

Julian M. Kunkel · Pavan Balaji
Jack Dongarra (Eds.)

High Performance Computing

31st International Conference, ISC High Performance 2016
Frankfurt, Germany, June 19–23, 2016
Proceedings

Contents

Autotuning and Thread Mapping

- An Analytical Model-Based Auto-tuning Framework
for Locality-Aware Loop Scheduling 3
*Rengan Xu, Sunita Chandrasekaran, Xiaonan Tian,
and Barbara Chapman*
- Performance, Design, and Autotuning of Batched GEMM for GPUs 21
*Ahmad Abdelfattah, Azzam Haidar, Stanimire Tomov,
and Jack Dongarra*
- TCU: A Multi-Objective Hardware Thread Mapping Unit for HPC Clusters . . . 39
Ravi Kumar Pujari, Thomas Wild, and Andreas Herkersdorf

Data Locality and Decomposition

- Dynamic Sparse-Matrix Allocation on GPUs 61
James King, Thomas Gilray, Robert M. Kirby, and Matthew Might
- An Efficient Parallel Load-Balancing Framework for Orthogonal
Decomposition of Geometrical Data 81
*Bruno R.C. Magalhães, Farhan Tauheed, Thomas Heinis,
Anastasia Ailamaki, and Felix Schürmann*
- Parallel Community Detection Algorithm Using a Data Partitioning
Strategy with Pairwise Subdomain Duplication 98
*Diana Palsetia, William Hendrix, Sunwoo Lee, Ankit Agrawal,
Wei-keng Liao, and Alok Choudhary*
- TiDA: High-Level Programming Abstractions for Data
Locality Management 116
*Didem Unat, Tan Nguyen, Weiqun Zhang, Muhammed Nufail Farooqi,
Burak Bastem, George Michelogiannakis, Ann Almgren, and John Shalf*

Scalable Applications

- OpenAtom: Scalable Ab-Initio Molecular Dynamics
with Diverse Capabilities 139
*Nikhil Jain, Eric Bohm, Eric Mikida, Subhasish Mandal, Minjung Kim,
Prateek Jindal, Qi Li, Sohrab Ismail-Beigi, Glenn J. Martyna,
and Laxmikant V. Kale*

SPRITE: A Fast Parallel SNP Detection Pipeline	159
<i>Vasudevan Rengasamy and Kamesh Madduri</i>	
Machine Learning	
Predictive Modeling for Job Power Consumption in HPC Systems	181
<i>Andrea Borghesi, Andrea Bartolini, Michele Lombardi, Michela Milano, and Luca Benini</i>	
Towards Machine Learning on the Automata Processor	200
<i>Tommy Tracy II, Yao Fu, Indranil Roy, Eric Jonas, and Paul Glendenning</i>	
AutoMOMML: Automatic Multi-objective Modeling with Machine Learning	219
<i>Prasanna Balaprakash, Ananta Tiwari, Stefan M. Wild, Laura Carrington, and Paul D. Hovland</i>	
Datacenters and Cloud	
Supercomputing Centers and Electricity Service Providers: A Geographically Distributed Perspective on Demand Management in Europe and the United States	243
<i>Tapasya Patki, Natalie Bates, Girish Ghatikar, Anders Clausen, Sonja Klingert, Ghaleb Abdulla, and Mehdi Sheikhalishahi</i>	
Resource Management for Running HPC Applications in Container Clouds . . .	261
<i>Stephen Herbein, Ayush Dusia, Aaron Landwehr, Sean McDaniel, Jose Monsalve, Yang Yang, Seetharami R. Seelam, and Michela Taufer</i>	
Communication Runtime	
Mitigating MPI Message Matching Misery	281
<i>Mario Flajslik, James Dinan, and Keith D. Underwood</i>	
INAM ² : InfiniBand Network Analysis and Monitoring with MPI	300
<i>Hari Subramoni, Albert Mathews Augustine, Mark Arnold, Jonathan Perkins, Xiaoyi Lu, Khaled Hamidouche, and Dhabaleswar K. Panda</i>	
Comparing Runtime Systems with Exascale Ambitions Using the Parallel Research Kernels	321
<i>Rob F. Van der Wijngaart, Abdullah Kayi, Jeff R. Hammond, Gabriele Jost, Tom St. John, Srinivas Sridharan, Timothy G. Mattson, John Abercrombie, and Jacob Nelson</i>	

Intel Xeon Phi

High Order Seismic Simulations on the Intel Xeon Phi Processor (Knights Landing)	343
<i>Alexander Heinecke, Alexander Breuer, Michael Bader, and Pradeep Dubey</i>	

Leveraging a Cluster-Booster Architecture for Brain-Scale Simulations	363
<i>Pramod Kumbhar, Michael Hines, Aleksandr Ovcharenko, Damian A. Mallon, James King, Florentino Sainz, Felix Schürmann, and Fabien Delalondre</i>	

Manycore Architectures

Efficient and Predictable Group Communication for Manycore NoCs	383
<i>Karthik Yagna, Onkar Patil, and Frank Mueller</i>	

Distributed Job Allocation for Large-Scale Manycores	404
<i>Subramanian Ramachandran and Frank Mueller</i>	

Extreme-Scale Computations

Many-Core Acceleration of a Discrete Ordinates Transport Mini-App at Extreme Scale	429
<i>Tom Deakin, Simon McIntosh-Smith, and Wayne Gaudin</i>	

Efficiency of High Order Spectral Element Methods on Petascale Architectures	449
<i>Maxwell Hutchinson, Alexander Heinecke, Hans Pabst, Greg Henry, Matteo Parsani, and David Keyes</i>	

Resilience

Scalability of Partial Differential Equations Preconditioner Resilient to Soft and Hard Faults	469
<i>Karla Morris, Francesco Rizzi, Khachik Sargsyan, Kathryn Dahlgren, Paul Mycek, Cosmin Safta, Olivier Le Maître, Omar Knio, and Bert Debusschere</i>	

Multi-versioning Performance Opportunities in BGAS System for Resilience	486
<i>Nan Dun, Dirk Pleiter, Aiman Fang, Nicolas Vandenbergem, and Andrew A. Chien</i>	

Author Index	505
-------------------------------	-----