



PROCEEDINGS

Third LACSI Symposium

October 13 – 16, 2002

Santa Fe, NM USA

INTRODUCTION

The Third Symposium of the Los Alamos Computer Science Institute ([LACSI](#)) was held in Santa Fe, NM on October 13-16, 2002. LACSI was formed at [Los Alamos National Laboratory](#) to conduct research in computer science issues relevant to DOE's Accelerated Strategic Computing Initiative (renamed [ASC](#)). 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 technical program for 2002 addressed the current and future state of high performance computing in several ways.

- 14 peer-reviewed technical papers were presented to the Symposium and reproduced in this proceedings.
- 13 posters were presented at the poster session.
- Three prominent researchers presented “State of the Field” talks.
- The keynote address discussed the development of the Japanese Earth Simulatory system.
- A special session was held on the DARPA High Productivity Computing Systems initiative. Five prime contractors from industry made their first public presentations on their projects. This was followed up by a panel discussion.
- Five workshops were held focusing on technical areas of particular importance to the LACSI community.

In addition to the Proceedings of the Symposium, this CD contains additional supporting material submitted by the participants and organizers of the technical sessions.



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.

Sunday, October 13:

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

At the Opening Reception, 13 poster presentations attracted attendees into lively discussions. The posters were also made available over the next two days for additional inspection.

Poster Presentations

Coupling of the Stochastic Vlasov Equation to a Deterministic Fluid Model in One Dimension

J.U. Brackbill, Los Alamos National Laboratory; Petr. Kloucek, F.R. Tofoletto, and J. Wightman, Rice University

An Integrated System for Photo-realistically Restoring 2D Images and 3D Models

Alice J. Lin and Michael G. Chen, University of Kentucky

A Fast Scheduling Algorithm for All-to-All Exchanges

John Wallin and Alexander Antunes, George Mason University; Bradley V. Stuart, University of Maryland

CODELAB: A Developers' Tool for Efficient Code Generation and Optimization

Dragan Mirkovic and S. Lennart Johnsson, University of Houston

LA-MPI: An End-to-End Fault-Tolerant Message-Passing System

David Daniel, Nehal Desai, Richard N Graham, L. Dean Risinger, and Mitchel W. Sukalski, Los Alamos National Laboratory

An Emerging Co-Array Fortran Compiler Poster Abstract

Cristian Coarfa, Yuri Dotsenko, Daniel Chavarría-Miranda, and John Mellor-Crummey

A Source-to-source Loop Transformation Tool

Robert Fowler, John Mellor-Crummey, Guohua Jin and Apan Qasem, Rice University

New Algorithms for Graph Partitioning Problems Based on Continuous Optimization

Yin Zhang, Rice University

Performance Modeling of MCNP on Large-Scale Systems

Mark M. Mathis, Texas A & M University; Darren J. Kerbyson, Los Alamos National Laboratory



ARPACK -- An Application of Telescoping-Language Technology
Cheryl McCosh, Arun Chauhan, and Ken Kennedy, Rice University

Building Parameterized Models for Black-Box Applications
Gabriel Marin and John Mellor-Crummey, Rice University

Update on the PAPI and Dynaprof Projects
Philip J. Mucci, Jack J. Dongarra, Kevin S. London, Shirley V. Moore, Daniel Terpstra,
and Haihang You, University of Tennessee

Performance-based Workload Management for Grid Computing
Daniel Spooner, Stephen Jarvis, and Junwei Cao, University of Warwick; Subhash Saini,
NASA Ames Research Center; Darren Kerbyson, Los Alamos National Laboratory

Monday, October 14:

8:45AM Welcoming remarks

9:00AM: Keynote Address

"The Development of the Earth Simulator"
Shigemune Kitawaki, Yokohama Institute of Earth Science

10:00AM Break

10:30AM Grids and Distributed Systems

Building Sensors and Actuators for Adaptive Resource Management in Linux Systems
C. Eric Wu (IBM Research)

Monitoring Large Systems via Statistical Sampling
Celso L. Mendes (University of Illinois)
Daniel A. Reed (University of Illinois)

Performance Prediction for Simple CPU and Network Sharing
Shreenivasa Venkataramaiah (University of Houston)
Jaspal Subhlok (University of Houston)

Making TCP Viable as a High Performance Computing Protocol
Patricia E. Gilfeather (University of New Mexico)
Arthur B. Maccabe (University of New Mexico)

Improving Memory Hierarchy Performance Through Combined Loop Interchange and Multi-Level Fusion
Qing Yi (Rice University)
Ken Kennedy (Rice University)



1:00PM – 2:15PM Lunch

2:15PM State of the Field Talks

The Virtualization Approach To Parallel Programming: Runtime Optimizations and the State of Art

Laxmikant Kale (University of Illinois)

Optimization Using Surrogates for Engineering Design - A Status Report

Mark Abramson (USAFIT)

Charles Audet (Ecole Polytechnique de Montreal)

J.E. Dennis (Rice University)

Clusters, and Networks, and Grids: Oh, My!

Daniel Reed (National Center for Supercomputing)

4:00PM Break

4:30PM Architecture and Operating Systems

A Dynamic Kernel Modifier for Linux

Ronald G. Minnich (LANL)

Performance Evaluation of an EV7 Alphaserver Machine

Darren J. Kerbyson (Los Alamos National Laboratory)

Adolfy Hoisie (Los Alamos National Laboratory)

Scott Pakin (Los Alamos National Laboratory)

Fabrizio Petrini (Los Alamos National Laboratory)

Harvey J. Wasserman (Los Alamos National Laboratory)

Accuracy of Performance Monitoring Hardware

Michael E. Maxwell (University of Texas-El Paso)

Patricia J. Teller (University of Texas-El Paso)

Shirley Moore (University of Tennessee-Knoxville)

Leonardo Salayandia (University of Texas-El Paso)



Tuesday, October 15:

8:00AM Breakfast

8:55AM Announcement

9:00AM Compilers and Performance

WBTK: A New Set of Microbenchmarks to Explore Memory System Performance

William Jalby (PRiSM Laboratory)

Christophe Lemuett (PRiSM Laboratory)

Xavier Le Pasteur (PRiSM Laboratory)

Vizer: A System to Vectorize Intel x86 Binaries

Keith Cooper (Rice University)

Anshuman Dasgupta (Rice University)

Ken Kennedy (Rice University)

Building Performance Topologies for Computational Grids

Martin Swaney (UC Santa Barbara)

Rich Wolski (UC Santa Barbara)

10:30AM Break

11:AM Algorithms and Implementations

DFTI, a New API for DFT: Motivation, Design, and Rationale

Peter Tang (Intel Corporation)

The Least Square Stabilization of Finite Element Approximation of Landau-Vlasov Equation

Petr Kloucek (Rice University)

Pavel Solin (University of Texas)

Optimizing Sparse Matrix Vector Product Computations using Unroll and Jam

John Mellor-Crummey (Rice University)

John Garvin (Rice University)

12:30 Lunch

2:00PM Special Session

The DARPA High Productivity Computing Systems (HPCS) program.

Presentations by Cray, HP, IBM, SGI, and Sun on their projects under this program
(<http://www.darpa.mil/ipto/research/hpcs/>)

4:30PM Short break

4:45PM – 5:30PM Panel on HPCS and the Future of Supercomputing



Wednesday, October 16:

Workshop Sessions

All Day Workshop

Title: Tools for Performance Analysis of Large-Scale Applications

Organizers: Allen D. Malony (University of Oregon)

Richard Barrett (Los Alamos National Lab)

Jeffrey Vetter (Lawrence Livermore National Lab)

Morning Workshops: 8:30am - 12:30pm

Title: Common Components Architecture (CCA) Tutorial

Organizers: Craig Rasmussen (Los Alamos National Lab) (and others from CCA)

Title: Simulation Driven Optimization

Organizers: M. Heinkenschloss, W. W. Symes, Y. Zhang (Rice University)

Afternoon Workshops: 1:30pm - 5:30pm

Title: Specialized and Commodity Approaches in Operating Systems for HPC Platforms

Organizers: Arthur B Maccabe (University of New Mexico)

Ron Brightwell (Sandia National Labs)

Ron Minnich (Los Alamos National Lab)

Title: Visualization Research in LACSI

Organizers: Thomas P Caudell, Edward Angel (University of New Mexico)



SUPPLEMENTAL MATERIAL

Archive consisting of 4 Quicktime movies that feature a simple object-oriented particle system that could be used across a wide range of applications. The short clips illustrate 4 applications and include additional images. Review the files on the CDROM – extra/sup1/

Ed Angel (University of New Mexico)

Paul Alsing (University of New Mexico)

Jun Zhang, (University of New Mexico)

Coupling of the Stochastic Vlasov Equation to a Deterministic Fluid Model in One Dimension

J.U. Brackbill (Los Alamos National Laboratory)

Petr Kloucek (Rice University)

F.R. Toffoletto (Rice University)

J. Wightman (Rice University)

Testing the Performance of CSR, CSRV, and L-CSR

John Garvin (Rice University)

John Mellor-Crummey (Rice University)

- Locate source code (extra/sup3/LCSR-source.tar.gz) to accompany the paper “Optimizing Sparse Matrix Vector Product Using Unroll and Jam”

An Emerging Co-Array Fortran Compiler

Cristian Coarfa (Rice University)

Yuri Dotsenko (Rice University)

John Mellor-Crummey (Rice University)

Daniel Chavarría-Miranda (Rice University)

New Algorithms for Graph Partitioning Problems Based on Continuous Optimization

Yin Zhang (Rice University)

An Integrated System for Photo-realistically Restoring 2D Images and 3D Models

Michael G. Chen University of Kentucky)

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ARPACK An Application of Telescoping-Language Technology

Arun Chauhan (Rice University)

Ken Kennedy (Rice University)

Cheryl McCosh (Rice University)

- Description
- Poster



Performance-based Workload Management for Grid Computing

Junwei Cao (University of Warwick)

Stephen Jarvis (University of Warwick)

Darren Kerbyson (Los Alamos National Laboratory)

Subhash Saini (NASA Ames Research Center)

Daniel Spooner (University of Warwick)

- Presented poster
- Extended Abstract
- Recent Presentations
 - Use of Performance Prediction Techniques for Grid Management
 - Localised Workload Management using Performance Prediction and QoS Contracts
 - Grid Information Services using Software Agents
- Website

Performance Modeling of MCNP on Large-Scale Systems

Darren J. Kerbyson (Los Alamos National Laboratory)

Mark M. Mathis (Texas A & M University)

Building Parameterized Models for Black-Box Applications

Gabriel Marin (Rice University)

John Mellor-Crummey (Rice University)



SUPPORTING CAST

The 2002 LACSI Symposium was successful because of the combined efforts of many people.

LACSI Co-Directors

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

Organizing Committee

Rob Fowler, Chair, Rice University; Richard Barrett, Los Alamos National Laboratory; Tom Caudell, University of New Mexico; Barbara Chapman, University of Houston; Jack Dongarra, University of Tennessee; Matthias Heinkenschloss, Rice University; Chuck Koelbel, Rice University; Doug Kothe, Los Alamos National Laboratory; Barney MacCabe, University of New Mexico; Celso Luiz Mendes, University of Illinois; Rod Oldehoeft, Los Alamos National Laboratory; Harvey Wasserman, Los Alamos National Laboratory

Additional Referees

Richard Hanson, Rice University

Conference Arrangements

- **Meeting Planner, Local Arrangements**
Jan Hull
- **Registration Coordinator**
Eleanor Fellers
- **Electronic Registration Development**
Marsha Vigil
- **Administrative Support**
Penny Anderson, Rice University
Petra Fajardo
Kathryn O'Brien, Rice University

Submission and review management software and service

John Konkle, [Linklings](#)

Symposium Web Pages

Sarah Gonzales, Rice University

This work was supported by Los Alamos National Laboratory Contract 03891-0019-23 – Mod. 4.

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