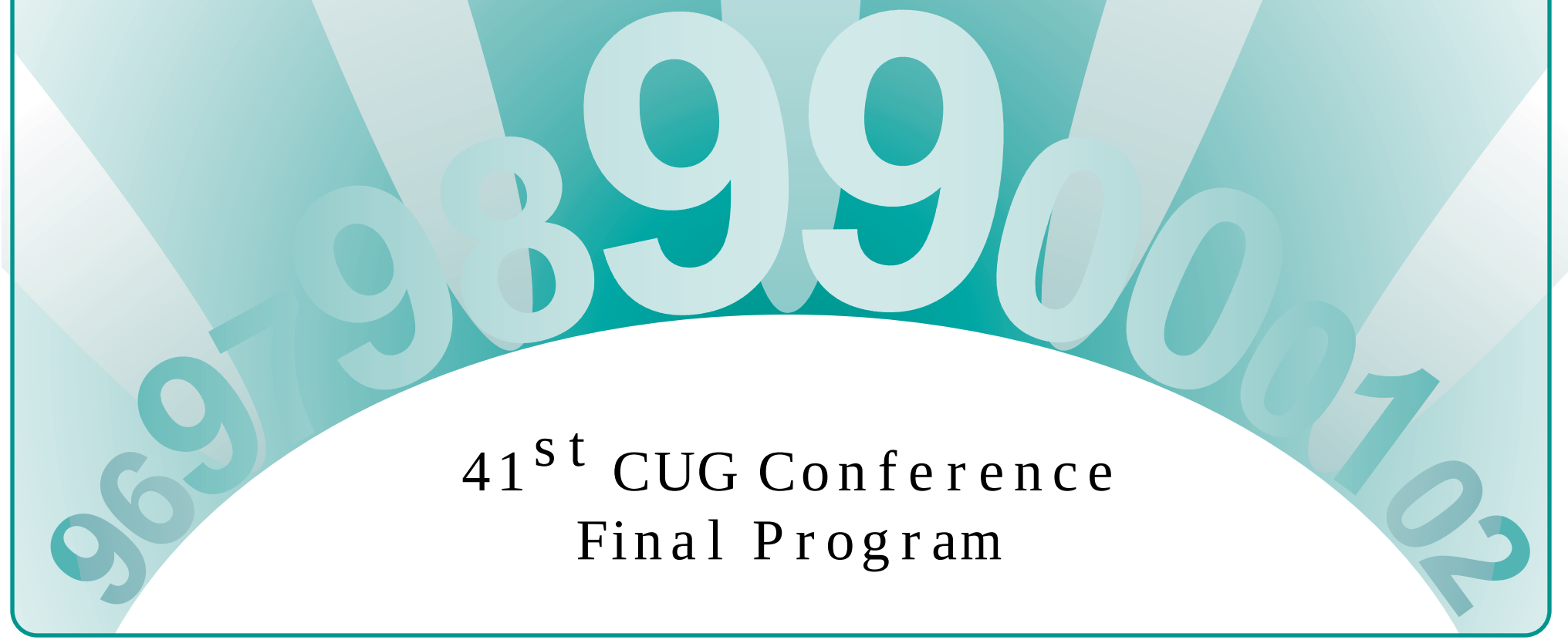
MAY 24-28, 1999 • MINNEAPOLIS, MN

End of an Era . . .

. . . Eve of a New Millennium



41st CUG Conference
Final Program

Welcome

Welcome to the 1999 CUG Conference!

We are excited to welcome everyone to Minneapolis for the 1999 CUG Conference. As the original home of Cray Research, it seems a fitting place to close out the millennium and look ahead to the next. We are indeed at the end of an era, as the supercomputing paradigm has shifted from the "big iron" to an HPC world of high-performance commodity processors.

The CUG Program Committee has planned an exciting week of technical sessions and discussions. Add to that good food, a grand night out in the elegant Minnesota History Center, an evening reception hosted by SGI, a special luncheon for CUG newcomers, and a chance to meet with your colleagues in the comfortable setting of the downtown Minneapolis Marriott City Center Hotel. We think it will be a rewarding and important event for the the CUG community.

The technical program promises to be excellent and we encourage you to peruse the program. In addition, we are excited to have as keynote speaker Dr. Cherri M. Pancake, Professor of Computer Science at Oregon State University.

Minnesota is called the Land of 10,000 Lakes, and we hope you take some extra time to enjoy the environment. Spring is a beautiful time of year here, and enthusiasm runs high as people begin to enjoy the outdoors after a long northern winter. From the bluffs of the mighty Mississippi River in the east, to the scenic shores of one of the largest fresh water lakes in the world (Lake Superior), to the farms and prairies of the west, Minnesota provides a diverse offering for visitors. Whether you like outdoor activities and sports, a quiet respite in the northern woods, or just some time to see the sights in the Twin Cities of Minneapolis and St. Paul, we hope your stay will be memorable.

Minnesota is known for friendly but reserved people, who often are masters of understatement. To use the words of Garrison Keillor, well-known Minnesota humorist and host of national public radio's "A Prairie Home Companion," we think this conference will be "not too bad," which, translated from understated Minnesota parlance, means it will be great!

John M. Sell

Network Computing Services, Inc.

Local Arrangements Chair

Message from the CUG Program Committee

To the Members of CUG:

Welcome to the 41st CUG conference on high performance computation and visualization. This is your best chance in 1999 to exchange problem-solving information and enjoy professional interactions with your fellow users of SGI and CRAY technical computing systems in the birthplace of supercomputing!

Discover how CUG—your user forum on SGI high performance systems—can be your source for up-to-the-minute information and insight for that competitive edge you need.

Please, review the **Technical Program** in the following pages for a truly unique opportunity to experience the "*End of an Era ... Eve of a New Millennium.*"

The CUG Program Committee has assembled a diverse array of detail-packed presentations in Tutorials, Keynote and General Sessions, Special Interest Group technical presentations and spontaneous "Birds of a Feather" (BOF) discussions.

- Tutorial Sessions on Monday morning—available to you at NO additional charge—are a great opportunity for you to update your technical skills with the help of selected technical experts from SGI and CUG sites.
- The Welcome and Keynote Session, Monday afternoon, starts the countdown. The Keynote Speaker, Cherri Pancake of Oregon State University, is a well-known opinion-leader in HPCC.
- General Sessions during the week provide you with the latest corporate and technical information from SGI executives, as well as general-interest technical presentations.
- Parallel Technical Sessions each day give you the opportunity to focus on the specific knowledge domains of the Special Interest Groups (SIGs). Presentations in these sessions have been reviewed and selected for you by SIG Chairpersons.
- Summit Interactive Sessions on Tuesday and Thursday each provide a forum for interaction between CUG and SGI with more time than a Parallel Technical Session and more focus than a General Session.
- Birds of a Feather (BOF) Sessions, the most dynamic aspect of a CUG conference, are scheduled as needed, and notices of BOF meetings will be posted near the Message Board. You are welcome to organize a BOF session during the conference.
- Formal receptions and informal luncheons are among the countless occasions you will have to exchange information with your colleagues from other CUG sites and to collaborate with representatives from SGI.

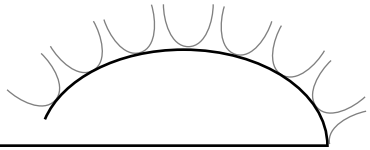
You can see how the **Minneapolis CUG Conference** offers something for everyone during an exciting, educational, and entertaining week as we experience the

End of an Era...
...Eve of a New Millennium

Sam Milosevich
CUG Vice-President and Program Chair
Eli Lilly and Company

CUG CRAY CUG USER CUG GROUP
INCORPORATED

Program Notes



Contents

Special Interest Group (SIG) Meetings

SIGs will hold meetings on Monday that are open to all interested CUG attendees. They provide a forum to discuss the future direction of the SIG, important issues, and talks of special interest. You are encouraged to attend any of these open meetings.

Summit Interactive Sessions

Summit Interactive Sessions on Tuesday and Thursday each provide a forum for interaction between CUG and SGI with more time than a Parallel Technical Session and more focus than a General Session.

Program Committee Meeting

The Program Committee needs your ideas! Come to the Open Program Committee meeting on Thursday to hear about the next CUG conference and to share your suggestions of how to make each CUG the best one to date. All conference attendees are invited and encouraged to attend this open meeting. The CUG Conference Program is the net result of the combined efforts of all interested CUG sites. Come to the Program Committee meeting and make your unique contribution to the next CUG conference!

Video Theater

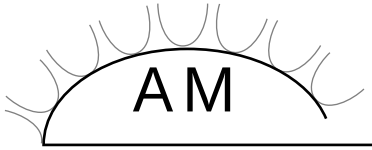
Supercomputers generate data that, via scientific visualization, can be transformed into pictures that provide a way for scientists to understand the information more fully and quickly. Although the primary purpose of visualization is to facilitate the discovery process, scientists are increasingly coming to rely on it also to present their research conclusions. This Friday morning session showcases the latest in scientific/engineering visualization.

Conference Program Updates

We anticipate that there will be continuing changes to the Program schedule. You should plan to check the Bulletin Boards on site at CUG each day for schedule changes. Thank you for your patience and cooperation.

Call for Papers

We encourage you to present a paper at the CUG 2000 conference in The Netherlands. Please see the Call for Papers at the end of this brochure.



Monday

Ballroom 2

Tutorial I

8:30 System Tuning for the Origin2000
Edward Hayes-Hall (SGI)

Ballroom 3

Tutorial II

8:30 OpenMP
Tom MacDonald (SGI)

Ballroom 4

Tutorial III

8:30 Visualization: OpenGL Volumizer
Chikai Ohazama (SGI)

Deer / Elk Lake

Tutorial IV

8:30 SV1
Jef Dawson (SGI)

10:30–11:00 Break

Tutorial V

11:00 Performance Tools on the Origin
Alex Poulos (SGI)

Tutorial VI

11:00 Scheduling for the T3E
Jay Blakeborough (SGI)

Tutorial VII

11:00 I/O Tuning
Randy Kreiser (SGI)

Tutorial VIII

11:00 Data Intensive Computing
William Kramer (NERSC)

12:30–2:00 Newcomers Luncheon

Monday

PM

Ballrooms 1 & 2

1 General Session

Chair: John Sell (NCS-MINN)

2:00 Welcome
John Sell (MINN)

2:20 Keynote Address:
They Who Live by the FLOP May Die by the Flop
Cherri Pancake, Oregon State University

3:05 CUG Report
Sally Haerer (NCAR), CUG President

3:30–4:00 Break

Ballroom 2

2A Special Interest Group (SIG) Updates (Open Meeting)

4:00 **Communication and Data Management SIG**, *Chair: Hartmut Fichtel (DKRZ)*
Mass Storage System Focus
Jeff Terstriep (NCSA)
Networking Focus
Hans Mandt (BCS)

5:00 **Operating Systems SIG**
Chair: Chuck Keagle (BCS)
IRIX Focus
Cheryl Wampler (LANL)
Security Focus
Virginia Bedford (ARSC)
UNICOS Focus
Ingeborg Weidl (MPG)

Ballroom 3

2B Special Interest Group (SIG) Updates (Open Meeting)

4:00 **Programming Environments SIG**
Chair: Jeff Kuehn (NCAR)
Compilers and Libraries Focus
Hans-Hermann Frese (ZIB)
Software Tools Focus
Guy Robinson (ARSC)

5:00 **High Performance Solutions SIG**
Chair: Eric Greenwade (INEEL)
Applications Focus
Larry Eversole (JPL)
Performance Focus
Michael Resch (RUS)
Visualization Focus
John Clyne (NCAR)

Ballroom 4

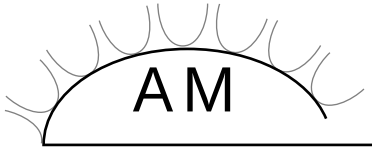
2C Special Interest Group (SIG) Updates (Open Meeting)

4:00 **Computer Centers SIG**
Chair: Leslie Southern (OSC)
Operations Focus
Brian Kucic (NCSA)

5:00 **Computer Centers SIG**
Chair: Leslie Southern (OSC)
User Services Focus
Chuck Niggley (SS-SSD)

All SIG Meetings will end and the rooms must be vacated promptly at 6:00.

7:00–9:00 SGI Reception



Tuesday

Ballroom 2

3A Security and User Services

Chair: Virginia Bedford (ARSC)

9:00 Meeting the Requirements of a "Security Test and Evaluation" with UNICOS and IRIX
Virginia Bedford (ARSC)

9:30 The First Ten Steps to Securing a Unix Host
Liam Forbes (ARSC)

10:00 Allocations on the Web—Beyond Removable Tape
Barbara Woodall (OSC)

Ballroom 3

3B Mass Storage

Chair: Jeff Terstriep (NCSA)

9:00 KART: a simple client/server interface to access different tape devices at CINECA site
Sergio Bernardi (CINECA)

9:30 FibreChannel and Storage Area Networks on the Origin2000
Thomas Ruwart, University of Minnesota

10:00 CXFS: A Clustered File System from SGI
R. Kent Koeninger (SGI)

Ballroom 4

3C Software Tools

Chair: Guy Robinson (ARSC)

9:00 Development Tools Update
Bill Cullen (SGI)

9:30 The Integrative Role of COW's and Supercomputers in Research and Education Activities
Don Morton (ARSC)

10:00 Application of Fortran Pthreads on Linear Algebra Routines
Clay Breshears, Henry Gabb, and Mark Fahey (NRC_VBURG)

10:30–11:00 Break

Ballrooms 1 & 2

4 General Session

Chair: Laney Kulsrud (IDA)

11:00 SGI Software Report
Mike Booth (SGI)

11:30 SGI Hardware Report
Steve Oberlin (SGI)

12:30–2:00 Lunch

Tuesday PM

Ballroom 2

5A Compilers and Libraries

Chair: Jeff Kuehn (NCAR)

2:00 Strategies and Obstacles in Converting a Large Production System to FORTRAN 90 (f90) on a T90
David Gigrich (BCS)

2:30 A Solver that Learns
Thomas Elken (SGI)

3:00 What's New in the Message Passing Toolkit
Karl Feind (SGI)

Ballroom 3

5B Networking

Chair: Hans Mandt (BCS)

2:00 Super Computer Communications
Ralph Niederberger (KFA)

2:30 Systems Issues in Building Gigabyte Networks
Joe Gervais (SGI)

3:00 GSN and ST: Infrastructures for High Bandwidth, Low Latency Communications
Brad Strand (SGI)

Ballroom 4

5C Performance and IRIX

Chair: Michael Resch (RUS)

2:00 How Moderate-Sized RISC-Based SMPs Can Outperform Much Larger Distributed Memory MPPs
Daniel Pressel, Walter B. Sturek, J. Sahu, and K.R. Heavey (USARL)

2:30 Performance Evaluation of MPI and MPICH on the CRAY T3E
Hans-Hermann Frese (ZIB)

3:00 IRIX Scalability
Gabriel Broner (SGI)

3:30–4:00 Break

6A Summit Interaction Session (SIS) Open Meeting

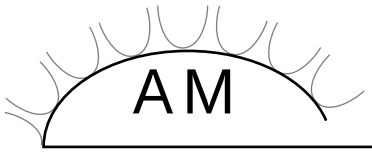
4:00 SV1
Patti Langer (SGI)

6B Summit Interaction Session (SIS) Open Meeting

4:00 Origin2000
Dave Morton (SGI)

6C Summit Interaction Session (SIS) Open Meeting

4:00 IRIX Release Plans
Betsy Zeller (SGI)



Wednesday

Ballroom 2

7A UNICOS
Chair: Ingeborg Weidl (MPG)

9:00 T3E Resilience Update
Dean Elling (SGI)

9:30 T3E Scheduling Update
Jay Blakeborough (SGI)

10:00 GigaRing SWS and I/O Status
Paul Falde (SGI)

Ballroom 3

7B Applications
Chair: Larry Eversole (JPL)

9:00 Experiences Porting a CFD Parallel Code to Fortran 90 Including Object-Oriented Programming
Jean-Pierre Grégoire (EDF)

9:30 Performance of the Parallel Climate Model on the SGI Origin2000 and the CRAY T3E
Thomas Bettge, Anthony Craig, Rodney James, Warren G. Strand, Jr., and Vincent Wayland (NCAR)

10:00 Teraweb: Browser-Based High Performance Computing
Joel Neisen, David Pratt, and Ola Bildtsen (MINN)

Ballroom 4

7C User Services
Chair: Leslie Southern (OSC)

9:00 SGI Technical Publications Strategy
Laurie Mertz (SGI)

9:30 High Performance Computing at the University of Utah: A User Services Overview
Julia Caldwell (CHPCUTAH)

10:00 Providing Extra Service: What To Do With Migrated User Files
R.K. Owen (NERSC)

10:30–11:00 Break

Ballrooms 1 & 2

8 General Session
Chair: Bruno Loepfe (ETHZ)

11:00 CUG Election Candidates
11:25 SGI Service Report
Bob Brooks (SGI)
12:25 CUG Election Results

12:30–2:00 Lunch

Wednesday PM

Ballroom 2

9A Performance
Chair: Hans-Hermann Frese (ZIB)

2:00 Optimizing AMBER for the CRAY T3E
Robert Sinkovits and Jerry Greenberg (SDSC)

2:30 Performance Metrics for Parallel Systems
Daniel Pressel (USARL)

3:00 Performance Characteristics of Messaging Systems on the T3E & the Origin2000
Mark Reed, Eric Sills, Sandy Henriquez, Steve Thorpe, and Lee Bartolotti (NCSC)

Ballroom 3

9B Operations
Chair: Brian Kucic (NCSA)

2:00 IRIX/Windows NT Interoperability,
Hank Shiffman (SGI)

2:30 An Examination of the Issues in Implementing the PBS Scheduler on a SGI Onyx2/Origin2000
Sandra Bittner (ARGONNELAB)

3:00 LSF Workload Management System Status and Plans
Jack Thompson (SGI) and John Feduzzi, Platform Computing Corporation

Ballroom 4

9C Visualization
Chair: John Clyne (NCAR)

2:00 Reality Monster Volume Rendering
James Painter, Al McPherson, and Pat McCormick (LANL)

2:30 Interacting with Gigabyte Volume Datasets on the Origin2000
Steve Parker, Peter Shirley, Yarden Livnat, Charles Hansen, Peter-Pike Sloan, and Michael Parker (CHPCUTAH)

3:00 Distributed Memory Octree Algorithms for Interactive, Adaptive, Multiresolution Visualization of Large Data Sets
Raymond Loy and Lori Freitag (ARGONNELAB)

3:30–4:00 Break

10A UNICOS
Chair: Chuck Keagle (BCS)

4:00 Clustering—Operational and User Impacts
Sarita Wood (SS-SSD)

4:30 Cluster UDB for SV1 Clusters
Richard Lagerstrom (SGI)

5:00 UNICOS and UNICOS/mk Release Plans and Status
Laura Mikrut (SGI)

10B Mass Storage
Chair: Hartmut Fichtel (DKRZ)

4:00 CRAY Data Migration Facility and Tape Management Facility Update
Neil Bannister and Laraine MacKenzie (SGI)

4:30 Storage Management—Seven Years and Seven Lessons with DMF
Robert Bell (CSIRO)

5:00 Performance Evaluation of New STK ACS Tape Drives
Ulrich Detert (KFA)

10C Compilers and Libraries
Chair: Hans-Hermann-Frese(ZIB))

4:00 Compilers and Libraries Update
Jon Steidel (SGI)

4:30 Scientific Library Update
Mimi Celis (SGI)

5:00 Co-Array Fortran
Robert Numrich (SGI)

CUG Night Out 7:00

Ballroom 2

11A IRIX
Chair: Cheryl Wampler (LANL)

9:00 IRIX Software Engineering Support
Laura Mikrut (SGI)

9:30 Experiences with the SGI/CRAY Origin2000 256 Processor System Installed at the NAS Facility of the NASA Ames Research Center
Jens Petersohn and Karl Schilke (NAS)

10:00 IRIX Resource Management Plans and Status
Dan Higgins (SGI)

Ballroom 3

11B Operations
Chair: Brian Kucic (NCSA)

9:00 SV1 SuperCluster Resiliency
Mike Wolf (SGI)

9:30 Installation and Administration of Software onto a CRAY SV1 SuperCluster from the SWS
Scott Grabow (SGI)

10:00 Site Planning for SGI Products
Jim Tennesen (SGI)

Ballroom 4

11C Visualization
Chair: Eric Greenwade (INEEL)

9:00 Lagrangian Visualization of Natural Convection Flows
Luis M. de la Cruz, Eduardo Ramos, and Victor Godoy (UNAM)

9:30 Animation of Hairpin Vortices in a Laminar-Boundary-Layer Flow Past a Hemisphere
Henry Tufo, Paul Fischer, Mike Papka, and Matt Szymanski (ARGONNELAB)

10:00 The Use of Virtual Reality Techniques in Industrial Applications
Lori Freitag and Darin Diachin (ARGONNELAB),
Daniel Heath, Iowa State University, and Tim Urness (ARGONNELAB)

10:30–11:00 Break

Ballrooms 1 & 2

12 General Session
Chair: John Clyne (NCAR)

11:00 Strategies for Visual Supercomputing
Scott Ellman (SGI)

11:45 New Techniques for High Performance Visualization
Jim Foran (SGI)

12:30–2:00 Lunch

Ballrooms 1 & 2

13 General Session

Chair: Barbara Horner-Miller (ARSC)

2:00 "Honey, I Flew the CRAY"
Candace Culhane (DOD)

2:45 SGI Corporate Report
Beau Vrolyk (SGI)

3:30–4:00 Break

Ballroom 2

14A Summit Interaction Session (SIS) Open Meetings

4:00 T3E
William White (SGI)

Ballroom 3

14B Summit Interaction Session (SIS) Open Meetings

4:00 T90
Vito Bongiorno (SGI)

Ballroom 4

14C Summit Interaction Session (SIS) Open Meetings

4:00 Storage Directions
Art Beckman (SGI)

Deer / Elk Lake

14D Summit Interaction Session (SIS) Open Meetings

4:00 SGI Operations Q&A Panel
Charlie Clark (SGI)

Ballrooms 1 & 2

15 General Session

Chair: Sam Milosevich (ELILILLY), CUG Vice President

5:30 Conference Program Discussion (Open Meeting)

Everyone interested in the CUG Program is invited to attend.

Ballroom 2

16A Performance

Chair: Michael Resch (RUS)

9:00 A CMOS Vector Processor with a Custom Streaming Cache
Greg Faanes (SGI)

9:30 Performance Tuning for Large Systems
Edward Hayes-Hall (SGI)

10:00 High Performance Simulation of Magnets
Balazs Ujfalussy (ORNL)

Ballroom 3

16B Software Tools

Chair: Guy Robinson (ARSC)

9:00 Panel Discussion: Is "write" still the Best Debug / Performance Analysis Tool Available?
Guy Robinson (ARSC)

9:30 (continued)

10:00 The SGI Multi-Stream Processor (MSP)
Terry Greyzck (SGI)

Ballroom 4

16C Visualization and Operations

Chair: Eric Greenwade (INEEL)

9:00 Visualization Theater Videotapes

9:30 (continued)

10:00 Improvements in SGI's Electronic Support
Lori Leanne Parris and Vernon Clemons (SGI)

10:30–11:00 Break

Ballrooms 1 & 2

17 General Session

Chair: Sam Milosevich (ELILILLY), CUG Vice-President

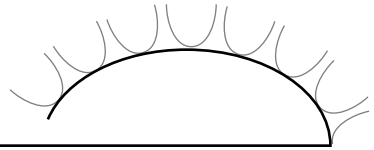
11:00 SIG Reports
Sam Milosevich (ELILILLY), CUG Vice-President

11:15 Progress and Power of Flow Simulation and Modeling
Tayfun E. Tezduyar, Rice University

12:00 Next Conference: Noordwijk aan Zee, Holland
Technical University of Delft (DELFTU) and Stichting Academisch Rekencentrum Amsterdam (SARA)

12:15 Closing Remarks
Sally Haerer (NCAR), CUG President

12:30 Conference Ends



Monday

Tutorials I–IV 8:30

I System Tuning for the Origin2000

Edward Hayes-Hall (SGI)

A focus on the systune parameters. The tutorial will present a list of the most often used parameters (15–20 or so) with descriptions of what they are and how they interact with other systune parameters. This will be a technical presentation for people who know something about systune and system resources.

II OpenMP

Tom MacDonald (SGI)

OpenMP is a portable shared memory programming model with bindings for Fortran, C and C++. This tutorial will present the major constructs and features in OpenMP that enable programmers to write coarse grain, scalable, shared memory parallel programs. The tutorial is aimed at users interested in writing parallel applications or parallelizing existing applications in Fortran, C and C++.

III Visualization: OpenGL Volumizer

Chikai Ohazama (SGI)

This tutorial will present the basic structure of OpenGL Volumizer. Details of its use for scientific visualization, and the advantages versus the disadvantages for using volume rendering, will be discussed. The mechanics behind Monster Volumizer and its use will also be addressed.

IV SV1

Jef Dawson (SGI)

This tutorial will describe the performance characteristics of the Cray SV1. It is intended to enable programmers to develop optimization strategies for their software running on the SV1.

Tutorials V–VIII 11:00

V Performance Tools on the Origin

Alex Poulos (SGI)

As applications grow larger, compiler optimizations more aggressive, processor designs more sophisticated and system architectures more scalable, performance analysis is getting more and more complex. This tutorial will provide a presentation of SGI's performance tools that offer practical solutions helping the users understand the behavior of their codes and tune their applications on Origin systems. The tutorial is targeted toward all audiences. A Q&A session will follow.

VI Scheduling for the T3E

Jay Blakeborough (SGI)

A presentation of the current state of scheduling for the T3E. A discussion of the solution of current solved and unsolved problems. Questions arising from this tutorial will be treated in a Q&A session later in the meeting.

VII I/O Tuning

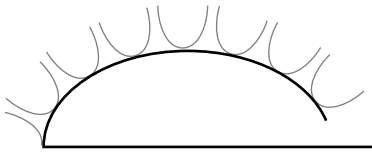
Randy Kreiser (SGI)

How to optimize disk I/O for both SCSI and Fibre Channel attached disks and XFS File Systems. To include Optimal File System Block size determination, whether to stripe and what the stripe size should be, systune resources that affect disk I/O performance, performance aspects of internal vs. external Journal files, and how to determine the optimal allocation group count. Some information about specific computers and OS systems will be presented.

VIII Data Intensive Computing

William Kramer (NERSC)

Data intensive computing is increasingly important in scientific research, whether for experimental data analysis and visualization, or intensive simulation such as climate modeling. By integrating high performance computation, very large data storage, high bandwidth access, and both local and wide area high-speed networking, data intensive computing stretches the technical resources of most architectures. The synergy of networking and computational initiatives should produce major improvements in data intensive computing technology in the next several years. Preparing for this paradigm shift is the prime motivation for this tutorial. The tutorial provides an overview of these issues followed by case studies that explore in detail different aspects of research and systems solutions for data intensive computing.



Abstracts

1 General Session 2:00

Keynote Address:

They Who Live by the FLOP May Die by the Flop

Cherri Pancake, Oregon State University

It's definitely not your father's supercomputer anymore—it's not even like your own supercomputer of just a few years ago. HPC users don't want to believe that every time they get familiar with a new type of machine it will be superceded by something entirely different. Are they being unrealistic, or are market forces going to push users to the breaking point? This presentation will examine trends that have emerged at HPC vendors, at user sites, and across the broader computing marketplace to identify the long-term implications for usability. Examples gleaned from hundreds of interviews with users and vendors will be used to show why HPC has evolved to its current state, and what will be needed for users to believe that future machines are really "new and improved."

2A–C Special Interest Group (SIG) Updates (Open Meetings) 4:00 to 6:00

These meetings are open to everyone. The meetings will introduce the SIG leadership, SGI contacts and basic agenda of the SIG. Please come and participate. See the Monday 4:00 and 5:00 schedule on page 5 for a list of SIGs and Chairs.

2A Communications and Data Management SIG 4:00

Chair: Hartmut Fichtel (DKRZ),

Mass Storage Focus Area Chair: Jeff Terstreip (NCSA)

Networking Focus Area Chair: Hans Mandt (BCS)

This SIG currently consists of the above two focus areas, and is interested in nearly all aspects of networking, I/O, and mass storage (hardware, software, performance, security). After the SIG restructuring process of last year this meeting concentrates on compiling input to get the technical activities going again. The meeting is open to everyone. Please come and participate, and give us your technical input. This is the opportunity to influence the direction of the SIG and compile questions/comments/criticism to SGI

2C Computer Centers SIG 4:00

SIG Chair: Leslie Southern (OSC)

Operations Focus Area Chair: Brian Kucic (NCSA)

Welcome/Introduction - Brian Kucic

CUG Survey - Fran Pellegrino

Around the Room - Introductions

- Site Configuration Summary
- Any Concerns or Problems (help needed, issues for panel)
- Any Solutions or Problems Overcome (help offered)

2A Operating Systems SIG 5:00

SIG Chair: Chuck Keagle (BCS)

IRIX Focus Area Chair: Cheryl Wampler (LANL)

Security Focus Area Chair: Virginia Bedford (ARSC)

UNICOS Focus Area Chair: Ingeborg Weidl (MPG)

This session will be of interest to those who want the inside scoop on SGI's plans for IRIX, Unicos, and Security. SGI will discuss their development plans for IRIX and security and their retirement plans for Unicos. Will we ever see NT on SGI high end systems? What about Linux? Will IRIX support Session Level Accounting? Will User Resource Limits be integrated into IRIX? SGI will answer these questions and more in a thumbnail sketch of their development plans for IRIX, Unicos, and Security. Following this 15 minute presentation, we will discus features we both like and dislike about the existing products. These will be categorized and the top likes and dislikes for each area will be presented to SGI.

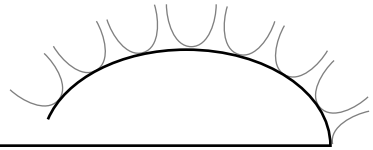
Introductions of Focus Group Chairs

- IRIX - Cheryl Wampler, LANL
- Security - Virginia Bedford, ARSC
- Unicos - Ingeborg Weidl, MPG
- SGI Liason - TBD

SGI Thumbnail Sketch of future plans

Open discusion of issues and concerns

Voting for the top issues and concerns to present to SGI



Tuesday

3A Security 9:00

Meeting the Requirements of a "Security Test and Evaluation" with UNICOS and IRIX

Virginia Bedford (ARSC)

This talk will cover the steps taken to meet the requirements put forth by a US Security Agency, specifically focusing on Unicos and IRIX operating system platforms. Specific changes made to the system's monitoring tools will be covered as well as some general policy issues. It will also describe the steps taken to ensure that newly installed systems maintain a safer environment.

3B Mass Storage 9:00

KART: A simple client/server interface to access different tape devices at CINECA site

Sergio Bernardi (CINECA)

KART was developed to provide a controlled and easy access to different tape devices at CINECA site. Based on a client/server architecture, KART provides a set of commands in order to define logical tape volumes, to read and write files on the defined volumes. The set of commands is also accessible via a Web page.

3C Software Tools 9:00

Development Tools Update

Bill Cullen (SGI)

During this talk, users will hear about current Debugger and Performance Tool offerings on IRIX. Specifically, the talk will highlight features that have gone into the WorkShop IDE, SpeedShop, and ProMP. In addition, this talk will cover future plans for development tools on IRIX, Linux, and NT.

3A Security 9:30

The First Ten Steps to Securing a Unix Host

Liam Forbes (ARSC)

This paper and talk will cover the first ten steps ARSC performs to secure a Unix (UNICOS or IRIX) machine. This paper is aimed at system administrators implementing host based security network-wide or on a single machine. None of these steps require extra security packages and have helped us to maintain a similar configuration across multiple platforms and machines.

3B Mass Storage 9:30

FibreChannel and Storage Area Networks on the Origin2000

Thomas Ruwart, University of Minnesota

FibreChannel is fast becoming the standard for connecting storage to high performance machines. This talk describes the performance of FibreChannel storage on SGI Origin2000 and its use in creating Storage Area Networks (SANs).

3C Software Tools 9:30

The Integrative Role of COW's and Supercomputers in Research and Education Activities

Don Morton (ARSC)

Experiences of researchers and students are presented in the porting of code between a cluster of Linux workstations at The University of Montana and the CRAY T3E at the Arctic Region Supercomputing Center. We test the thesis that low-cost workstation environments may be utilized for training and for developing and debugging parallel codes which can ultimately be moved to the CRAY T3E with relative ease for realizing high performance gains. We further present ideas on how the computing environments of supercomputers and COW's might benefit from more commonality.

Abstracts

3A User Services 10:00

Allocations on the Web—Beyond Removable Tape

Barbara Woodall (OSC)

OSC's allocations process is moving from manually produced records to automated, Web-based access for applicants and Allocations Committee members. Now, hyperlinks and immediate, committee-wide access to application information have replaced notes attached to file folders with removable tape. Future plans include linking OSC's database with the Web pages to automate the process even more and to make more information readily available.

3B Mass Storage 10:00

CXFS: A Clustered File System from SGI

R. Kent Koeninger (SGI)

CXFS is a clustered file system that provides near-local IO performance for shared access to Fibre Channel disks from multiple hosts. This talk will give an overview of CXFS and the status of the CXFS product development.

3C Software Tools 10:00

Application of Fortran Pthreads on Linear Algebra Routines

Clay Breshears, Henry Gabb, and Mark Fahey (NRC_VBURG)

The manipulation and solution of dense linear systems with 10,000 to 40,000 equations is not unheard of in the HPC community. We propose to use Pthreads to make concurrent Fortran linear algebra routines. The effectiveness of this work will be demonstrated with a MRI image analysis application. This work builds on research presented at the 40th CUG conference.

5A Compilers and Libraries 2:00

Strategies and Obstacles in Converting a Large Production System to FORTRAN 90 (f90) on a T90.

David Gigrich (BCS)

Why the decision to convert in-house Triton applications from FORTRAN 77 (cft77) to FORTRAN 90 (f90)? The strategies used and challenges faced in the f90 conversion of a 1.4 million line finite element application used by the world's largest producer of commercial jetliners. Complications due to poor programming, compiler changes, and unexpected compiler features (bugs). The tools used/developed, regression testing, system validation for acceptance by the engineering customers, and the resources required.

5B Networking 2:00

Super Computer Communications

Ralph Niederberger (KFA)

In the last several years, the distribution of a parallel application over high speed communication lines onto more than one computer system has become highly interesting. The paper will describe how the current CRAY supercomputer systems (GigaRing Systems) can contribute to such metacomputing environments and what has to be done to support high speed ATM 622 Mb/s communication lines on CRAY GigaRing systems using an HiPPI-to-ATM-gateway.

5C Performance and IRIX 2:00

How Moderate-Sized RISC-Based SMPs Can Outperform Much Larger Distributed Memory MPPs

Daniel Pressel, Walter B. Sturek, J. Sahu, and K.R. Heavey (USARL)

This paper is an expanded version of the middle part of my talk from the CUG Origin2000 Workshop and was accepted for presentation at the SCS sponsored Simulation Conference in April.

Abstracts

5A Compilers and Libraries 2:30

A Solver that Learns

Thomas Elken (SGI)

Silicon Graphics was one of the first to employ nested dissection matrix ordering methods for reducing the non-zeroes in solving sparse systems of linear equations. This talk will discuss an enhancement which uses randomization, parallel processing, and a long-term memory to improve the quality of the matrix ordering. This enhancement has been applied to application software such as ABAQUS and CPLEX and will soon be part of the SCSL (SGI/CRAY Scientific Library).

5B Networking 2:30

Systems Issues in Building Gigabyte Networks

Joe Gervais (SGI)

System Area Networks require more than a fast channel like Gigabyte System Network (GSN) to achieve high performance. An overview of the Scheduled Transfer (ST) Protocol for OS Bypass will be provided. ST is a connection-oriented data transfer protocol that can be thought of as "Network DMA." A survey of systems issues in interfacing to a gigabyte per second network will be done. Applications of technology to other networks such as Gigabit Ethernet will also be presented.

5C Performance and IRIX 2:30

Performance Evaluation of MPI and MPICH on the CRAY T3E

Hans-Hermann Frese (ZIB)

MPI is a portable message passing interface for parallel applications on distributed memory MIMD machines. In this paper we present performance results for the native SGI/CRAY MPI implementation and the portable ANL/MSU MPICH implementation on the CRAY T3E.

5A Compilers and Libraries 3:00

What's New in the Message Passing Toolkit?

Karl Feind (SGI)

In the past year a number of new features and optimizations have been added to the Message Passing Toolkit (MPT) on Origin2000 and CRAY T3E systems. This talk will describe recently added features in the MPI, SHMEM, and PVM message passing libraries, as well as outline the current feature road map for upcoming releases.

5B Networking 3:00

GSN and ST: Infrastructures for High Bandwidth, Low Latency Communications

Brad Strand (SGI)

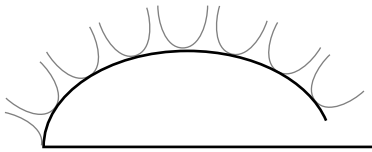
In this presentation, SGI's Gigabyte Systems Network (GSN) network interface and Scheduled Transfers (ST) protocol will be described. Details of the high bandwidth and low latency of GSN and ST will be presented. Options for using ST as a framework for clustering and storage area networking will be explored. Finally, performance numbers gathered will be presented, and compared with current generation technologies.

5C Performance and IRIX 3:00

IRIX Scalability

Gabriel Broner (SGI)

In the past year we have made improvements to IRIX scalability. This talk will cover the plans and status for scaling IRIX in an SMP fashion, additional reliability and features, and support across multiple SMPs for additional scaling.



Abstracts

Wednesday

7A UNICOS 9:00

T3E Resilience Update

Dean Elling (SGI)

This talk will cover upcoming enhancements to improve T3E resilience. SGI currently supports warm booting PEs from the SWS. With the release of UNICOS/mk 2.0.5, warm booting PEs from the mainframe will be supported, which could significantly reduce the time needed to perform this function. Dynamic PE renumbering will also be provided. This feature will enable sites to reconfigure a failed PE with a renumbered PE and thereby maintain the APP PE space without requiring a system reboot.

7B Applications 9:00

Experiences Porting a CFD Parallel Code to Fortran 90 Including Object-Oriented Programming

Jean-Pierre Grégoire (EDF)

Platform used: C98, Programming Environment 3.0. First we present the successful efforts we have done to obtain from CF90 parallelizer a Fortran parallel version of the N3S code similar to that produced by the CF77 parallelizer. We also discuss the stability of the results during this porting. Then we describe the difficulties in controling memory consumption when moving from basic programming to object-oriented programming.

7C User Services 9:00

SGI Technical Publications Strategy

Laurie Mertz (SGI)

SGI Technical Publications delivers documentation through various methods, from online to print. This session will give an overview of current documentation delivery mechanisms and thoughts on future delivery methods.

7A UNICOS 9:30

T3E Scheduling Update

Jay Blakeborough (SGI)

With UNICOS/mk 2.0.4, we have made significant strides in the stability and functionality of application scheduling on the T3E. This talk will highlight recent and planned changes to the Political Scheduling Daemon (psched) and kernel-level scheduling support. It will also outline the implementation of single-PE applications and migrate-on-swap.

7B Applications 9:30

Performance of the Parallel Climate Model on the SGI Origin2000 and the CRAY T3E

Thomas Bettge, Anthony Craig, Rodney James, Warren G. Strand, Jr., and Vincent Wayland (NCAR)

The DOE Parallel Climate Model (PCM) is a tightly coupled model of the earth's physical and dynamic climate system, and includes fully active components of the atmosphere, ocean, land, river water, and space. It was designed for use on the T3E massively parallel machine architecture, and adapted for use on the distributed shared memory Origin2000. The computational design of the PCM, including the compromises incorporated to address conflicting scientific and computational requirements, priorities, and deadlines, will be summarized. Performance experiences on both the T3E and Origin2000 will be presented.

7C User Services 9:30

High Performance Computing at the University of Utah: A User Services Overview

Julia Caldwell (CHPCUTAH)

The user community supported by CHPC comes from a wide array of disciplines at the University of Utah. The resources at CHPC include a 64 node SGI Origin2000 with graphics pipes, a 72 node IBM SP, a 20 node SGI PowerChallenge, a 32 node Intel Cluster, a 16 node Sun E10K, and a few other small workstation clusters. This talk will discuss how the User Services division supports this diverse user community, including problem tracking, and our online support services.

7A UNICOS 10:00

GigaRing SWS and I/O Status

Paul Falde (SGI)

This presentation will cover the current status of the SWS and GigaRing I/O.

7B Applications 10:00

Teraweb: Browser-Based High Performance Computing

Joel Neisen, David Pratt, and Ola Bildtsen (MINN)

With standard browsers, Teraweb provides a seamless and unified graphical environment for users of High Performance Computing (HPC) equipment. Teraweb can be used to run computational models, manipulate data files, print or visualize results, or display system usage information without having to learn cryptic command-line interfaces or operating system commands.

7C User Services 10:00

Providing Extra Service: What To Do With Migrated User Files?

R.K. Owen (NERSC)

When faced with decommissioning our popular C90 machine, there was a problem of what to do with the 80,000 migrated files in 40,000 directories and the users' non-migrated files. Special software and scripts were written to store the file inode data, parse the DMF database, and interact with the tape storage system. Design issues, problems to overcome, boundaries to cross, and the hard reality of experience will be discussed.

9A Performance 2:00

Optimizing AMBER for the CRAY T3E

Robert Sinkovits and Jerry Greenberg (SDSC)

AMBER is a widely used suite of programs employed to study the dynamics of biomolecules and is the single most used application on the SDSC CRAY T3E. In this paper, we describe the cache and intrinsic function optimizations that were taken to tune the molecular dynamics module of AMBER, resulting in single processor speedups of more than 70%. The implications of these performance gains for biochemistry calculations will be briefly described.

9B Operations 2:00

IRIX/Windows NT Interoperability

Hank Shiffman (SGI)

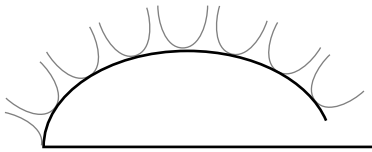
No man is an island, entire of itself. Similarly, computing systems need to interact, to share information, to cooperate in helping users do their jobs. We'll discuss the range of challenges involved in integrating IRIX and Windows systems into one environment, a variety of solutions to these challenges and ways to satisfy the differing concerns of application users, developers and system administrators.

9C Visualization 2:00

Reality Monster Volume Rendering

James Painter, Al McPherson, and Pat McCormick (LANL)

Texture based volume rendering algorithms can be used to exploit high performance graphics accelerators such as the SGI IR (Infinite Reality) for interactive volume rendering. A single IR can interactively render a 64M voxel data set (256^3). Working with SGI, we have chained together multiple IR pipes in order to enable rendering of even larger problems. With 16 IR pipes we have been able to render billion cell data sets (1024^3) at approximately 5 frames per second. We have constructed an I/O system that enables us to interactively page through billion cell time histories at approximately the same rate. This I/O system is able to page texture data from disk at 5 Gigavoxels per second.



Abstracts

9A Performance 2:30

Performance Metrics for Parallel Systems

Daniel Pressel (USARL)

This presentation deals with various metrics one might use for measuring the success of a project to parallelize a code (or port it to a new system).

9B Operations 2:30

An Examination of the Issues in Implementing the PBS Scheduler on a SGI Onyx2/ Origin2000

Sandra Bittner (ARGONNELAB)

Schedulers and supporting utilities are used to automate resource allocation. Identifying those resources, tracking their usage, and identifying mechanisms to control their allocation without causing the system to thrash or crash is a challenge. I will outline the solutions we implemented and the obstacles we encountered while rolling out the PBS scheduler and supporting utilities on our Onyx2.

9C Visualization 2:30

Interacting with Gigabyte Volume Datasets on the Origin2000

Steve Parker, Peter Shirley, Yarden Livnat, Charles Hansen, Peter-Pike Sloan, and Michael Parker (CHPCUTAH)

We present a parallel ray tracing program that computes isosurfaces of large-scale volume datasets interactively. The system is shown for the gigabyte Visable Woman dataset.

9A Performance 3:00

Performance Characteristics of Messaging Systems on the T3E and the Origin2000

Mark Reed, Eric Sills, Sandy Henriquez, Steve Thorpe, and Lee Bartolotti (NCSC)

Interprocessor communication time has a large impact upon the scaling of parallel applications with processor number. To assess the effectiveness of the T3E and the Origin2000 in using messages to move data to remote memory, the performance characteristics of PVM, MPI and SHMEM are investigated and performance curves for transfer time as a function of message size are presented. In addition, latencies, bandwidths and the message size required to achieve half of peak are reported. Performance is also compared with a cluster of O2 workstations connected via Ethernet. Differences for many types of point-to-point calls are presented and discussed. A variety of collective communication calls representing a diverse set of traffic patterns is investigated and results reported.

9B Operations 3:00

LSF Workload Management System Status and Plans

Jack Thompson (SGI) and John Feduzzi, Platform Computing Corporation

SGI is working with Platform Computing to incorporate key NQE functionality into LSF. Platform and SGI will jointly present the status of LSF for IRIX, UNICOS, and UNICOS/mk and discuss upcoming features of LSF 4.0.

9C Visualization 3:00

Distributed Memory Octree Algorithms for Interactive, Adaptive, Multiresolution Visualization of Large Data Sets

Raymond Loy and Lori Freitag (ARGONNELAB)

Interactive visualization of scientific data sets generated on MPP architectures is a difficult task due to their immense size; adaptive multiresolution techniques are necessary to reduce data sets while still providing adequate resolution in areas of interest and full resolution on demand. Because these data sets are often too large to fit into the memory of a serial visualization engine, we use a parallel octree data structure closely coupled to the application to increase the speed of interactive visualization of both structured and unstructured data sets. In this talk we discuss the parallel octree data structure, its creation using criteria such as mesh feature size or data gradients to adjust level of detail, and efficient parallel algorithms for searching and manipulating the octree.

10A UNICOS 4:00

Clustering—Operational and User Impacts

Sarita Wood (SS-SSD)

Clustering can improve the overall utilization of multiple hosts and can provide better turn-around to users by balancing workloads across hosts. Changes are needed on the operational side and in user scripts to accommodate a clustered environment.

10B Mass Storage 4:00

CRAY Data Migration Facility and Tape Management Facility Update

Neil Bannister and Laraine Mackenzie (SGI)

This paper will review status and plans for both CRAY and SGI platforms. Since the last CUG meeting DMF four was released. This has presented the DMF team with new challenges which will be covered in this paper. The paper will also report progress and release plans for the TMF and CRL products.

10C Compilers and Libraries 4:00

Compilers and Libraries Update

Jon Steidel (SGI)

This talk will cover the status and plans for compilers and libraries.

10A UNICOS 4:30

Cluster UDB for SV1 Clusters

Richard Lagerstrom (SGI)

Each node of an SV1 cluster will have a local UDB just as if it were a stand-alone system. The assumptions of an SV1 cluster require that much of the user information be consistent among all nodes of the cluster. The Cluster UDB feature provides commands and interfaces to make UDB administration global. This makes it possible to enforce UDB consistency within the cluster while accommodating nodes with varying resources or designated functions.

10B Mass Storage 4:30

Storage Management—Seven Years and Seven Lessons with DMF

Robert Bell (CSIRO)

CSIRO has been using CRAY's Data Migration Facility (DMF) for storage management for over seven years. This talk will focus on seven lessons learned in the seven years.

10C Compilers and Libraries 4:30

Scientific Library Update

Mimi Celis (SGI)

This talk will describe the SGI/CRAY Scientific Library (SCSL) and plans for future releases. Differences in interfaces from the SGI library (Complib) and the CRAY library (scilib) will be covered.

10A UNICOS 5:00

UNICOS and UNICOS/mk Release Plans and Status

Laura Mikrut (SGI)

UNICOS and UNICOS/mk are alive and well. This talk will cover enhancements, release plans, support status and Software Problem Report (SPR) status.

10B Mass Storage 5:00

Performance Evaluation of New STK ACS Tape Drives in an SGI/CRAY Mainframe Environment

Ulrich Detert (KFA)

In spring '99 new STK tape drives 9840 (formerly called "Eagle") become available for SGI/CRAY systems. The capacity of the new tapes is 20 GB with a peak transfer rate of 10 MB/s. The paper describes performance characteristics for the new tapes in comparison to the older tape drives 9490 (Timberline) and 4490(Silverton) with BMX and SCSI interfaces. Related topics of installation and handling of the tapes are also discussed.

10C Compilers and Libraries 5:00

Co-Array Fortran

Robert Numrich (SGI)

Co-array Fortran (previously known as F--) is a small set of extensions to Fortran 95 for Single Program Multiple Data (SPMD) parallel processing. It is a simple, explicit notation for data decomposition expressed in a natural Fortran-like syntax. This talk will give a short introduction into Co-array Fortran and will illustrate its power and simplicity through some examples.

Thursday

11A IRIX 9:00

IRIX Software Engineering Support

Laura Mikrut (SGI)

With recent reorganizations within the Software Division, a new emphasis on IRIX maintenance is under way. The overriding goal is increased customer satisfaction. This session will cover how SGI will deliver on this goal along with a current status.

11B Operations 9:00

SV1 SuperCluster Resiliency

Mike Wolf (SGI)

Cluster configurations introduce new resiliency challenges. This talk will discuss both automated and manual processes for detecting SV1 SuperCluster failures and recovering from them. It will emphasize how to keep the cluster alive rather than how to keep any individual system within it alive.

11C Visualization 9:00

Lagrangian Visualization of Natural Convection Flows

Luis M. de la Cruz, Eduardo Ramos, and Victor Godoy (UNAM)

We present a new technique to visualize natural convection flows inside a cubic cavity. This technique consists in following a closed surface using a Lagrangian system. We used advanced techniques to build spectacular graphics and animations in 3D. In our particular research, we made a visualization of a natural convection mixing flow, and this visualization permits us to analyze, in a graphic way, our flow. Calculations and graphics were done in an Origin-2000 and an Onyx with R10000 processors, using Fortran programs and Alias/Wavefront software.

11A IRIX 9:30

Experiences with the SGI/ CRAY Origin2000 256 Processor System Installed at the NAS Facility of the NASA Ames Research Center

Jens Petersohn and Karl Schilke (NAS)

The NAS division of the NASA Ames Research Center installed a 256 processor single system image Origin2000 system, the first at a customer site, during the latter half of October 1998. Due to the large number of processors, the system exhibits different operational characteristics than smaller Origin2000 systems. The causes of the observed behavior are discussed along with progress towards solving or reducing the effect of problem areas. Reliability and benchmarking data are also presented.

11B Operations 9:30

Installation and Administration of Software onto a CRAY SV1 SuperCluster from the SWS

Scott Grabow (SGI)

With the introduction of the CRAY SV1 SuperCluster, the installation process for initial and upgrade installations has been updated to provide a level of flexibility and consistency for sites that have a CRAY SV1 SuperCluster system. This paper will outline the two processes available to perform each installation and address some administration issues when working with SV1-8 and larger SuperClusters.

11C Visualization 9:30

Animation of Hairpin Vortices in a Laminar-Boundary-Layer Flow Past a Hemisphere

Henry Tufo, Paul Fischer, Mike Papka, and Matt Szymanski (ARGONNELAB)

In an effort to understand the vortex dynamics of coherent structures in turbulent and transitional boundary layers, we consider direct numerical simulation of the interaction between a flat-plate-boundary-layer flow and an isolated hemispherical roughness element. Of principal interest is the evolution of hairpin vortices that form an interlacing pattern in the wake of the hemisphere, lift away from the wall, and are stretched by the shearing action of the boundary layer. Using animations of unsteady, three-dimensional representations of this flow produced by a vtk enhanced CAVE library developed at Argonne National Laboratory, we identify and study several key features in the evolution of this complex vortex topology not previously observed in other visualization formats.

11A IRIX 10:00

IRIX Resource Management Plans and Status

Dan Higgins (SGI)

This talk is a review of the current plans and status of IRIX Resource Management for large systems. A list of Resource Management features has been identified, based on customer input, and work is underway to complete these features. The feature plan set, plans, and status information will be presented.

11B Operations 10:00

Site Planning for SGI Products

Jim Tennesen (SGI)

With the volume of system installations shifting from liquid cooled mainframes to air cooled racks, the considerations for data processing facility infrastrutures are changing. In general, site preparations for the air cooled systems are much simpler and less expensive; however, as air cooled systems scale to hundreds of processors in dozens of racks, the cumulative air cooled load may overwhelm data processing facilities which have traditionally supported liquid cooled systems. The presentation will provide power and cooling estimates for future products to provide the data center operations people a view of the long-term trends. In order to get as much out of this session as possible, it would be beneficial for the participants to know how much heat rejection to air and water their present facilities can provide and to consider at what heat rejection value it is desirable to have equipment cooled by liquid versus air. I'll also cover the impacts that are associated with having few mainframes consuming considerable current at medium voltage (400 to 480vac), 3 phase power versus dozens of chassis consuming

current at lower voltage (180 to 240), single phase power. I prefer this to be a session where I will present the information in 10 to 15 minutes and spend the rest of the time discussing the issues with the participants. This will allow me to understand the customers' viewpoints and bring those back to SGI Engineering.

11C Visualization 10:00

The Use of Virtual Reality Techniques in Industrial Applications

Lori Freitag and Darin Diachin (ARGONNELAB), Daniel Heath, Iowa State University, and Tim Urness (ARGONNELAB)

At Argonne National Laboratory we have successfully used the CAVE virtual reality environment for interactive engineering and analysis in two industrial combustion applications; the design of injective pollution control systems for commercial boilers and the analysis of different fuel types for a new burner in aluminum smelting furnaces. In this talk we will describe the applications in some detail, the visualization techniques developed, the software mechanisms used to create data structure independent toolkits, and the use of interactive virtual reality environments to add value to engineering analysis and design.

12 General Session 11:00

Strategies for Visual Supercomputing

Scott Ellman (SGI)

This talk will summarize the current state of visualization for supercomputing environments, including the emergence of the Visual Supercomputing paradigm. It will then look at how Visual Supercomputing can be used to increase the insight obtained from supercomputing calculations, and will conclude with a discussion of how various Visual Supercomputing sites are implementing these strategies.

12 General Session 11:45

New Techniques for High Performance Visualization

Jim Foran (SGI)

Visualization is a critical aspect in understanding results from supercomputing calculations. However, in many supercomputing environments, the visualization techniques used are limited by the capabilities of desktop workstations and do not match the requirements of the end user. This presentation describes several new visualization paradigms that eliminate obstacles to understanding, increase the involvement of scientists and engineers in the analysis of their data, and increase the value of supercomputing and visualization assets to the organization.

13 General Session 2:00

"Honey, I Flew the CRAY"

Candace Culhane (DOD)

From 1994 to 1999, the Department of Defense has supported multiple R&D contracts with Cray Research and SGI, all in support of the goal of demonstrating a supercomputer capable of operating in mobile environments. These research efforts included the application of new thermal management and packaging technologies to achieve miniaturization of a standard CRAY product, the J90 vector supercomputer. The research prototype SOLITAIRE and its host system was designed, built and tested. Companion programs were targeted at further developing spray cooling technologies and investigating the design space for ruggedized versions of the Scalable Node (SN) and Scalable Vector (SV) product lines. This talk will summarize the research programs, the experiences encountered along the way, successes and lessons learned, and what the future outlook for ruggedized high performance computers is. A highlight of the talk will be the recounting of the successful Jan 99 flight test of an alternate ruggedized version of the CRAY J90.

14C Summit Interaction Session (SIS) Open Meeting 4:00

Storage Directions

Art Beckman (SGI)

Data is growing faster than ever, with recent growth exceeding Moore's Law. The combination of Big Data and the Net is already creating, and will create, much more stress on the infrastructure (i.e., InfraStress) of computing. This talk examines storage technology trends expected over the next few years, tries to pinpoint the likely stress issues and reasons, and looks at some of the potential solutions for the problems.

Friday

16A Performance 9:00

A CMOS Vector Processor with a Custom Streaming Cache

Greg Faanes (SGI)

The CRAY SV1 processor is a CMOS chipset that represents an affordable approach to a custom CPU architecture for vector applications that is interesting in both the micro-architecture and design methodology. The design includes several new features not found in existing vector processors. The talk will describe the micro-architecture of the scalar processor, the vector processor, and the custom streaming cache.

16B Software Tools 9:00

Panel Discussion: Is "write" still the Best Debug/Performance Analysis Tool Available?

Guy Robinson (ARSC)

As many programmers know, there is much activity aimed at creating debuggers and performance tools to aid in code development. However, the majority of programmers still use write statements and human logic combined with knowledge of the applications when finding bugs or performance bottlenecks. This panel's members will discuss two questions, why write statements are preferred and why programmers should use a debugger / performance analysis tool.

16A Performance 9:30

Performance Tuning for Large Systems

Edward Hayes-Hall (SGI)

A set of strategies and methods of tuning useful for large Origin systems will be presented. This will cover existing mechanisms and the means to monitor the benefits of the changes.

16A Performance 10:00

High Performance Simulation of Magnets

Balazs Ujfalussy (ORNL)

This talk summarizes the computational aspects of the computer code that received the 1998 Gordon Bell prize. The code shows near linear scale-up to 1024-processing elements (PE) and also achieved record breaking performance of 1.02 Teraflops.

16B Software Tools 10:00

The SGI Multi-Stream Processor (MSP)

Terry Greyzck (SGI)

The SGI Multi-Stream Processor (MSP) is an innovative concept in supercomputer design. Exciting new developments in compiler and library technology, coupled with hardware support on the CRAY SV1, allow immediate, direct comparisons with wide-pipe long-vector architectures, with a four gigaflop peak speed. This talk covers how to compile and run on an MSP, what code changes may be necessary, and the current status of the compiler. Through examples and anecdotal evidence, a strategy for developers to harness the full power of the MSP on the SV1 is presented.

16C Visualization and Operations 10:00

Improvements in SGI's Electronic Support

Lori Leanne Parris and Vernon Clemons (SGI)

Join SGI for an update on our Electronic Support and Services roadmap and planned improvements in this area. Learn of our exciting plans to optimize your electronic support and services experience. This session will be interactive, and we encourage you to share your feedback with us.

Local Arrangements

How to Contact Us

Local Arrangements Committee

During the Conference

Minneapolis Marriott City Center
Fourth Floor: Birch & Maple Lake
30 South Seventh Street
Minneapolis, MN 55402 USA
(1-612) 349-7885
cug99@networkcs.com

After the Conference

Minneapolis CUG '99 Conference
Liz Stadther
Network Computing Services, Inc.
1200 Washington Avenue South
Minneapolis, MN 55415 USA
(1-612) 337-3430
Fax: (1-612) 337-3400
cug99@networkcs.com

Conference Hotel

Minneapolis Marriott City Center
30 South Seventh Street
Minneapolis, Minnesota 55402 USA
(1-612) 349-4000
Fax: (1-612) 332-7165

CUG Office (Registration)

2911 Knoll Road
Shepherdstown, WV 25443 USA
(1-304) 263-1756
Fax: (1-304) 263-4841
bob@fpes.com

Conference Information

Who May Attend?

CUG bylaws specify that employees of a CUG member (usually a facility or company using an SGI computer, identified by its CUG site code) and users of computing services provided by a CUG member, may attend a CUG meeting. Visitors are also eligible to attend a CUG meeting, provided they have formal approval from a member of the CUG Board of Directors. The members of the Board of Directors are listed later in this booklet.

Conference Registration Fees

The member registration fee is $695 through April 30, 1999. The registration fee after April 30 and before May 20 is an additional $55. Registration on or after May 30 is $800. For the first registrant from non-member sites, add $500 for a one year membership in addition to the registration fee.

Cancellations

Conference registration cancellations must be received by the CUG Office (see "How to Contact Us" above) before April 30, 1999. All registration fees will be refunded if the cancellation is received by this date.

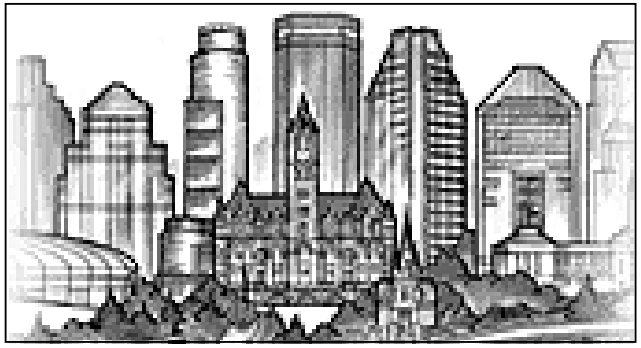
Conference Registration Location/Hours

Conference registration is located on the 4th floor, Minneapolis Marriott City Center Hotel.

Office Hours

Sunday	3:00–5:00 p.m.
Mon.–Thurs.	8:00 a.m.–6:00 p.m.
Friday	8:00 a.m.–1:00 p.m.

Badges and registration materials are available during these scheduled hours. All attendees must wear badges during CUG Conference activities.



Local Arrangements

On-Site Facilities

Messages

During the Conference, messages will be taken at the on-site CUG office at (1-612) 349-7885. Messages may also be e-mailed to cug99@networkcs.com. The messages will be posted in the registration area.

Faxes

A fax machine will be available at the CUG Conference Office for conference-related business.

Business Center

The Minneapolis Marriott City Center has a business center located in the main lobby area. Services available there include printing, copying, and faxing. Those with laptops can take them to the business center and send files to printers (including transparencies). There is a charge for these services.

E-mail

E-mail facilities will be provided at the Conference for attendees' use.

Speaker Preparation

The Speaker Preparation room is Pine Lake on the fourth floor near the CUG Office. There will be an overhead projector, a Macintosh, and a PC available for minor last-minute editing of presentations.

Photocopying

A copy machine for making a limited number of copies will be available in the CUG Conference office on-site. If you plan to distribute copies of your presentation, please bring sufficient copies with you. You may also use the Minneapolis Marriott Business Center for making copies, for a charge.

Dining Services

The conference registration fee includes luncheons Tuesday through Thursday. In addition, refreshments will be provided during breaks Monday through Friday morning. The fee also includes breakfast Tuesday through Friday mornings. Breakfast and luncheons will be served in the Marriott City Center sixth floor dining area. The refreshments during breaks will be available just outside session rooms on the fourth floor.

Special Assistance

Throughout the conference, our staff at the CUG Office will be glad to assist you with any special requirements.

Smoking Policy

There is no smoking allowed at the Conference. Smoking is allowed only in designated areas of the hotel.

Travel Information

Transportation

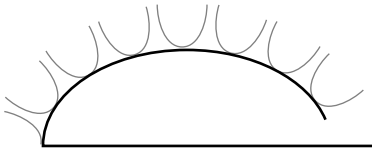
From the Airport

Airport Express is a public shuttle service, providing transportation from the airport to hotels in Downtown Minneapolis. A shuttle departs from the airport (in front of the luggage pick-up area) approximately every half hour. The cost is $10.00 one-way and $16.50 round-trip. It is best to make advance reservations by calling (1-612) 827-7777.

At the airport, taxis are available at the cab starter booth. From the Main Terminal building, cross underground through the Ground Transportation Center toward the parking ramp and go up one level. The distance to downtown Minneapolis is approximately 16 miles. All cab fares are metered. The phone number for taxi service is (1-612) 726-5877.

Car Rental Agencies

Alamo Rent-a-Car . . . . . (1-800) 327-9633
www.goalamo.com
Avis Rent-a-Car . . . . . (1-800) 331-1212
www.avis.com
Budget Rent-a-Car. . . . . (1-800) 527-0700
www.budgetrentacar.com
Dollar Rent-a-Car . . . . . (1-800) 800-4000
www.dollarcar.com
Hertz Rent-a-Car . . . . . (1-800) 654-3131
www.hertz.com
National Car Rental . . . . . (1-800) 227-7368
www.nationalcar.com
Americar . . . . . (1-612) 866-4918
Enterprise. . . . . (1-800) 325-8007
Thrifty . . . . . (1-800) 367-2277



Local Arrangements

Holiday

Please note that Monday, May 31, is Memorial Day, a U.S. national holiday. Some shops and services may be unavailable that day.

Currency

The currency is the U.S. dollar. Currency, including travelers checks, can be exchanged at a bank or at the airport. Norwest Bank, at Sixth Street and Marquette Avenue in downtown Minneapolis, is open Monday through Friday from 9:00 a.m. until 5:00 p.m. At the airport, there is a currency exchange service located across from Northwest Airline's ticket counter on the upper level of the main terminal. The hours are from 6:00 a.m. to 8:00 p.m. Monday through Saturday, and from 8:00 a.m. to 8:00 p.m. on Sundays.

Voltage

Electrical service is 120 volts, 60 cycle. You will most likely need an adapter for use in electrical outlets.

Climate

The average daily high temperature in May is 21˚ C or 69˚ F. Light coats or jackets are recommended, and there may be rain.

Social Events

Newcomer's Luncheon

All first-time CUG attendees are invited to the Newcomer's Luncheon to be held on Monday. This is a good time to meet CUG officers and ask any questions you may have about CUG or the Conference. Please be sure to sign up for this luncheon at the Registration Desk.

SGI Reception

SGI will host a reception on Monday evening, from 7:00 p.m until 9:00 p.m. at the Minneapolis Marriott City Center. All conference participants and their guests are invited to attend.

CUG Night Out

The traditional CUG Night Out will be a trip to the Minnesota History Center, located across the Mississippi River from Minneapolis, in downtown St. Paul. The building itself provides an elegant setting for dinner. You will also be able to explore the history exhibits, visit a gift shop, or just relax and enjoy the magnificent views of the Minnesota State Capitol and the St. Paul Cathedral. Weather permitting, the outdoor plaza will be available to take in a warm spring evening.

Guests are welcome for an additional fee of $60.00 for each guest. Please pay at the registration desk if you have not already paid with your registration fee and pick up a guest badge(s) there as well.

Tour of Network Computing Services, Inc.

There will be an opportunity for CUG attendees to tour Network Computing Services, Inc., your local host for the Minneapolis CUG Conference. Detailed information will be posted on conference bulletin boards and will be available at the CUG Conference Office.

Contacts

CUG Board of Directors

President

Sally Haerer
National Center for Atmospheric Research
NCAR - SCD
1850 Table Mesa Drive
Boulder, CO 80307-3000 USA
(1-303) 497-1283 Fax: (1-303) 497-1804
haerer@ucar.edu

Vice President

Sam Milosevich
Eli Lilly and Company
Computational Science Apps, DC0725
Lilly Corporate Center
Indianapolis, IN 46285-0725 USA
(1-317) 276-9118 Fax: (1-317) 276-4127
sam@lilly.com

Secretary

Margaret Simmons
San Diego Supercomputer Center
NPACI/SDSC
University of California, San Diego
MC 0505
9500 Gilman Dr., Bldg. 109
La Jolla, CA 92093-0505 USA
(1-619) 822-0857 Fax: (1-619) 534-8380
mls@sdsc.edu

Treasurer

Barbara Horner-Miller
Arctic Region Supercomputing Center
910 Yukon Drive, Suite 108, P.O. Box 756020
Fairbanks, AK 99775-6020 USA
(1-907) 474-5409 Fax: (1-907) 474-5494
horner@arsc.edu

Director—Asia/Pacific

Shigeki Miyaji
Chiba University
Dept. of Physics
1-33, Yayoi-cho, Inage-ku
2538522 Chiba, Japan
(81-43) 290-3719 Fax: (81-43) 290-3720
miyaji@c.chiba-u.ac.jp

Director—Europe

Bruno Loepfe
ETH Zürich
Informatikdienste/Systemdienste
Clausiusstrasse 59
CH-8092 Zürich Switzerland
(41-1) 632 35 56 Fax: (41-1) 632 10 22
loepfe@sd.id.ethz.ch

Director—Americas

Barry Sharp
Boeing Information and Support Services
TS Enterprise Servers
P.O. Box 3707 MC 7J-04
Seattle, WA 98124-3707 USA
(1-425) 865-6411 Fax: (1-425) 865-2221
barry.sharp@boeing.com

Past President

Gary Jensen
National Center for Supercomputing Applications
139 West 640 North
American Fork, UT 84003 USA
(1-801) 492-9235 Fax: (1-801) 492-9552
gajensen@uswest.net

CRAY USER GROUP INCORPORATED

CUG Chief Information Manager

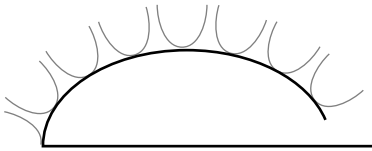
Walter Wehinger
Rechenzentrum der Universitaet Stuttgart
Allmandring 30
D-70550 Stuttgart Germany
(49-711) 685-2513 Fax: (49-711) 682 357
wehinger@rus.uni-stuttgart.de

Advisory Council Secretary and CUG.log Editor

Lynda Lester
National Center for Atmospheric Research
P.O. Box 3000
1850 Table Mesa Drive
Boulder, CO 80303 USA
(1-303) 497-1285 Fax: (1-303) 497-1804
lester@ucar.edu

Conference Chair

John Sell
Network Computing Services, Inc.
1200 Washington Ave. South
Minneapolis, MN 55415 USA
(1-612) 337-0200 Fax: (1-612) 337-3400
jsell@networkcs.com



Special Interest Groups

Communications and Data Management Group

Group Chair, Hartmut Fichtel
Deutsches Klimarechenzentrum GmbH
Systems Software
Bundesstrasse 55
D-20146 Hamburg 13 Germany
(49-40) 41-173-220 Fax: (49-40) 41-173-174
fichtel@dkrz.de

Chair, Mass Storage Systems Focus
Jeff Terstriep
National Center for Supercomputing Applications
152 Computing Applications Building
605 E. Springfield Ave.
Champaign, IL 61820 USA
(1-217) 244-2193 Fax: (1-217) 244-1987
jeff@ncsa.uiuc.edu

Chair, Networking Focus
Hans Mandt
Boeing Advanced Systems Laboratory
P.O. Box 3707
MC 7L-48
Seattle, WA 98124-2207 USA
(1-425) 865-3252 Fax: (1-425) 865-2965
hans.mandt@redwood.rt.cs.boeing.com

Deputy Chair, Networking Focus
Dieter Raith
Rechenzentrum der Universitaet Stuttgart
Systems LAN
Allmandring 30
D-70550 Stuttgart Germany
(49-711) 685-4516 Fax: (49-711) 682-357
raith@rus.uni-stuttgart.de

SGI Liaison, Communication and Data Management Group
Brian Gaffey
Silicon Graphics, Inc.
655 Lone Oak Drive
Eagan, MN 55121 USA
(1-651) 683-5445 Fax: (1-651) 683-5644
btg@sgi.com

Computer Services Group

Group Chair, Leslie Southern
Ohio Supercomputer Center
User Services
1224 Kinnear Road
Columbus, OH 43212-1163 USA
(1-614) 292-9248 Fax: (1-614) 292-7168
leslie@osc.edu

Chair, Operations Focus
Brian Kucic
National Center for Supercomputing Applications
605 E. Springfield
Champaign, IL 61820 USA
(1-217) 333-0926 Fax: (1-217) 244-9561
bkucic@ncsa.uiuc.edu

Chair, User Services Focus
Chuck Niggley
NASA Ames Research Center
M/S 258-6
Moffett Field, CA 94087
(1-650) 604-4347 Fax: (1-408) 737-2041
niggley@nas.nasa.gov

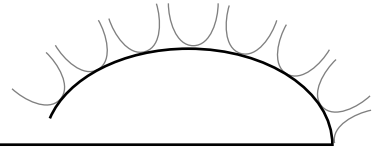
SGI Liaison, Computer Services Group
Lynn Sayles
655 Lone Oak Drive
Eagan, MN 55121
(1-651) 683-5723 Fax: (1-651) 683-5599
las@sgi.com

High Performance Solutions Group

Group Chair, Eric Greenwade
Idaho Natinal Engineering and Environmental Laboratory
P.O. Box 1625, MS-3605
Idaho Falls, ID 83415 USA
(1-208) 526-1276 Fax: (1-208) 526-4017
leg@inel.gov

Chair, Applications Focus
Larry Eversole
Jet Propulsion Laboratory
California Institute of Technology
4800 Oak Grove Drive, MS 126-147
Pasadena, CA 91109-8099 USA
(1-818) 354-2786 Fax: (1-818) 393-1187
larry.c.eversole@jpl.nasa.gov

Chair, Performance Focus
Michael Resch
Rechenzentrum der Universitaet Stuttgart
Allmandring 30
D-70550 Stuttgart Germany
(49-711) 685 5834 Fax: (49-711) 678 7626
resch@hlrs.de



Chair, Visualization Focus
John Clyne
National Center for Atmospheric Research
Scientific Computing Division
1850 Table Mesa Drive
Boulder, CO 80303 USA
(1-303) 497-1236 Fax: (1-303) 497-1804
clyne@ncar.ucar.edu

SGI Liaison, High Performance Solutions Group
Michael Brown
Silicon Graphics, Inc.
mbrown@engr.sgi.com

Operating Systems Group

Group Chair, Chuck Keagle
Boeing Information and Support Services
Engineering Systems Support
P.O. Box 3707, M/S 2T-20
Seattle, WA 98124 USA
(1-206) 544-5535 Fax: (1-206) 544-5544
chuck.keagle@boeing.com

Chair, IRIX Focus
Cheryl Wampler
Los Alamos National Laboratory
CIC-7, Computing
MS B294
Los Alamos, NM 87544 USA
(1-505) 667-0147 Fax: (1-505) 665-6333
clw@lanl.gov

Chair, Security Focus
Virginia Bedford
Arctic Region Supercomputing Center
University of Alaska
P.O. Box 756020
Fairbanks, AK 99775-6020 USA
(1-907) 474-5426 Fax: (1-907) 474-5494
bedford@arsc.edu

Chair, UNICOS Focus
Ingeborg Weidl
Max Planck Institut fuer Plasmaphysik
Computer Center
Boltzmannstrasse 2
D-85748 Garching Germany
(49-89) 3299-2191 Fax: (49-89) 3299-1301
weidl@ipp-garching.mpg.de

SGI Liaison, Operating Systems Group
Open

Programming Environments Group

Group Chair, Jeff Kuehn
National Center for Atmospheric Research
Scientific Computing Division
1850 Table Mesa Drive
Boulder, CO 80303 USA
(1-303) 497-1311 Fax: (1-303) 497-1804
kuehn@ucar.edu

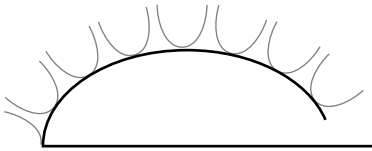
Chair, Compilers and Libraries Focus
Hans-Hermann Frese
Konrad Zuse-Zentrum für
Informationstechnik Berlin
Supercomputing Department
Takustrasse 7
D-14195 Berlin-Dahlem Germany
(49-30) 84185-145 Fax: (49-30) 84185-311
frese@zib.de

Chair, Software Tools Focus
Guy Robinson
Arctic Region Supercomputing Center
MPP Specialist
P.O. Box 756020
Fairbanks, AK 99775-6020 USA
(1-907) 474-6386 Fax: (1-907) 474-5494
robinson@arsc.edu

SGI Liaison, Programming Environments Group
Margaret Cahir
Silicon Graphics, Inc.
655 Lone Oak Drive
Eagan, MN 55121 USA
(1-612) 683-5072
mcahir@sgi.com

Tutorials

Chair, Helene E. Kulsrud
Institute for Defense Analyses
CCR-P
290 Thanet Road
Princeton, NJ 08540 USA
(1-609) 279-6243 Fax: (1-609) 924-3061
laney@ccr-p.ida.org



Contacts

Regional CUG Representatives

Latin CUG Representative

Alain Massiot
Centre de Ressources Informatiques de Haute-Normandie
32 rue Raymond Aron
F-76130 Mont Saint Aignan France
(33-2) 35596159 Fax: (33-2) 35596140
Alain.Massiot@crihan.fr

German CUG Representative

Hartmut Fichtel
Deutsches Klimarechenzentrum GmbH
Systems Software
Bundesstrasse 55
D-20146 Hamburg 13 Germany
(49-40) 41-173-220 Fax: (49-40) 41-173-174
fichtel@dkrz.de

Program Layout Committee

Chair: Sam Milosevich
Eli Lilly and Company
Computational Science Apps, DC0725
Lilly Corporate Center
Indianapolis, IN 46285-0725 USA
(1-317) 276-9118 Fax: (1-317) 276-4127
sam@lilly.com

Mary Kay Bunde
Silicon Graphics, Inc.
Software Development
655 Lone Oak Drive
Eagan, MN 55121 USA
(1-651) 683-5655 Fax: (1-651) 683-5098
mkay@sgi.com

Leslie Southern
Ohio Supercomputer Center
User Services
1224 Kinnear Road
Columbus, OH 43212-1163 USA
(1-614) 292-9248 Fax: (1-614) 292-7168
leslie@osc.edu

Hartmut Fichtel
Deutsches Klimarechenzentrum GmbH
Systems Software
Bundesstrasse 55
D-20146 Hamburg 13 Germany
(49-40) 41-173-220 Fax: (49-40) 41-173-174
fichtel@dkrz.de

Eric Greenwade
Idaho Natinal Engineering and Environmental Laboratory
P.O. Box 1625, MS-3605
Idaho Falls, ID 83415 USA
(1-208) 526-1276 Fax: (1-208) 526-4017
leg@inel.gov

Chuck Keagle
Boeing Information and Support Services
Engineering Systems Support
P.O. Box 3707, M/S 2T-20
Seattle, WA 98124 USA
(1-206) 544-5535 Fax: (1-206) 544-5544
chuck.keagle@boeing.com

Jeff Kuehn
National Center for Atmospheric Research
Scientific Computing Division
1850 Table Mesa Drive
Boulder, CO 80303 USA
(1-303) 497-1311 Fax: (1-303) 497-1804
kuehn@ucar.edu

Helene E. Kulsrud
Institute for Defense Analyses
CCR-P
290 Thanet Road
Princeton, NJ 08540 USA
(1-609) 279-6243 Fax: (1-609) 924-3061
laney@ccr-p.ida.org

Contacts

SGI Representatives to CUG

Vito Bongiorno
Silicon Graphics, Inc.
655 Lone Oak Drive
Eagan, MN 55121 USA
(1-651) 683-3404
Fax: (1-651) 683-5599
vb@sgi.com

Charlie Clark
Silicon Graphics, Inc.
Customer Service
890 Industrial Boulevard
Chippewa Falls, WI 54729 USA
(1-715) 726-5334
Fax: (1-715) 726-4343
cmc@sgi.com

Lynn Sayles
Silicon Graphics, Inc.
655 Lone Oak Drive
Eagan, MN 55121
(1-651) 683-5723
Fax: (1-651) 683-5599
las@sgi.com

Mary Kay Bunde
Silicon Graphics, Inc.
Software Development
655 Lone Oak Drive
Eagan, MN 55121 USA
(1-651) 683-5655
Fax: (1-651) 683-5098
mkay@sgi.com

Eric Pitcher
Silicon Graphics, Inc.
655 Lone Oak Drive
Eagan, MN 55121 USA
(1-651) 683-3414
Fax: (1-651) 683-5599
pitcher@sgi.com

Linda Yetzer
Silicon Graphics, Inc.
655 Lone Oak Drive
Eagan, MN 55121 USA
(1-651) 683-3556
Fax: (1-651) 683-5599
yetzerll@sgi.com

CUG Office

Bob Winget
2911 Knoll Road
Shepherdstown, WV 25443 USA
(1-304) 263-1756 Fax: (1-304) 263-4841
bob@fpes.com

Call for Papers

You'll want to mark your calendars for the CUG "Event of the Millennium": our next CUG conference will be held from May 22 through 26, 2000, near Amsterdam in Nordwick, The Netherlands. Our hosts will be Technical University of Delft and Stichting Academisch Rekencentrum Amsterdam. You and your colleagues from other CUG sites are the key to the conference, so we wanted to give you time to start thinking about presenting a paper. The information and experience you share in your presentation will provide you with the opportunity to help your colleagues solve problems and develop solutions relevant to your work environment.

Your paper will be organized under the following categories:

Group / Focus Area

Communications and Data Management
- Mass Storage
- Networking

Computer Services
- Operations
- User Services

High Performance Solutions
- Applications
- Performance
- Visualization

Operating Systems
- IRIX
- Security
- UNICOS

Programming Environments
- Compilers and Libraries
- Software Tools

Find a Group or Focus Chair during or after this conference (see the Contacts list on p. 29–33 of this Program) and discuss your ideas for your presentation. When you are ready to submit your abstract, use the on line form at the CUG home page, **www.cug.org**. It will be available by Sept. 15, 1999. Also check the CUG home page for guidelines for preparing and submitting your paper.