PROCEEDINGS
Second LACSI Symposium
October 15-18, 2001
Santa Fe, NM USA

INTRODUCTION

The Second Symposium of the Los Alamos Computer Science Institute (LACSI) was held in Santa Fe, NM on October 15-18, 2001. LACSI was formed at Los Alamos National Laboratory to conduct research in computer science issues relevant to DOE's Accelerated Strategic Computing Initiative (ASCI). The Institute focuses on research with a longer time frame than the operational requirements of ASCI, and supports work both at LANL and at LACSI-associated universities.

The Symposium's Call for Participation attracted 60 submissions for technical paper sessions, the poster session, and the focused workshops. The peer review process resulted in the acceptance of 20 technical papers, 15 posters, and 3 workshops for presentation. They reflect both the high quality of presentations and the diversity of computer science topics that characterized the Symposium.

TECHNICAL PROGRAM

The opening reception was accompanied by the Symposium poster session. The first two days of the Symposium were devoted to keynote addresses and technical paper sessions. Focused workshops were held on the third Symposium day.

Monday, October 15, 2001

6:00PM - 8:00PM: Opening Reception and Poster Presentations

At the Opening Reception, 15 poster presentations attracted attendees into lively discussions. The posters were also made available over the next two days for additional inspection.

Poster Presentations

Predicting Application Performance on Shared Networks Based on Measured Resource Usage, Shreenivasa Venkataramaiah, Jaspal Subhlok, Amitoj Singh and Srikanth Goteti, University of Houston

Commodity Protocols and High-Performance Computing, Patricia E. Gilfeather, University of New Mexico

Dynamic Detection of Streams in Memory References, Tushar Mohan and Sally A. McKee, University of Utah; Bronis. R. de Supinski, Frank Mueller and Andy Yoo, Lawrence Livermore National Laboratory

A Generic Scheduling Simulator for High Performance Parallel Computers, Andy B. Yoo and Morris A. Jette, Lawrence Livermore National Laboratory; Gyu S. Choi, Penn State University

Iterative Solver Benchmark, Jack Dongarra and Victor Eijkhout, University of Tennessee; Henk van der Vorst, Universiteit van Utrecht

Measuring the Regularity of Array References, Erin Parker, University of North Carolina

Numerical Class Design and Component Frameworks, William W. Symes, Rice University

Object Migration and Task Scheduling in Cluster Computing Environments, Paul Ruth and Ananth Grama, Purdue University

Parallel Solution of Time-Dependent Optimal Control Problems Using Time-Domain Decomposition, Matthias Heinkenschloss, Rice University

A Pre-conditioning Scheme for Large Eigenvalue Problems, Danny C. Sorensen and Heidi K. Thornquist, Rice University, Danny C. Sorensen and Heidi K. Thornquist, Rice University

Statistical Analysis of the Relation Between Low-level Performance Information, the Program, and the Environment, Nayda G. Santiago, Michigan State University and Diane Rover, Iowa State University

Terascale Optimal PDE Simulations (TOPS): Building An Holistic Approach to PDE-based Modeling, David E. Keyes, Old Dominion University

Translation of OpenMP to Parallel Program using SMARTS for Maximum Parallelism and Data Locality, Tien-hsiung Weng and Barbara Chapman, University of Houston

Using the Min-Min Heuristic to Map Tasks onto Heterogeneous High-Performance Computing Systems, Tracy D. Braun, NOEMIX; Shoukat Ali, Purdue University; Howard Jay Siegel and Anthony A. Maciejewski, Colorado State University

What's the Latency? Ping An, Mark Mathis and Nancy Amato, Texas A&M University

Tuesday, October 16, 2001

8:45AM: Opening Remarks

9:00AM: Keynote Address

Kelvin Droegemeier, Director of the Center for Analysis and Prediction of Storms, University of Oklahoma
"The Explicit Numerical Prediction of Thunderstorms: The Unimaginable Becomes Reality with High Performance Computing"

10:00AM: Break

Technical Papers

10:30AM: Compilation

Adaptive Optimizing Compilers for the 21st Century,
Keith D. Cooper (Rice University)
Devika Subramanian (Rice University)
Linda Torczon (Rice University)

High Performance Image Processing on FPGAs,
J. Hammes (Colorado State University)
A.P.W. Bohm (Colorado State University)
C. Ross (Colorado State University)
M. Chawathe (Colorado State University)
B. Draper (Colorado State University)
W. Najjar (Colorado State University)

Scalarizing Fortran 90 Array Syntax,
Yuan Zhao (Rice University)
Ken Kennedy (Rice University)

CHASM: Static Analysis and Automatic Code Generation for Improved Fortran 90 and C++ Interoperability,
C.E. Rasmussen (Los Alamos National Laboratory)
K.A. Lindlan (University of Oregon)
B. Mohr (Forschungszentrum Juelich)
J. Striegnitz (Forschungszentrum Juelich)

12:30PM: Lunch---On your own

2:00PM: Node Performance

HPCView: A Tool for Top-down Analysis of Node Performance,
John Mellor-Crummey (Rice University)
Robert Fowler (Rice University)
Gabriel Marin (Rice University)

Identifying Application Performance Limitations Associated with Microarchitecture Design,
Gary Rybak (The University of Texas at El Paso)
Patricia J. Teller (The University of Texas at El Paso)
Richard L. Oliver (New Mexico State University)

Design and Prototype of a Performance Tool Interface for OpenMP,
Bernd Mohr (Research Centre Juelich, ZAM, Germany)
Allen D. Malony (University of Oregon)
Sameer Shende (University of Oregon)
Felix Wolf (Research Centre Juelich, ZAM, Germany)

3:30PM: Break

4:00PM: Applications

Implict, Large-Scale, Parallel, 3D Simulations of Waves Impacting on Floating Vessels,
S. Aliabadi (Clark Atlanta University)
A. Johnson (Network Computing Services, Inc., Army HPC Research Center)
B. Zellars (Clark Atlanta University)
J. Abedi (Clark Atlanta University)
C. Berger (US Engineer Research and Development Center)
J. Smith (US Engineer Research and Development Center)

A Virtual Test Facility for the Simulation of Dynamic Response in Materials,
Julian Cummings (California Institute of Technology)
Michael Aivazis (California Institute of Technology)
Ravi Samtaney (California Institute of Technology)
Raul Radovitzky (California Institute of Technology)
Sean Mauch (California Institute of Technology)
Dan Meiron (California Institute of Technology)

Scalable Spectral Element Climate Dynamical Core,
Stephen J. Thomas (National Center for Atmospheric Research)
Richard D. Loft (National Center for Atmospheric Research)
John M. Dennis (National Center for Atmospheric Research)

Wednesday, October 17, 2001

9:00AM: Keynote Address

Burton Smith, Chief Scientist, Cray, Inc.
"General Purpose Supercomputers"

10:00AM: Break

10:30AM: Partitioning

Generalized Multipartitioning,
Alain Darte (LIP, ENS-Lyon, France)
Daniel Chavarría-Miranda (Dept. of Computer Science, Rice University)
Robert Fowler (Dept. of Computer Science, Rice University)
John Mellor-Crummey (Dept. of Computer Science, Rice University)

An Experimental Study of Adaptive Application-Sensitive Partitioning Strategies
for SAMR Applications,
Sumir Chandra (Rutgers University)
Johan Steensland (Rutgers University)
Manish Parashar (Rutgers University)
Julian C Cummings (California Institute of Technology)

11:30AM: Collective Operations

High-level Language Support for User-defined Reductions,
Steven J. Deitz (University of Washington)
Bradford L. Chamberlain (University of Washington)
Lawrence Snyder (University of Washington)

Performance Modeling For Self Adapting Collective Communications for MPI ,
Sathish S Vadhiyar (ICL / U of Tennessee)
Graham E Fagg (ICL / U of Tennessee)
Jack J Dongarra (ICL / U of Tennessee)

12:30PM: Lunch---On your own

2:00PM: Grids and Security

The Role of Computational and Data Grids in Large-Scale Science and
Engineering,
William E Johnston (Lawrence Berkeley National Laboratory and NASA Ames
Research Center)

An Inter-Realm, Cyber-Security Infrastructure for Virtual Supercomputing,
Jalal Al-Muhtadi (University of Illinois at Urbana-Champaign)
Wu-chun Feng (Los Alamos National Laboratory)
Mike E. Fisk (Los Alamos National Laboratory)

Playing Inside the Black Box: Using Dynamic Instrumentation to Create Security Holes,
Barton Miller (University of Wisconsin)
Mihai Christodorescu (University of Wisconsin)
Robert Iverson (University of Wisconsin)
Tevfik Kosar (University of Wisconsin)
Alexander Mirgorodskii (University of Wisconsin)
Florentina Popovici (University of Wisconsin)

3:30PM: Break

4:00PM: Network Performance

The MAGNeT Toolkit: Design Implementation and Evaluation,
Jeffrey Hay (Los Alamos National Laboratory)
Wu-chun Feng (Los Alamos National Laboratory and Ohio State University)
Mark K. Gardner (Los Alamos National Laboratory)

Packet Spacing: An Enabling Mechanism for Delivering Multimedia Content in Computational Grids,
Annette Feng (University of Illinois and Los Alamos National Laboratory)
Wu-chun Feng (Los Alamos National Laboratory)
Geneva Belford (University of Illinois)

Dynamic Right-Sizing in TCP,
Mike Fisk (Los Alamos National Laboratory, University of California San Diego)
Wu-chun Feng (Los Alamos National Laboratory, The Ohio State University)

Workshops

Thursday, October 18, 2001

On the final day, the Symposium hosted three special-interest workshops.

8:30AM - 5:00PM: Tools for Performance Analysis of Large-Scale Applications

Organized by Richard Barrett and Federico Bassetti, Los Alamos National Laboratory; Allen D. Malony, University of Oregon

8:30AM - 5:00PM: High-Performance Numerical Libraries for Science and Engineering

Organized by Tony Drummond and Osni Marques, Lawrence Berkeley National Laboratory

8:30AM - 12:00PM: Compilation Issues for Itanium Architectures

Organized by Keith Cooper, Rice University; Rod Oldehoeft, Los Alamos National Laboratory

SUPPORTING CAST

The 2001 LACSI Symposium was successful because of the the combined efforts of many people.

LACSI Co-Directors

Andy White, Los Alamos National Laboratory
Ken Kennedy, Rice University

Organizing Committee

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Celso Luiz Mendes, University of Illinois
Jim Pool, California Institute of Technology
John Thorp, Los Alamos National Laboratory
Linda Torczon, Rice University
David Womble, Sandia National Laboratories

Additional Referees

John Ambrosiano, Los Alamos National Laboratory
David Bader, University of New Mexico
Richard F. Barrett, Los Alamos National Laboratory
Mark Bartelt, California Institute of Technology
Maciej Brodowicz, California Institute of Technology
Bradley Broom, Rice University
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Symposium web pages

Chad Kieffer, Los Alamos National Laboratory