

Los Alamos Computer Science Symposium

October 14-15, 2008

La Fonda Hotel

Santa Fe, New Mexico

Organizing Committee

Adolfy Hoisie, Chair, Los Alamos National Laboratory

Frank Alexander, Los Alamos National Laboratory

Benjamin Bergen, Los Alamos National Laboratory

Jack Dongarra, University of Tennessee

Sudip Dosanjh, Sandia National Laboratories

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Doug Kothe, Oak Ridge National Laboratory

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Horst Simon, Lawrence Berkeley National Laboratory

Dan Reed, Microsoft

Andy White, Los Alamos National Laboratory

Organized by LANL's Center for Advanced Architectures and Usable Supercomputing (CAAUS)

We thank IBM for the generous sponsorship of the Symposium



Tuesday, October 14, 2008 – Plenary Session

- 7:30 AM Continental Breakfast
- 8:00 AM Opening Remarks: Alan Bishop (LANL)
- 8:20 AM Keynote Speaker: Dan Reed (Microsoft), “*The Future of Large-Scale Computing*”
- 9:10 AM Robert Harrison (ORNL)
- 9:50 AM Brian Albright (LANL), “*Application Design Considerations for Roadrunner and Beyond*”
- 10:30 AM Coffee Break
- 11:00 AM David Bader (George Institute of Technology), “*Accelerators, Cell Broadband Engine, Graphics Processors, and FPGAs*”
- 11:40 PM Lunch
- 1:00 PM Peter Hofstee (IBM), “*The Case for Heterogeneous Multicore Processors*”
- 1:40 PM Josep Torrellas (University of Illinois), “*Intrinsic Heterogeneity in Multicores Due to Process Variation and Core Aging*”
- 2:20 PM Ken Koch (LANL), “*Roadrunner: What Makes it Tick?*”
- 3:00 PM Coffee Break
- 3:30 PM Steve Wallach (Convey), “*Computer Architecture: Past, Present, Future*”
- 4:10 PM Kevin Gildea (IBM), “*Petascale Challenges and Solutions*”
- 4:50 PM Keith Shields (Cray, Inc.), “*High Productivity and the Cray Cascade System*”
- 6:00 – 8:00 Symposium Reception



Wednesday, October 15, 2008 – Workshop 1

Programming Models for Modern Architectures

Organizers: Ben Bergen and Pat McCormick (LANL)

- 7:30 - 8:30 Continental Breakfast
- 8:30 - 9:00 Mattan Erez (University of Texas at Austin), *“Parallelism isn't Enough: An Architect's Perspective on Building and Programming Terascale Processors and Petascale Systems”*
- 9:00 - 9:30 Gustavo Espinosa (Intel Corp.), *“Larrabee: A Many-Core x86 Architecture for High Performance Computing”*
- 9:30 - 10:00 Richard Barrett (ORNL), *“HPCS Languages : Potential for Scientific Computing”*
- 10:00 - 10:30 Coffee Break
- 10:30 - 11:00 Joel Morrisette (Intel Corp.), *“A Vertical-Integrated Approach to Hardware Acceleration”*
- 11:00 - 11:30 Chris Baker (SNL), *“An Abstract Node API for Heterogeneous and Multi-core Computing”*
- 11:30 - 12:00 Peter Messmer (Tech-X), *“GPULib: GPU acceleration of scientific applications in high-level languages”*
- 12:00 - 1:30 Lunch
- 1:30 - 2:00 John Clark (Stanford University), *“Sequoia on Roadrunner”*
- 2:00 - 2:30 Greg Bronevetsky (LLNL), *“Static Communication-Sensitive Dataflow for MessagePassing Applications”*
- 2:30 - 3:00 Chen Ding (University of Rochester), *“Suggestion-based Program Parallelization”*
- 3:00 - 3:30 Coffee Break
- 3:30 - 4:00 Paul Woodward (University of Minnesota), *“Simulating Compressible Turbulent Mixing with Multifluid PPM on the Los Alamos Roadrunner Machine”*
- 4:00 - 4:30 David Bader (Georgia Tech), *“Accelerating Scientific Computing with the Cell Broadband Engine Processo”*
- 4:30 – 5:00 Douglas Doerfler (SNL), *“Adapting Codes for a Heterogenous Multi-core Red Storm”*
- 5:00 - 5:30 Discussion and Closing

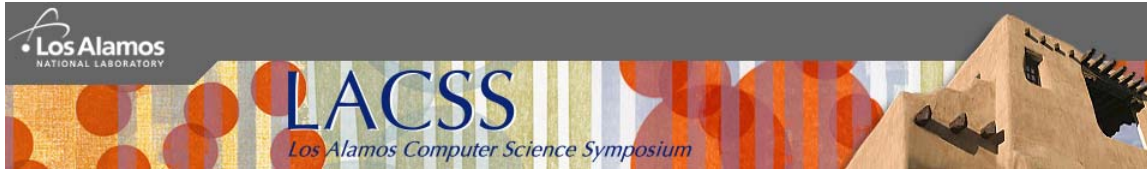


Wednesday, October 15, 2008 – Workshop 2

Performance Analysis of Extreme-Scale Systems and Applications

Organizers: Adolfo Hoisie (LANL) and Jeff Hollingsworth (Maryland)

- 7:30 - 8:30 Continental Breakfast
- 8:30 - 9:00 Harvey Wasserman (NERSC) “*Recent Workload Characterization Activities at NERSC*”
- 9:00 - 9:30 Pat Worley (ORNL) “*Performance Optimization at Scale - Recent Experiences*”
- 9:30 - 10:00 Celso Mendes (UIUC), “*Tools Performance modeling and optimization of Parallel Applications on Future Supercomputers*”
- 10:00 - 10:30 Coffee Break
- 10:30 - 11:00 Karen Karavanic (PSU) “*Environment Aware Performance Diagnosis*”
- 11:00 - 11:30 Al Malony (Oregon) “*Targeting TAU for Extreme Scale*”
- 11:30 - 12:00 Guojing Cong (IBM) “*Automated Performance Analysis and Tuning Through the IBM High Productivity Computing System Toolkit (HPCST)*”
- 12:00 - 1:30 Lunch
- 1:30 - 2:00 Greg Bronevetky (LLNL) “*Accurate Prediction of Soft Error Vulnerability of Scientific Applications*”
- 2:00 - 2:30 Vladimir Getov (Westminster), “*Integrated Framework for Development and Execution of Component-based Applications*”
- 2:30 - 3:00 Jeff Carver (Alabama), “*Software Development Environments for Scientific and Engineering Software: A Series of Case Studies*”
- 3:00 - 3:30 Coffee Break
- 3:30 - 4:00 Alan Snaveley (SDSC), “*Performance Modeling on the Path from Petascale to Exascale*”
- 4:00 - 4:30 Jeanine Cook (NMSU), “*Monte Carlo Processor Modeling of Contemporary Architectures*”
- 4:30 – 5:00 Kevin J. Barker (LANL), “*Application Performance Modeling: Predictive Accuracy in the Presence of Simplifying Abstractions*”
- 5:00 - 5:30 Discussions and Closing

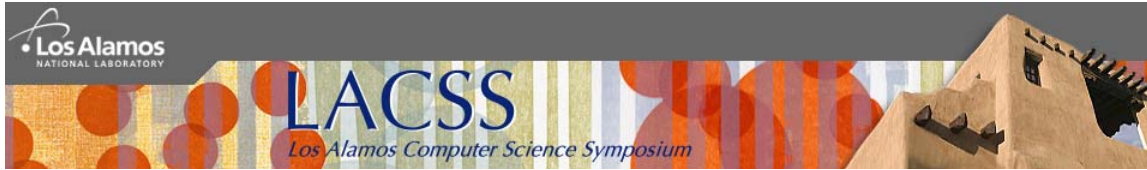


Wednesday, October 15, 2008 – Workshop 3

Next-Generation Particle-Based Simulations

Organizers: Salman Habib (LANL)

- 7:30 - 8:30 Continental Breakfast
- 8:30 - 9:00 Salman Habib (LANL), *“Introductions/Initial Business”*
- 9:00 - 9:30 Sriram Swaminarayan (LANL), *“Porting Yesterday’s Molecular Dynamics Codes to Tomorrow’s Machines: A Case Study Using SPaSM”*
- 9:30 - 10:00 Paul Mullaney (Tech X Corp.) *“Towards Kinetic Modeling of Ion Transport in an ECRIS Plasma”*
- 10:00 - 10:30 Coffee Break
- 10:30 - 11:00 Brian Albright (LANL), *“Next-Generation Particle-In-Cell Modeling of Plasma”*
- 11:00 - 11:30 Salman Habib (LANL), *“Petascale Cosmology Simulation: The Roadrunner Universe Project”*
- 11:30 - 12:00 Art Voter/Danny Perez (LANL), *“Replica Methods”*
- 12:00 - 1:30 Lunch
- 1:30 - 2:00 Mark Moraes (D.E. Shaw Research Anton), *“A Special Purpose Molecular Dynamic Machine Capable of Millisecond-Scale Simulation”*
- 2:00 - 3:00 Directed open discussion on future challenges and possible collaborations/coordination
- 3:00 - 3:30 Coffee Break
- 3:30 - 5:00 Individual Discussions
- 5:00 - 5:30 Discussions and Closing



Wednesday, October 15, 2008 – Workshop 4

Resiliency for Petascale HPC

Organizers: Stephen Scott (ORNL) and Chokchai (Box) Leangsuksun (LTU)

- 7:30 - 8:30 Continental Breakfast
- 8:30 - 9:00 John T. Daly (LANL), *“Resilience: Sacrificing Previous Convictions About Physical Laws”*
- 9:00 - 9:30 Garth Gibson (Carnegie Mellon University / Panasas, Inc), *“Failure in Supercomputers and Supercomputer Storage”*
- 9:30 - 10:00 Paul Hargrove (LBNL), *“System-level Checkpoint/Restart with BLCR”*
- 10:00 - 10:30 Coffee Break
- 10:30 - 11:00 Stephen L. Scott (ORNL), *“Process-Level Fault Tolerance for Job Healing in HPC Environments”*
- 11:00 - 11:30 Rinku Gupta (ANL), *“A Coordinated Infrastructure for Fault Tolerant Systems (CIFTS)”*
- 11:30 - 12:00 Greg Koenig (ORNL), *“Towards Support for Fault Tolerance in the MPI Standard”*
- 12:00 - 1:30 Lunch
- 1:30 - 2:00 Adam J. Oliner (Stanford University), *“Studying Systems as Artifacts”*
- 2:00 - 2:30 Jim Brandt (SNL), *“Combining System Characterization and Novel Execution Models to Achieve Scalable Robust Computing”*
- 2:30 - 3:00 Jon Stearley (SNL), *“Root Cause Analysis”*
- 3:00 - 3:30 Coffee Break
- 3:30 - 4:00 Greg Bronevetsky (LLNL), *“Accurate Prediction of Soft Error Vulnerability of Scientific Applications”*
- 4:00 - 4:30 Christian Engelmann (ORNL), *“Modular Redundancy in HPC Systems: Why, Where, When and How?”*
- 4:30 – 5:00 James Elliott (Louisiana Tech University), *“Making Resilience a Reality Through a Resilience Consortium”*
- 5:00 – 5:30 Discussions & Closing