Society for Industrial and Applied Mathematics

Preliminary Program

Fourth SIAM Conference on Parallel Processing for Scientific Computing

December 11 – 13, 1989

Hyatt Regency Hotel
Chicago, Illinois

CONFERENCE THEMES

General Themes

- Massively Parallel Computing
- Visualization of Scientific Computation
- Tools for Parallel Algorithm Development

Special Themes

- High-Speed Computer Architectures
- Computer Performance Evaluation
- Distributed Computing
- High-Speed Computer Environments
- Numerical Linear Algebra
- Computational Complexity
- Numerical Domain Decomposition Methods
- Adaptive Numerical Methods
- Scientific Programming Languages
- Numerical Particle Methods

AND

Short Course on

Linear Algebra Computations on Vector and Parallel Computers

December 10, 1989

Sponsored by the SIAM Activity Group on Supercomputing

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DEADLINE DATES

Hotel Reservations: November 17, 1989

Please note that hotel rooms will be difficult to acquire after November 17th as there is another convention in the hotel over the same days as the SIAM conference.

Advance Conference Registration: December 4, 1989

A proceedings of selected papers will be published after the conference.
Upon the availability of the proceedings, all those attending this conference will be notified.

ORGANIZING COMMITTEE

Jack J. Dongarra (Chair)
University of Tennessee and
Oak Ridge National Laboratory
Oliver A. McBryan
University of Colorado, Boulder
Paul C. Messina
California Institute of Technology
Danny C. Sorensen
Rice University
Robert Voigt
ICASE, NASA-Langley Research Center

FUNDING AGENCY

SIAM is conducting this conference with the partial support of the National Science Foundation.

PROGRAM DESIGN: TOM JACKSON ASSOCIATES

SHORT COURSE

SHORT COURSE ON LINEAR ALGEBRA COMPUTATIONS ON VECTOR AND PARALLEL COMPUTERS

December 10, 1989
Hyatt Regency Hotel
Chicago, Illinois

Organizers:
Jack J. Dongarra, University of Tennessee and Oak Ridge National Laboratory; Iain S. Duff, Harwell Laboratory, U.K.; Danny C. Sorensen, Rice University; and Henk Van der Vorst, Delft University of Technology, Netherlands.

Who Should Attend?
Those interested in mathematics software and programming environments on advanced computer architectures should attend this tutorial. This includes those interested in linear algebra algorithms, the techniques employed in the update of standard algorithm packages, and tools for the development and analysis of parallel algorithms on shared memory machines.

Recommended Background:
The lectures assume a general knowledge of numerical linear algebra and an understanding of high-performance computers.

Course Description:
The development of vector and parallel computers in the late 1970s led to a critical review of mathematical software. Many of the sequential algorithms used satisfactorily on traditional machines fail to exploit the architecture of advanced computers. We will review the various features of these more advanced systems and discuss how the architecture affects the potential performance of linear algebra algorithms. We will consider recent techniques devised for utilizing advanced architectures more fully, especially the design of the Level 1, 2, and 3 BLAS. We will discuss a new package, called LAPACK, which is intended to most fully exploit advanced computers.

In addition we will cover the state-of-the-art for direct and iterative methods for sparse systems of linear equations.

We will describe a programming environment that will aid in the design, development, and understanding of parallel algorithms for high-performance computers. The tools provide an environment for developing and analyzing new parallel algorithms in Fortran that require sophisticated synchronization at a large-grain level. This package provides portability of a user's code and also has a graphics postprocessor for performance analysis and debugging.

Finally, we will address the challenge facing designers of mathematical software in view of the development of massively parallel computer systems.

PROGRAM

9:30 AM - 10:30 AM
Introduction

10:30 AM - 11:00 AM
Coffee

11:00 AM - 12:00 PM
Dense Direct Linear Algebra

12:00 PM - 1:00 PM
Lunch is provided for those attending the short course

1:00 PM - 2:00 PM
Sparse Direct Linear Algebra

2:00 PM - 2:30 PM
Coffee

2:30 PM - 3:30 PM
Sparse Iterative Linear Algebra

3:30 PM
Adjournment

INVITED PRESENTATIONS

Monday, December 11/9:00 AM
Invited Presentation 1

The Limitations and Potential of Large Scale Parallelism

We now have considerable experience in using pallel computers with tens of thousands of processors in a variety of applications. What have we learned? What kinds of problems work well on massively parallel machines, and what problems do not? What are the issues that should be considered when designing algorithms for such machines? How does what we have learned influence architectural choices for the future?

The speaker will discuss progress that is being made toward answering these questions.

W. Daniel Hillis
Thinking Machines Corporation
Cambridge, Massachusetts

Monday, December 11/9:45 AM
Invited Presentation 2

Trends in Computer Graphics

What may scientists and engineers using scientific visualization expect in the near future from computer graphics hardware and software? The speaker will discuss ongoing developments in high performance graphics workstations. A new generation of visualization software that emphasizes animation and minimizes end-user programming will be described.

Andries van Dam
Computer Science Department
Brown University

Monday, December 11/2:15 PM
Invited Presentation 3

Programming Tools for Parallel Systems

The speaker will describe a programming environment to aid in the parallelization and vectorization of FORTRAN and C(++) software. The system, known as Sigma, is part of the Faust programming environment being built at CSRD in Urbana and Indiana University. Sigma consists of five primary components: A front-end parser and data dependence analyzer for Fortran and VPC++; A data base for global flow analysis of large applications; A runtime system for parallel Fortran and C on the Alliant FX/8, Ardent Titan, and BBN Butterfly parallel processors; A parallel machine performance prediction system that estimates behavior on the Alliant and attempts to predict performance problems; An X windows based front end to give users easy access to these tools and the data base.

The whole system will be described with a focus on the performance problems associated with memory use on parallel processors and the design of parallel scientific code in C and C++.

Dennis Gannon
Department of Computer Science
Indiana University, Bloomington

Tuesday, December 12/9:00 AM
Invited Presentation 4

Compiling for Parallel Machines with Complex Memory Hierarchies

Modern parallel computers tend to have complicated memory hierarchies. On shared-memory machines, one finds cache memories (sometimes more than one) between each processor and the main memory. Distributed-memory multicomputers package memory with each processor, so efficient use of the communications system requires that the placement of data in the system will be thought out. If we are to achieve any degree of program portability, most of the work of mapping a program to the memory hierarchy of a specific machine should be done in the compiler. The speaker will survey some of the research in this area and introduce a new programming model, the "blockable algorithm", which can be easily translated to code that makes efficient use of memory on a variety of machines. If this line of research is successful, it will mean that a great deal of portability can be achieved in parallel programs written in explicitly parallel languages.

Ken Kennedy
Department of Computer Science
Rice University

Tuesday, December 12/9:45 AM
Invited Presentation 5

Beyond Parallelism to Coordination: Developing a Multi-site, Multi-time and Translanguage Programming Environment Using Linda

Linda was developed as a machine- and language-independent model of parallel programming, based on a shared, associative object memory. The goal was to make the system simultaneously simple and powerful. Although the model's high-level character made implementation challenging, many efficient implementations now exist, many applications have been developed using Linda, and the system is seeing increasing use.

We are now turning to the topic of parallelism as a special case of coordination, a term that can be applied to the problem of building programs out of many active pieces — whether similar or not, owned by one user or many, running on one or many autonomous hosts, at one time or many separate times. Approaching parallelism as a special case of coordination rather than a generalization of some language model promises gains in convenience (a variety of systems problems can be approached using the same constructs and the same development and debugging environment) and in conceptual economy. It reduces the definition of a complete programming environment to two orthogonal choices: a computation model and a coordination model.

The uncoupled and anonymous character of communication in Linda and the flexibility of its basic operators makes Linda seem like a promising model for coordination. The speaker will introduce the Linda model and the current Linda development environment, and then discuss how the model is being expanded and generalized to deal with coordination as well as with parallelism.

David Gelernter
Department of Computer Science
Yale University

Tuesday, December 12/1:30 PM
Invited Presentation 6

Visualization and Atomic-Level Simulation of Materials

Many of the important problems in the simulation of materials demand enhanced ways to visualize interactions. Examples include finding optimum substrates for epitaxial growth of thin layers and examining interactions of polymer chains in condensed phases to understand the atomic origin of mechanical properties. The approaches that are being developed toward such problems will be discussed as will some of the strategies for using parallelization for predicting structures of amorphous condensed polymers.

William A. Goddard III,
Robert E. Donnelly, and
Naoki Karasawa
Arthur Amos Noyes Laboratory of Chemical Physics
California Institute of Technology

Wednesday, December 13/9:00 AM
Invited Presentation 7

Numerical Simulation of Fluid Flow on a Massively Parallel Processor

The parallel implementation of a numerical method, known as the random vortex method, for simulating fluid flow in arbitrary, complex geometries will be described. The code is implemented on the Connection Machine CM-2, a massively parallel processor. The numerical method is particularly suited for computing complex viscous, incompressible flow across a wide range of flow regimes and characteristics. In this method, the vorticity of the flow is approximated by a collection of particles whose positions and strength induce an underlying flow. As such, it is a Lagrangian scheme, in which the position of each particle is affected by all others at each time step.

The efficient execution of this method on the Connection Machine results from a parallel N-body solver, parallel elliptic solvers, and a parallel data structure for the adaptive creation of computational elements on the boundary of the confining region. Using this method, we analyze the generation of large vortex structures, mixing, and shedding under various flow Geometries and inlet/outlet profiles. The data from the simulations are visualized using the real-time flow visualization environment developed on the Connection Machine.

James A. Sethian
Department of Mathematics
University of California, Berkeley

INVITED PRESENTATIONS

Wednesday, December 13/9:45 AM
Invited Presentation 8

Connection Machine Utilization and Experience at UTRC

Massively parallel computers offer considerable performance potential for many engineering problems. Use of these machines is claimed, by some, to be difficult and to require a large investment in software to realize this potential. Although new algorithms and improved software will undoubtedly help, it is now possible to achieve significant computational performance using the massively parallel SIMD Connection Machine CM-2 on numerous existing algorithms in engineering applications with relatively minor code modifications. For many cases the programming effort is no more extensive than that required to modify non-vectorized codes to achieve good vector performance. To support this point, the speaker will discuss UTRC experience on the CM-2 using FORTRAN 8X Array Extensions for recent engineering code development efforts in the areas of CFD and Structural Mechanics.

T. Alan Egolf
Aeromechanics and Thermal Sciences
United Technologies Research Center

Wednesday, December 13/1:30 PM
Invited Presentation 9

Title to be announced in final program

Karl-Heinz Winkler
University of Illinois, Urbana
National Center for Supercomputing Applications

VENDOR PRESENTATIONS

Monday, December 11/4:00 PM
Vendor Presentation 1

MasPar Introduces New Family of Massively Parallel Computer Systems

MasPar Computer Corporation is developing, manufacturing, and marketing very high-performance Massively Parallel computers and their software systems. MasPar utilizes unique technologies in which thousands of processors communicate in a highly efficient, easily understood, and economical manner. Because of these technological innovations, it is possible to deliver a family of complete systems that provide tens of thousands of MIPS and GigaFLOPS of performance, in a price range that is affordable by a broad spectrum of users and for a wide variety of applications. MasPar is providing languages, tools, and other aspects of complete programming environment that will make programming these machines practical, convenient, and productive. These systems are ideal for data-and computationally-intensive applications including Image Recognition, Signal Processing, Fluid and Solid Mechanics, Databases, VLSI Simulation, Computational Chemistry, and Artificial Intelligence.

William A. Hogan
MasPar Computer Corporation
Sunnyvale, CA

Monday, December 11, 4:00 PM
Vendor Presentation 2

Performance and Portability with the NAG Library

The Nag Fortran Library continues to broaden its contents and improve its performance on modern high-performance computers, while becoming available on an ever-widening range of systems. Mark 14 of the Library will contain over 100 new routines, including the Level 3 BLAS and linear algebra routines which exploit them. This talk will present the latest information about the performance of selected NAG routines, demonstrating the benefits of optimised implementations of the BLAS, and the advantages of Level 3 BLAS over Level 2 on certain machines. Developments in FFT's, quadrature and random number generators will also be described.

Jeremy Du Croz
Numerical Algorithms Group Ltd.
United Kingdom

GET-TOGETHERS ★

SIAM Welcoming Reception
Sunday, December 10th, 7:00 PM - 9:00 PM
Cash Bar

Poster Session I
Monday, December 11th, 4:00 PM - 6:00 PM
Exhibit Hall
Cash Bar

Stop in to see the 60 - 75 poster presentations and visit the computer and book exhibits

SIAM Beer Party $18
Monday, December 11th, 6:15 PM - 7:45 PM

This is a great time to get together with your colleagues. The party will consist of three stations where the chefs are creating the dishes right before your eyes. Menu will consist of chicken and steak fajitas, freshly made rottini, tortellini and fettucini with marinara and alfredo sauce, and oriental stir fry consisting of shrimp, scallops, chicken and chinese vegetables. Domestic beer and assorted sodas will also be available.

Poster Session II
Tuesday, December 12th, 4:00 PM - 6:00 PM
Exhibit Hall
Cash Bar

Stop in to see the 60 - 75 poster presentations and visit the computer and book exhibits

Exhibit Hours:

Please be sure to visit the computer and book exhibitors located in East Wacker Exhibit Hall. The hours for book purchases and computer demonstration will be as follows:

Monday, December 11th	9:30 AM - 8:00 PM
Tuesday, December 12th	8:00 AM - 6:00 PM
Wednesday, December 13th	8:00 AM - 4:00 PM

CONTRIBUTED PRESENTATIONS

Monday, December 11/11:00 AM
Contributed Presentations 1
Massively Parallel Computing I

Massively Parallel Computing for Aerophysics Problems: Status and Trends
Lyle N. Long, H. Thomas Sharp, and M.M.S. Khan, Lockheed, Burbank, CA; and Gary Demos, DemoGraFX, Culver City, CA

Large Scale Numerical Optimization on a Massively Parallel Connection Machine
Stavros A. Zenios, University of Pennsylvania

Monday, December 11/11:00 AM
Contributed Presentations 2
Sparse Linear Algebra I

A Large-Grain Parallel Sparse System Solver
K. Gallivan, B. Marsolf, and H. Wijshoff, University of Illinois, Urbana

Incremental Condition Estimator for Parallel Sparse Matrix Factorizations
Jesse L. Barlow and Udaya B. Vemulapati, Pennsylvania State University

Monday, December 11/11:00 AM
Contributed Presentations 3
Systolic Array Design

Parallel Computation of Algorithms with Uniform and Broadcast Dependencies
Jean-Marc Delosme and Ilse Ipsen, Yale University

SYSDES: A Systolic Array Automation Design System
PeiZong Lee, Albert Yang, and Kee Yip, Courant Institute of Mathematical Sciences, New York University; and Jeffrey Wu, IBM T.J. Watson Research Center

Monday, December 11/2:15 PM
Contributed Presentations 4
Sparse Linear Algebra II

Parallel Computation at CERFACS
Iain Duff, Harwell Laboratory, Oxon, U.K.

Monday, December 11/2:15 PM
Contributed Presentations 5
Linear Algebra I

Optimizing Tridiagonal Solvers for Alternating Direction Methods on Boolean Cube Multiprocessors
Ching-Tien Ho, Yale University; and S. Lennart Johnsson, Yale University and Thinking Machine Corporation, Cambridge, MA

Monday, December 11/2:15 PM
Contributed Presentations 6
Eigenvalues I

A Parallel-Vector Implementation of Lanczos's Method for the Generalized Eigenvalue Problem
Mark T. Jones, Duke University; and Merrell L. Patrick, Duke University and ICASE, NASA Langley Research Center

Monday, December 11/3:15 PM
Contributed Presentations 7
Domain Decomposition

Parallel Domain Decomposition with Local Mesh Refinement
William D. Gropp and David E. Keyes, Yale University

An Analysis of Parallel Numerical Algorithms for the Solution of the Navier-Stokes Equations
Sam Yu and A. Daniel Kowalski, Rutgers University

Multitasking Domain Decomposition Fast Poisson Solvers on the Cray Y-MP
Tony Chan, University of California, Los Angeles; and Rod Fatoohi, NASA Ames Research Center

Experiments with Elliptic Problem Solvers on the CEDAR Multicluster
G. Frank, E. Gallopoulos and U. Meier, University of Illinois, Urbana

Monday, December 11/3:15 PM
Contributed Presentations 8
Eigenvalues II

Efficient Implementation of Sturm Sequence Methods for Parallel Computation of Eigenvalues
Elizabeth R. Jessup, University of Colorado, Boulder

Parallel Algorithms for the Banded Symmetric Eigenvalue Problem $AX = \lambda BX$
Ricardo D. Pantazis and Daniel B. Szyld, Duke University

The Effect of Rotation Ordering on the Convergence of Parallel Jacobi-type Algorithms
P.J. Eberlein and M. Mantharam, SUNY, Buffalo

Scheduling Linear Algebra Parallel Algorithms on MIMD Architectures
Apostolos Gerasoulis and Izzy Nelken, Rutgers University

Monday, December 11/3:15 PM
Contributed Presentations 9
Massively Parallel Computing II

Minimizing Communication Cost for Distributed Arrays on Massively Parallel Machines
Marina C. Chen, Young-Il Choo, and Michel Jacquemin, Yale University

Observations Regarding CONNECTION Machine Performance for Nonlinear Dynamic Finite Element Analysis
Ted Belytschko, Northwestern University; and Edward J. Plaskacz, Northwestern University and Argonne National Laboratory

Benchmark Performance of a Massively Parallel Algorithm for Computing Conservation Laws
Marc Garbey, Ecole Normale Superieure de Lyon, France; and David Levine, Argonne National Laboratory

Parallel Molecular Dynamics for Liquids with Short-Range Interactions on the Connection Machine
Rosco Giles, Boston University; Andrew Melcuk and Harvey Gould, Clark University

Monday, December 11/3:15 PM
Contributed Presentations 10
Numerical Methods I

Design and Analysis of ADI Methods for Distributed Memory Architectures
Naomi Decker and John Van Rosendale, NASA Langley Research Center; and Piyush Mehrotra, NASA Langley Research Center and Purdue University, West Lafayette

Compute-Exchange Computation for Parallel Homotopy Method: The Method and Application
Xian He Sun and Lionel M. Ni, Michigan State University

Parallel Predictor-Corrector Block Methods for Ordinary Differential Equations
Hon Wah Tam, University of Illinois, Urbana

Parallel Processing for Numerical Singularity and Bifurcation Analysis of Large Nonlinear Systems
Raymond A. Adomaitis, Illinois Institute of Technology and Princeton University; and Ali Cinar, Illinios Institute of Technology

Tuesday, December 12/11:00 AM
Contributed Presentations 11
Tools

Writing Portable Parallel Programs in Seymour
Russ Miller, SUNY, Buffalo; and Quentin F. Stout, University of Michigan, Ann Arbor

Scattered Decomposition and the Partitioning of Loops and Domains
Joel Saltz and Harry Berryman, Yale University and NASA Langley Research Center; David Nicol, College of William and Mary; Kay Crowley and Ravi Mirchandaney, Yale University

Tuesday, December 12/11:00 AM
Contributed Presentations 12
Finite Element Methods

Parallel Element-by-Element Techniques for Elliptic Systems Using Finite Quadtree Meshes
M. Benantar, J.E. Flaherty and M.S. Shephard, Rensselaer Polytechnic Institute

The Finite Element Method on a Data Parallel Architecture
Kapil K. Mathur, Thinking Machines Corporation, Cambridge, MA

Tuesday, December 12/11:00 AM
Contributed Presentations 13
Linear Algebra II

Spectral Algorithms for Ordering Sparse Matrices in Parallel
Alex Pothen, Pennsylvania State University; and Horst Simon, NASA Ames Research Center

LAPACK - A Linear Algebra Library for High-Performance Computers
Edward Anderson and Jack Dongarra, Argonne National Laboratory

Tuesday, December 12/2:15 PM
Contributed Presentations 14
Linear Algebra III

Parallel Preconditioners for the Connection Machine
Horst D. Simon, NASA Ames Research Center

Tuesday, December 12/2:15 PM
Contributed Presentations 15
Partial Differential Equations I

Efficient Parallel Solution of Parabolic Equations: Implicit Methods
E. Gallopoulos, University of Illinois, Urbana; and Y. Saad, NASA Ames Research Center

CONTRIBUTED PRESENTATIONS

Tuesday, December 12/2:15 PM
Contributed Presentations 16
Fast Fourier Transforms

FFTs in External or Hierarchical Memory
David H. Bailey, NASA Ames Research Center

Tuesday, December 12/3:15 PM
Contributed Presentations 17
Numerical Methods II

Solving Navier-Stokes Equations on the CEDAR Multi-Cluster System
Jacques Laminie, University of Illinois, Urbana (and Universite Paris Sud, France); and Ulrike Meier, University of Illinois, Urbana

Parallel Properties of the Multi-Directional Search Algorithm
Virginia Torczon, Rice University

Parallelism in the Coherency Optimization Method in Reflection Seismology
R. Michael Lewis and William W. Symes, Rice University

Parallel Homotopy Curve Tracking on a Hypercube
A. Chakraborty, D.C.S. Allison, C.J. Ribbens, and L.T. Watson, Virginia Polytechnic Institute and State University

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Contributed Presentations 18
Linear Algebra IV

High Level Programming of Nonshared Memory Architectures
Piyush Mehrotra, NASA Langley Research Center and Purdue University, West Lafayette; and John Van Rosendale, NASA Langley Research Center

Parallel QR Algorithm for Iterative Subspace Methods on the Connection Machine (CM2)
Serge G. Petiton, Yale University

s-Step Iterative Methods for (Non)symmetric (In)definite Linear Systems
A.T. Chronopoulos, University of Minnesota, Minneapolis

Parallel Row Projection Algorithms for Nonsymmetric Systems
Randall Bramley, and Ahmed Sameh, University of Illinois, Urbana

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Contributed Presentations 19
Massively Parallel Computing III

An Object-Oriented Interface to Scientific Parallel Computing
Richard L. Peskin and Sandra S. Walther, Rutgers University

A Distributed Dynamic Load Balancing Strategy for Highly Parallel Multicomputer Systems
Marc Willebeek LeMair and Anthony P. Reeves, Cornell University

Communication Efficient MIMD Systems
Alan G. Chalmers and Derek J. Paddon, University of Bristol, U.K.

Hypercubes vs. 2D Meshes
Suresh Chittor and Richard Enbody, Michigan State University

Tuesday, December 12/3:15 PM
Contributed Presentations 20 Performance I

Evaluating the Overhead of Parallel Programs
J.C. Diaz and K.C. Lee, University of Tulsa

Performance Study of Some Supercomputers Using a Sparse Matrix Benchmark
Y. Saad, RIACS, NASA Ames Research Center; and H.A.G. Wijshof, University of Illinois, Urbana

Correlating Workload Characteristics to Performance Metrics for the CRAY X-MP/Y-MP
Walid Abu-Sufah, Virginia Polytechnic Institute and State University; and John L. Larson, University of Illinois, Urbana

Bit Serial SIMD on the CM-2 and the Cray-2
David Smitleyand Ken Iobst, Supercomputing Research Center, Bowie, MD

Wednesday, December 13/11:00 AM
Contributed Presentations 21
Numerical Methods III

Automatic Generation of Parallel Programs for Nonlinear Singular Perturbation Problems
Mark F. Russo, Concurrent Computer Corp., Tinton Falls, NJ; and Richard L. Peskin, Rutgers University

Multiprocessing a Global Spectral Numerical Weather Prediction Model
Ross N. Hoffman and Thomas Nehrkorn, Atmospheric and Environmental, Research, Inc., Cambridge, MA

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Contributed Presentations 22
Performance II

The Generation of Scalable Performance Models from Empirical Data
Michael T. Heath, Michael R. Leuze, George Ostrouchov, Patrick H. Worley, Oak Ridge National Laboratory

Performance of Block Algorithms and LAPACK on CRAY Y-MP and CRAY-2
Qasim M. Sheikh and Phuong A. Vu, Cray Research, Inc., Mendota Heights, MN

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Contributed Presentations 23
Massively Parallel Computing IV

Connection Machine Implementation of an Iterative Solver for Sparse Linear Systems
J.C. Diaz, and Tung Mansfield, University of Tulsa

User Requirements and Algorithmic Techniques for Highly Parallel Computer Systems
Heather M. Liddell, Queen Mary College, London, U.K.

Wednesday, December 13/2:15 PM
Contributed Presentations 24
Partial Differential Equations II

Asynchronous Numerical Solution of PDEs on Parallel Computers
D. Amitai, A. Averbuch, S. Itzikowitz, and E. Turkel, Tel-Aviv University, Israel

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Contributed Presentations 25
Linear Algebra V

Distributed and Shared Memory Block Algorithms for the Triangular Sylvester Equation with Condition (sep^{-1}) Estimators
Bo Kagstrom and Peter Poromaa, University of Umea, Sweden

Wednesday, December 13/2:15 PM
Contributed Presentations 26
Massively Parallel Application

A Radar Simulation Program for a 1024 Node Hypercube
Mark P. Sears, Robert E. Benner, and John L. Gustafson, Sandia National Laboratories

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Contributed Presentations 27
Partial Differential Equations III

Domain Decomposition Methods in Aerodynamics
V. Venkatakrishnan, Analytical Services and Materials, Inc, NASA Langley Research Center

Pre-conditioned-Time-Differencing Methods for Solving Convection-Diffusion Problems
Garry H. Rodrigue, Lawrence Livermore National Laboratory

A Parallel Iterative Solution Method for Systems of Nonlinear Hyperbolic Equations
Jeffrey S. Scroggs, ICASE, NASA Langley Research Center

Efficient Parallel Solution of Parabolic Equations: Explicit Methods
E. Gallopoulos, University of Illinois, Urbana; and Y. Saad, RIACS, NASA Ames Research Center

Wednesday, December 13/3:15 PM
Contributed Presentations 28
Linear Algebra VI

A Block QR Factorization Algorithm using Restricted Pivoting
Christian H. Bischof, Argonne National Laboratory

Comparisons of Three Algorithms for Distributed Cholesky Factorization
C. Ashcraft, S.C. Eisenstat, and A.H. Sherman, Yale University; and J. Liu, York University

Parallel Tridiagonalization of a General Matrix Using Distributed-Memory Multiprocessors
G.A. Geist, Oak Ridge National Laboratory

Balanced Divide-and-Conquer Algorithms for the Fine-Grained Parallel Direct Solution Triangular Linear Systems and their CM Implementation
Z. George Mou, David E. Keyes, and William D. Gropp, Yale University

Wednesday, December 13/3:15 PM
Contributed Presentations 29
Optimization

Parallel Processing in the Solution of Two-Stage Stochastic Linear Programs with Complete Recourse
K.A. Ariyawansa, Washington State University

Parallel Algorithms for Block-Constrained Optimization
G.L. Schultz and R.R. Meyer, University of Wisconsin, Madison

An Adaptive, Asynchronous Parallel Global Optimization Algorithm
Sharon L. Smith, Elizabeth Eskow, and Robert B. Schnabel, University of Colorado, Boulder

A Genetic Algorithm for Knapsack Feasibility Problems
Michael C. Ferris, University of Wisconsin, Madison

POSTER SESSIONS

Wednesday, December 13/3:15 PM
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Numerical Methods IV

Knowledge Based Assistance for the Generation of Parallel Numerical Programs
Mark F. Russo, Concurrent Computer Corporation, Tinton Falls, NJ; and A. Daniel Kowalski, Rutgers University

Massive Parallelism and Process Contraction in Dino
Matthew Rosing, Robert B. Schnabel, and Robert P. Weaver, University of Colorado, Boulder

Modeling Parallel, Distributed Computations Using ParaDiGM—A Case Study: the Adaptive Global Optimization Algorithm
Isabelle M. Demeure, Sharon L. Smith and Gary J. Nutt, University of Colorado, Boulder

Variation of Parallel Processing Time with Continuously Partitioned Load Allocation
Emile K. Haddad, Virginia Polytechnic Institute and State University

Monday, December 11/4:00 PM

Poster Session I

MasPar Introduces New Family of Massively Parallel Computer Systems
William A. Hogan, MasPar Computer Corporation, Sunnyvale, CA

Performance and Portability with the NAG Library
Jeremy Du Croz, Numerical Algorithms Group Ltd., Oxford, UK

Parallel Homotopy Algorithm for Symmetric Tridiagonal Eigenvalue Problem
Tien-Yien Li, Hong Zhang Sun and Xian-He Sun, Michigan State University

Parallel Euler-Jacobi Methods for Spectral Decomposition
A.W. Bojanczyk, Cornell University; and A. Lutoborski, Syracuse University

Numerical Computation of Zeros of Parametrized Characteristic Equations Using Straight Line Approximation
Ali A.K. Hasan, University of Technology, Iraq

On Zeros of Polynomials and Entire Functions
Mohammed A. Hasan, Colorado State University, Fort Collins; and Ali A. Hasan, University of Technology, Iraq

Parallel ADI for the Solution of Hyperbolic and Parabolic Differential Equations on an Intel Hypercube
Russell Carter and Rosemary Renaut; Arizona State University

Robust Parallel Algorithms for Triangulation and Shelling
Isabel Beichl and Francis Sullivan, National Institute of Standards and Technology

Adopting Interior Search Algorithms for the Solution of LPs for Serial, Coarse Grain Parallel and Massively Parallel Computers
Johannes Andersen, Roni Levkovitz, and Gautam Mitra, Brunel University, Oxford, U.K.; and Mahrdad Tamiz, Numerical Algorithms Group Limited, Oxford, U.K.

Adaptive Quadrature on a Message-Passing Multiprocessor
Valerie A. Miller and George J. Davis, Georgia State University

Performance Evaluation of the Client-Server Model for Distributed Scientific Computing
Scott F. Midkiff and Paramesh Vaidyanathan, Virginia Polytechnic Institute and State University

Load Balancing of Medium-grained Processes for Multiprocessing
Wei Shu and L.V. Kale, University of Illinois, Urbana

Generating Prime Sieve Numbers on Multicomputers
Min-You Wu, Wei Shu and Marina Chen, Yale University

A Parallel Algorithm for Multi-Variable Fuzzy Control Systems
M.A. Manzoul and S. Tayal, Southern Illinois University, Carbondale

Fast Parallel Schemes for Elliptic PDEs
Avi Lin, Temple University

A Parallel Depth-Merge Paradigm for HSR and Shadowing of Boundary Models
Alberto Paoluzzi, Universita di Roma "La Sapienza"; and Roberto Scopigno, Istituto CNUCE-Consiglio Nazional delle Ricerche, Italy

Linear Algebra Applications on a Bus-based Shared-memory Multiprocessor
Ramesh Natarajan, IBM T.J. Watson Research Center

Burst-mode Adaptive Message Router: On the Enhancement of System Performance
Filip S. To, Jim C. Harden, and John K. Owens, Mississippi State University

Hybrid Neural Networks Architecture for Intelligent Control of Industrial Robot
Roman W. Swiniarski, San Diego State University

Hybrid Neural Networks Application to Adaptive Time-Optimal Control of Linear Systems
Roman W. Swiniarski, San Diego State University

Transputer Interface to DSP Vector Processor
Richard L. Tutwiler and Alan Onweller, Penn State University

Parallel Lanczos-like Algorithms Implemented on Parallel Computers
Sunkyung Kim and Anthony Chronopoulos, University of Minnesota, Minneapolis

Maximum Subcube Recognition and Fault Tolerance in N-cube Multiprocessors
Jai Eun Jang and Won Kyung Cho, Oregon State University

A Sensitivity Analysis of the Linear Model Workfarm
Chyan Yang and Timothy J. Johnson, Naval Postgraduate School

Partitioning and Message-Communicating Process Implementation of a Nested Dissection Algorithm
Pierre Charrier and Jean Roman, Universite Bordeaux 1, France

A New Monte Carlo Algorithm for Solving Elliptic Problems on Massively Parallel Computers
Michael Mancagni, The National Institutes of Health

An Improvement of Numerical Technique to Compute Eigenvalues of Differential Operators
R.G. Campos, Universidad Michoacana, Mexico

Mapping of a Parallel SVD Algorithm on the BBN Butterfly Multiprocessor
G.R. Gao, McGill University, Montreal, Canada; S.J. Long, BBN Advanced Computers Inc., Cambridge, MA; and S.J. Thomas, Biotechnology Research Institute, Montreal, Canada

Computing Multidimensional Discrete Fourier Transform on the Mesh of Trees Architecture
I. Gertner, The Graduate School and University Center CUNY

Balanced FFT Computation on Processor Arrays
Jiann-Cherng Shieh and Ferng-Ching Lin, National Taiwan University, R.O.C.

The Iterative Solution of Linear Systems on a Hypercube Multiprocessor
Chuck H. Baldwin, University of South Carolina, Columbia

Reconfigurability Versus Scaleability
Patrick Eklund, Umea Universitet, Sweden; Michael Kaufmann, Universitat des Saarlandes, West Germany; Tor-Erik Malen and Abo Akademi, Institutionen for Informationsbehandling, Finland

Comparison of Two Parallel Solution Techniques in Sparse Linear Systems
Gita Alaghband and Andrew Slifka, University of Colorado, Denver; and Youngbae Kim, University of Colorado, Boulder

Giant Fourier Transforms
Steven M. Bershader, Thomas A. Kraay and John F. Holland, MRJ Incorporated, Oakton, VA

Scalability, Granularity and Parallelism of Numerical Algorithms
Luigi Brochard, IBM T.J. Watson Research Center

A Construct to Support Functional Parallelism
Harry F. Jordan and Aruna V. Ramanan, University of Colorado, Boulder

Parallel Algorithms for Computing Stationary Distribution Vectors
R. Bruce Mattingly, Youngstown State University

Continued on page 10

PROGRAM-AT-A-GLANCE

Conference on Parallel Processing for Scientific Computing

Saturday, December 9

5:00 PM - 8:00 PM
Registration for Short Course

Sunday, December 10

8:00 AM
Registration Opens for Short Course

9:30 AM - 10:30 AM
Introduction

10:30 AM - 11:00 AM
Coffee

11:00 AM - 12:00 PM
Dense Direct Linear Algebra

12:00 PM - 1:00 PM
Lunch

1:00 PM - 2:00 PM
Sparse Direct Linear Algebra

2:00 PM - 2:30 PM
Coffee

2:30 PM - 3:30 PM
Sparse Iterative Linear Algebra

3:30 PM Short Course Adjourns

7:00 PM - 9:00 PM
Registration Opens for Conference

7:00 PM - 9:00 PM
Welcoming Reception

PROGRAM-AT-A-GLANCE

Monday, December 11

7:30 AM
Registration Opens

8:45 AM - 9:00 AM
Opening Remarks
Jack J. Dongarra
University of Tennessee and Oak Ridge National Laboratory

9:00 AM - 9:45 AM
Invited Presentation 1
The Limitations and Potential of Large Scale Parallelism
W. Daniel Hillis
Thinking Machines Corporation

9:45 AM - 10:30 AM
Invited Presentation 2
Trends in Computer Graphics
Andries van Dam
Brown University

10:30 AM - 11:00 AM
Coffee

11:00 AM - 12:00 PM
Contributed Presentations 1
Massively Parallel Computing I

11:00 AM - 12:00 PM
Contributed Presentations 2
Sparse Linear Algebra I

11:00 AM - 12:00 PM
Contributed Presentations 3
Systolic Array Design

12:00 PM - 1:30 PM
Lunch

1:30 PM - 2:15 PM
Invited Presentation 3
Programming Tools for Parallel Systems
Dennis Gannon
Indiana University, Bloomington

2:15 PM - 2:45 PM
Contributed Presentations 4
Sparse Linear Algebra II

2:15 PM - 2:45 PM
Contributed Presentations 5
Linear Algebra I

2:15 PM - 2:45 PM
Contributed Presentations 6
Eigenvalues I

2:45 PM - 3:15 PM
Coffee

3:15 PM - 4:35 PM
Contributed Presentations 7
Domain Decomposition

3:15 PM - 4:35 PM
Contributed Presentations 8
Eigenvalues II

3:15 PM - 4:35 PM
Contributed Presentations 9
Massively Parallel Computing II

3:15 PM - 4:35 PM
Contributed Presentations 10
Numerical Methods I

4:00 PM - 6:00 PM
Poster Presentation I
60 - 75 Poster Presentations
Cash Bar

6:15 PM - 7:30 PM
Beer Party

Tuesday, December 12

8:00 AM - 7:30 PM
Exhibit Booths Open

9:00 AM - 9:45 AM
Invited Presentation 4
Compiling for Parallel Machines with Complex Memory Hierarchies
Ken Kennedy
Rice University

9:45 AM - 10:30 AM
Invited Presentation 5
Beyond Parallelism to Coordination: Developing a Multi-site, Multi-time and Translanguage Programming Environment using Linda
David Gelernter
Yale University

10:30 AM - 11:00 AM
Coffee

11:00 AM - 12:00 PM
Contributed Presentations 11
Tools

11:00 AM - 12:00 PM
Contributed Presentations 12
Finite Element Methods

11:00 AM - 12:00 PM
Contributed Presentations 13
Linear Algebra II

12:00 PM - 1:30 PM
Lunch

1:30 PM - 2:15 PM
Invited Presentation 6
Visualization and Atomic-Level Simulation of Materials
William A. Goddard III
California Institute of Technology

2:15 PM - 2:45 PM
Contributed Presentations 14
Linear Algebra III

2:15 PM - 2:45 PM
Contributed Presentations 15
Partial Differential Equations I

2:15 PM - 2:45 PM
Contributed Presentations 16
Fast Fourier Transforms

2:45 PM - 3:15 PM
Coffee

3:15 PM - 4:35 PM
Contributed Presentations 17
Numerical Methods II

3:15 PM - 4:35 PM
Contributed Presentations 18
Linear Algebra IV

3:15 PM - 4:35 PM
Contributed Presentations 19
Massively Parallel Computing III

3:15 PM - 4:35 PM
Contributed Presentations 20
Performance I

4:00 PM - 6:00 PM
Poster Presentation II
60 - 75 Poster Presentations
Cash Bar

Wednesday, December 13

8:00 AM - 4:00 PM
Exhibit Booths Open
Be sure to stop in to see the exhibits in East Wacker Hall as today is the last day to purchase any items or gather information from exhibitors.

9:00 AM - 9:45 AM
Invited Presentation 7
Numerical Simulation of Fluid Flow on a Massively Parallel Processor
James A. Sethian
University of California, Berkeley

9:45 AM - 10:30 AM
Invited Presentation 8
Connection Machine Utilization and Experience at UTRC
T. Alan Egolf
United Technologies Research Center

10:30 AM - 11:00 AM
Coffee

11:00 AM - 12:00 PM
Contributed Presentations 21
Numerical Methods III

11:00 AM - 12:00 PM
Contributed Presentations 22
Performance II

11:00 AM - 12:00 PM
Contributed Presentations 23
Massively Parallel Computing IV

12:00 PM - 1:30 PM
Lunch

1:30 PM - 2:15 PM
Invited Presentation 9
(Title to be announced in final program)
Karl-Heinz Winkler
University of Illinois, Urbana
National Center for Super Computing Applications

2:15 PM - 2:45 PM
Contributed Presentations 24
Partial Differential Equations II

2:15 PM - 2:45 PM
Contributed Presentations 25
Linear Algebra V

2:15 PM - 2:45 PM
Contributed Presentations 26
Massively Parallel Applications

2:45 PM - 3:15 PM
Coffee

3:15 PM - 4:35 PM
Contributed Presentations 27
Partial Differential Equations III

3:15 PM - 4:35 PM
Contributed Presentations 28
Linear Algebra VI

3:15 PM - 4:35 PM
Contributed Presentations 29
Optimization

3:15 PM - 4:35 PM
Contributed Presentations 30
Numerical Methods IV

4:00 PM **Exhibit Booths Dismantle**

4:35 PM Conference Adjourns

POSTER SESSIONS

Parallel Pseudospectral Methods for Forward Modelling
Mahn-Ling Woo and Rosemary Renaut, Arizona State University

A Particle-Finite Element Method for the Transport Equation
Rodolfo Bermejo, University of British Columbia, Canada

An Algebraic Framework for Manipulating Address Sets and Message Patterns
P.J. Bernhard, Clemson University; and D.J. Rosenkrantz, SUNY, Albany

Routing Algorithms for Double Loop Networks
Y. Cheng, AT&T Bell Laboratories, Holmdel; F.K. Hwang, AT&T Bell Laboratories, Murray Hill; I.F. Akyildiz, Georgia Institute of Technology; and D.F. Hsu, Fordham University

On the Convergence of Back-Propagation
Frederic Bien and Eric Baum, Princeton University

Input/Output Complexity of Bit-Level VLSI Array Architectures
Wayne P. Burleson and Louis L. Scharf, University of Colorado, Boulder

Implicitly Defined Curve Fitting Problems Solved on a Message Passing Multiprocessor
Per Lindstrom, University of Umea, Sweden

Random Number Generators for Parallel Processors
Peter Wollan, Michigan Technological University

Interior Proximal Point Solution of Linear Programs
O.L. Mangasarian and Rudy Setiono, University of Wisconsin, Madison

Systolic Computation of Interpolating Polynomials
Peter R. Cappello, University of California, Santa Barbara; E. Gallopoulos, University of Illinois, Urbana; and Cetin K. Koc, University of Houston, University Park

Partially and Totally Asynchronous Algorithms for Linear Complementarity Problems and Linear Programs
Renato De Leone, University of Wisconsin, Madison

Parallel Implementation of Lemke's Algorithm on the Hypercube
Renato De Leone and Thong-Hwee Ow, University of Wisconsin, Madison

SVDs On The Connection Machine
Scott W. Shaw, SRI International, Menlo Park, CA

Strongly Coupled GSAM
Wei Pai Tang, University of Waterloo, Canada

A Parallel Algorithm for Computing the Singular Value Decomposition on a Distributed Memory Multiprocessor
A. Vidal and V. Hernandez, Universidad Politecnica de Valencia, Spain

Parallel Implementations of Jacobi-like Eigenvalue Algorithms
Giel Paardekooper, Tilburg University, The Netherlands

Some Experience on the Use of Parallel Computers in the Aerodynamic Field
C. Mamone Capria, G. Leone, and P. Schiano, C.I.R.A., Italian Aerospace Research Center, Capua, Italy

Optimal Algorithms for Parallel Computers
Milton L. Brown, Jet Propulsion Laboratory, Pasadena

Optimal Parallel Merging and Sorting Algorithms
Renbing Xiong and Ted Brown, Queens College of CUNY, Flushing

Leap-Frog Ordering for Parallel One-Sided Jacobi Methods
Robert A. van de Geijn, University of Texas, Austin

Tools for Developing Computation Intensive Applications Using Networked Computers
Yuan Shi, Temple University

Multi-processor Molecular Dynamics in an ELXSI UNIX Environment
James A. Lupo and Michael J. Sabochick, Air Force Institute of Technology

Overlapping Grids for Incompressible Flow
John C. Strikwerda and Carl D. Scarbnick, University of Wisconsin, Madison

Far-Field Boundary Conditions for Incompressible Flow
Carl D. Scarbnick and John C. Strikwerda, University of Wisconsin, Madison

Process Clustering in Deadlock-prone Distributed Systems
Bojan Groselj, University of Southwestern Louisiana

A Parallel Algorithm for Random Walk Generation with Application to the Monte Carlo Solution of Partial Differential Equations
Abdou Youssef, George Washington University

Parallelization of Rule Based Knowledge System Modeling with Petri Net Analysis
Lisa Anneberg, Wayne State University; and Ece Yaprak, Western Michigan University

Parallel Solution of Least Squares Problems on Orthogonal Multiprocessors
Haesun Park, University of Minnesota, Minneapolis; and Kai Hwang, University of Southern California

A New Projective Method: Padé-Rayleigh-Ritz
Nahid Emad, Institut National des Telecommunication, France

Parallel Algorithm Development Using Unified Signal Algebras
C.R. Giardina, CUNY, Mahwah, NJ

Automatic Loop Parallelization in Scientific Programs
Kleanthis Psarris, Stevens Institute of Technology, Hoboken, NJ

The Quen Computer: Architecture, Programming and Performance
Quentin E. Dolecek, Johns Hopkins University

Performance Optimization of Combustion Simulations on a Graphics Workstation
Wayne R. Cowell and Michael Minkoff, Argonne National Laboratory

Implementation of an SDI Application Program on a Connection Machine
David W. Leibfritz and Thomas F. Ewing, Argonne National Laboratory

Recent Work with the Argonne Monitor/Macro and Send/Recv Packages
David Levine and Jim Patterson, Argonne National Laboratory; and Dan Ross, University of Texas, Austin

Tuesday, December 12/4:00 PM

Poster Session II

Development of a Particle Trajectory Code on the Connection Machine
Michael A. Muller, Alyson L. Thring, and Chin S. Lin, Southwest Research Institute, San Antonio, TX

A Vector–Parallel Solution of Multigroup Transport k-Eigenvalue Problem
Jasmina L. Vujic and William R. Martin, University of Michigan, Ann Arbor

Iterative Matrix-Vector Products on the Connection Machine for Neural Network Simulation
Suresh Chittor and Richard Enbody, Michigan State University

A Complexity Model for Optimizing Multiprocessor Organizations and Mappings of Algorithms
Feng Gao, University of British Columbia, Canada

Matching Communication Structures of Interconnection Networks and Parallel Algorithms for Scientific Computing
Bhagirath Narahari, George Washington University

Optimal Hamiltonians for Lattice-Based Computations on Vector Pipelined Machines
A. Narayanan, Princeton University

Multigrid Solution of the 2-d Transient Euler Equations on the CM-2
Chandra Koesoemodiprodjo, Edward Hensel and Steven P. Castillo, New Mexico State University, Las Cruces

Influence of Machine Architecture on Parallel Algorithm Development
Siamak Arya, San Diego, CA

Multiple-Radix Arithmetic on a Connection Machine
Wayne Patterson, University of New Orleans

Implementing Division by Multiplication on a Transputer-Based System
Andrea Dunham and Wayne Patterson, University of New Orleans

Multiplication Using Multiple-Radix Arithmetic on a Transputer-Based System
Wayne Patterson, University of New Orleans; and Terri Richard, Ohio State University, Columbus

Parallel Micromagnetic Simulations on the Connection Machine
Roscoe Giles, P. Robert Kotiuga, and Floyd Humphrey, Boston University; and Masud Mansuripur, University of Arizona

Computational Ocean Acoustics on an MIMD Hypercube Multiprocessor
Ding Lee, Naval Underwater Systems Center, New London, CT; Martin H. Schultz and Faisal Saied, Yale University

Monte Carlo Yield Simulation in a Distributed Processing Environment
D.M.H. Walker and Daniel S. Dydick, Carnegie Mellon University

Computational Experience with Parallel Algorithms for Partially Observed Markov Decision Processes
William T. Scherer and Bradley S. Stewart, University of Virginia

Block Stiefel Acceleration for Linear Systems
Randall Bramley, University of Illinois, Urbana

Simulation of Enhanced Oil Recovery on the Myrias Parallel Computer
Alda Behie, SIMTECH Consulting Services Ltd., Calgary, Canada

Efficient Implementation Schemes for the Minimum Degree Ordering Algorithm on Multiprocessor Systems with Memory Hierarchy
Vijay K. Naik, IBM T.J. Watson Research Center

The Second Generation ACP Multimicroprocessor Project at Fermilab
J. Biel, H. Areti, B. Atac, A. Cook, J. Deppe, M. Edel, M. Fischler, I. Gaines, D. Husby, M. Isely, T. Nash, J. Paulk, T. Pham, and T. Zmuda, Fermilab, Batavia, IL; Mariano Miranda and Elza Paiva, CBPF, Brazil; and Yashiji Yasu, KEK, Japan

The Fermilab Lattice Gauge Supercomputer
M. Fischler, R. Atac, A. Cook, J. Deppe, I. Gaines, D. Husby, T. Nash, T. Pham, T. Zmuda, E. Eichten, G. Hockney, A. Kronfeld, P. Mackenzie and H.B. Thacker, Fermi National Accelerator Laboratory, Batavia, IL

An Optimal Communication Strategy for a Distributed System with Limited Number of Ports per Node
Ranjan K. Sen and Ruknet Cezzar, Hampton University; and M.K. Banga, B.I.E.T., India

Parallel Algorithm Computing Homomorphisms of Deterministic Complete Finite Automata
Boleslaw Mikolajczak, Southeastern Massachusetts University

Performance of the Finite Strip Method for Structural Analysis on a Parallel Computer
Hsin-Chu Chen and Ai-Fang He, University of Illinois, Urbana

An Evolutionary Social Architecture for Scientific Discovery
David L. Sallach, University of Arkansas, Fayetteville

Performance of Two Algorithms on a Parallel Processor with Vector Nodes
Christopher L. Cox, Clemson University

A Comparison of Implementations of Flux Corrected Transport Codes on Transputers and Other Parallel Processors
J.M. Jong and G.S. Stiles, Utah State University

Krylov Methods and Synthetic Workloads on the CM-2
Harry Berryman and Joel Saltz, Yale University and ICASE, NASA Langley Research Center; Ravi Mirchandaney and William Gropp, Yale University

A Continuum of Parallel N-Body Solvers
Jill P. Mesirov and Jean-Philippe Brunet, Thinking Machines Corporation, Cambridge, MA; and Washington Taylor IV, University of California, Berkeley

Recent Vectorization and Parallelization of ITPACK
Thomas C. Oppe and David R. Kincaid, University of Texas, Austin

An Efficient Architecture for Parallel Computation
Kemal Efe and Guna Seetharaman, University of Southwestern Louisiana

A Study of Sorting Algorithms on a Mesh-Connected Computer (DAP 510)
S.N. Gupta, M. Zubair and C.E. Grosch, Old Dominion University

Symmetric Orderings for Unsymmetric Sparse Matrices
Harry A.G. Wijshoff, University of Illinois, Urbana

An Introduction to Compiler Optimization of Data Layout
Lung-Yu Chang and Henry G. Dietz, Purdue University, West Lafayette

Eliminating Runtime Synchronizations by Static Barrier Scheduling
H. Dietz, M. O'Keefe, and A. Zaafrani, Purdue University, West Lafayette

A Compiler-Oriented Architecture: The CARP Machine
H. Dietz, H.J. Siegel, W. Cohen, M. O'Keefe, A. Zaafrani, M. Phillip, and C-H Chi, Purdue University, West Lafayette

Numerical Experience with Parallel Optimization Algorithms for Parameter Identification
J.E. Dennis, Jr. and Karen A. Williamson, Rice University

A Parallel Explicit Incomplete QR Preconditioner
Y. Saad, RIACS, NASA Ames Research Center

A Vectorized Implementation of the Incomplete Cholesky Conjugate Gradient Method on the Hypercube
Alpesh Amin, Universal Energy Systems, Dublin, OH; Fusun Ozguner, Ohio State University, Columbus; and Cevdet Aykanat, Ankara, Turkey

Antenna Optimization on Parallel Processors
Kosmo D. Tatalias and David A. Buchanan, Atlantic Aerospace Electronics Corp., Greenbelt, MD

Applications of a Parallel Algorithm for Fluid Flow Problems
H.U. Akay, O. Gurdogan, and S. Erwin, Technalysis Incorporated, Indianapolis, IN

Heuristic Approaches to the Mapping Problem
Hong Shen, Abo Akademi University, Finland

A Study of the Limitations of the Theory of Thin-Walled Beams Using a CRAY X-MP/48 Supercomputer
Mohamed Fouad Ahmad, University of Wisconsin, Milwaukee

Jacobi Algorithms for Non-symmetric Eigenvalue Problems on a CRAY-2
Andrew A. Anda and Haesun Park, University of Minnesota, Minneapolis

The Design and Implementation of New Barriers for Parallel Processing
Ping-Yang Li, University of Alabama, Birmingham

A Data Structure for Parallel Processing of Large Sparse Matrices
Mohamed Ouksel and Fillia Makedon, University of Texas, Dallas

The Hermes System for Programming Multi-processors
Gregory Riccardi, Eric Vetillard, and Usha Chandra, Florida State University

Design of a Workbench for the Evaluation of Scheduling Algorithms for Multiprogrammed Multiprocessors
Zue-Seng Chen, Margarat Gaitatzes, Aditya P. Mathur, David J. Oehlers, Vernon Rego, Viswa M. Thallapragada, and Raghunath Viswanathan, Purdue University, West Lafayette, IN

The Independent Time Step Method
Niel Madsen, Lawrence Livermore Laboratory; and Richard Sincovec, RIACS, NASA Ames Research Center

Image Algebra Language for Programming Massively Parallel Computers
Gerhard X. Ritter and Joseph N. Wilson, University of Florida

Auto-Tasking on MIMD Parallel Computers
Swarn P. Kumar, Boeing Computer Services, Seattle

A Multi-level Domain Decomposition Method for Parallel Architectures
Jianping Zhu, SUNY, Stony Brook

Parallel Monte Carlo Algorithms on Shared-Memory Architectures
Charles Nofsinger and Zarka Cvetanovic, Digital Equipment Corporation, Boxborough, MA

Parallel Computing and the Minimum Total Confusion Problem
Eric S. Theise, San Jose State University

Experience with a Linear Array of Transputers for Implementing Parallel Sorting Algorithms
Sajal K. Das and Walter Goodwin, University of North Texas, Denton

Tensor Products Formulation of a New Parallel FFT Algorithm
Domingo Rodriguez, University of Puerto Rico, Mayaguez, PR

Efficient Sorting on a MIMD Architecture Computer with Shared Memory
Jean-Pierre Panziera, Evans & Sutherland, Mountain View, CA

Alternative Parallel Processors for Creating Synthetic Seismograms
Mark J. Oliver, University of Wyoming

Parallel Programming and Portability: a High-Level Language Approach
Henk J. Sips, Delft University of Technology, The Netherlands; and Edwin M. Paalvast, Institute of Applied Computer Science (ITI-TNO), The Netherlands

On an Algebraic Approach for Hierarchical Data Structure Formalization
Adriana A. Georgieva, Sofia University of Technology, Bulgaria

The dLP Harness for Distributed Processing
D.E. Stevenson, Clemson University

Multiple Target Tracking Algorithms of an SIMD Architecture
G.M. Loseke and K.S. Min, East Texas State University

Optimum Command Tree for Faulted Network of Multicomputers
Patricia L. Patterson, Solitonics, St. Petersburg, FL

An Efficient Symmetric Topology for Multicomputer Interconnection Networks
Patricia L. Patterson, Solitonics, St. Petersburg, FL

Graph Entropy in a Multicomputer Network
Patricia L. Patterson, Solitonics, St. Petersburg, FL

Block-Colouring Schemes for SOR-Methods on Binary-Tree Local Memory Machines
Andreas Frommer and Gunter Mayer, University of Karlsruhe, West Germany; and Uwe Block, ipSystems KG Wost, West Germany

Spectrally Equivalent Parallel Domain Decomposition Preconditioners for Non-separable Problems
Diana Resasco, Yale University

Performance of a Parallel Variational Algorithm for Solving Systems of Linear Equations
Jerry F. Magnan and Richard Bertram, Florida State University

Sparse LU Factorization on Shared-Memory Parallel Architectures
John R. Gilbert, Xerox Palo Alto Research Center, CA and University of Bergen, Norway

Speeding Up the Jacobi Method
Walter Mascarenhas, Massachusetts Institute of Technology

The Implementation of Parallel Multigrid on the Princeton Engine
Herbert H. Taylor and Scott A. Markel, David Sarnoff Research Center, Princeton, NJ

A Scheduling Strategy for Multiprocessor Simulation Systems
C. Siva Ram Murthy, Indian Institute of Technology, India

QR Decomposition on the Connection Machine
C.Y. Roger Chen and Zaide Liu, Syracuse University

Block Iterative Methods for Binary Tree Computers
Gunter Mayer and Andreas Frommer, University of Karlsruhe, West Germany; and Uwe Block, iP-Systems KG Wost, West Germany

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Case History

A prominent research team demanded rapid development and prototyping of complex numerical simulation and modeling.

The human-time factor was grossly inefficient. Programmers were unable to interact effectively with existing computers.

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TRANSPORTATION

BY AIR

American Airlines has been chosen as the official carrier for this conference. You can fly to Chicago and save on travel from Dec 9 - 16, 1989 inclusive.

In a special arrangement with SIAM, American Airlines is offering you the services of their toll free convention reservation desk, along with a complement of discounts.

- 5% off any fare for which you qualify, including First Class and Ultra Saver fares. THE DISCOUNTS CAN RANGE FROM 40% - 70% OFF NORMAL COACH FARES!

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- American Airlines will offer a minimum of 45% off regular coach fares. Those passengers originating in Canada will be offered a 35% discount off full coach fares. Both of these rates require a 7 day advance purchase.

To make reservations for one of the above discounted fares:

- Call American Airlines Convention Desk, at 1-800-433-1790, seven days a week 8:00 AM to 11:00 PM Eastern Time. Be sure to mention the SIAM account number: *S16090.* American Airlines will arrange to mail your tickets to your home or office.
- For those of you having to use a corporate or university travel agent, you may still purchase your ticket through the local agent, just be sure to mention to the agent the above discounts. Your local agent can call the American Airlines Convention Desk to make your reservation. Make sure that the agent uses the SIAM account number: *S16090.*

Courtesy Airport Transportation: There is no courtesy van service available to the hotel from the airport.

CAR RENTAL

Dollar Rent A Car has been selected as the official car rental agency for the SIAM Conference on Parallel Processing. The following rates will apply:

Type of Car	Daily Rate	Weekly Rate
Compact	$32	$150
Intermediate	$35	$165
Standard	$35	$165
Premium	$40	$225

- These rates are valid December 9 - 16, 1989 and are available at the airport location.
- Daily and Weekly rates are limited to 150 miles per day or 700 miles per week. There is a $.20 charge for each mile over the limit.

Rental Requirements

- Cars must be picked up and dropped off at the same location.
- You must be 21 years of age and have a valid U.S. or International Driver's License.
- You must have one of the following credit cards to rent a car: AMEX, MasterCard, VISA, or Diners Club.
- The prices quoted do not include refueling services, tax, optional collision damage waiver, and personal accident insurance.

Reservations

We encourage you to make an advance reservation, as on-site availability cannot be guaranteed. Make reservations by calling: 1-800-421-6878. Make sure to give them the SIAM account code: *CCSIA6.* Be certain to mention that you are attending the SIAM Conference on Parallel Processing, December 11 - 13, in Chicago, Illinois.

DIRECTIONS FOR DRIVING FROM THE AIRPORT:

Take Kennedy Expressway east to the Ohio exit. Take Ohio exit until you come to Michigan Avenue. At Michigan and Ohio take a right. Follow this to South Waters Street. At South Waters and Michigan Avenues, make a U-turn and go back one block to Michigan and Wacker. At Michigan and Wacker make a left then proceed for half a block and the Hyatt Regency is on your right. The Hyatt is approximately 15 miles from the airport.

PUBLIC TRANSPORTATION FROM THE AIRPORT

There is no complimentary bus or van service from the airport to the Hyatt Regency Hotel.

Outside the baggage claim terminal at each airline, you can catch the Continental Bus Line (blue and white buses). The cost is $10.75 to the Hyatt Regency. They continually pass in front of all of the terminals. Once aboard the bus, ask to be dropped off at the Hyatt Regency.

Taxicab service is also available outside the baggage claim areas. The average cost of the cab service is $18.00 to $20.00.

ABOUT THE HOTEL

Hyatt Regency Hotel
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(312) 565-1234

SIAM is holding a block of rooms at the Hyatt Regency Hotel on a first come first served basis at the specially discounted rates of $80/Single and $95/Double. There is a 10.1% occupancy tax that is added to your room rate. These rooms will be held for our exclusive use only until November 17, 1989, after which date reservations will depend on availability and the above rates may not be in effect. We urge you to make your reservations as soon as possible. You may do so by telephoning (312) 565-1234, or via the Hotel Reservation Form on the inside back page of this brochure (domestic mail only). When making reservations by telephone, be certain to obtain the discounted rate by identifying yourself as an attendee at the SIAM Conference on Parallel Processing.

Arrivals and Departures: Your room will be reserved for you until 6:00 PM. If later arrival is anticipated, please guarantee your reservation by credit card or advance deposit. Check-out time is 12:00 noon.

Facilities: At the Hyatt Regency you have ten restaurants and lounges from which to choose. Stetson's Chop House emphasizes steaks, lobsters and roast duckling. At Scampi you'll enjoy a relaxed island setting featuring 24 hour service. Sample the deli sandwiches at Mrs. O'Leary's . . . or enjoy a kosher restaurant, La Misada. The Hyatt Regency is located just minutes away from Chicago's Art Institute and walking distance from many shops and restaurants.

The Hyatt Regency is affiliated with the Downtown Health Club located at 441 North Wabash (directly across the bridge on Michigan Avenue and behind the North side of the Wrigley Building). Cost for Hyatt guests is $12.00 by showing the club attendant your Hyatt Passport (received upon check-in). If you would like to swim you must go to the health club, as the hotel does not have a pool on site.

Parking: At the Hyatt Regency parking rates are $7 for 1 hour, $11 for 2 to 11 hours, and $15 for 12 to 24 hours. Alternative parking is available at the following locations:

Standard Oil Building — 200 East Randolph Street located two blooks south of the Hyatt, within walking distance to the hotel.
RATE: $6.00 flat fee for up to 12 hours

Three Illinois Center — Lower Columbus Drive and South Waters Street Connected to Hyatt by enclosed concourse. Enter at Lower Columbus Drive.
RATES: $7.50 for 4 - 12 hours; $8.50 for 12 - 24 hours

REGISTRATION INFORMATION

Please complete the Advance Registration Form found on the back page of this brochure and return it in the envelope provided in the middle section of this program. We urge attendees to register in advance as the registration fee is lower for advance registrants. Advance registration must be received by December 4, 1989.
The registration desk will be open as listed below.

Saturday, Dec 9	5:00 pm - 8:00 pm
Sunday, Dec 10	8:00 am - 3:30 pm
	7:00 pm - 9:00 pm
Monday, Dec 11	7:30 am - 4:30 pm
Tuesday, Dec 12	8:00 am - 4:30 pm
Wednesday, Dec 13	8:00 am - 2:00 pm

GET-TOGETHERS

SIAM Welcoming Reception
Sunday, December 10th, 7:00 PM - 9:00 PM
Cash Bar

Poster Session I
Monday, December 11th, 4:00 PM - 6:00 PM
Exhibit Hall
Cash Bar
Stop in to see the 60 - 75 poster presentations and visit the computer and book exhibits

SIAM Beer Party $18
Monday, December 11th, 6:15 PM - 7:45 PM
This is a great time to get together with your colleagues. The party will consist of three stations where the chefs are creating the dishes right before your eyes. Menu will consist of chicken and steak fajitas, freshly made rottini, tortellini and fettucini with marinara and alfredo sauce, and oriental stir fry consisting of shrimp, scallops, chicken and chinese vegetables. Domestic beer and assorted sodas will also be available.

Poster Session II
Tuesday, December 12th, 4:00 PM - 6:00 PM
Exhibit Hall
Cash Bar
Stop in to see the 60 - 75 poster presentations and visit the computer and book exhibits

REGISTRATION FEES:

		SIAG/ SC	SIAM Member	Non-Member	Student
Short Course	Advance	$105	$105	$125	$55
	On-Site	$125	$125	$145	$75
Meeting	Advance	$105	$110	$140	$20
	On-Site	$135	$140	$180	$20

Non-SIAM Members
Non-member registrants are encouraged to join SIAM in order to obtain the member rate for conference registration and enjoy all the other benefits of SIAM membership. You can join SIAM by filling out a membership form at the SIAM Registration Desk. If you join for this meeting, SIAM will retroactively give you the member rate for registration.

Notice
There will be no prorated fees. No refunds will be issued once the conference has started.

If SIAM does not receive your Advance Registration Form by December 4th, you will be asked to give us a check or a credit card number at the conference. We will not process either until we have ascertained that your registration form has gone astray. In the event that we receive your form after December 4th, we will destroy your check or credit card slip.

Telephone Messages
The telephone number at the Hyatt Regency Hotel is 1-(312)-565-1234. The Hyatt will either connect you with the SIAM registration desk or forward a message.

Credit Cards
SIAM is now accepting VISA, MasterCard, and American Express for the payment of registration fees and special functions. When you complete the Advance Registration Form, please be certain to indicate the type of credit card, the number, and the expiration date.

SIAM Corporate Members
Non-member attendees who are employed by the following institutions are entitled to the SIAM member rate.

Aerospace Corporation
Amoco Production Company
AT&T Bell Laboratories
Bell Communications Research
The Boeing Company
BP America
Cray Research, Inc.
E.I. duPont de Nemours and Company
Eastman Kodak Company
Exxon Research and Engineering Company
General Motors Corporation
GTE Laboratories, Inc.
Hollandse Signaalapparaten B.V.
IBM Corporation
ICASE-NASA Langley Research Center
IMSL, Inc.
MacNeal-Schwendler Corporation
Marathon Oil Company
Martin Marietta Energy Systems
Mathematical Sciences Research Institute
Schlumberger Industries
Supercomputing Research Center, a division of Institute for Defense Analyses
Texaco Inc.
Topexpress Ltd.
United Technologies Corporation

UPCOMING CONFERENCES

January 22 - 24, 1990
ACM/SIAM Symposium on Discrete Algorithms
Cathedral Hill Hotel
San Francisco,CA

March 5 - 7, 1990
SIAM Conference on Applied Probability in Science and Engineering
Clarion Hotel
New Orleans,LA

May 7 - 10, 1990
SIAM Conference on Applications of Dynamical Systems
Marriott Hotel
Orlando,FL

June 11 - 14, 1990
Fifth SIAM Conference on Discrete Mathematics
Hyatt Regency Hotel
Atlanta, GA

July 16 - 20, 1990
SIAM Annual Meeting
Hyatt Regency Hotel
Chicago,IL

November 5 - 7, 1990
Second SIAM Conference on Linear Algebra in Signals, Systems and Control
Cathedral Hill Hotel
San Francisco, CA

HOTEL RESERVATION FORM

SIAM Conference on Parallel Processing

Dec 11-13, 1989
Hyatt Regency Hotel
Chicago, Illinois

PLEASE SEND ME A CONFIRMATION NOTICE

Specially discounted rooms are being held for our exclusive use until Nov. 17, 1989. After that date, reservations will depend on availability. Your reservation is not confirmed until acknowledged in writing by the hotel or verified by phone. When making reservations by phone, be certain to identify yourself as an attendee at the SIAM Conference on Parallel Processing. Telephone: 1-(312)-565-1234

Name _____ (First) _____ (Last) Phone _____

Address _____

City _____ State _____ Zip _____

Please reserve [ ] Single($80) [ ] Double ($95) Arrival Date _____

Arrival Time _____ Check-Out Date _____

Guarantee my room for late arrival (after 6:00 PM) [ ] Yes [ ] No

I choose to pay by:* [ ] AMEX [ ] VISA [ ] MC [ ] Check

Credit Card Number _____

Expiration Date _____ Deposit $_____ (Late Arrivals Only)

Signature _____

If you list your credit card number, please enclose this card in an envelope and mail to:Reservations, Hyatt Regency Chicago, In Illinois Center, 151 East Wacker Drive, Chicago, Illinois 60601.

* You only need to list your credit card number if you want to guarantee your room for late arrival.

ADVANCE REGISTRATION FORM

SIAM Conference on Parallel Processing
December 11-13, 1989
Hyatt Regency Hotel Chicago, Illinois

Advance registration form must be received at the SIAM office by December 4, 1989. If paying by check, please make check payable to SIAM.

REGISTRATION FEES:

		SIAG/SC	SIAM Member	Non-Member	Student
Short Course	Advance	$105	$105	$125	$55
	On-Site	$125	$125	$145	$75
Conference	Advance	$105	$110	$140	$20
	On-Site	$135	$140	$180	$20

Registration Fee:

Short Course	$_____	$_____	$_____	$_____
Conference	$_____	$_____	$_____	$_____
Beer Party $18	$_____	$_____	$_____	$_____
Total	$_____	$_____	$_____	$_____

Please Print

Name _____ (First) _____ (Last)

Affiliation _____

Department _____

Address _____

City _____ State _____ Zip _____

Telephone Number _____

Local Address in Chicago _____

I wish to pay by [ ] AMEX [ ] VISA [ ] MC [ ] Check

Credit Card Number _____

Expiration Date _____

Signature _____

Detach card and enclose with payment in the envelope provided (domestic mail only), or mail to: SIAM, 3600 University City, Science Center, Philadelphia,PA 19104-2688. Telephone:(215) 382-9800; FAX: 215-386-7999; E-Mail: SIAM @ wharton.upenn.edu

From _____

_____

_____

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To: RESERVATIONS
Hyatt Regency Chicago
In Illinois Center
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Chicago, IL 60601

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