>	
Discrete Adjoint of PETSc through dco/c++ and Adjoint MPI	497
<i>Johannes Lotz, Uwe Naumann, Max Sagebaum, and Michel Schanen</i>	
Evaluation of Two Formulations of the Conjugate Gradients Method with Transactional Memory	508
<i>Martin Schindewolf, Björn Rucker, Wolfgang Karl, and Vincent Heuveline</i>	
Multifrontal QR Factorization for Multicore Architectures over Runtime Systems	521
<i>Emmanuel Agullo, Alfredo Buttari, Abdou Guermouche, and Florent Lopez</i>	

Fast Methods for Computing Selected Elements of the Green's Function in Massively Parallel Nanoelectronic Device Simulations	533
<i>Andrey Kuzmin, Mathieu Luisier, and Olaf Schenk</i>	

Topic 11: Multicore and Manycore Programming

Introduction.....	545
<i>Luiz Derosé, Jan Treibig, David Abramson, Alastair Donaldson, William Jalby, Alba Cristina M.A. de Melo, and Tomàs Margalef</i>	

Assessing the Performance of OpenMP Programs on the Intel Xeon Phi	547
<i>Dirk Schmidl, Tim Cramer, Sandra Wienke, Christian Terboven, and Matthias S. Müller</i>	

A Hybrid Parallel Barnes-Hut Algorithm for GPU and Multicore Architectures	559
<i>Hannes Hannak, Hendrik Hochstetter, and Wolfgang Blochinger</i>	

A Generic High-Performance Method for Deinterleaving Scientific Data	571
<i>Eric R. Schendel, Steve Harenberg, Houjun Tang, Venkatram Vishwanath, Michael E. Papka, and Nagiza F. Samatova</i>	

Transparent Support for Partial Rollback in Software Transactional Memories	583
<i>Alice Porfirio, Alessandro Pellegrini, Pierangelo Di Sanzo, and Francesco Quaglia</i>	

Lightweight Contention Management for Efficient Compare-and-Swap Operations	595
<i>Dave Dice, Danny Hendler, and Ilya Mirsky</i>	

MacroDB: Scaling Database Engines on Multicores	607
<i>João Soares, João Lourenço, and Nuno Preguiça</i>	

Towards a Scalable Microkernel Personality for Multicore Processors ...	620
<i>Jilong Kuang, Daniel G. Waddington, and Chen Tian</i>	

An Implementation of the Codelet Model	633
<i>Joshua Suettlerlein, Stéphane Zuckerman, and Guang R. Gao</i>	

Topic 12: Theory and Algorithms for Parallel Computation

Introduction.....	645
<i>Giuseppe F. Italiano, Henning Meyerhenke, Guy Blelloch, and Philippas Tsigas</i>	

Model and Complexity Results for Tree Traversals on Hybrid Platforms	647
<i>Julien Herrmann, Loris Marchal, and Yves Robert</i>	
Efficient Parallel and External Matching	659
<i>Marcel Birn, Vitaly Osipov, Peter Sanders, Christian Schulz, and Nodari Sitchinava</i>	
Splittable Single Source-Sink Routing on CMP Grids: A Sublinear Number of Paths Suffice	671
<i>Adrian Kosowski and Przemysław Uznański</i>	

Topic 13: High-Performance Networks and Communication

Introduction	684
<i>Olav Lysne, Torsten Hoeftler, Pedro López, and Davide Bertozzi</i>	
Making the Network Scalable: Inter-subnet Routing in InfiniBand	685
<i>Bartosz Bogdański, Bjørn Dag Johnsen, Sven-Arne Reinemo, and José Flich</i>	
BBQ: A Straightforward Queuing Scheme to Reduce HoL-Blocking in High-Performance Hybrid Networks	699
<i>Pedro Yebenes Segura, Jesus Escudero-Sahuquillo, Crispin Gomez Requena, Pedro Javier Garcia, Francisco J. Quiles, and Jose Duato</i>	
Accelerating Communication-Intensive Parallel Workloads Using Commodity Optical Switches and a Software-Configurable Control Stack	713
<i>Diego Lugones, Konstantinos Christodoulopoulos, Kostas Katrinis, Marco Ruffini, Donal O'Mahony, and Martin Collier</i>	
Dynamic Protocol Tuning Algorithms for High Performance Data Transfers	725
<i>Engin Arslan, Brandon Ross, and Tevfik Kosar</i>	

Topic 14+16: High-Performance and Scientific Applications and Extreme-Scale Computing

Introduction	737
<i>Turlough P. Downes, Sabine Roller, Ari P. Seitsonen, Sophie Valcke, David Keyes, Marie-Christine Sawley, Thomas Schulthess, and John Shalf</i>	

A Scalable Barotropic Mode Solver for the Parallel Ocean Program	739
<i>Yong Hu, Xiaomeng Huang, Xiaoge Wang, Haohuan Fu, Shizhen Xu, Huabin Ruan, Wei Xue, and Guangwen Yang</i>	
Heterogeneous Combinatorial Candidate Generation	751
<i>Fahad Khalid, Zoran Nikoloski, Peter Tröger, and Andreas Polze</i>	
Solving a Least-Squares Problem with Algorithmic Differentiation and OpenMP	763
<i>Michael Förster and Uwe Naumann</i>	
Hierarchical Parallel Algorithm for Modularity-Based Community Detection Using GPUs	775
<i>Chun Yew Cheong, Huynh Phung Huynh, David Lo, and Rick Siow Mong Goh</i>	
GWAS on GPUs: Streaming Data from HDD for Sustained Performance	788
<i>Lucas Beyer and Paolo Bientinesi</i>	
Topic 15: GPU and Accelerator Computing	
Introduction	800
<i>Naoya Maruyama, Leif Kobbelt, Pavan Balaji, Nikola Puzovic, Samuel Thibault, and Kun Zhou</i>	
High-Resolution Power Profiling of GPU Functions Using Low-Resolution Measurement	801
<i>Jens Lang and Gudula Rünger</i>	
Power/Performance Trade-Offs of Small Batched LU Based Solvers on GPUs	813
<i>Oreste Villa, Massimiliano Fatica, Nitin Gawande, and Antonino Tumeo</i>	
Optimizing 3D Convolutions for Wavelet Transforms on CPUs with SSE Units and GPUs	826
<i>Brice Videau, Vania Marangozova-Martin, Luigi Genovese, and Thierry Deutsch</i>	
GPUMAFIA: Efficient Subspace Clustering with MAFIA on GPUs	838
<i>Andrew Adinetz, Jiri Kraus, Jan Meinke, and Dirk Pleiter</i>	
GPU Accelerated Maximum Cardinality Matching Algorithms for Bipartite Graphs	850
<i>Mehmet Deveci, Kamer Kaya, Bora Uçar, and Ümit V. Çatalyürek</i>	

On-Board Multi-GPU Molecular Dynamics	862
<i>Marcos Novalbos, Jaime Gonzalez, Miguel Angel Otaduy, Alvaro Lopez-Medrano, and Alberto Sanchez</i>	
Algorithmic Skeleton Framework for the Orchestration of GPU Computations	874
<i>Ricardo Marques, Hervé Paulino, Fernando Alexandre, and Pedro D. Medeiros</i>	
Author Index	887