FCRC '96

Federated Computing Research Conference

Philadelphia Skyline

Invited Speakers

Wm. A. Wulf
Burton Smith
Cynthia Dwork
Robin Milner
Randy Katz

Sponsors

ACM
CRA
IEEE
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SIAM

CRA Workshop on Academic Careers for Women in Computing Science

23rd Annual ACM/IEEE International Symposium on Computer Architecture

ACM International Conference on Supercomputing

ACM SIGMETRICS International Conference on Measurement and Modeling of Computer Systems

28th Annual ACM Symposium on Theory of Computing

11th Annual IEEE Conference on Computational Complexity

15th Annual ACM Symposium on Principles of Distributed Computing

12th Annual ACM Symposium on Computational Geometry

First ACM Workshop on Applied Computational Geometry

ACM/UMIACS Workshop on Parallel Algorithms

ACM SIGPLAN '96 Conference on Programming Language Design and Implementation

ACM Workshop of Functional Languages in Introductory Computing

SIGPLAN International Conference on Functional Programming

10th ACM Workshop on Parallel and Distributed Simulation

ACM SIGMETRICS Symposium on Parallel and Distributed Tools

4th Annual ACM/IEEE Workshop on I/O in Parallel and Distributed Systems

SIAM Symposium on Networks and Information Management

May 20-28, 1996

Philadelphia, PA

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AT&T Bell Laboratories

Dave Patterson
University of California, Berkeley

Paul Young
CISE, NSF

WELCOME

Welcome to the second Federated Computing Research Conference, FCRC'96, which is being held May 20 - 28, 1996 at the Philadelphia downtown Marriott. This second FCRC follows the same model of the highly successful first conference, FCRC'93, in which nine constituent conferences participated. FCRC'96 includes seventeen constituent conferences - almost twice the size of FCRC'93! The FCRC model is one that assembles a number of existing, specialized, research conferences into a coordinated meeting held at a common time in a common place. This model retains the advantages of the smaller conferences, while at the same time, facilitating communication among researchers in different subfields in computer science and engineering. We have arranged a number of venues for attendee interaction including common breakfasts and coffee breaks throughout the week. And, of course, due to its size, FCRC'96 also provides great visibility for the field as a whole.

The technical program for each constituent conference is independently administered, with each responsible for its own meeting's structure, content, and proceedings. The constituent conference committees are to be commended for putting together exceptionally strong, interlinking technical programs. To the extent facilities allow, attendees are free to attend technical sessions of other constituent conferences being held at the same time as their "home" conference. Proceedings from other constituent conferences will be available for purchase on-site.

Five mornings of FCRC'96 week will start with a plenary talk on a topic of broad appeal to the CS&E community. We think you will find the talks presented by our outstanding slate of plenary speakers both inspiring and thought-provoking. The plenaries are open to anyone registered for a constituent conference meeting that day. FCRC week also features two exciting evening excursions, one Wednesday and one Saturday evening, and an informative Friday evening Panel organized by CRA. Almost all constituent conferences meeting on Wednesday or Saturday have included the excursion in their registration package. The CRA Panel is open to all registrants. Exhibits, consisting of books and educational software displays and demonstrations, will be open Wednesday through Sunday of FCRC week.

You have probably noticed that FCRC week spans a U.S. holiday, Memorial Day. The Organizing Committee encourages you to consider bringing your family along to Philadelphia. They can have fun (while you work!). Philadelphia boasts world famous art exhibits and museums, a lively and colorful historic district, exciting arts and entertainment venues, and fantastic restaurants.

In planning FCRC'96, the Organizing Committee is grateful for support and assistance from the sponsoring organizations (ACM, CRA, The IEEE Computer Society, and SIAM) as well as the National Science Foundation. ACM, The Association for Computing, was notably active in providing support and planning expertise. In particular, the Committee would like to extend a warm thanks to Debbie Hall of ACM SIG Services for her help with budgets, schedules, printings and mailings, and for putting up with our naiveté about society policies and procedures. Rod Abraham and the staff of R.E. Abraham Associates provided outstanding conference management services. Finally, the Committee would like to thank James Haines of the Computer Science Department at Purdue University, who formatted this Advance Program with much patience, professionalism, and humor. The computing resources provided by Purdue's Computer Science Department for its production are also gratefully acknowledged.

CONTENTS

Invited Speakers

P1

Wm. A. Wulf

University of Virginia
Wednesday, May 22, 1996
8:00 – 9:00 am
Room: Salon F, Grand Ballroom

Information Technology Is The Lever, But Where Shall We Stand?

Bill Wulf is AT&T Professor of Engineering at the University of Virginia. He formerly was a Professor of Computer Science at Carnegie-Mellon, founded and was CEO of Tartan Laboratories, and was Assistant Director of NSF. His research interests have spanned programming languages, optimizing compilers, computer architecture, and computer security.

His current activities include research into memory systems architecture, steering a fundamental rethinking of the undergraduate CS curriculum, assisting scholars in the humanities exploit information technology, and chairing the Computer Science and Telecommunications Board at the National Research Council. Dr. Wulf is a member of the National Academy of Engineering, a Fellow of the American Academy of Arts and Sciences, and a Fellow of the ACM, IEEE, and AAAS.

P2

Burton Smith

Tera Computer
Thursday, May 23, 1996
8:00 – 9:00 am
Room: Salon F, Grand Ballroom

Designing your own multi-threaded processor

Burton Smith is Chairman and Chief Scientist of Tera Computer Company. He received the BSEE from the University of New Mexico in 1967 and the Sc.D. from MIT in 1972. From 1985 to 1988 he was Fellow at the Supercomputing Research Center of the Institute for Defense Analyses in Maryland. Before that, he was Vice President, Research and Development at Denelcor, Inc. and was chief architect of the HEP computer system. Dr. Smith is a Fellow of the ACM and a Fellow of the IEEE, and winner of the IEEE-ACM Eckert-Mauchly award in 1991. His main interest is general purpose parallel computer architecture.

P3

Cynthia Dwork

IBM Almaden
Friday, May 24, 1996
8:00 – 9:00 am
Room: Salon F, Grand Ballroom

TBA

Cynthia Dwork has been a member and occasional manager of the Systems Fundamentals group at the IBM Almaden Research Center since 1985. Her principal areas of research are distributed computing and cryptography, with particular emphasis on applications of the latter to the former. For several years she has worked both to gain theoretical understanding of the sui generis cryptographic requirements of distributed computing aggregates, such as the Internet, and to develop practical primitives for these and more structured environments. This work has ranged from the invention of non-malleable cryptography to the design of the security architecture of the Almaden Distributed Digital Library System (both collaborative efforts).

P4

Robin Milner

University of Cambridge UK
Saturday, May 25, 1996
8:00 – 9:00 am
Room: Salon F, Grand Ballroom

Computing is Interaction

Robin Milner is Professor of Computation Theory at Cambridge UK, since January 1995; from January 1996 he is Head of the Computer Laboratory there. Previously he was at the University of Edinburgh for 22 years; in 1986, with colleagues, he founded there the Laboratory for Foundation of Computer Science. In 1991 gained the A.M. Turing Award.

He has worked on computer-assisted reasoning; his system LCF (Logic for Computable Functions) was a model for several later systems. He led a team which designed and defined Standard ML, a widely used programming language; this is one of the first industry-scale languages whose semantic definition is fully formal. His main contribution has been to the theory of concurrent computation. Some of this work is widely accessible through his book Communication and Concurrency (1989); also, around that time he devised (with two colleagues) the pi calculus, a basic model for mobile communicating systems. A continuing purpose of this work is to unite the theories which underlie computation and communication.

P5

Randy Katz

UC - Berkeley
Sunday, May 26, 1996
8:00 – 9:00 am
Room: Salon F, Grand Ballroom

The Case for Wireless Overlay Networks

Randy H. Katz is a leading researcher in computer system design and implementation. He has written over 120 technical publications on CAD, database management, multiprocessor architectures, high performance storage systems, and video server architectures.

He led the implementation of the SPUR (Symbolic Processing Using RISCs) multiprocessor memory system, the first such system to integrate coherent multiprocessor cache memories with efficient virtual memory management. He was responsible for co-developing the concept of Redundant Arrays of Inexpensive Disks (RAID). He led the implementation of the first large-scale RAID file server for high performance applications. From January 1993 through December 1994, Katz was a program manager and deputy director of the Computing Systems Technology Office of ARPA.

Katz's recent research has focused on wireless communications and mobile computing. His current work involves providing seamless roaming across heterogeneous wireless networks. In collaboration with several service providers and wireless technology companies, he is developing a wireless communications testbed in the San Francisco Bay Area called BARWAN (Bay Area Research Wireless Access Network).

FCRC Town Meeting

TH

Town Hall Meeting

Friday, May 24, 1996
6:00 pm – 7:30 pm
Room: Salon F, Grand Ballroom

Our Precarious Future: Who Will Fund Computing Research and Why?

The Computing Research Association presents a discussion among influential policy makers from industry, academia and government concerning the funding future of computing research. At a time of significant threats to government funding sources and industrial focus on product-relevant research, this issue affects us all. Find out where your research funding will (or won't) come from!

Government: The Honorable Robert S. Walker (R PA, 16th District). Chair, House Committee on Science (invited)

Industry: (to be announced)

Academia: Professor Dave Patterson (Moderator) University of California, Berkeley. Chair, Computing Research Association

Exhibits
Wednesday – Sunday
9:00 am – 6:00 pm
Room: Franklin Hall

Continental Breakfast
Daily
7:15 am – 8:00 am
Room: Franklin Hall

CRA Workshop on Academic Careers for Women (Careers)

Continental Breakfast
Daily
7:15 am – 8:00 am
Room: Franklin Hall

Registration for the CRA Workshop on Academic Careers for Women in Computer Science includes continental breakfasts, coffee breaks, lunch on May 20th, and a reception on the evening of May 20th. The workshop is sponsored by the Computing Research Association with support from the National Science Foundation.

Sessions

Introduction and Welcome

Monday, May 20, 1996
8:15 am – 8:30 am

Janice Cuny, general chair
University of Oregon

This is the fifth in a series of CRA-sponsored Workshops on Academic Careers for Women in Computer Science. The workshop is primarily intended for women who are beginning academic careers -- either in the final stages of finishing a Ph.D. or newly hired as faculty. Participants will meet with women who are already established in their fields. The established professionals will share their own experiences, providing practical information, advice, and support to their younger colleagues. The workshop will impart basic information that new faculty members need for success.

S1

The Tenure Decision

Monday, May 20, 1996
8:30 am – 9:45 am

Mary Jane Irwin, chair
Pennsylvania State University

What's needed and what's not needed. Writing a good tenure dossier. Choosing references. Typical successful cases. Common pitfalls and mistakes.

S2

Building a Research Program

Monday, May 20, 1996
9:45 am – 11:00 am

Nancy Leveson, chair
University of Washington

Going beyond your thesis. Advising graduate students. Collaborating. Journal versus conference publications. What referees look for. What to do when a paper is rejected.

11:00 am Coffee Break

S3

Teaching

Monday, May 20, 1996
11:30 am – 12:30 am

Joan Francioni, chair
University of Southwestern Louisiana

How to be a good teacher. Common mistakes of new teachers. What should you be teaching. Dealing with problem students. Special problems facing women faculty. Documenting your accomplishments.

L

12:30 pm – 1:30 pm
Luncheon

S4

Getting a Job

Monday, May 20, 1996
1:30 pm – 2:30 pm

Francine Berman, chair
University of California at San Diego

How to develop a marketable vita. Options after grad school. Interviewing. The Offer.

S5

First Year Surprises

Monday, May 20, 1996
2:30 pm – 3:30 pm

Eileen Kraemer, chair
Washington University

The first few years. How to establish yourself. Tips for getting started.

3:30 pm Coffee Break

S6

Funding Mini-Workshop

Monday, May 20, 1996
4:00 pm – 6:00 pm

Caroline Wardle, chair
National Science Foundation

Writing an NSF proposal.

R

Reception

Monday, May 20, 1996
6:30 pm

S7

Networking

Tuesday, May 21, 1996
8:30 am – 9:30 am

Susan Eggers, chair
University of Washington

The importance of networking. Attending conferences. Describing your work. Being part of the "young girls' network."

S8

The Perspective From the Smaller Schools

Tuesday, May 21, 1996
9:30 am – 10:30 am

Sheila Castaneda, chair
Clarke College

How do requirements and expectations differ at smaller schools and four year institutions. Research with fewer resources. Rewards.

10:30 am Coffee Break

S9

Time Management

Tuesday, May 21, 1996
11:00 am – 12:30 pm

Janice Cuny, chair
University of Oregon

How can you get this all done? How hard do you have to work? Life outside of work. Balancing family life with a career. Two career familes.

Committee

Janice Cuny
University of Oregon
Organizer and General Chair

Francine Berman
University of California at San Diego

Ruzena Bajcsy
University of Pennsylvania

Carla Brodley
Purdue University

Sheila Castaneda
Clarke College

Susan Eggers
University of Washington

Joan Fiegenbaum
AT&T

Joan Francioni
University of Southwestern Louisiana

Helen Gill
National Science Foundation

Mary Jane Irwin
Pennsylvania State University

Eileen Kraemer
Washington University

Andrea LaPaugh
Princeton University

Nancy Leveson
University of Washington

Dian Rae Lopez
University of Minnesota at Morris

Donna Reese
Mississippi State University

Mary Vernon
University of Wisconsin

Caroline Wardle
National Science Foundation

23rd Annual International Symposium On Computer Architecture (ISCA)

Plenary Invited Speaker
Daily
8:00 — 9:00 am
Room: Salon F
Grand Ballroom

Registration for the 23rd Annual International Symposium On Computer Architecture includes a SIGARCH/TCCA business meeting, a reception, an evening excursion, Eckert-Mauchly Award Lunch, continental breakfasts, coffee breaks, and conference proceedings. Student registration includes all of the above except the evening excursion. The conference is sponsored by the ACM Special Interest Group on Computer Architecture and the IEEE Computer Society Technical Committee on Computer Architecture.

Sessions and Tutorials

ISCA '96
Student Travel Grants

A limited number of Student Travel Grants will be available for ISCA '96 student attendees. To apply for a grant, please contact (preferably by e-mail);

Prof. Jean-Loup Baer
Dept. of Computer Science
and Engineering
Box 352350
University of Washington
Seattle, WA 98195-2350
baer@cs.washington.edu

T1 A

Pradip Bose
IBM T. J. Watson Research Center

S. Surya
IBM Corp., Somerset Design Center

Tuesday, May 21, 1996
8:30 am – 12:30 pm

Pre-Silicon Performance Analysis and Verification Methodology

A significant portion of this tutorial will be devoted to the problem of validation and formal verification of processor timer models, based on latest research at IBM and elsewhere. We will cover: (a) early estimation models for use during processor design definition; (b) cycle-by-cycle simulation models for CPU-memory subsystems; (c) model validation and application performance verification; (d) generation of representative traces from user and benchmark source code; (e) projection of benchmark suite performance using the target processor simulation model; and (f) compiler tuning basics for performance enhancement of processor-memory subsystems. Extensions to cover SMP performance also will be described briefly.

T1 B

Jelica Protic, Milo Tomasevic and Veljko Milutinovic
Institute for Advanced Computer Technology, Belgrade, Yugoslavia

Tuesday, May 21, 1996
8:30 am – 12:30 pm

Distributed Shared Memory: Concepts and Systems

This tutorial will be an introduction to DSM concepts and algorithms. We will cover memory consistency models with examples; classification criteria and parameters; hardware implementations (e.g., DASH, SCI, KSR, DDM, Merlin, RMS, and state-of-the-art research); software implementations (e.g., Munin, IVY, Linda, Mirage, Clouds, Orca, and state-of-the-art research); and hybrid implementations (e.g., Alewife, Paradigm, Galactica, Plus, Flash, Shrimp, and state-of-the-art research). Examples and case studies will be presented.

T2 A

Peter Steenkiste
Carnegie Mellon University

Tuesday, May 21, 1996
1:30 pm – 5:30 pm

High-Performance Communication on Loosely-Coupled Systems: Architecture and Software

Application-level communication performance often is limited by the interface between the compute node and the network or interconnect. In this tutorial we will describe hardware and software techniques that can be used to improve communication performance on loosely-coupled systems. We will draw from our experience in the Nectar, Gigabit Nectar, and Credit Net high-speed networking projects, and from lessons learned by the architecture community in optimizing communication on tightly-coupled systems. The tutorial will be based on a "vertical slice" approach where we look at system issues from the Application Programming Interface all the way down to the communication hardware.

T2 B

Yale N. Patt
University of Michigan

Tuesday, May 21, 1996
1:30 pm – 5:30 pm

Continuing to Exploit Instruction Level Parallelism: Issues, Bottlenecks, and Enabling Conditions

Exploiting instruction level parallelism continues to be a hot topic in computer architecture. We will focus on what you can accomplish at run time, along with how the compiler can help. Compile time vs. run time, superscalar vs. VLIW, and the various design decisions affecting the microarchitecture (instruction supply mechanisms, branch prediction, multi-wide decode/issue, static or dynamic scheduling, multiple functional units and distribution buses, and various state maintenance mechanisms) will be covered. Recent announcements of wide-issue processors, most using out-of-order execution, will be discussed. Finally, what to expect in the near future, especially in light of these recent announcements, coupled with renewed interest in VLIW.

R

Reception

Tuesday, May 21, 1996
7:00 pm – 10:00 pm

S1

Welcome

Wednesday, May 22, 1996
9:20 am – 9:30 am

Keynote Address

9:30 am – 10:30 am

10:30 am Coffee Break

S2 A

Branch Prediction

Wednesday, May 22, 1996
11:00 am – 12:30 pm

Joel Emer, chair

Using Hybrid Branch Predictors to Improve Branch Prediction Accuracy in the Presence of Context Switches
Marius Evers, Po-Yung Chang and Yale N. Patt
University of Michigan

An Analysis of Dynamic Branch Prediction Schemes on System Workloads
Nicolas Gloy, Cliff Young, J. Bradley Chen and Michael D. Smith
Harvard University

Correlation and Aliasing in Dynamic Branch Predictors
Stuart Sechrest, Chih-Chieh Lee and Trevor N. Mudge
University of Michigan

S2 B

Shared Memory

Wednesday, May 22, 1996
11:00 am – 12:30 pm

Per Stenstrom, chair

Decoupled Hardware Support for Distributed Shared Memory
Steven K. Reinhardt, Robert W. Pfile and David A. Wood
University of Wisconsin

MGS: A Multi-Grain Shared Memory System
Donald Yeung, John Kubiatowicz and Anant Agarwal
MIT

COMA: an Opportunity for Building Fault-Tolerant Scalable Shared Memory Multiprocessors
Christine Morin, Alain Gefflaut, Michel Banâtre and Anne-Marie Kermarrec
IRISA

S3

Processor/Memory Tradeoffs

Wednesday, May 22, 1996
2:00 pm – 3:30 pm

Dave Patterson, chair

Evaluation of Design Alternatives for a Multiprocessor Microprocessor
Basem A. Nayfeh, Lance Hammond and Kunle Olukotun
Stanford University

Memory Bandwidth Limitations of Future Microprocessors
Doug Burger, Alain Kägi and James R. Goodman
University of Wisconsin

Sessions

Missing the Memory Wall: The Case for Processor/Memory Integration
Ashley Saulsbury
Swedish Institute of Computer Science
Fong Pong and Andreas Nowatzyk
Sun Microsystems Computer Corporation

3:30 pm Coffee Break

S4

Panel Discussion: Research Opportunities and Critiques: An Industrial Perspective

Wednesday, May 22, 1996
4:00 pm – 5:30 pm

Dave Patterson, Organizer

S5 A

Cache Organization

Thursday, May 23, 1996
9:30 am – 10:30 pm

Corinna Lee, chair

Don't use the page number, but a pointer on it
André Seznec
IRISA

The Difference-bit Cache
Toni Juan and Juan J. Navarro
Universitat Politecnica de Catalunya
Tomas Lang
UC Irvine

S5 B

Application Implications for MP Systems

Thursday, May 23, 1996
9:30 am – 10:30 pm

Thomes Gross, chair

Understanding the Performance of Shared Virtual Memory from an Applications Perspective
Liviu Iftode, Jaswinder Pal Singh and Kai Li
Princeton University

Application and Architectural Bottlenecks in Large Scale Distributed Shared Memory Machines
Chris Holt and John Hennessy
Stanford University
Jaswinder Pal Singh
Princeton University

10:30 am Coffee Break

S6 A

Superscalar Memory Systems

Thursday, May 23, 1996
11:00 am – 12:00 pm

Matt Farrens, chair

Increasing Cache Port Efficiency for Dynamic Superscalar Microprocessors
Kenneth M. Wilson, Kunle Olukotun and Mendel Rosenblum
Stanford University

High-Bandwidth Address Translation for Multiple-Issue Processors
Todd M. Austin and Gurindar S. Sohi
University of Wisconsin

S6 B

I/O and Interrupts

Thursday, May 23, 1996
11:00 am – 12:00 pm

Jai Menon, chair

DCD-Disk Caching Disk: A New Approach for Boosting I/O Performance
Yiming Hu and Qing Yang
University of Rhode Island

Polling Watchdog: Combining Polling and Interrupts for Efficient Message Handling
Olivier Maquelin, Guang R. Gao, Kevin Theobald and Xinmin Tian
McGill University
Herbert H. J. Hum
Concordia University

L

12:30 pm – 2:00 pm
E-M Award Luncheon

S7 A

Processor Microarchitecture

Thursday, May 23, 1996
2:00 pm – 3:30 pm

Jim Smith, chair

Exploiting Choice: Instruction Fetch and Issue on an Implementable Simultaneous Multithreading Processor
Dean M. Tullsen, Susan J. Eggers, Henry M. Levy and Jack L. Lo
University of Washington
Joel S. Emer and Rebecca L. Stamm
Digital Equipment Corporation

Evaluation of Multithreaded Uniprocessors for Commercial Application Environments
Rick J. Eickmeyer, Ross E. Johnson, Steve R. Kunkel, Shiafun Liu and Mark S. Squillante
IBM

Performance Comparison of ILP Machines with Cycle Time Evaluation
Tetsuya Hara, Hideki Ando, Chikako Nakanishi and Masao Nakaya
Mitsubishi Electric Corporation

S7 B

Networks

Thursday, May 23, 1996
2:00 pm – 3:30 pm

Kai Li, chair

Rotating Combined Queueing (RCQ): Bandwidth and Latency Guarantees in Low-Cost, High-Performance Networks
Jae H. Kim and Andrew A. Chien
University of Illinois at Urbana-Champaign

A Router Architecture for Real-Time Point-to-Point Networks
Jennifer Rexford, John Hall and Kang G. Shin
University of Michigan

Coherent Network Interfaces for Fine-Grain Communication
Shubhendu S. Mukherjee, Babak Falsafi, Mark D. Hill and David A. Wood
University of Wisconsin

3:30 pm Coffee Break

S8

Performance Evaluation and Optimization

Thursday, May 23, 1996
4:00 pm – 5:30 pm

Patricia Teller, chair

Informing Memory Operations: Providing Memory Performance Feedback in Modern Processors
Mark Horowitz
Stanford University
Margaret Martonosi
Princeton University
Todd C. Mowry
University of Toronto
Michael D. Smith
Harvard University

Instruction Prefetching of Systems Codes With Layout Optimized for Reduced Cache Misses
Chun Xia and Josep Torrellas
University of Illinois at Urbana-Champaign

Compiler and Hardware Support for Cache Coherence in Large-Scale Multiprocessors: Design Considerations and Performance Evaluation
Lynn Choi
University of Illinois
Pen-Chung Yew
University of Minnesota

M

SIGARCH/TCCA Business Meeting

Thursday, May 23, 1996
6:00 pm

S9

Systems

Friday, May 24, 1996
9:30 am – 10:30 am

Steve Scott, chair

Early Experience with Message-Passing on the SHRIMP Multicomputer
Richard D. Alpert, Angelos Bilas, Matthias A. Blumrich, Douglas W. Clark, Stefanos Damianakis, Cezary Dubnicki, Edward W. Felten, Liviu Iftode and Kai Li
Princeton University

STiNG: A CC-NUMA Computer System for the Commercial Marketplace
Tom Lovett and Russell Clapp
Sequent Computer Systems

10:30 am Coffee Break

S10

Joint ISCA/PODC Panel and Discussion

Friday, May 24, 1996
11:00 am – 12:30 pm

23rd Annual International Symposium On Computer Architecture (ISCA)

Committees

Allan Gottlieb
New York University
General Chair

Norm Jouppi
Digital Equipment Corporation
Program Chair

Patricia Teller
New Mexico State University
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Real World Computing Partnership

Steve Scott
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André Seznec
IRISA-INRIA

Mike Smith
Harvard

Guri Sohi
Univ. of Wisconsin

Per Stenstrom
Lund University

Patricia Teller
New Mexico State Univ.

Mateo Valero
Univ. of Catalonia

International Conference on Supercomputing (ICS)

Plenary Invited Speaker
Daily
8:00 — 9:00 am
Room: Salon F
Grand Ballroom

Registration for the 1996 International Conference on Supercomputing includes an excursion, a reception, a luncheon, continental breakfasts, coffee breaks, and conference proceedings. Student registration includes all of the above except the evening excursion. The conference is sponsored by the ACM Special Interest Group on Computer Architecture.

Tutorial and Sessions

T

Dr. Michael Wolfe
The Portland Group, Inc., and Oregon Graduate Institute

Friday, May 24, 1996
9:30 am – 5:00 pm

Supercomputer Architecture: Hardware and Software Trade-offs

Michael Wolfe is a leader in the development of optimizing and parallelizing compilers. Since 1988, he has been Associate Professor at the Oregon Graduate Institute. In 1996, he joins the Portland Group, Inc., the leading supplier of optimizing High Performance Fortran compilers.

This full day tutorial will cover modern supercomputer architectures, ranging from pipelined superscalar and vector processors to moderately and massively parallel systems. Of particular interest are the trade-offs between capabilities implemented in hardware vs. software, such as parallelism detection and exploitation, memory locality, and so on.

This tutorial is aimed at developers, researchers and students who want a fast-paced, comprehensive introduction to the wide variety of supercomputer architectures available. This includes system software and hardware developers, as well as application writers.

S1 A

Distributed Memory Compilers

Saturday, May 25, 1996
9:30 am – 11:00 am

Compiler Support for Hybrid Irregular Accesses on Multicomputers
Antonio Lain and Prithviraj Banerjee
University of Illinois at Urbana-Champaign

Analysis of Local Enumeration and Storage Schemes in HPF
H.J. Sips and C. van Reeuwijk
Delft University of Technology, Delft, the Netherlands
W. Denissen
TNO-TPD, Delft, the Netherlands

Detection and Global Optimization of Reduction Operations for Distributed parallel Machines
Toshio Suganuma, Hideaki Komatsu and Toshio Nakatani
IBM Japan Tokyo Research Laboratory, Kanagawa, Japan

S1 B

Memory Systems (I)

Saturday, May 25, 1996
9:30 am – 11:00 am

Memory Organization in Multi-Channel Optical Networks: NUMA and COMA Revisited
John K. Bennett and Y. Y. Xaio
Rice University

The GLOW Cache Coherence Protocol Extensions for Widely Shared Data
Stefanos Kaxiras and James R. Goodman
University of Wisconsin-Madison

A Cost-Comparison Approach for Adaptive Distributed Shared Memory
Jai-Hoon Kim and Nitin H. Vaidya
Texas A&M University

11:00 am Coffee Break

S2

Invited Talk

Saturday, May 25, 1996
11:30 am – 12:30 pm

S3 A

Distribution of Data and Computations

Saturday, May 25, 1996
2:00 pm – 4:00 pm

Minimizing Communication while Preserving Parallelism
Wayne Kelly and William Pugh
University of Maryland

Data-Localization for Fortran Macro-Dataflow Computation Using Partial Static Task-Assignment
Akimasa Yoshida, Kenichi Koshizuka and Hironori Kasahara
Waseda University, Tokyo, Japan

Mapping Performance Data for High-Level and Data Views of Parallel Program Performance

Sessions

R. Bruce Irvin
Informix Software Inc.
Barton P. Miller
University of Wisconsin-Madison

Experimental Evaluation of Efficient Sparse Matrix Distributions
Manuel Ujaldon and Emilio L. Zapata
University of Malaga, Spain
Shamik D. Sharma and Joel Saltz
University of Maryland

S3 B

Physical and Mathematical Computations

Saturday, May 25, 1996
2:00 pm – 3:30 pm

A Generator of Multi-Platform High Performance Codes for PDE-based Scientific Applications
Robert vanEngelen, Lex Wolters and Gerard Cats
Leiden University, the Netherlands

A Performance Study of Cosmological Simulations on Message-Passing and Shared-Memory Multiprocessors
Marios D. Dikaiakos and Joachim Stadel
University of Washington

Parallel Additive Lagged Fibonacci Random Number Generators
Srinivas Aluru
Syracuse University

3:30 pm Coffee Break

S4

Data Prefetching

Saturday, May 25, 1996
4:30 pm – 5:30 pm

Data Prefetching and Multi-level Blocking for Linear Algebra Operations
Juan J. Navarro, Elena Gracia-Diego and Jose R. Herrero
Universitat Politecnica de Catalunya, Barcelona, Spain

A Template for Non-uniform Parallel Loops Based on Dynamic Scheduling and Prefetching Techniques
Salvatore Orlando
Universita' Ca' Foscari Venezia, Venezia Mestre, Italy
Raffaele Perego
Istituto CNUCE, Consiglio Nazionale delle Ricerche (CNR), Pisa, Italy

S5

Invited Session

Sunday, May 26, 1996
9:30 am – 12:30 pm

Dennis Gannon, Organizer
Indiana University

MetaComputing: Progress and New Directions in Parallel and Distributed Computing

S6 A

Memory Systems (II)

Sunday, May 26, 1996
2:00 pm – 3:30 pm

Evaluation of Dynamic Access Ordering Hardware
Sally McKee, C.W. Oliver, W.A. Wulf, K.L. Wright and J.H. Taylor
University of Virgina

Examination of a Memory Access Classification Scheme for Pointer-intensive and Numeric Programs
Sharad Mehrotra and Luddy Harrison
University of Illinois at Urbana-Champaign

Optimizing the Primary Cache for Parallel Scientific Applications: The Pool Buffer Approach
Josep Torrellas and Liuxi Yang
University of Illinois at Urbana-Champaign

S6 B

Load Balance Issues in Unstructured Applications

Sunday, May 26, 1996
2:00 pm – 3:30 pm

ParInt: A Software Package for Parallel Integration
Elise de Doncker, Ajay Gupta, Jay Ball, Patricia Ealy and Alan Genz
Western Michigan University

Automatic Partitioning Techniques for Solving Partial Differential Equations on Irregular Adaptive Meshes
Jerome Galtier
Universite de Versailles Saint-Quentin, France

Profile Driven Weighted Decomposition
Karen A. Tomko
Wright State University
Edward S. Davidson
University of Michigan

3:30 pm Coffee Break

S7 A

Message Passing Optimizations

Sunday, May 26, 1996
4:00 pm – 5:30 pm

Evaluating the Limits of Message Passing via the Shared Attraction Memory on CC-COMA Machines: Experiences with TCGMSG and PVM
Kaushik Ghosh
Georgia Institute of Technology
Steve Breit
Dragon Systems

Hybrid Algorithms for Complete Exchange in 2D Meshes
N.S.Sundar, D.N.Jayasimha, D.K.Panda and P.Sadayappan
Ohio State University

The Effect of Interrupts on Software Pipeline Execution on Message-passing Architectures
Rob F. Van der Wijngaart, Sekhar R. Sarukkai and Pankaj Mehra
NASA Ames Research Center

S7 B

Combinatorial Problems

Sunday, May 26, 1996
4:00 pm – 5:30 pm

Amon2: A Parallel Wire Routing Algorithm on a Torus Network Parallel Computer
Hesham Keshk, Shin-ichiro Mori, Hiroshi Nakashima and Shinji Tomita
Kyoto University, Kyoto, Japan

Parallel Construction of Multi-Dimensional Binary Search Trees
Ibraheem Al-furaih, Srinivas Aluru and Sanjay Goil
Syracuse University
Sanjay Ranka
University of Florida

Satisfiability Test with Synchronous Simulated Annealing on the Fujitsu AP1000 Massively-Parallel Multiprocessor
Andrew Sohn
New Jersey Institute of Technology

R

Reception

Sunday, May 26, 1996
7:00 pm – 10:00 pm

S8 A

Runtime Optimizations

Monday, May 27, 1996
9:30 am – 11:00 am

Automating Parallel Runtime Optimizations Using Post-Mortem Analysis
Sanjeev Krishnan and Laxmikant V.Kale
University of Illinois at Urbana-Champaign

Runtime Coupling of Data-parallel Programs
M.Ranganathan, A.Acharya, G.Edjlali, A.Sussman and J.Saltz
University of Maryland

Run-time Compilation for Parallel Sparse Matrix Computations
Cong Fu and Tao Yang
University of California

S8 B

Analysis of Multi-Node Systems

Monday, May 27, 1996
9:30 am – 11:00 am

Synchronization Hardware for Networks of Workstations: Performance vs. Cost
Rahmat S. Hyder and David A. Wood
University of Wisconsin-Madison

Are There Advantages to High-Dimension Architectures?: Analysis of k-ary n-cubes for the Class of Parallel Divide-and-Conquer Algorithms
Shantanu Dutt and Nam Trinh
Univ. of Minnesota

Evaluating Virtual Channels for Cache-Coherent Shared-Memory Multiprocessors
Akhilesh Kumar and Laxmi Bhuyan
Texas A&M University

Sessions

11:00 am Coffee Break

S9

Invited Talk

Monday, May 27, 1996
11:30 am – 12:30 pm

L

12:30 pm – 2:00 pm
ICS Luncheon

S10 A

Compilation Techniques

Monday, May 27, 1996
2:00 pm – 3:30 pm

A New Guaranteed Heuristic for the Software Pipelining Problem
Pierre-Yves Calland, Alain Darte and Yves Robert
Ecole Normale Superieure de Lyon, France

A Register Allocation Technique Using Guarded PDG
Akira Koseki and Yoshiaki Fukazawa
Waseda University, Tokyo, Japan
Hideaki Komatsu
IBM Japan Tokyo Research Laboratory, Kanagawa, Japan

Counting Solutions to Linear and Nonlinear Constraints Through Ehrhart polynomials: Applications to Analyze and Transform Scientific Programs
Philippe Clauss
Universite Louis Pasteur, France

S10 B

Linear Algebra

Monday, May 27, 1996
2:00 pm – 3:30 pm

An Efficient Steepest-Edge Simplex Algorithm for SIMD Computers
Michael E. Thomadakis and Jyh-Charn Liu
Texas A&M University

Parallel Implementation of the Lanczos Method for Sparse Matrices: Analysis of Data Distributions
E.M. Garzon and I. Garcia
Universidad de Almeria, Spain

Block Algorithms for Sparse Matrix Computations on High Performance Workstations
Juan J. Navarro, Elena Garcia, Josep-L. Larriba-Pey and Toni Juan
Universitat Politecnica de Catalunya, Spain

3:30 pm Coffee Break

S11 A

Programming Models

Monday, May 27, 1996
4:00 pm – 5:30 pm

Inference Mechanism for Fast Array Language Computation
Luiz De Rose and David Padua
University of Illinois at Urbana-Champaign

Integrating Task and Data Parallelism Using Shared Objects
Saniya Ben Hassen and Henri Bal
Vrije Universiteit, Amsterdam, the Netherlands

Eliminating Redundant Barrier Synchronizations in Rule-based Programs
Anurag Acharya
University of Maryland

S11 B

Performance Evaluation

Monday, May 27, 1996
4:00 pm – 5:30 pm

Benchmark Tests on the Digital Equipment Corporation Alpha AXP 21164-Based AlphaServer 8400
Harvey Wasserman
Los Alamos National Laboratory

Fine Grain Parallel Communication on General Purpose LANs
T. Mummert, C. Losak, P. Steenkiste and A. Fisher
Carnegie Mellon University

Improving Single-Process Performance with Multithreaded Processors
Olivier Teman and A. Farcy
University of Versailles, France

S12

Input/Output Systems

Tuesday, May 28, 1996
9:30 am – 11:00 am

An Interprocedural Framework for Placement of Asynchronous I/O operations
Gagan Agrawal, Anurag Acharya and Joel Saltz
University of Maryland

Automatic Optimization of Communication in Compiling Out-of-core Stencil Codes
Rajesh Bordawekar and Alok Choudhary
Syracuse University
J.Ramanujam
Louisiana State University

The Galley Parallel File System
Nils Nieuwejaar and David Kotz
Dartmouth College

11:00 am Coffee Break

S13

Vector Memory Systems

Tuesday, May 28, 1996
11:30 am – 12:30 pm

Reducing Inter-Vector-Conflicts in Complex Memory Systems
Anna del Corral and J. Llaberia
Universitat Politecnica de Catalunya, Barcelona, Spain

Performance of the Vectorial Processor VEC-SM2 Using Serial Multiport Memory
Jacques Jorda, A. Mzoughi and D. litaize
IRIT/UPS, Toulouse, France

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Olivier Telman
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Clemens Thole
GMD - German National Research Center for Information Technology

Josep Torrellas
University of Illinois at Urbana-Champaign

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Los Alamos National Laboratory

Harry Wijshoff
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Michael Wolfe
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Yoshinori Yamaguchi
Electrotechnical Laboratory, Japan

Xiaodong Zhang
University of Texas at San Antonio

Hans P. Zima
University of Vienna, Austria

Plenary Invited Speaker
Daily
8:00 — 9:00 am
Room: Salon F
Grand Ballroom

Registration for the 1996 ACM SIGMETRICS Conference on Measurement and Modeling of Computer Systems includes one lunch, a reception, an evening excursion, continental breakfasts, coffee breaks, and the conference proceedings. The student registration includes all of the above except the evening excursion. The conference is sponsored by the ACM Special Interest Group on Measurement and Modeling of Computer Systems.

Tutorials

T1 A

Larry Dowdy
Vanderbilt University

Thursday, May 23, 1996
8:30 am – 9:30 am

Performance Evaluation 101: Basic Modeling Techniques

This tutorial is aimed at novice performance modelers. The context and motivating examples focus on performance prediction. Given a computer system with several options for possible improvement, a performance prediction model can be used to evaluate each option. The option with the best predicted performance, relative to the implementation cost, is judged to be the best alternative. Topics include: measurement, workload characterization, model construction, model solution, calibration, prediction, and validation. The presentation is example oriented and intuition driven. Basic modeling techniques using Markovian analysis, convolution, mean value analysis, Petri net models, bounding techniques, decomposition, and approximate analysis are covered.

T1 B

Robert Berry
IBM

Thursday, May 23, 1996
8:30 am – 11:00 am

Systems Performance Instrumentation: Techniques, Trade-offs, and Implications for Analysis

System performance developers/analysts make performance-oriented design and tuning decisions based on the instrumentation available on their systems. Analysts must understand the nature of this instrumentation: the techniques, the trade-offs and the resulting implications for analysis.

We start with typical system instrumentation guidelines for large, complex systems. Next, we introduce basic instrumentation techniques and discuss the trade-offs that motivate the use of one technique over another. The key elements of an instrumentation architecture are described. The implications of recent system directions for instrumentation are discussed. We close with a brief review of available standards in the area of systems performance instrumentation.

T1 C

Carey Williamson
University of Saskatchewan

Thursday, May 23, 1996
8:30 am – 10:00 am

Introduction to ATM Networks

Asynchronous Transfer Mode (ATM) offers the potential for efficient statistical multiplexing of multiple traffic types (e.g., data, voice, video, image) on a single high speed integrated services network. ATM is basically the concept of connection-oriented packet switching, using small fixed size packets called cells.

This beginner-level tutorial will provide an overview of the concepts and motivation behind ATM, define a number of the terms from the "ATM dictionary", and then discuss a number of performance-related issues in high speed ATM networks (e.g., switching, call admission control, traffic management, QOS). No background knowledge of ATM is required.

T2

Tommy Wagner
US Military Academy

Thursday, May 23, 1996
9:45 am – 10:45 am

Performance Evaluation 102: Workload Characterization Techniques

In order to model the performance of a computer system, two models are required: a model of the system itself, and a model of the workload that runs on the system (as input to the system model). The process of workload characterization is the process of building those workload models. This tutorial will survey the field of workload characterization focusing on some of the most widely accepted methods for building workload models. The basic issues involved in parallel workload modeling will also be introduced and some of the proposed approaches will be discussed.

T3 A

Brian Carlson
Dakota State University

Thursday, May 23, 1996
11:00 am– 12:00 pm

Performance Evaluation 103: Basic Applications to Parallel Systems

Parallel programs have properties that are quite different from their sequential counterparts. Thus, basic performance modeling techniques differ considerably from the modeling and workload characterization of sequential programs. This tutorial will examine basic issues in the performance evaluation of parallel programs. Characterizations of parallel programs include Amdahl's Law, average parallelism, speedup, efficiency, parallelism profiles, execution signatures, and task graphs. Often, obtaining the characterization information is difficult and requires additional tools. One such tool that will be described in detail is PICL. A series of case studies will show how the algorithm works.

T3 B

Margaret Martonosi
Thursday, May 23, 1996
10:30 am – 12:00 pm

Hardware and Software Support for Performance Monitoring

Obtaining good performance on current computers often requires performance monitoring systems that allow programmers, compiler writers, and system designers to identify and tune the portions of their design that are limiting applications and system performance.

This tutorial examines the issues and challenges inherent in making fine-grained observations about system behavior (with low overhead and without perturbing the system being measured), focusing mainly on parallel code and the memory system. Hardware monitoring support can be crucial in gathering accurate program information. The tutorial provides a survey of existing performance monitoring hardware and software, and discusses the challenges in extending current approaches.

T3 C

Asit Dan
Dinkar Sitaram
IBM Research

Thursday, May 23, 1996
10:30 am – 12:00 pm

Resource Management in Distributed Video Server Environments

This tutorial provides an overview of resource management in a distributed video server cluster consisting of many interconnected processing and storage nodes. While admission control, CPU and I/O scheduling ensure QoS guarantees, distributed resource management issues include data placement, dynamic load balancing, cache management, etc. Efficient resource management algorithms can make an order of magnitude difference in terms of cost-effectiveness.

This tutorial will give casual participants an overview of the video server design issues, as well as provide sophisticated designers with new and timely information about this rapidly evolving area. Case studies of commercial servers will be of interest to both groups.

T4 A

Christoph Lindemann
GMD Research Institute, Berlin

Thursday, May 23, 1996
1:30 pm – 4:30 pm

Numerical Methods for Performance Modeling of Computer Architectures

While measurement is an attractive option for assessing an existing system or a prototype, it is

Sessions and Tutorials

not a feasible option during the system design and implementation phases. Model-based evaluation has proven to be an attractive alternative in these cases. The most appropriate type of model depends upon the complexity of the system, the questions to be studied, the accuracy required, and the resources available for the study. Deterministic and stochastic Petri nets (DSPNs), for example, are a modeling formalism well suited to modeling distributed computing systems and communication networks.

This tutorial is particularly intended for researchers and practitioners interested in modeling the performance of computer systems. The background is elementary probability and statistics.

T4 B

Sivaram Chelluri
AT&T Global Information Solutions

Danny Chen
/dev/counsel, Inc.

David Glover
Hewlett Packard Company, Inc.

Thursday, May 23, 1996
1:30 pm – 4:30 pm

Performance Measurement, Management, and Capacity Planning of UNIX Systems

This tutorial provides an introduction to the performance measurement and analysis tools available on several variants of the UNIX system. We will present these tools primarily in the context of bottleneck analysis, system tuning, and resource utilization. We will also survey some of the commercially available performance measurement and analysis packages and their role in performance analysis and capacity planning. This includes an in-depth survey of available benchmarking technology from third parties and industry standards groups. We will also discuss the current state of the art and future trends in performance measurement and management, including standardized interfaces.

T4 C

Joe Hellerstein
IBM Research

Thursday, May 23, 1996
1:30 pm – 3:00 pm

An Introduction to Multivariate Statistics: Their Geometry and Application

Multivariate statistical analysis is an invaluable tool in the study of performance data, especially for testing hypotheses, estimating parameters, and predicting future observations. This tutorial provides an introduction to several multivariate statistical techniques.

Key to multivariate statistical techniques are the concepts of multi-dimensional means, variances, and covariances. All three can be described using geometric notions of distances, angles, and volumes. The tutorial illustrates these relationships and the mathematics underlying multivariate analysis.

With these concepts in hand, several multivariate statistical techniques are studied (e.g., multivariate estimates of descriptive statistics; using multivariate analysis to reduce the dimensionality of data; and using multivariate least-squares regression for predicting future observations).

T5

Randy Nelson
OTA Limited Partnership

Thursday, May 23, 1996
3:30 pm – 5:00 pm

Mathematical Techniques in Financial Engineering

There are a surprising number of similarities between the mathematical techniques used in the fields of performance modeling and financial engineering. These similarities arise because financial markets are inherently unpredictable and are thus analyzed using probabilistic models. As with performance modeling, when problems are not mathematically tractable, solutions are obtained from approximations or simulations.

This tutorial explores the similarity of the two disciplines by analyzing a selection of problems that are encountered in practice (e.g., pricing of financial instruments; optimal portfolios). The models and solutions discussed provide a broad view of financial engineering, and reveal several complementary views of how to model random price movements.

R

Reception

Thursday, May 23, 1996
7:00 pm – 10:00 pm

S1

Scheduling

Friday, May 24, 1996
9:15 am – 10:45 am

Ken Sevcik, Chair
University of Toronto

9:15 am
Bringing Real-time Scheduling Theory and Practice Closer for Multimedia Computing
R. Gopalakrishnan and G.M. Parulkar
Washington University

9:45 am
Exploiting Process Lifetime Distributions for Dynamic Load Balancing
Mor Harchol-Balter and Allen Downey
University of California, Berkeley

10:15 am
Effective Local Scheduling of Parallel Jobs
Andrea C. Dusseau, Remzi Arpaci and David Culler
University of California, Berkeley

10:45 am Coffee Break

S2

Parallel Systems

Friday, May 24, 1996
11:15 am – 12:45 pm

Margaret Martonosi, Chair
Princeton University

11:15 am
Limits on the Performance Benefits of Multithreading and Prefetching
Beng-Hong Lim
IBM T.J. Watson Research Center
Ricardo Bianchini
Federal University of Rio de Janeiro

11:45 am
Fast Message Assembly Using Compact Address Relations
Peter Dinda and David O'Hallaron
Carnegie Mellon University

12:15 pm
Coordinated Allocation of Memory and Processors in Multiprocessors
Eric Parsons and Kenneth Sevcik
University of Toronto

L

12:45 pm – 2:15 pm
Luncheon

S3

Simulation

Friday, May 24, 1996
2:15 pm – 3:45 pm

Phil Heidelberger, Chair
IBM TJ Watson Research Center

2:15 pm
Embra: Fast and Flexible Machine Simulation
Emmett Witchel
MIT
Mendel Rosenblum
Stanford University

2:45 pm
Experiences with Network Simulation
Lawrence Brakmo and Larry L. Peterson
The University of Arizona

3:15 pm
Asynchronous Updates in Large Parallel Systems
Albert Greenberg
AT&T Bell Laboratories
Scott Shenker
Xerox PARC
Alexander Stolyar
Motorola

3:45 pm Coffee Break

S4

Poster Session

Friday, May 24, 1996
4:15 pm – 5:45 pm

Practical Algorithms for Self Scaling Histograms or Better than Average Data Collection
Michael Greenwald
Stanford University

Integrating Parallel Prefetching and Caching
Tracy Kimbrel
University of Washington
Pei Cao
University of Wisconsin, Madison

Sessions

Edward Felten
Princeton University
Anna Karlin
University of Washington
Kai Li
Princeton University

A Buffer Model for Evaluating the Performance of R-tree Packing Algorithms
Scott Leutenegger and Mario A. Lopez
University of Denver

An Approach to Selecting Metrics for Detecting Performance Problems in Information Systems
Joseph Hellerstein
IBM T.J. Watson Research Center

RAIDframe: Rapid Prototyping for Disk Arrays
Garth Gibson, William Courtright II, Mark Holland and Jim Zelenka
Carnegie Mellon University

Quantifying Achievable Routing Performance in Multiprocessor Interconnection Networks
Swaminathan Ramany
Digital Equipment Corporation
Derek Eager
University of Saskatchewan

Analysis of the Early Workload on the Cornell Theory Center IBM SP2
Steven Hotovy, David Schneider and Timothy O'Donnell
Cornell Theory Center

S5
Networks

Saturday, May 25, 1996
9:15 am – 10:45 am

Will Leland, Chair
Bellcore

9:15 am
Design and Analysis of Frame-based Fair Queing: A New Traffic Scheduling Algorithm for Packet Switched Networks
Anujan Varma and Dimitrios Stiliadis
University of California, Santa Cruz

9:45 am
Networking Support for Large Scale Multiprocessor Servers
David J. Yates, Erich M. Nahum, James F. Kurose and Don Towsley
University of Massachusetts, Amherst

10:15 am
Web Server Workload Characterization: The Search for Invariants
Martin Arlitt and Carey L. Williamson
University of Saskatchewan

10:45 am Coffee Break

S6
Measurement and Monitoring

Saturday, May 25, 1996
11:15 am – 12:45 pm

Ed Gehringer, Chair
North Carolina State University

11:15 am
Integrating Performance Monitoring and Communication in Parallel Computers
Margaret Martonosi
Princeton University
David Ofelt and Mark Heinrich
Stanford University

11:45 am
Micro-architecture Evaluation Using Performance Vectors
Umesh Krishnaswamy and Isaac D. Scherson
University of California, Irvine

12:15 pm
Explaining World Wide Web Traffic Self Similarity
Mark Crovella and Azer Bestavros
Boston University

S7
Modeling and Analysis I

Saturday, May 25, 1996
2:15 pm – 3:45 pm

Spencer Ng, Chair
IBM Research, Almaden

2:15 pm
On the Modeling and Performance Characteristics of a Serpentine Tape Drive
Bruce Hillyer and Avi Silberschatz
AT&T Bell Laboratories

2:45 pm
An Analytic Model of Hierachical Mass Storage Systems with Network-Attached Storage Devices
Daniel Menasce'
George Mason University
Odysseas Ioannis Pentakalos and Yelena Yesha
University of Maryland Baltimore County, CESDIS

3:15 pm
An Approximate Analysis of Waiting Time in Multi-classes M/G/1/./EDF Queues
Ken Chen and Laurent Decreusefond
ENST

3:45 pm Coffee Break

S8
Work In Progress

Saturday, May 25, 1996
4:15 pm – 5:45 pm

Larry Dowdy, Chair
Vanderbilt University

S9
Video

Sunday, May 26, 1996
9:15 am – 10:45 am

Joe Hellerstein, Chair
IBM TJ Watson Research Center

9:15 am
On Optimal Piggyback Merging Policies for Video-on-Demand Systems
Joel Wolf
IBM TJ Watson Research Center
Charu Aggarwal
MIT
Philip S. Yu
IBM TJ Watson Research Cente

9:45 am
Experiments with Digital Video Playback
Ladan Gharai and Richard Gerber
University of Maryland

10:15 am
Supporting Stored Video: Reducing Rate Variability and End-to-End Resource Requirements through Optimal Smoothing
James Salehi, Zhi-Li Zhang, James F. Kurose and Don Towsley
University of Massachusetts, Amherst

10:45 am Coffee Break

S10
Modeling and Analysis II

Sunday, May 26, 1996
11:15 am – 12:45 pm

Alois Ferscha, Chair
Univ. of Vienna

11:15 am
Analysis of Balanced Fork-Join Networks
Elizabeth Varki and Lawrence W. Dowdy
Vanderbilt University

11:45 am
Efficient Exploration of Availability Models Guided by Failure Distances
Juan Carrasco, Javier Escriba and Angel Calderon
Departament d'Enginyeria Electronica, UPC

12:15 pm
Minimizing Completion Time of a Program by Checkpointing and Rejuvenation
Kishor Trivedi, Sachin Garg, Yennun Huang and Chandra Kintala
Duke University

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ACM SIGMETRICS International Conference on Measurement and Modeling of Computer Systems (METRICS)

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28th Annual ACM Symposium on Theory of Computing (STOC)

Plenary Invited Speaker
Daily
8:00 — 9:00 am
Room: Salon F
Grand Ballroom

Registration for the 28th Annual ACM Symposium on Theory of Computing includes a reception, SIGACT business meeting, an evening excursion, two lunches, continental breakfasts, coffee breaks, and conference proceedings. Student registration fee includes all of the above except the evening excursion. The conference is sponsored by the ACM Special Interest Group on Algorithms and Computation Theory (SIGACT).

Sessions

R

Reception

Tuesday, May 21, 1996
7:00 pm – 10:00 pm

S1 A

Session 1A

Wednesday, May 22, 1996
9:20 am – 10:55 am

Jin-Yi Cai, Chair
SUNY Buffalo

9:20 am
The Linear-Array Conjecture of Communication Complexity is False
Eyal Kushilevitz
Technion
Nathan Linial
Hebrew Institute
Rafail Ostrovsky
Bellcore

9:45 am
Testing of the Long Code and Hardness for Clique
Johan Håstad
Royal Institute of Technology

10:10 am
The Space Complexity of Approximating the Frequency Moments
Noga Alon
Tel Aviv Univ.
Yossi Matias and Mario Szegedy
AT&T Bell Laboratories

10:35 am
Deterministic Restrictions in Circuit Complexity
Shiva Chaudhuri
Max-Planck Institut für Informatik
Jaikumar Radhakrishnan
Tata Institute of Fundamental Research

S1 B

Session 1B

Wednesday, May 22, 1996
9:20 am – 10:55 am

Monika R. Henzinger, Chair
Cornell

9:20 am
Fast Algorithms for k-Node Connectivity Augmentation and Related Problems
Joseph Cheriyan
Univ. of Waterloo
Ramakrishna Thurimella
Univ. of Denver

9:45 am
Approximating s-t Minimum Cuts in $O(n^2)$ time
Andras A. Benczur and David R. Karger
MIT

10:10 am
Minimum Cuts in Near-Linear Time
David R. Karger
MIT

10:35 am
Deterministic $\tilde{O}(nm)$ Time Edge-Splitting in Undirected Graphs
Hiroshi Nagamochi and Toshihide Ibaraki
Kyoto Univ.

10:55 am Coffee Break

S2 A

Session 2A

Wednesday, May 22, 1996
11:25 am – 12:25 pm

Jin-Yi Cai, Chair
SUNY Buffalo

11:25 am
Evaluation may be Easier than Generation
Moni Naor
Weizmann Institute

11:50 am
The PL Hierarchy Collapses
Mitsunori Ogihara
Univ. of Rochester

12:15 pm
Convergence Complexity of Optimistic Rate Based Flow Control Algorithms
Yehuda Afek, Yishay Mansour and Zvi Ostfeld
Tel Aviv Univ.

S2 B

Session 2B

Wednesday, May 22, 1996
11:25 am – 12:35 pm

ShangHua Teng, Chair
Univ. of Minnesota

11:25 am
Generating Hard Instances of Lattice Problems
M. Ajtai
IBM Almaden

Sessions

11:50 am
Translational Polygon Containment and Minimal Enclosure Using Linear Programming Based Restriction
Victor J. Milenkovic
Univ. of Miami

12:15 pm
Pushing Disks Together--the Continuous-motion Case
Marshall Bern
Xerox PARC
Amit Sahai
UC Berkeley

L

12:35 pm – 2:00 pm
Luncheon

S3 A

Session 3A

Wednesday, May 22, 1996
2:00 pm – 3:35 pm

Ronitt Rubinfeld, Chair
Cornell/MIT

2:00 pm
Learning Sat-k-DNF Formulas from Membership Queries
F. Bergadano
Universitá di Torino
D. Catalano
Universitá di Catania
S. Varricchio
Universitá di L' Aquila

2:25 pm
Towards the learnability of DNF formulae
Nader H. Bshouty
Univ. of Calgary

2:50 pm
Noise-tolerant Learning Near the Information-theoretic Bound
N. Cesa-Bianchi
Universitá di Milano
E. Dichterman
Technion
P. Fischer and H.U. Simon
Universität Dortmund

3:15 pm
Noise-tolerant Distribution-Free Learning of General Geometric Concepts
Nader Bshouty
Calgary
Sally Goldman, David Mathias and Subhash Suri
Washington University
Hisao Tamaki
IBM Tokyo

S3 B

Session 3B

Wednesday, May 22, 1996
2:00 pm – 3:35 pm

Erich Kaltofen, Chair
RPI

2:00 pm
The Complexity of Matrix Rank and Feasible Systems of Linear Equations
E. Allender
Rutgers
R. Beals
DIMACS, Rutgers
M. Ogihara
Univ. of Rochester

2:25 am
Computing Roadmaps of Semi-algebraic Sets
Saugata Basu and Richard Pollack
Courant Institute
Marie-Françoise Roy
IRMAR, Université de Rennes

2:50 pm
Using the Groebner Basis Algorithm to find Proofs of Unsatisfiability
Matthew Clegg
UCSD
Jeffery Edmonds
York Univ.
Russell Impagliazzo
UCSD

3:15 pm
Sparsity Considerations in Dixon Resultants
Deepak Kapur and Tushar Saxena
SUNY Albany

3:35 pm Coffee Break

S4 A

Session 4A

Wednesday, May 22, 1996
4:05 pm – 5:40 pm

Monika R. Henzinger, Chair
Cornell

4:05 pm
Efficient 3-d Range Searching in External Memory
Darren Erick Vengroff
Brown, Duke
Jeffery Scott Vitter
Duke

4:30 pm
Purely Functional Representations of Catenable Sorted Lists
Haim Kaplan and Robert E. Tarjan
Princeton

4:55 pm
A Fast Quantum Mechanical Algorithm for Database Search
Lov K. Grover
AT&T Bell Laboratories

S4 B

Session 4B

Wednesday, May 22, 1996
4:05 pm – 5:40 pm

Ronitt Rubinfeld, Chair
Cornell/MIT

4:05 pm
Constructing Evolutionary Trees in the Presence of Polymorphic Characters
Maria Bonet, Tandy J. Warnow and Shibu Yooseph
Univ. of Pennsylvania
Cynthia Phillips
Sandia National Labs

4:30 pm
Efficient Algorithms for Inverting Evolution
Martin Farach
Rutgers
Sampath Kannan
Univ. of Pennsylvania

S5 A

Session 5A

Thursday, May 23, 1996
9:20 am – 10:55 am

Maurice Herlihy, Chair
Brown

9:20 am
Modular Competitiveness for Distributed Algorithms
James Aspnes
Yale
Orli Waarts
UC Berkeley

9:45 am
Communication-Efficient Parallel Sorting
Michael T. Goodrich
Johns Hopkins

10:10 am
Automatic Methods for Hiding Latency in High Bandwidth Networks
Matthew Andrews, Tom Leighton and Lisa Zhang
MIT
P. Takis Metaxas
Wellesley

10:35 am
An $O(n \log n)$ -Size Fault-Tolerant Sorting Network
Yuan Ma
Stanford

S5 B

Session 5B

Thursday, May 23, 1996
9:20 am – 10:55 am

Alistair Sinclair, Chair
UC Berkeley

9:20 am
On Extracting Randomness From Weak Random Sources
Amnon Ta-Shma
Hebrew Univ.

9:45 am
Randomness-Optimal Sampling, Extractors, and Constructive Leader Election
David Zuckermann
Univ. of Texas, Austin

10:10 am
Generating Random Spanning Trees More Quickly than the Cover Time
David Bruce Wilson
MIT

10:35 am
Towards an Analysis of Local Optimization Algorithms
Tassos Dimitriou and Russell Impagliazzo
UCSD

10:55 am Coffee Break

S6

Knuth Prize Lecture

Thursday, May 23, 1996
11:30 am – 12:30 pm

Andrew C.-C. Yao
Princeton

L

12:30 pm – 2:00 pm
Luncheon

S7 A

Session 7A

Thursday, May 23, 1996
2:00 pm – 3:35 pm

Michel Goemans, Chair
MIT

Sessions

2:00 pm
A Threshold of ln n for Approximating Set Cover
Uriel Feige
Weizmann Institute

2:25 pm
Fast Algorithms for Parametric Scheduling come from Extensions to Parametric Maximum Flow
S. Thomas McCormick
UBC

2:50 pm
Towards a Syntactic Characterization of ptas
Sanjeev Khanna and Rajeev Motwani
Stanford

3:15 pm
Efficient Approximation Algorithms for MAX-CUT and COLORING
Philip Klein and Hsueh-I Lu
Brown

S7 B

Session 7B

Thursday, May 23, 1996
2:00 pm – 3:35 pm

Abhiram Ranade, Chair
UC Berkeley

2:00 pm
Dynamic Deflection Routing on Arrays
Andrei Border
Digital Systems Research
Eli Upfal
IBM Almaden

2:25 pm
Universal Algorithms for Store-and-Forward and Wormhole Routing
Robert Cypher
Johns Hopkins
Friedhelm Meyer auf der Heide, Christian Scheideler and Berthold Vocking
Univ. of Paderborn

2:50 pm
Distributed Packet Switching in Arbitrary Networks
Yuval Rabini and Eva Tardos
Cornell

3:15 pm
Adversarial Queueing Theory
Allan Borodin
Univ. of Toronto
Jon Kleinberg
MIT
Parbhakar Raghavan
IBM Almaden
Madhu Sudan and David P. Willaimson
IBM T.J.Watson

3:35 pm Coffee Break

S8 A

Session 8A

Thursday, May 23, 1996
4:05 pm – 5:40 pm

Gary L. Miller, Chair
CMU

4:05 pm
Computing Betti Numbers via Combinatorial Laplacians
Joel Friedman
UBC

4:30 pm
Embedding Graphs in an Arbitrary Surface in Linear Time
Bojan Mohar
University of Ljubljana

4:55 pm
Algorithms for Manifolds and Simplicial Complexes in Euclidean 3-Space
Tamal K. Dey
I.I.T. Kharagpur
Sumanta Guha
Univ. of Wisconsin

5:20 pm
On Bounding the Betti Numbers and Computing the Euler Characteristic of Semi-algebraic Sets
Saugata Basu
Courant Institute

S8 B

Session 8B

Thursday, May 23, 1996
4:05 pm – 5:40 pm

Vijay Vazirani, Chair
Georgia Tech

4:05 pm
Approximability and Nonapproximability Results for Minimizing Total Flow Time on a Single Maching
Hans Kellerer
Universität Graz
Thomas Tautenhahn
Universität Magdeburg
Gerhard J. Woeginger
Eindhoven Univ.

4:30 pm
How Good is the Goemans-Williamson MAX CUT Algorithm?
Howard J. Karloff
Georgia Tech

4:55 pm
A Tight Analysis of the Greedy Algorithm for Set Cover
Petr Slavik
SUNY Buffalo

5:20 pm
A Constant-factor Approximation Algorithm for the k-MST Problem
Avrim Blum, R. Ravi and Santosh Vempala
CMU

M

SIGACT Business Meeting

Thursday, May 23, 1996
9:00 pm

S9 A

Session 9A

Friday, May 24, 1996
9:20 am – 10:30 am

Thomas Lengauer, Chair
GMD

9:20 am
Reconstructing a Three-Dimensional Model with Arbitrary Errors
Bonnie Berger, Jon Kleinberg and Tom Leighton
MIT

9:45 am
On the Boosting Ability of Top-Down Decision Tree Learning Algorithms
Michael Kearns
AT&T Bell Laboratories
Yishay Mansour
Tel Aviv Univ.

10:10 am
Robot Navigation with Range Queries
Dana Angluin, Jeffery Westbrook and Wenhong Zhu
Yale

S9 B

Session 9B

Friday, May 24, 1996
9:20 am – 10:30 am

Joe Kilian, Chair
NECI

9:20 am
Correlated Pseudorandomness and the Complexity of Private Computations
Donald Beaver
Transarc Corp.

9:45 am
Digital Signets for Protection of Digital Information
Cynthia Dwork and Jeffery Lotspiech
IBM Almaden
Moni Naor
Weizmann Institute

10:10 am
Witness-Based Cryptographic Program Checking and Robust Function Sharing
Yair Frankel and Peter Gemmell
Sandia National Labs
Moti Yung
IBM T.J. Watson

10:30 am Coffee Break

S10 A

Session 10A

Friday, May 24, 1996
11:00 am – 12:20 pm

Serge Plotkin, Chair
Stanford

11:00 am
Non-Expansive Hashing
Nathan Linial and Ori Sasson
Hebrew Univ.

11:25 am
Making Commitments in the Face of Uncertainty: How to Pick a Winner Almost Every Time
Baruch Awerbuch
Johns Hopkins
Yossi Azar and Amos Fiat
Tel Aviv Univ.
Tom Leighton
MIT

11:50 am
Lower Bounds for On-line Graph Problems with Application to On-Line Circuit and Optical Routing
Yair Bartal
UC Berkeley
Amos Fiat
Tel Aviv Univ.
Stefano Leonardi
Universitá di Roma

Sessions

S10 B

Session 10B

Friday, May 24, 1996
11:00 am – 12:10 pm

Noam Nisan, Chair
Hebrew Univ.

11:00 am
Characterizing Linear Size Circuits in Terms of Privacy
Eyal Kushilevitz
Technion
Rafail Ostrovsky
Bellcore
Adi Rosen
Tel Aviv Univ.

11:25 am
Nondeterministic Communication with a Limited Number of Advice Bits
Juraj Hromkovic
Universität zu Kiel
Georg Schnitger
Johann Wolfgang Goethe-Universität

11:50 am
Public vs. Private Coin Flips in One Round Communication Games
Ilan Newman
Haifa Univ.
Mario Szegedy
AT&T Bell Laboratories

S11 A

Session 11A

Friday, May 24, 1996
2:00 pm – 3:35 pm

Alan Frieze, Chair
CMU

2:00 pm
Efficiently Four-coloring Planar Graphs
Neil Robertson and Daniel P. Sanders
Ohio State
Paul Seymour
Bellcore
Robin Thomas
Georgia Tech

2:25 pm
The Angle-TSP Problem and the Weighted Linear Matroid Parity Problem
A. Aggarwal, D. Coppersmith and B. Schieber
IBM T.J. Watson
S. Khanna and R. Motwani
Stanford

2:50 pm
Faster Isomorphism Testing of Strongly Regular Graphs
Daniel A. Spielman
UC Berkeley

3:15 pm
Node-Disjoint Paths on the Mesh and a New Trade-off in VLSI Layout
Alok Aggarwal and David P. Williamson
IBM Research
Jon M. Kleinberg
MIT

S11 B

Session 11B

Friday, May 24, 1996
2:00 pm – 3:35 pm

Alistair Sinclair, Chair
UC Berkeley

2:00 pm
Modular 2 Counting Formulas Are Hard for Cutting Planes Proofs
Xudong Fu
Univ. of Toronto

2:25 pm
Extremal Bipartite Graphs and Superpolynomial Lower Bounds for Monotone Span Programs
Laszlo Babai
Univ. of Chicago
Anna Gal
Institute for Advanced Study
Janos Kollar
Univ. of Utah
Lajos Ronyai
Hungarian Academy of Sciences
Tibor Szabo
Ohio State
Avi Wigderson
Hebrew Univ.

2:50 pm
A Lower Bound for Randomized Algebraic Decision Trees
Dima Grigoriev
Penn State
Marek Karpinski and Roman Smolensky
Univ. of Bonn
Friedhelm Meyer auf der Heide
Univ. of Paderborn

3:15 pm
Lower Bounds for Noisy Boolean Decision Trees
William Evans and Nicholas Pippenger
UBC

3:35 pm Coffee Break

S12

Session 12

Friday, May 24, 1996
4:05 pm – 5:40 pm

Sanjeev Arora, Chair
Princeton

4:05 pm
Adaptive Zero Knowledge and Computational Equivocation
Donald Beaver
Transarc Corp.

4:30 pm
Adaptively Secure Multiparty Computation
Ran Canetti
MIT
Uri Feige, Oded Goldreich and Moni Naor
Weizmann Institute

4:55 pm
On Relationships between Statistical Zero-Knowledge Proofs
Tatsuaki Okamoto
NTT Labs.

Exhibits
Wednesday – Sunday
9:00 am – 6:00 pm
Room: Franklin Hall

Committees

David S. Johnson
AT&T Research
General Chair

Gary L. Miller
Carnegie-Mellon University
Program Chair

Alok Aggarwal
IBM Research
Finance Chair

PROGRAM COMMITTEE
Sanjeev Arora
Princeton
Jin-Yi Cai
SUNY Buffalo
Alan Frieze
CMU
Erich Kaltofen
RPI
Joe Kilian
NECI
Michel Goemans
MIT
Monika R. Henzinger
Cornell
Maurice Herlihy
Brown
Thomas Lengauer
GMD
Gary L. Miller
CMU
Noam Nisan
Hebrew Univ.
Serge Plotkin
Stanford
Pavel Pudlak
Prague
Abhiram Ranade
Berkeley
Ronitt Rubinfeld
Cornell/MIT
Alistair Sinclair
UC Berkeley
ShangHua Teng
Univ. of Minnesota
Les Valiant
Harvard
Vijay Vazirani
Georgia Tech

11th Annual IEEE Conference on Computational Complexity (Complexity, previously Structures)

Plenary Invited Speaker
Daily
8:00 — 9:00 am
Room: Salon F
Grand Ballroom

Registration for the 11th Annual IEEE Conference on Computational Complexity (previously Structures) includes a reception, business meeting, evening excursion, Rump Sessions, continental breakfasts, coffee breaks, and conference proceedings. Student registration fee includes all of the above except the evening excursion. The conference is sponsored by the IEEE Technical Committee on Mathematical Foundations of Computing.

Sessions

Invited Speakers:

Noam Nisan
Friday, May 24, 1996
Extractors, Dispersers, and their Applications

Mike Saks
Saturday, May 25, 1996
Randomization and Derandomization in Space Bounded Complexity

Alan L. Selman
Sunday, May 26, 1996
Much Ado about Functions

Christos Papadimitriou
Monday, May 27, 1996
The Complexity of Knowledge Representation

R

Reception

Thursday, May 23, 1996
7:00 pm – 10:00 pm

S1

Session 1

Friday, May 24, 1996
9:15 am – 10:40 am

Birgit Jenner, Chair

9:20 am
An Isomorphism Theorem for Circuit Complexity
M. Agrawal
U. Ulm
E. Allender
Rutgers

10:00 am
Nondeterministic NC1 Computation
H. Caussinus and P. McKenzie
U. Montréal
D. Thérien
McGill U.
H. Vollmer
U. Würzburg

10:40 am Coffee Break

S2

Session 2

Friday, May 24, 1996
11:10 am - 12:30 pm

Mitsunori Ogihara, Chair

11:10 am
Parallel Complexity Hierarchies Based on PRAMs and DLOGTIME-Uniform Circuits
K. Iwama
Kyushu U.
C. Iwamoto
Kyushu Institute of Design

11:50 am
Collapsing Oracle-Tape Hierarchies
G. Gottlob
Technische U. Wien

S3

Session 3

Friday, May 24, 1996
2:00 pm – 3:40 pm

David Zuckerman, Chair

2:00 pm
Extractors, Dispersers, and their Applications (Invited Presentation)
Noam Nisan
Hebrew Univ.

3:00 pm
On Coherence, Random-self-reducibility, and Self-correction
J. Feigenbaum
AT&T Bell Labs
L. Fortnow, S. Laplante and A. Naik
U. Chicago

3:40 am Coffee Break

S4

Session 4

Friday, May 24, 1996
4:10 pm - 5:10 pm

Carsten Lund, Chair

4:10 pm
Error Reduction by Parallel Repetition - a Negative Result
U. Feige
Weizmann Institute
Oleg Verbitsky
Lviv University

4:30 pm
Deciding the Vapnik-Cervonenkis Dimension is Σ_3^p-Complete
M. Schaefer
Univ. Chicago

4:50 pm
VC Dimension in Circuit Complexity
P. Koiran
Ecole Normale Sup. Lyon

S5

Session 5

Saturday, May 25, 1996
9:20 am – 10:40 am

Jin-Yi Cai, Chair

9:20 am
Reducing P to a Sparse Set Using a Constant Number of Queries Collapses P to L
D. van Melkebeek
U. Chicago

10:00 am
Logspace Printability and Isomorphism
J. Goldsmith and M. Levy
U. Kentucky
S. Mahaney
DIMACS

10:40 am Coffee Break

S6

Session 6

Saturday, May 25, 1996
11:10 am - 12:30 pm

Luc Longpré, Chair

11:10 am
Hierarchies of Circuit Classes that are Closed under Complement
V. Vinay
Indian Institute of Science, Bangalore

11:50 am
Succinct Representation, Leaf Languages, and Projection Reductions
H.Veith
Technische U. Wien

S7

Session 7

Saturday, May 25, 1996
2:00 pm – 3:40 pm

Jin-Yi Cai, Chair

2:00 pm
Randomization and Derandomization in Space Bounded Complexity (Invited Presentation)
Mike Saks
Rutgers University

3:00 pm
On the Measure of Two-dimensional Regions with Polynomial-time Computable Boundaries
Ker-I Ko
SUNY Stony Brook
K. Weihrauch
Fern U. Germany

3:40 am Coffee Break

S8

Rump Session

Saturday, May 25, 1996
4:00 pm - 5:45 pm

S9

Session 9

Sunday, May 26, 1996
9:20 am – 10:40 am

Jack Lutz, Chair

9:20 am
On Positive P
C. Lautemann and T. Schwentick
U. Mainz, Germany
I. A. Stewart
U. Wales, UK

10:00 am
A Comparison of Weak Completeness Notions
K. Ambos-Spies and X. Zheng
U. Heidelberg
E. Mayordomo
U. Zaragoza

10:40 am Coffee Break

Sessions

S10

Session 10

Sunday, May 26, 1996
11:10 am - 12:30 pm

Jack Lutz, Chair

11:10 am
Stochastic Properties of Lutz-Random Sequences
Y. Wang
U. Heidelberg

11:50 am
Truth-table Closure and Turing Closure of Average Polynomial Time Have Different Measures in EXP
R. Schuler
U. Ulm

S11

Session 11

Sunday, May 26, 1996
2:00 pm – 3:40 pm

Mitsunori Ogihara, Chair

2:00 pm
Much Ado about Functions (Invited Presentation)
Alan L. Selman
SUNY Buffalo

3:00 pm
On Inverting Onto Functions
S. Fenner
U. Southern Maine
L. Fortnow and A. Naik
U. Chicago
J. Rogers
Depaul U.

3:40 am Coffee Break

S12

Session 12

Sunday, May 26, 1996
4:10 pm - 5:30 pm

Jie Wang, Chair

4:10 pm
A Note on P-selective Sets and on Adaptive versus Nonadaptive Queries to NP
A. Naik
U. Chicago
A. Selman
SUNY Buffalo

4:50 pm
Good Degree Bounds on Nullstellensatz Refutations of the Induction Principle
S. Buss
U.C. San Diego
T. Pitassi
U. Pennsylvania

M

Business Meeting

Sunday, May 26, 1996
8:30 pm

S13

Session 13

Monday, May 27, 1996
8:30 am - 10:10 pm

Kevin Compton, Chair

8:30 am
The Complexity of Knowledge Representation (Invited Presentation)
Christos Papadimitriou
U.C. San Diego

9:30 am
Integer Programming as a Framework for Optimization and Approximability
I. Barland and P. Kolaitis
U.C. Santa Cruz
M. Thakur
Borland International

10:10 am Coffee Break

S14

Session 14

Monday, May 27, 1996
10:30 am - 12:30 pm

Luc Longpré, Chair

10:30 am
Complements of Multivalued Functions
S. Fenner
U. Southern Maine
F. Green
Clark Univ.
S. Homer
Boston Univ.
A. Selman
SUNY Buffalo
T. Thierauf
U. Ulm
H. Vollmer
U. Würzburg

11:10 am
A Note on Decision versus Search for Graph Automorphism
M. Agrawal
U. Ulm
V. Arvind
Institute of Mathematical Sciences, Madras

11:50 am
Zero Knowledge and the Chromatic Number
Uriel Feige
Weizmann Institute
Joe Kilian
NEC Research Institute

S15

Session 15

Monday, May 27, 1996
2:00 pm – 3:30 pm

Carsten Lund, Chair

2:00 pm
DNA Models and Algorithms for NP-Complete Problems
E. Bach, A. Condon, E. Glaser and C. Tanguay
U. Wisconsin

2:40 pm
Reversible Simulation of Irreversible Computation
M. Li
U. Waterloo
P. Vitányi
CWI and U. Amsterdam

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Boston University
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Jack Lutz
Iowa State University
Mitsunori Ogihara
University of Rochester
Jie Wang
University of North Carolina, Greensboro
David Zuckerman
University of Texas, Austin

"I don't know what's more inspiring, to look at the Liberty Bell or to look at the faces of children who are looking at the Liberty Bell."
Bert Shanas, *New York Daily News*

15th Annual ACM Symposium on Principles of Distributed Computing (PODC)

Plenary Invited Speaker
Daily
8:00 — 9:00 am
Room: Salon F
Grand Ballroom

Registration for the 15th Annual Symposium on Principles of Distributed Computing includes a reception, the conference business meeting, one lunch, an evening excursion, continental breakfasts, coffee breaks, and conference proceedings. Student registration fee includes all of the above except lunch and the evening excursion. The conference is sponsored by the ACM Special Interest Group for Automata and Computability Theory and the ACM Special Interest Group for Operating Systems Principles.

Sessions

Note:
Paper titles preceded by an "=>" are Brief Announcements

R

Reception

Thursday, May 23, 1996
8:00 pm – 10:00 pm

S1

Session 1

Friday, May 24, 1996
9:20 am – 10:40 am

Ray Strong, Chair
IBM Almaden

Memory Requirements for Silent Stabilization
Shlomi Dolev
Ben-Gurion University
Mohamed G. Gouda and Marco Schneider
University of Texas at Austin

Self-Stabilization by Window Washing
Adam Costello and George Varghese
Washington University in St. Louis

Fault-Containing Self-Stabilizing Algorithms
Sukumar Ghosh, Arobinda Gupta, Ted Herman and Sriram V. Pemmaraju
University of Iowa

=>Mutually Consistent Recording in Asynchronous Computations
Roberto Baldoni, Jean-Michel Helary and Michel Raynal
IRISA

=>Minimizing Access Costs in Replicated Distributed Systems
Michael Goldweber
Beloit College
Donald Johnson
Dartmouth College

=>On the Borowsky-Gafni Simulation Algorithm
Nancy Lynch
MIT
Sergio Rajsbaum
UNAM Mexico

10:40 am Coffee Break

S2

Session 2

Friday, May 24, 1996
11:00 am – 12:30 pm

Joint ISCA/PODC Panel and Discussion

L

12:30 pm – 2:00 pm
Luncheon

S3

Session 3

Friday, May 24, 1996
2:00 pm – 3:30 pm

Douglas B. Terry, Chair
Xerox Parc

Trade-Offs in Implementing Optimal Message Logging Protocols
Lorenzo Alvisi
Cornell University
Keith Marzullo
U.C. San Diego

Efficient Message Ordering in Dynamic Networks
Idit Keidar and Danny Dolev
Hebrew University

An efficient recovery-based spin lock protocol for preemptive shared memo
Injong Rhee
Emory University
Chi-Yung Lee
University of Warwick

=>An Optimal Algorithm for Generalized Causal Message Ordering
Ajay Kshemkalyani
IBM Research Triangle
Mukesh Singhal
Ohio State University

=>Characterization of Message Ordering Specifications and Protocols
V. V. Murty and V. K. Garg
University of Texas at Austin

=>Efficient Delta-Causal Broadcasting of Multimedia Applications
Roberto Baldon and Michel Raynal
IRISA
Ravi Prakash and Mukesh Singhal
Ohio State University

=>Comparing Primary-Backup and State Machines for Crash Failures
Jeremy B. Sussman and Keith Marzullo
U.C. San Diego

3:30 pm Coffee Break

S4

Session 4

Friday, May 24, 1996
3:50 pm – 5:20 pm

Mark R. Tuttle, Chair
DEC CRL

Refining Knowledge Oriented Actions to Layered Implementations
Wil Janssen
University of Oldenburg

Automated Logical Verification Based on Trace Abstractions
Nils Klarlund, Mogens Nielsen and Kim Sunesen
University of Aarhus

Synthesis of Concurrent Systems for an Atomic Read Atomic Write Model of Computation
Paul Attie and Allen Emerson
University of Texas at Austin

=>Synthesis of Distributed Concurrent Systems
Evelyn Tumlin Pierce
University of Texas at Austin

=>I/O Automata Based Verification of Finite State Distributed Systems; Complexity Issues
Sandeep K. Shukla, Harry B. Hunt III, Daniel J. Rosenkrantz, S. S. Ravi and R. E. Stearns
SUNY Albany

=>Using Event Structure for the Efficient Analysis of States Graphs
Dominique Ambroise and Brigitte Rozoy
Universite de Paris XI

=>Testing Concurrent Data Structures
John L. Bruno
UC Santa Barbara
Phillip B. Gibbons and Steven Phillips
AT&T Bell Laboratories

M

Business Meeting

Friday, May 24, 1996
7:30 pm - 8:30 pm

S5

Rump Session

Friday, May 24, 1996
8:30 pm - 10:00 pm

S6

Session 6

Saturday, May 25, 1996
9:30 am – 11:00 am

Pierre Fraigniaud, Chair
LIP-CNRS

Memory Requirement for Routing in Distributed Networks
Cyril Gavoille
Ecole Normale Superieure de Lyon
Stephane Perennes

Optimal Routing Tables
Harry Buhrman and Jaap-Henk Hoepman
CWI
Paul M. B. Vitanyi
CWI and University of Amsterdam

Spreading Rumors Rapidly Despite an Adversary
James Aspnes and Will Hurwood
Yale

=>Fast, Long-Lived Renaming Improved and Simplified

Sessions

Mark Moir
University of Carolina at Chapel Hill
Juan A. Garay
IBM T.J. Watson

=>The Complexity of Data Mining on the Web
Evangelos Kranakis and Danny Krizanc
Carleton University
Andrzej Pelc
Universite de Quebec a Hull
David Peleg
Weizmann Institute

=>Efficient Token-based Control in Rings
Esteban Feuerstein
Universidad de Buenos Aires and Universidad de General Sacramento
Stefano Leonardi and Alberto Marchetti-Spaccamela
Universita di Roma "La sapienza"
Nicola Santoro
Carleton University

=>Efficient Traffic Laws for Mobile Robots
Sonne Preminger
Weizmann Institute
Eli Upfal
Weizmann Institute and IBM Almaden

11:00 am Coffee Break

S7

Session 7

Saturday, May 25, 1996
11:20 am – 12:35 pm

Yoram Moses, Chair
Weizmann Institute

Strong-Feasibilities of Equivalence-Completions
Yuh-Jzer Joung
National Taiwan University

Polylog Randomized Wait-Free Consensus
Tushar Deepak Chandra
IBM T.J. Watson

=>Asynchrony versus Bulk-Synchrony in QRQW PRAM Models
Phillip B. Gibbons and Yossi Matias
AT&T Bell Laboratories
Vijaya Ramachandran
University of Texas at Austin

=>Constructing a Reliable Test&set Bit (Extended Abstract)
Frank Stomp
AT&T Bell Laboratories
Gadi Taubenfeld
AT&T Bell Laboratories and Israel Open University

=>Space-efficient Construction of Buffer-optimal 1-Writer 1-Reader Multivalued Atomic Variable
S. Haldar
Tata Institute
K. Vidyasankar
Memorial U. of Newfoundland

=>Randomized Adaptive Video on Demand
C. Bouras, V. Kapoulas, T. Pantziou and P. Spirakis
Patras University

=>Message and Time Efficient Distributed Algorithms for Sparse k-connectivity Certificates
Esther Jennings and Lenka Matyckova
Lulea University of Technology

S8

Session 8

Saturday, May 25, 1996
2:30 pm – 4:00 pm

James Aspnes, Chair
Yale

Randomness in Private Computations
Eyal Kushilevitz
Technion
Yishay Mansour
Tel-Aviv University

Distributed Pseudo-Random Bit Generators: A New Way to Speed-Up Shared Coin Tossing
Mihir Bellare
U.C. San Diego
Juan Garay
IBM T.J. Watson
Tal Rabin
MIT

A Randomized Byzantine Agreement Protocol with Constant Expected Time and Guaranteed Termination in Optimal (Deterministic) Time
Arkady Zamsky
Technion

=>Early-Stopping Terminating Reliable Broadcast Protocol for General Omission Failures
Marcel-Catalin Rosu
Cornell University

=>Baked Potatoes: Deadlock Prevention Via Scheduling
Shlomi Dolev
Ben-Gurion University
Evangelos Kranakis and Danny Krizanc
Carleton University

=>Witness-based Cryptographic Program Checking and Robust Function Sharing (Announcement)
Yair Frankel and Peter Gemmel
Sandia National Laboratories
Moti Yung
IBM T.J. Watson

=>On the Convergence Complexity of Optimistic Rate Based Flow Control Algorithms
Yehuda Afek, Yishay Mansour and Zvi Ostfeld
Tel-Aviv University

4:00 pm Coffee Break

S9

Session 9

Saturday, May 25, 1996
4:15 pm – 5:45 pm

Eli Gafni, Chair
U.C. Los Angeles

The Power of Multi-objects
Yehuda Afek
Tel-Aviv University
Michael Merritt
AT&T Bell Laboratories
Gadi Taubenfeld
AT&T Bell Laboratories and Israel Open University

Universal Operations: Unary versus Binary
Hagit Attiya and Eyal Dagan
Technion

Real-Time Object Sharing with Minimal System Support
Srikanth Ramamurthy, Mark Moir and James H. Anderson
University of North Carolina at Chapel Hill

=>Space Bounds for Transactional Synchronization
John Valois
Rensselaer Polytechnic Institute

=>What Critical Algebraic Property Allows Operations of Concurrent Abstract Data Types to be Fast?
Martha J. Kosa
Tennessee Technological University

=>The Role of Data-Race-Free Programs in Recoverable DSM
Soma Chaudhuri
Iowa University
Sundar Kanthadai and Jennifer Welch
Texas A & M University

=>Crash Failures vs. Crash + Link Failures
Anindya Basu and Sam Toueg
Cornell University
Bernadette Charron-Bost
Ecole Polytechnic

S10

Session 10

Sunday, May 26, 1996
9:30 am – 11:00 am

Ambuj K. Singh, Chair
U.C. Santa Barbara

Crash Failures Can Drive Protocols to Arbitrary States
Mahesh Jayaram and George Varghese
Washington University in St. Louis

Time and Space Lower Bounds for Non-Blocking Implementations
Prasad Jayanti
Dartmouth College
King Tan and Sam Toueg
Cornell University

Simple, Fast, and Practical Non-Blocking and Blocking Concurrent Queue Algorithms
Maged Michael and Michael Scott
University of Rochester

=>A Proof of a Theorem in Algebraic Topology by a Distributed Algorithm
Eli Gafni
U.C. Los Angeles

=>Wait-Free Solvability via Combinatorial Topology
Marios Mavronicolas
University of Cyprus

=>Simulation as an Iterated Task
Eli Gafni
U.C. Los Angeles

=>On the Decidability of Distributed Decision Tasks
Maurice Herlihy
Brown University
Sergio Rajsbaum
UNAM Mexico

Sessions

11:00 am Coffee Break

S11

Session 11

Sunday, May 26, 1996
11:20 am – 12:35 pm

Tal Rabin, Chair
MIT

Counting Networks are Practically Linearizable
Nancy Lynch and Alex Shvartsman
MIT
Nir Shavit
Tel-Aviv University and MIT
Dan Touitou
Tel-Aviv University

How to be an Efficient Snoop, or the Probe Complexity of Quorum Systems
David Peleg and Avishai Wool
Weizmann Institute

Eventually-Serializable Data Services
Alan Fekete
University of Sidney
David Gupta, Victor Luchangco, Nancy Lynch and Alex Shvartsman
MIT

=>From Serializable to Causal Transactions for Collaborative Applications
M. Raynal and G. Thiakime
IRISA, Campus de Beaulieu
M. Ahamad
Georgia Institute of Technology

=>The Strength of Counting Networks
Costas Busch and Marios Mavronicolas
University of Cyprus

=>Tight Bounds on the Cumulative Profit of Distributed Voters
Peter Auer
UC Santa Cruz
Pasquale Caianiello
Universita dell'Aquila
Nicolo Cesa-Bianchi
Universita di Milano

=>The Offset Problem
Lenore Cowen
Johns Hopkins University
Rudolph Mathar
Aachen University of Technology

S12

Session 12

Sunday, May 26, 1996
2:30 pm – 4:00 pm

Sergio Rajsbaum, Chair
UNAM Mexico

Fail-Awareness in Timed Asynchronous Systems
Christof Fetzer and Flaviu Cristian
U.C. San Diego

A New Look at Membership Services
Gil Neiger
Intel Corporation

On the Impossibility of Group Membership
Tushar Deepak Chandra
IBM T.J. Watson
Vassos Hadzilacos
University of Toronto
Sam Toueg
Cornell University
Bernadette Charron-Bost
Ecole Polytechnic

=>Collective Consistency
Cynthia Dwork, Ching-Tien Ho and Ray Strong
IBM Almaden

=>Perfect Failure Detectors and (Repeated) Reliable Broadcast
Aleta Ricciardi
University of Texas at Austin

=>A Framework for Partitionable Membership Service
Danny Dolev
Hebrew University
Dalia Malki
AT&T Bell Laboratories
Ray Strong
IBM Almaden

=>Evaluating Quorum Systems Over the Internet
Yair Amir
Hebrew University
Avishai Wool
Weizmann Institute

Committees

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Yoram Moses
Weizmann Institute
Program Chair

Brian Coan
Bellcore
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Brown University
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Brian Coan
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Vassos Hadzilacos
University of Toronto

Barbara Liskov
MIT

Yoram Moses
Weizmann Institute

David Peleg
Weizmann Institute

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Yale University

Benny Chor
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Tal Rabin
MIT

Sergio Rajsbaum
UNAM Mexico

Ambuj K. Singh
U.C. Santa Barbara

Ray Strong
IBM Almaden

Douglas B. Terry
Xerox PARC

Mark R. Tuttle
DEC CRL

Jeannette M. Wing
CMU

Job Zwiers
University of Twente

Philadelphia
"The Nation's Friendliest City"
Conde Nast Traveler

The 12th Annual ACM Symposium on Computational Geometry (SCG)

Plenary Invited Speaker
Daily
8:00 — 9:00 am
Room: Salon F
Grand Ballroom

Registration for the 12th Annual ACM Symposium on Computational Geometry includes a welcoming reception, business meeting, an evening excursion, continental breakfasts, coffee breaks, a copy of the conference proceedings, and a copy of the video proceedings. Student registration fee includes all of the above except the evening excursion. The conference is sponsored by the ACM Special Interest Group on Algorithms and Computation Theory (SIGACT) and the ACM Special Interest Group on Graphics (SIGGRAPH).

Sessions

R

Reception

Thursday, May 23, 1996
7:00 pm – 10:00 pm

S1

Session 1

Friday, May 24, 1996
9:15 am – 10:55 am

Sue Whitesides, Chair
McGill University

9:15 am
New Lower Bounds for Convex Hull Problems in Odd Dimensions
Jeff Erickson

9:40 am
Shadows and Slices of Polytopes
Nina Amenta and Günter Ziegler

10:05 am
Vertical Decomposition of a Single Cell in a Three-Dimensional Arrangement of Surfaces and its Applications
Otfried Schwarzkopf and Micha Sharir

10:30 am
On the Number of Arrangements of Pseudolines
Stefan Felsner

10:55 am Coffee Break

S2

Session 2

Friday, May 24, 1996
11:20 am - 12:35 pm

Marshall Bern, Chair
Xerox PARC

11:20 am
On Triangulating Three-Dimensional Polygons
Gill Barequet, Matthew Dickerson and David Eppstein

11:45 am
An Aspect Ratio Bound for Triangulating a d-Grid Cut by a Hyperplace
Scott A. Mitchell and Stephen A. Vavasis

12:10 pm
Linear Complexity Hexahedral Mesh Generation
David Eppstein

S3

Session 3

Friday, May 24, 1996
2:00 pm – 3:45 pm

Nicholas Patrikalakis, Chair
MIT

2:00 pm
Combinatorial and Experimental Results for Randomized Point Matching Algorithms
Sandy Irani and Prabhakar Raghavan

2:25 pm
Temporally Coherent Conservative Visibility
Satyan Coorg and Seth Teller

2:50 pm
Splitting a Complex of Convex Polytopes in any Dimension
Chandrajit L. Bajaj and Valerio Pascucci

3:15 pm
A Computational Algorithm for Origami Design
Robert J. Lang

3:45 pm Coffee Break

S4

Session 4

Friday, May 24, 1996
4:05 pm – 5:20 pm

Pankaj K. Agarwal, Chair
Duke University

4:05 pm
A Near-Linear Algorithm for the Planar 2-Center Problem
Micha Sharir

4:30 pm
On Piercing Sets of Objects
Matthew J. Katz and Franck Nielsen

4:55 pm
Rectilinear and Polygonal p-Piercing and p-Center Problems
Micha Sharir and Emo Welzl

M

Business Meeting

Friday, May 24, 1996
7:30 pm

Joseph Mitchell, Chair
SUNY-Stony Brook

S5

Session 5

Saturday, May 25, 1996
9:15 am – 10:55 am

Victor Milenkovic, Chair
University of Miami

9:15 am
Parallel Robust Algorithms for Constructing Strongly Convex Hulls
Wei Chen, Koichi Wada and Kimio Kawaguchi

9:40 am
Robust Adaptive Floating-Point Geometric Predicates
Jonathan Shewchuk

10:05 am
On the Bit Complexity of Minimum Link Paths: Superquadratic Algorithms for Problems Solvable in Linear time
Simon Kahan and Jack Snoeyink

10:30 am
Checking Geometric Programs or Verification of Geometric Structures
Kurt Mehlhorn, Stefan Näher, Michael Seel, Raimund Seidel, Thomas Schilz, Stefan Schirra and Christian Uhrig

10:55 am Coffee Break

S6

Session 6

Saturday, May 25, 1996
11:20 am - 12:35 pm

Pankaj K. Agarwal, Chair
Duke University

11:20 am
On Computing Voronoi Diagrams by Divide-Prune-and-Conquer
Nancy M. Amato and Edgar A. Ramos

11:45 am
Faster Output-Sensitive Parallel Convex Hulls for $d < 3$: Optimal Sublogarithmic Algorithms for Small Outputs
Neelima Gupta and Sandeep Sen

12:10 pm
Developing a Practical Projection-Based Parallel Delaunay Algorithm
Guy Blelloch, Gary L. Miller and Dafna Talmor

S7

Session 7

Saturday, May 25, 1996
2:00 pm – 3:40 pm

Joseph O'Rourke, Chair
Smith College

2:00 pm
Approaching the Largest β-Skeleton within a Minimum Weight Triangulation
Siu-Wing Cheng and Yin-Feng Xu

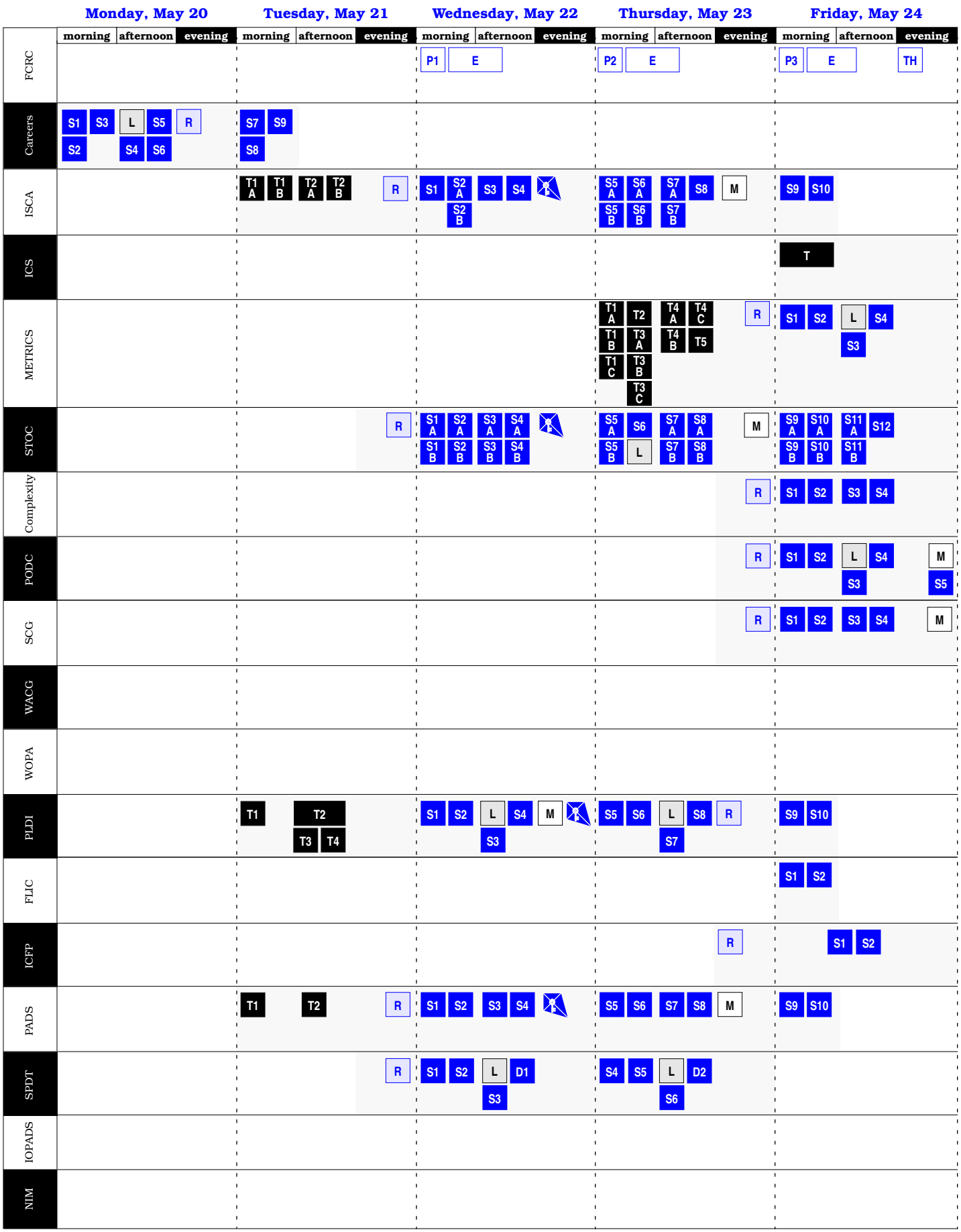
2:25 pm
The Exact Minimum Weight Triangulation
Matthew T. Dickerson and Mark H. Montague

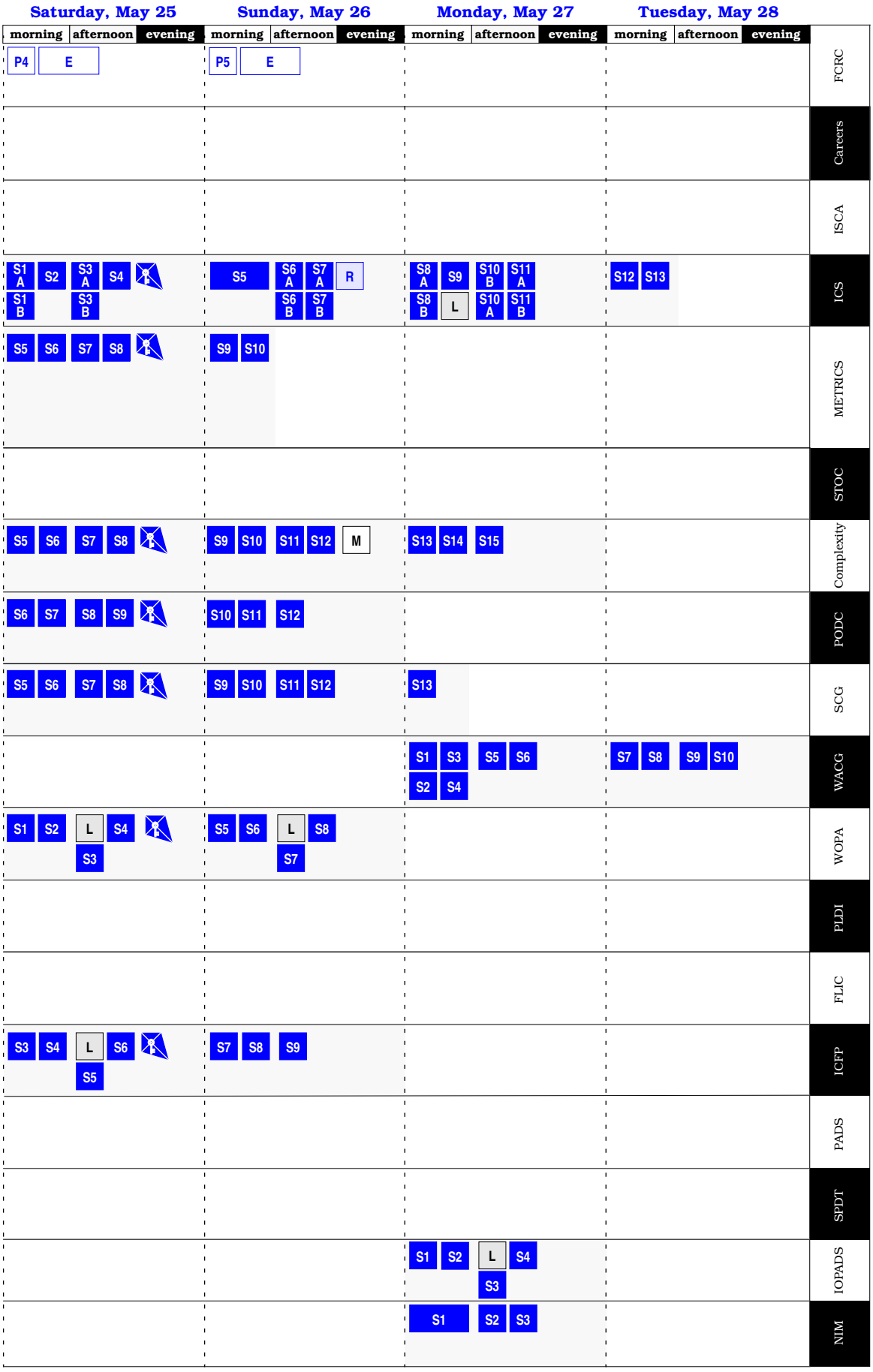
2:50 pm
Flipping Edges on Triangulations
F. Hurtado, M. Noy and J. Urrutia

3:15 pm
Enumeration of Regular Triangulations
Tomonari Masada, Hiroshi Imai and Keiko Imai

3:40 pm Coffee Break

PROGRAM AT A GLANCE





S Session

T Tutorial

D Panel Discussion

M Meeting

P Plenaries

E Exhibits

TH CRA Town Hall

R Reception

L Lunch

Science Museum

Sessions

S8

Poster Session (Short Communications)

Saturday, May 25, 1996
4:05 pm – 5:45 pm

Experimental Results of a Randomized Clustering Algorithm
Mary Inaba, Hiroshi Imai and Naoki Katoh

Animating Geometric Algorithms over the Web
James E. Baker, Isabel F. Cruz, Giuseppe Liotta and Roberto Tamassia

Simple Traversal of a Subdivision Without Extra Storage
Mark de Berg, Marc van Kreveld, René van Oostrum and Mark Overmars

The Graph of Triangulations of a Convex Polygon
F. Hurtado and M. Noy

Partial Surface Matching by Using Directed Footprints
Gill Barequet and Micha Sharir

On the Sectional Area of Convex Polytopes
D. Avis, P. Bose, T. Shermer, J. Snoeyink, G. Toussaint and B. Zhu

Smallest Enclosing Cylinders
Elmar Schomer, Jurgen Sellen, Marek Teichmann and Chee Yap

Curve Based Stereo Matching Using the Minimum Hausdoff Distance
Klara Kedem and Yana Yarmovski

Approximate Geometric Matching of 3d Bronchial Tree Structures
Chandrasekhar Pisupati, Lawrence Wolff, Wayne Mitzner and Elias Zerhouni

S9

Session 9

Sunday, May 26, 1996
9:15 am – 10:55 am

Olivier Devillers, Chair
INRIA, Sophia-Antipolis

9:15 am
Algorithms to Compute the Convolution and Minkowski Sum Outer-Face of Two Simple Polygons
G. D. Ramkumar

9:40 am
A Polynomial-time Algorithm for Computing a Shortest Path of Bounded Curvature Amidst Moderate Obstacles
Jean-Daniel Boissonnat and Sylvain Lazard

10:05 am
d_1-Optimal Motion for a Rod
Tetsuo Asano, David Kirkpatrick and Chee K. Yap

10:30 am
Optimal Robot Localization in Trees
Kathleen Romanik and Sven Schuierer

10:55 am Coffee Break

S10

Session 10

Sunday, May 26, 1996
11:20 am - 12:35 pm

Marc van Kreveld, Chair
Utrecht University

11:20 am
Fast Randomized Point Location Without Preprocessing in Two-and Three-Dimensional Delaunay Triangulations
Ernst P. Mücke, Isaac Saias and Binhai Zhu

11:45 am
Fixed-Dimensional Linear Programming Queries Made Easy
Timothy M. Chan

12:10 pm
Pseudo-Triangulations: Theory and Applications
Michel Pocchiola and Gert Vegter

S11

Session 11

Sunday, May 26, 1996
2:00 pm - 3:40 pm

Subhash Suri, Chair
Washington University

2:00 pm
Improvements on Bottleneck Matching and Related Problems Using Geometry
Alon Efrat and Alon Itai

2:25 pm
Approximating Monotone Polygonal Curves Using the Uniform Metric
Kasturi R. Varadarajan

2:50 pm
Convex Drawings of Graphs in Two and Three Dimensions
Marek Chrobak, Michael T. Goodrich and Roberto Tamassia

3:15 pm
Approximate Shortest Paths on a Convex Polytope in 3-d
Kasturi R. Varadarajan

3:40 pm Coffee Break

S12

Session 12

Sunday, May 26, 1996
4:05 pm - 5:20 pm

Imre Barany, Chair
Hungarian Academy

4:05 pm
Monotonicity of Rectilinear Geodesics in d-Space
Joonsoo Choi and Chee-Keng Yap

4:30 pm
Disk Packings and Planar Separators
Daniel A. Spielman and Shang-Hua Teng

4:55 pm
Ramsey-Type Results for Geometric Graphs
Gyula Karolyi, Janos Pach and Geza Toth

S13

SCG/WACG Invited Talk

Monday, May 27, 1996
8:00 am - 9:00 am

David Dobkin
Princeton University

Computational Geometry - Where Did it Come From, What is it Good For?

Committees

Michael T. Goodrich
Johns Hopkins University
Conference Chair

Leonidas J. Guibas
Stanford University
Program Chair

PROGRAM COMMITTEE
Pankaj K. Agarwal
Duke University

Imre Barany
Hungarian Academy

Marshall Bern
(Xerox PARC

Olivier Devillers
INRIA, Sophia-Antipolis

Marc van Kreveld
Utrecht University

Jean-Claude Latombe
Stanford University

Chris Levcopoulos
Lund University

Victor Milenkovic
University of Miami

Joseph O'Rourke
Smith College

Nicholas Patrikalakis
MIT

Gunter Rote
Technische Universitat Graz

Subhash Suri
Washington University

Sue Whitesides
McGill University

First ACM Workshop on Applied Computational Geometry (WACG)

Continental Breakfast Daily
7:15 am – 8:00 am
Room: Franklin Hall

Registration for the First Workshop on Applied Computational Geometry includes continental breakfasts, coffee breaks, and workshop proceedings. Student registration fee includes all of the above. The workshop is sponsored by the ACM Special Interest Groups for Graphics (SIGGRAPH) and Algorithms & Computation Theory (SIGACT).

Sessions

S1

SCG/WACG Invited Talk

Monday, May 27, 1996
8:00 am - 9:00 am

David Dobkin
Princeton University

Computational Geometry - Where Did it Come From, What is it Good For?

S2

WACG Welcome and Opening Remarks

Monday, May 27, 1996
9:00 am – 9:20 am

S3

Molecular Modeling

Monday, May 27, 1996
9:20 am – 10:40 am

Ming Lin, Chair
Army Research Office & UNC Chapel Hill

9:20 am
Smooth Surfaces for Multi-Scale Shape Representation
Herbert Edelsbrunner
University of Illinois

10:00 am
Geometric Manipulation of Flexible Ligands
D. Halperin, L. Kavraki, J. Latombe, R. Motwani, C. Shelton and S. Venkatasubramanian
Stanford University

10:20 am
Application of the Ray-Representation to Problems of Protein Structure and Function
Michael G. Prisant
Duke University

10:40 am Coffee Break

S4

Solid Modeling and Geometric Robustness

Monday, May 27, 1996
11:00 am – 12:50 pm

Dinesh Manocha, Chair
Univ. of N. Carolina, Chapel Hill

11:00 am
How Solid is Solid Modeling
Christoph Hoffmann
Purdue University

11:40 am
PANEL DISCUSSION on Robustness Issues
Steve Fortune, Panel Chair
AT & T Bell Labs
Leo Guibas
Stanford University
Franco Preparata
Brown University

S5

Manufacturing

Monday, May 27, 1996
1:50 pm – 3:40 pm

Chee Yap, Chair
New York University

1:50 pm
Computational Geometry in Design and Manufacturing
Michael J. Wozny
Department of Commerce

2:30 pm
Applications of Computational Geometry in Mechanical Engineering Design and Manufacturing
Michael Pratt
National Institute of Standards & Technology

3:00 pm
Column-Based Strip Packing using Ordered and Compliant Containment
V. Milenkovic
Univ. of Miami
K. Daniels
Harvard University

3:20 pm
Computing a flattest, undercut--free parting line for a convex polyhedron, with application to mold design
J. Majhi, P. Gupta and R. Janardan
U. of Minnesota

3:40 pm Coffee Break

S6

MACHINE LEARNING, VISION & COMPUTATIONAL ROBOTICS

Monday, May 27, 1996
4:00 pm – 5:40 pm

Leo Guibas, Chair
Stanford University

4:00 pm
Geometric Pattern Matching and Computer Vision
Dan Huttenlocher
Cornell University

4:40 pm
Geometric Problems in Machine Learning
David Dobkin and Dimitrios Gunopulos
Princeton University

5:00 pm
Matching convex polygons and polyhedra, Allowing for Occlusion
Ronen Basri
Weizmann Institute
David Jacobs
NEC

5:20 pm
Stably Placing Piecewise Smooth Objects
Chao-Kuei Hung and Doug Ierardi
University of Southern CA

S7

Geometric Applications I

Tuesday, May 28, 1996
9:00 am – 10:45 am

Dinesh Manocha, Chair
Univ. of N. Carolina, Chapel Hill

9:00 am
On Some Applications of Computational Geometry in Virtual Environments
Joseph Mitchell
SUNY Stony Brook

9:35 am
Geometric Issues Arising from N-Manifold Geometry in BRL-CAD
Michael Muuss
Army Research Laboratory

10:05 am
A beam-tracing algorithm for indoor radio propagation
Steve Fortune
AT & T Bell Labs

10:25 am
Extracting Geometric Information from Architectural Drawings
Brian Kernighan
AT & T Bell Labs
Chris Van Wyk
Drew

10:45 am Coffee Break

S8

Geometric Software and Visualization

Tuesday, May 28, 1996
11:00 am – 12:50 pm

Joe Mitchell, Chair
SUNY Stony Brook

11:00 am
Using the visibility complex for radiosity computation
R. Orti, F. Durand, S. Riviere and C. Puech
IMAG-INRIA

11:20 am
The CGAL kernel: A basis for geometric computation
A. Fabri
INRIA
G. Gierzeman
Utrecht Univ.
L. Kettner and S. Schonherr
Freie Univ.
S. Schirra
Max-Planck Institut fur Informatik

11:40 am
PANEL DISCUSSION on Geometric Software & Visualization
Mark Overmars, Panel Chair
Utrecht University
David Dobkin
Princeton University
D. T. Lee
Northwestern University
Kurt Mehlhorn
Max-Planck-Institut fuer Informatik

First ACM Workshop on Applied Computational Geometry (WACG)

Sessions

S9

Geometric Applications II

Tuesday, May 28, 1996
1:50 pm – 3:50 pm

David Dobkin, Chair
Princeton

1:50 pm
Grid Generation for Computational Field Simulation
Joe Thompson
Mississippi State University

2:30 pm
Computational Geometry issues in VLSI Design Verification
V. T. Rajan
IBM T.J. Watson Research Center

3:00 pm
Near Linear Time for Ray Tracing
Tony Woo
University of Washington

3:30 pm
Triangle: Engineering a 2D Quality Mesh Generator and Delaunay Triangulator
Jonathan Richard Shewchuk
Carnegie-Mellon U.

3:50 pm Coffee Break

S10

Geometric Engineering

Tuesday, May 28, 1996
4:00 pm – 5:40 pm

Ming Lin, Chair
U.S. Army Research Office & UNC-Chapel Hill

4:00 pm
Issues in Geometric Toleranc-ing
Chee Yap
New York University

4:40 pm
PANEL DISCUSSION
On the Future Trend of Geometric Computing

Committees

Ming C. Lin
U.S. Army Research Office & UNC-Chapel
General Chair

Dinesh Manocha
University of North Carolina, Chapel Hill
Program Chair

Ming C. Lin
U.S. Army Research Office & UNC-Chapel Hill
Finance Chair

Committees

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Max-Planck-Institut fuer Informatik, Germany

Joseph Mitchell
SUNY, Stony Brook

Emo Welzl
Fachbereich Mathematik, Freie Universitat, Germany

Chee Yap
New York University

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Princeton University

Leo Guibas
Stanford University

Joe Mitchell
SUNY, Stony Brook

Chee Yap
New York University

ACM/UMIACS Workshop on Parallel Algorithms (WOPA)

Plenary Invited Speaker
Daily
8:00 — 9:00 am
Room: Salon F
Grand Ballroom

Registration for the 4th Workshop on Parallel Algorithms includes two lunches, continental breakfasts, an excursion, and coffee breaks. Student registration fee includes all of the above except the excursion. The conference is sponsored by the University of Maryland Institute for Advanced Computer Studies (UMIACS) and the ACM Special Interest Group on Algorithms and Computation Theory (SIGACT).

Sessions

S1

Session 1

Saturday, May 25, 1996
9:15 am – 10:45 am

9:15 am
Recent Developments in Parallel Asychronous Computing (invited presentation)
Michael O. Rabin
Harvard University and Hebrew University

10:15 am
Self-Stabilizing Synchronization Algorithms
Shlomi Dolev
Ben-Gurion University of the Negev

10:45 am Coffee Break

S2

Session 2

Saturday, May 25, 1996
11:00 am – 12:30 pm

11:00 am
Estimation Algorithms for Efficient Parallel Query Processing (invited presentation)
Phillip B. Gibbons
AT&T Bell Laboratories

12:00 pm
Fine-Grain Parallelism: PRAM Algorithms and Instruction-Level-Parallelism
Rimon Orni and Uzi Vishkin
University of Maryland, College Park and Tel Aviv University

L

12:30 pm – 2:00 pm
Luncheon

S3

Session 3

Saturday, May 25, 1996
2:15 pm – 3:15 pm

2:15 pm
Parallel Multisearch: Recent Results and Open Problems (invited presentation)
Mikhail J. Atallah
Purdue University

3:15 pm Coffee Break

S4

Session 4

Saturday, May 25, 1996
3:45 pm – 4:45 pm

3:45 pm
Models, Algorithms and Architectures: Immediate Family or Distant Cousins? (invited presentation)
Satish Rao
NEC Research Institute

S5

Session 5

Sunday, May 26, 1996
9:15 am – 10:45 am

9:15 am
Building Parallel Machines: How Useful Is Theory? (invited presentation)
Marc Snir
IBM T. J. Watson Research Center

10:15 am
Programming and Analyzing Parallel Algorithms in the Cilk Multithreaded Language
Robert Blumofe, Matteo Frigo, Charles E. Leiserson and Keith Randall
The University of Texas at Austin and MIT

10:45 am Coffee Break

ACM/UMIACS Workshop on Parallel Algorithms (WOPA)

Sessions

S6

Session 6

Sunday, May 26, 1996
11:00 am – 12:30 pm

11:00 am
LogP Network Characterization by Microbenchmarks (invited presentation)
David Culler
University of California at Berkeley

12:00 pm
Communication-Efficient Bulk-Synchronous Parallel Computing
Michael T. Goodrich
Johns Hopkins University

L

12:30 pm – 2:00 pm
Luncheon

S7

Session 7

Sunday, May 26, 1996
2:15 pm – 3:15 pm

2:15 pm
Algorithm Design for Parallel Scientific Computation (invited presentation)
Gary Miller
Carnegie Mellon University

3:15 pm Coffee Break

S8

Session 8

Sunday, May 26, 1996
3:15 pm – 4:45 pm

3:45 pm
The Random-Adversary Technique
Philip D. MacKenzie
Sandia National Laboratories

4:15 pm
How Can We Demonstrate Increasing Parallel Complexities?
Chuzo Iwamoto and Kazuo Iwama
Kyushu Institute of Design, Japan

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Exhibits
Wednesday – Sunday
9:00 am – 6:00 pm
Room: Franklin Hall

ACM SIGPLAN '96 Conference on Programming Language Design and Implementation (PLDI)

Plenary Invited Speaker
Daily
8:00 — 9:00 am
Room: Salon F
Grand Ballroom

Registration for the ACM SIGPLAN '96 Conference on Programming Language Design and Implementation includes three continental breakfasts, two lunches, a joint reception with ICFP, an evening excursion, coffee breaks, and conference proceedings. Student registration includes all of the above except for the evening excursion. The conference is sponsored by the ACM Special Interest Group on Programming Languages (SIGPLAN).
Registration for the full day of ACM SIGPLAN '96 tutorials includes a continental breakfast, lunch, coffee breaks and tutorial notes. Registration for the morning tutorial includes a continental breakfast, a coffee break, and tutorial notes. Registration for afternoon tutorials includes a coffee break and tutorial notes.

Tutorials

T1

Richard J. LeBlanc
Georgia Institute of Technology

Tuesday, May 21, 1996
9:00 am – 12:00 pm

Object-Oriented Analysis and Design

This tutorial will introduce the principles of object-oriented software development and provide an overview of object-oriented analysis and design techniques. The basic concepts of object-oriented software, such as object, class, message and inheritance, will be defined and discussed. Object-oriented analysis will be presented as a way of modeling user requirements and the high-level architecture of corresponding software solutions. Object-oriented design concepts will be described as a systematic means of implementing the results of object-oriented analysis. Some popular analysis and design techniques will be compared. The presentation of these techniques will not depend on the features of any particular programming language.

This tutorial is intended for people who are familiar with traditional imperative style programming and who want to learn about object technology. It will provide valuable language-independent skills for those who wish to begin programming in object-oriented languages.

Richard J. LeBlanc is a Professor and the Associate Dean of the College of Computing of the Georgia Institute of Technology. His current teaching and research interests include object technology, in which he frequently teaches continuing education courses.

10:30 am Coffee Break
For Tutorial T1

12:00 pm – 1:30 pm
Luncheon
For full day tutorial registrants

T2

Owen Astrachan
Duke University

Tuesday, May 21, 1996
1:30 pm – 4:30 pm

Teaching C++ in Introductory Courses

C++ is a large and complex language. It's still a very reasonable choice for the first year of Computer Science courses provided that careful choices are made about what parts of the language will be covered and what classes are provided for student use. We'll survey different approaches to using C++, discuss how to develop and manage C++ as a student's first language, and discuss practical methods for instructors and students to get up-to-speed with C++ and object-oriented programming.

Tutorials and Sessions

This tutorial is intended for anyone interested in practical information on how best to teach C++ in introductory Computer Science courses. The primary focus will be on the first course (CS1) with attention to the second, data structures course (CS2). Prior experience with C++ is not mandatory.

Owen Astrachan is an Assistant Professor of the Practice of Computer Science, and Director of Undergraduate Studies at Duke University. He has been involved in Computer Science education for many years, and has given numerous invited talks at education conferences and workshops.

T3

Luca Cardelli
Digital Equipment Corporation

Tuesday, May 21, 1996
1:30 pm– 2:50 pm

Object-based vs. Class-based Languages

Class-based object-oriented programming languages take object generators as central, while object-based languages emphasize the objects themselves. Class-based languages have become relatively well-understood, widely debated, and hugely popular. In contrast, the area of object-based languages is still underdeveloped. Nonetheless, object-based languages are intrinsically simpler and more general than traditional class-based languages, and hold promise for the future of object-oriented programming. I discuss these two categories of object-oriented languages, giving them equal weight, and concentrating on the variations and potentials of object-based languages.

This tutorial is intended for people interested in understanding the principal concepts behind object-oriented languages. People interested in typed object-oriented programming, but not just C++, and in untyped object-oriented programming, but not just Smalltalk. A general knowledge of at least one class-based language is assumed.

Luca Cardelli is a senior computer scientist at Digital Equipment Corporation, Systems Research Center in Palo Alto. His main interests are in type theory and operational semantics, mostly for applications to language design, semantics, and implementation.

2:50 pm Coffee Break
For Tutorials T2, T3 and T4.

T4

Guy L. Steele Jr.
Sun Microsystems Laboratories

Tuesday, May 21, 1996
3:10 pm – 4:30 pm

The Java Programming Language

Java is a small, simple, object-oriented programming language that is attracting a lot of interest for use on the World Wide Web. Just as HTML allows Web users to access text with embedded pictures, sound clips, and movies with a simple point-and-click interface, Java allows a Web user to access programs: a mouse click in a Java-capable browser can retrieve and execute a program on a local machine. This simple concept raises important language design issues, including security, privacy, and authentication. We discuss the design of the Java language with an emphasis on how the design choices make Java suitable for its intended applications.

This tutorial is intended for those interested in using the Java programming language and those interested in the problems of programming language design.

Guy L. Steele Jr., is a Distinguished Engineer at Sun Microsystems Laboratories. His honors include ACM Grace Murray Hopper Award (1988), AAAI Fellow (1990), and ACM Fellow (1994).

S1

Instruction Scheduling

Wednesday, May 22, 1996
9:30 am – 10:30 am

Monica Lam, Chair
Stanford University

9:30 am
Software Pipelining Showdown: Optimal vs. Heuristic Methods in a Production Compiler
John Ruttenberg and W. Lichtenstein
Silicon Graphics
G.R. Gao and A. Stouchinin
McGill University

10:00 am
A Reduced Multipipeline Machine Description that Preserves Scheduling Constraints
Alexandre E. Eichenberger and Edward S. Davidson
University of Michigan

10:30 am Coffee Break

S2

Testing and Verification

Wednesday, May 22, 1996
11:00 am – 12:30 pm

Dirk Grunwald, Chair
University of Colorado

11:00 am
Teapot: Language Support for Writing Memory Coherence Protocols
Satish Chandra, Brad Richards and James Larus
University of Wisconsin, Madison

11:30 am
Target-Sensitive Construction of Diagnostic Programs for Procedure Calling Sequence Generators
Mark W. Bailey and Jack W. Davidson
University of Virginia

12:00 pm
Replay For Concurrent Non-Deterministic Shared Memory Applications
Mark Russinovich, Bryce Cogswell and Zary Segall
University of Oregon

L

12:30 pm – 2:00 pm
Luncheon

S3

Parallelizing Compilers

Wednesday, May 22, 1996
2:00 pm – 3:30 pm

Kathryn S. McKinley, Chair
University of Massachusetts

2:00 pm
Commutativity Analysis: A New Analysis Framework for Parallelizing Compilers
Martin C. Rinard and Pedro C. Diniz
University of California, Santa Barbara

2:30 pm
Global Communication Analysis and Optimization
Soumen Chakrabarti
University of California, Berkeley
Manish Gupta and Jong-Deok Choi
IBM T.J. Watson Research Center

3:00 pm
GUM: A Portable Parallel Implementation of Haskell
P.W. Trinder, K. Hammond and S.L. Peyton Jones
Glasgow University
J.S. Mattson Jr.
Hewlett Packard
A.S. Partridge
University of Tasmania

3:30 pm Coffee Break

S4

Program Analysis

Wednesday, May 22, 1996
4:00 pm – 5:30 pm

William Landi, Chair
Siemens Corporate Research

4:00 pm
Data Flow Frequency Analysis
G. Ramalingam
IBM T.J. Watson Research Center

4:30 pm
A New Framework for Exhaustive and Incremental Data Flow Analysis Using DJ Graphs
Vugranam Sreedhar and Guang Gao
McGill University
Yong-fong Lee
Intel Corporation

5:00 pm
Generalized Dominance and Control Dependence
Gianfranco Bilardi
Universita di Padova
Keshav Pingali
Cornell University

M

Report by the Program Chair

Wednesday, May 22, 1996
5:30 pm – 6:00 pm

Michael Burke, Program Chair
IBM Thomas J. Watson Research Center

Sessions

S5

New Directions

Thursday, May 23, 1996
9:30 am – 10:30 am

Michael Burke, Chair
IBM Thomas J. Watson Research Center

9:30 am
Practical Program Analysis Using General Purpose Logic Programming Systems
Steven Dawson, C.R. Ramakrishnan and David S. Warren
SUNY, Stony Brook

10:00 am
Efficient and Language-Independent Mobile Programs
Ali-Reza Adl-Tabatabai, Geoff Langdale, Steven Lucco and Robert Wahbe
Carnegie Mellon University

10:30 am Coffee Break

S6

Run-time Code Generation

Thursday, May 23, 1996
11:00 am – 12:30 pm

Bernhard Steffen, Chair
University of Passau

11:00 am
Optimizing ML with Run-Time Code Generation
Peter Lee and Mark Leone
Carnegie Mellon University

11:30 am
Fast, Effective Dynamic Compilation
J. Auslander, M. Philipose, C. Chambers, S. Eggers and B. Bershad
University of Washington

12:00 pm
VCODE: a Retargetable, Extensible, Very Fast Dynamic Code Generation System
Dawson R. Engler
M.I.T. Laboratory for Computer Science

L

12:30 pm – 2:00 pm
Luncheon

S7

ML

Thursday, May 23, 1996
2:00 pm – 3:30 pm

Fritz Henglein, Chair
DIKU, University of Copenhagen

2:00 pm
Simple Objects for Standard ML
John Reppy and Jon Riecke
AT&T Bell Laboratories

2:30 pm
TIL: A Type-Directed Optimizing Compiler for ML
D. Tarditi, G. Morrisett, P. Cheng, C. Stone, R. Harper and P. Lee
Carnegie Mellon University

3:00 pm
Flow-directed Inlining
Suresh Jagannathan and Andrew Wright
NEC Research Institute

3:30 pm Coffee Break

S8

Currying/Partial Evaluation

Thursday, May 23, 1996
4:00 pm – 5:30 pm

Room:

Tom Reps, Chair
University of Wisconsin, Madison

4:00 pm
Realistic Compilation by Partial Evaluation
M. Sperber and P. Thiemann
Universitaet Tuebingen

4:30 pm
Data Specialization
T. Knoblock and E. Ruf
Microsoft Research

5:00 pm
Relocating Machine Instructions by Currying
Norman Ramsey
Purdue University

5:30 pm - 6:00 pm
Open SIGPLAN Meeting

R

Joint Reception with ICFP

Thursday, May 23, 1996
6:30 pm – 8:30 pm

S9

Friday, May 24, 1996
9:30 am – 11:00 am

Robert Halstead, Chair
DEC Cambridge Research Lab

9:30 am
Static Debugging: Browsing the Web of Program Invariants
Cormac Flanagan, K. Shriram, Stephanie Weirich and Matthias Felleisen
Rice University

10:00 am
Source-Level Debugging of Scalar Optimized Code
Ali-Reza Adl-Tabatabai and Thomas Gross
Carnegie Mellon University

10:30 am
Static Detection of Dynamic Memory Errors
David Evans
M.I.T. Laboratory for Computer Science

11:00 am Coffee Break

S10

Implementation Techniques

Friday, May 24, 1996
11:30 am – 1:00 pm

Robert Cartwright, Chair
Rice University

11:30 am
Simple Garbage-Collector-Safety
Hans-J. Boehm
Xerox PARC

12:00 pm
Representing Control in the Presence of One-Shot Continuations
Carl Bruggeman, Oscar Waddell and R. Kent Dybvig
Indiana University

12:30 pm
Printing Floating-Point Numbers Quickly and Accurately
Robert G. Burger, R. Kent Dybvig
Indiana University

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University of Wisconsin, Madison

Bernhard Steffen
University of Passau

Workshop of Functional Languages in Introductory Computing (FLIC)

This Workshop is part of ICFP, with an additional fee of $50.

Registration for the workshop includes morning coffee break. The first 50 registrants will receive a free copy of The Little Schemer, 4th edition, courtesy of MIT Press. The workshop is sponsored by ACM SIGPLAN, NEC Research, and MIT Press, and is held in conjunction with the International Conference on Functional Programming.

Sessions

Welcome

Over the past ten years, Scheme has rapidly become the programming language of choice for many introductory computing courses. Other functional languages, especially SML and Haskell, have recently been adopted at a number of universities. Approximately 50 departments in the US and 95 worldwide use functional languages as their introductory programming languages. Some 20 secondary schools in the US have courses based on the functional philosophy. All preparatory schools in France use CAML.

This workshop will present speakers who discuss their experience with using Scheme, SML, and Haskell in the introductory curriculum. They will report on successes, recent changes, and the relationship of their courses to other parts of the curriculum.

S1

Session 1

Friday, May 24, 1996
9:15 am – 11:05 am

Matthias Felleisen, Chair
Rice University

9:15 am
Welcome
Matthias Felleisen
Rice University

9:20 am
Programming as a Medium for Teaching
Gerald J. Sussman
MIT
Daniel P. Friedman
Indiana University

10:05 am
Teaching Computation Theory Of and With Scheme
Albert Meyer
MIT

10:35 am
Scheme in Pre-College Classrooms
Ian Ferguson
Schemer's Inc.

11:05 am Coffee Break

S2

Session 2

Friday, May 24, 1996
11:20 am – 12:50 pm

Christopher Haynes, Chair
Indiana University

11:20 am
Programming Languages and Techniques
Carl Gunter
University of Pennsylvania

11:50 am
CAML at ENS
Guy Cousineau

12:20 pm
An FP-based Series of Undergraduate Lectures using Gofer
S. Doaitse Swierstra
University of Utrecht

Exhibits
Wednesday – Sunday
9:00 am – 6:00 pm
Room: Franklin Hall

ACM SIGPLAN International Conference on Functional Programming (ICFP)

Plenary Invited Speaker
Daily
8:00 — 9:00 am
Room: Salon F
Grand Ballroom

Registration for the International Conference on Functional Programming includes a reception (held jointly with PLDI), an evening excursion, one luncheon, continental breakfasts, coffee breaks, and conference proceedings. Student registration includes all of the above except the evening excursion. The conference is sponsored by ACM SIGPLAN in cooperation with IFIP Working Group 2.8.

Sessions

R

Joint Reception with PLDI

Thursday, May 23, 1996
6:30 pm – 8:30 pm

S1

Session 1

Friday, May 24, 1996
2:00 pm – 3:30 pm

Olivier Danvy, Chair
Aarhus University

2:00 pm
Let-floating: Moving bindings to give faster programs
Simon Peyton Jones, Will Partain and André Santos
University of Glasgow

2:30 pm
A reflection on call-by-value
Amr Sabry
Chalmers University
Philip Wadler
University of Glasgow

3:00 pm
Functional back-ends within the lambda-sigma-calculus
Thérèse Hardin
LITP and INRIA Rocquencourt
Luc Maranget
INRIA Rocquencourt
Bruno Pagano
LITP and INRIA Rocquencourt

3:30 pm Coffee Break

S2

Session 2

Friday, May 24, 1996
4:00 pm – 5:30 pm

Olin Shivers, Chair
MIT

4:00 pm
Lag, drag, void and use -- space-efficient compilation
Colin Runciman and Niklas Röjemo
University of York

4:30 pm
Static and dynamic partitioning of pointers as links and threads
David S. Wise and Joshua Walgenbach
Indiana University

5:00 pm
Storage use analysis and its applications
Manuel Serrano
University of Montreal & INRIA Rocquencourt
Marc Feeley
University of Montreal

S3

Session 3

Saturday, May 25, 1996
9:30 am – 10:30 am

Paul Hudak, Chair
Yale University

9:30 am
The role of lazy evaluation in amortized data structures
Chris Okasaki
Carnegie Mellon University

Sessions

10:00 am
Deriving structural hylomorphisms from recursive definitions
Zhenjiang Hu, Hideya Iwasaki and Masato Takeichi
University of Tokyo

10:30 am Coffee Break

S4

Session 4

Saturday, May 25, 1996
11:00 am – 12:30 pm

John Launchbury, Chair
Oregon Graduate Institute

11:00 am
Analysis and caching of dependencies
Martín Abadi
Digital Systems Research Center
Butler Lampson
Microsoft
Jean-Jacques Lévy
INRIA Rocquencourt

11:30 am
Optimality and inefficiency: What isn't a cost model of the lambda calculus?
Julia L. Lawall
IRISA
Harry G. Mairson
Brandeis University

12:00 pm
Inductive, coinductive, and pointed types
Brian T. Howard
Kansas State University

L

12:30 pm – 2:00 pm
Luncheon

S5

Session 5

Saturday, May 25, 1996
2:00 pm – 3:30 pm

Didier Rémy, Chair
INRIA

2:00 pm
A new look to pattern matching in abstract data types
Pedro Palao Gostanza, Ricardo Peña Marí and Manuel Núñez Garcia
Universidad Complutense de Madrid

2:30 pm
Simplifying subtyping constraints
François Pottier
ENS Paris & INRIA Rocquencourt

3:00 pm
Complexity of kernel Fun subtype checking
Giorgio Ghelli
Universita' di Pisa

3:30 pm Coffee Break

S6

Session 6

Saturday, May 25, 1996
4:00 pm – 5:30 pm

Matthias Felleisen, Chair
Rice University

4:00 pm
The semantics of Scheme with future
Luc Moreau
University of Southampton

4:30 pm
First-class synchronization barriers
Franklyn Turbak
Wellesley College

5:00 pm
pHluid: The design of a parallel functional language implementation
Cormac Flanagan
Rice University
Rishiyur S. Nikhil
Digital Equipment Corporation

S7

Sessions 7

Sunday, May 26, 1996
9:30 am – 10:30 am

Peter Lee, Chair
Carnegie Mellon University

9:30 am
Cogen in six lines
Peter Thiemann
Universität Tübingen

10:00 am
A probabilistic approach to the problem of automatic selection of data representations
Tyng-Ruey Chuang and Wen L. Hwang
Academia Sinica

10:30 am Coffee Break

S8

Session 8

Sunday, May 26, 1996
11:00 am – 12:30 pm

John Reppy, Chair
AT&T Research

11:00 am
A theory of weak bisimulation for core CML
William Ferreira, Matthew Hennessy and Alan Jeffrey
Sussex University

11:30 am
A provable time and space efficient implementation of NESL
Guy E. Blelloch and John Greiner
Carnegie Mellon University

12:00 pm
Synchronous Kahn networks
Paul Caspi and Marc Pouzet
VERIMAG

S9

Session 9

Sunday, May 26, 1996
2:00 pm – 3:30 pm

Andrew Wright, Chair
NEC Research

2:00 pm
Enriching the lambda calculus with contexts: Toward a theory of incremental program construction
Shinn-Der Lee and Daniel P. Friedman
Indiana University

2:30 pm
Sharing code through first-class environments
Christian Queinnec
Ecole Polytechnique & INRIA Rocquencourt
David DeRoure
University of Southampton

3:00 pm
Mixin modules
Dominic Duggan and Constantinos Sourelis
University of Waterloo

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Olin Shivers
MIT
Andrew Wright
NEC

10th ACM Workshop on Parallel and Distributed Simulation (PADS)

Plenary Invited Speaker
Daily
8:00 — 9:00 am
Room: Salon F
Grand Ballroom

Registration for the 10th Workshop on Parallel and Distributed Simulation (PADS'96) includes a reception, an evening excursion, the PADS business meeting, continental breakfasts, coffee breaks, and conference proceedings. Student registration fee includes all of the above except the reception and evening excursion. The conference is sponsored by the ACM Special Interest Group on Simulation (SIGSIM), the IEEE Computer Society Technical Committee on Simulation, and the Society for Computer Simulation.

Sessions and Tutorials

T1

Richard Fujimoto
College of Computing
Georgia Institute of Technology

Tuesday, May 21, 1996
9:00 am – 12:00 pm

Parallel Discrete Event Simulation

Discrete event simulation is widely used in the design and evaluation of complex systems and processes, e.g., large computer systems, communication networks, air traffic systems, and battlefield strategies, to mention a few. The goal of this tutorial is to introduce researchers and practitioners to the current state of the art concerning the execution of discrete event simulation programs on parallel computers. The tutorial will first review fundamental concepts in discrete event simulation. Classical synchronization algorithms such as the Chandy/Misra/Bryant "null message" algorithm and Jefferson's "Time Warp" protocol will be discussed, as well as more recent algorithms and techniques. Work concerning other important issues related to parallel execution (e.g., memory management and load balancing) will also be described, as well as experiences in utilizing this technology. Algorithms exploiting temporal parallelism to simulate systems such as cache memories and queueing networks will be discussed, as well as current trends in the field.

Researchers interested in the high performance parallel discrete event simulation field, and practioners with large scale simulation problems that could benefit from concurrent execution. No prior knowledge of discrete event simulation is assumed.

T2

Presenter to be determined
Organized by Richard Fujimoto

Tuesday, May 21, 1996
1:00 pm – 4:00 pm

Distributed Interactive Simulation and the High Level Architecture

Distributed Interactive Simulation (DIS) is an infrastructure for building large-scale virtual worlds from a set of independent simulator nodes. DIS is intended to support a mixture of simulation types: real-time, human-in-the-loop "virtual" simulations; real platforms including "live" systems, sensors, and tactical links; and event driven wargames, known as "constructive" simulations. While DIS is being developed by the Department of Defense to support training, DIS goes far beyond military applications. The DIS technology is applicable to transportation, medicine, education, emergency management, and entertainment, to name just a few.

The next generation of DIS is known as the High Level Architecture (HLA). The HLA is a framework into which specific simulation architectures can be defined. Like DIS, it is based on a composable approach to construct federations of autonomous simulations. HLA establishes the rules that must be followed to achieve proper interactions of simulations during a federation execution. It includes means for specifying object models to achieve interoperability among simulations, a set of interface definitions and a Run Time Infrastructure (RTI) for managing the execution of the federation.

This tutorial will present an overview of DIS and the HLA, and discuss differences between work in these fields and the high performance parallel discrete event simulation community. Fundamental design principals and concepts in DIS such as autonomy of simulation nodes and dead reckoning will be described. The central components of the HLA will be described, with particular emphasis on object model templates and services provided by the RTI.

Researchers and practitioners interested in on-going work to enable interoperability among separately developed simulations in geographically distributed computing environments.

Researchers in the parallel discrete event simulation community with no prior knowledge of DIS or the HLA are particularly encouraged to attend.

R

Reception

Tuesday, May 21, 1996
7:00 pm – 9:00 pm

S1

Welcome and Keynote Address

Wednesday, May 22, 1996
9:20 am – 10:50 am

Mary L. Bailey, Chair
University of Arizona

9:30 am
PADS Keynote Address
Ten Years of PADS: Where We've Been, Where We're Going
Richard M. Fujimoto
Georgia Institute of Technology

10:50 am Coffee Break

S2

Techniques I: Load Balancing in Parallel Simulation

Wednesday, May 22, 1996
11:10 am – 12:40 pm

Stephen J. Turner, Chair
University of Exeter, UK

11:10 am
Experiments in Automated Load Balancing
Linda F. Wilson
NASA
David M. Nicol
College of William and Mary

11:40 am
Background Execution of Time Warp Programs
Christopher D. Carothers and Richard M. Fujimoto
Georgia Institute of Technology

12:10 pm
The Dynamic Load Balancing of CTW for Logic Simulation
Herve Avril and Carl Tropper
McGill University, CA

S3

Applications I: ATM and Network Simulation

Wednesday, May 22, 1996
2:00 pm – 3:30 pm

Samir R. Das, Chair
University of Texas at San Antonio

2:00 pm
Conservative Parallel Simulation of ATM Networks
John G. Cleary and Jya-Jang Tsai
University of Waikato, NZ

2:30 pm
Massively Parallel Simulation of Asynchronous Transfer Mode (ATM) Systems
Krishnan Kumaran
Rutgers University
Boris Lubachevsky
AT&T Bell Labs

3:00 pm
Parallel Simulation of a High-Speed Wormhole Routing Network
Rajive Bagrodia, Mario Gerla, Bruce Kwan, Jay Martin, Prasasth Palnati and Simon Walton
University of California at Los Angeles

3:30 pm Coffee Break

S4

PADS, DIS, and the DoD High Level Architecture: What is PADS' Role?

Wednesday, May 22, 1996
3:50 pm – 5:20 pm

Richard M. Fujimoto, Chair
Georgia Institute of Technology

3:50 pm
Time Management in the DoD High Level Architecture
Richard M. Fujimoto
Georgia Institute of Technology
Richard Weatherly
MITRE Corporation

Sessions

4:20 pm
Panel Discussion
Richard M. Fujimoto, Moderator
Georgia Institute of Technology

S5
Techniques II: State-Saving and Synchronization in Optimistic Simulation

Thursday, May 23, 1996
9:20 am – 10:50 am

Rajive Bagrodia, Chair
University of California at Los Angeles

9:20 am
Transparent Incremental State Saving in Time Warp Parallel Discrete Event Simulation
Robert Ronngren, Michael Liljenstam and Rassul Ayani
Royal Institute of Technology, SE
Johan Montagnat
Ecole National Superieure de Cachan, FR

9:50 am
Automatic Incremental State Saving
Darin West
Science Applications International Corporation
Kiran Panesar
Georgia Institute of Technology

10:20 am
Reducing Synchronization Overhead in Parallel Simulation
Ulana Legedza and William E. Weihl
Massachusetts Institute of Technology

10:50 am Coffee Break

S6
Techniques III: Granularity and Partitioning in Parallel Simulation

Thursday, May 23, 1996
11:10 am – 12:40 pm

Wayne M. Loucks, Chair
University of Waterloo, CA

11:10 am
Concurrency Preserving Partitioning (CPP) for Parallel Logic Simulation
Hong K. Kim and Jack Jean
Wright State University

11:40 am
Hierarchical Strategy of Model Partitioning for VLSI-Design Using an Improved Mixture of Experts Approach
K. Hering, R. Haupt, and Th. Villmann
Universitaet Leipzig, DE

12:10 pm
The APOSTLE Simulation Language: Performance Data and Granularity Control
Paul Wonnacott and David Bruce
Defence Research Agency, UK

S7
Applications II: Logic and Circuit Simulation

Thursday, May 23, 1996
2:00 pm – 3:30 pm

Rassul Ayani, Chair
Royal Institute of Technology, SE

2:00 pm
Conservative Circuit Simulation on Shared-Memory Multiprocessors
Joerg Keller, Thomas Rauber, and Bernd Rederlechner
Universitaet des Saarlandes, DE

2:30 pm
Actor Based Parallel VHDL Simulation Using Time Warp
Venkatram Krishnaswamy and Prithviraj Banerjee
University of Illinois

3:00 pm
Optimistic Simulation of Parallel Architectures Using Program Executables
Sashikanth Chandrasekaran and Mark D. Hill
University of Wisconsin

3:30 pm Coffee Break

S8
Work In Progress

Thursday, May 23, 1996
3:50 pm – 5:20 pm

Phil A. Wilsey, Chair
University of Cincinnati

M
PADS Business Meeting

Thursday, May 23, 1996
5:20 pm – 6:20 pm

S9
Potpourri: Languages, Models, and Algorithms

Friday, May 24, 1996
9:20 am – 10:50 am

Bruno R. Preiss, Chair
University of Waterloo, CA

9:20 am
Design of High Level Modelling/High Performance Simulation Environments
Bernard P. Zeigler and Doohwan Kim
University of Arizona

9:50 am
Queueing Models and Stability of Message Flows in Distributed Simulators of Open Queueing Networks
Manish Gupta, Anurag Kumar and Rajeev Shorey
Indian Institute of Science (Bangalore), IN

10:30 am
Discrete-Event Simulation and the Event Horizon, Part 2: Event List Management
Jeff Steinman
Jet Propulsion Laboratory

10:50 am Coffee Break

S10
Short Papers

Friday, May 24, 1996
11:10 am – 12:50 pm

John G. Cleary, Chair
University of Waikato, NZ

11:10 am
A Performance Evaluation Methodology for Parallel Simulation Protocols
Vikas Jha and Rajive Bagrodia
University of California at Los Angeles

11:30 pm
Estimating the Cost of Throttled Execution in Time Warp
Samir R. Das
University of Texas at San Antonio

11:50 pm
Parallel Simulation of Billiard Balls using Shared Variables
Peter McKenzie and Carl Tropper
McGill University, CA

12:10 pm
Improving Conservative VHDL Simulation Performance
Joel F. Hurford and Thomas C. Hartrum
Air Force Institute of Technology

12:30 pm
On Extending More Parallelism to Serial Simulators
David Nicol
College of William and Mary
Philip Heidelberger
IBM T. J. Watson Research Center

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Wayne M. Loucks and Bruno R. Preiss
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ACM SIGMETRICS Symposium on Parallel and Distributed Tools (SPDT)

Plenary Invited Speaker
Daily
8:00 — 9:00 am
Room: Salon F
Grand Ballroom

Registration for the SIGMETRICS Symposium on Parallel and Distributed Tools includes an evening reception, two lunches, continental breakfasts, coffee breaks, and conference proceedings. Student registration fee includes all of the above. The conference is sponsored by the ACM Special Interest Group on Measurement and Evaluation.

Sessions

R

Reception

Tuesday, May 21, 1996
7:00 pm – 10:00 pm

S1

Performance Tuning

Wednesday, May 22, 1996
9:20 am – 10:40 am

Barton Miller, Chair
University of Wisconsin

Performance Tuning with Carnival
Wagner Meira Jr., Thomas J. LeBlanc and Alexander Poulos
University of Rochester

An On-line Computation of Critical Path Profiling
Jeffrey K. Hollingsworth
University of Maryland, College Park

10:40 am Coffee Break

S2

Debugger Techniques

Wednesday, May 22, 1996
10:55 am – 12:40 pm

Al Malony, Chair
University of Oregon

Event and State-Based Debugging in TAU: A Prototype
Sameer Shende, Janice Cuny, Lars Hansen, Joydip Kundu, Stephen McLaughry and Odile Wolf
University of Oregon

Debugging Race Conditions in Message-Passing Programs
Robert H.B. Netzer and Timothy W. Brennan
Brown University
Suresh K. Damodaran-Kamal
Convex Computer Corp.

Debugging Heterogeneous Applications with Pangaea
Leesa Hicks and Francine Berman
University of California, San Diego

L

12:40 pm – 2:00 pm
Luncheon

S3

Performance Monitoring

Wednesday, May 22, 1996
2:00 pm – 3:20 pm

Bert Halstead, Chair
DEC Cambridge Research Lab

Execution Analysis of DSM Applications: A Distributed and Scalable Approach
Lionel Brunie, Laurent Lefevre and Olivier Reymann
Ecole Normale Superieure de Lyon

The SHRIMP Performance Monitor: Design and Applications
Margaret Martonosi, Douglas W. Clark and Malena Mesarina
Princeton University

3:20 pm Coffee Break

D1

Tools: What's Right, What's Wrong

Wednesday, May 22, 1996
3:45 pm – 5:00 pm

Joan Francioni, Moderator
University of Southwest Louisiana

S4

Debugger Architectures

Thursday, May 23, 1996
9:20 am – 10:30 am

Doug Kimelman, Chair
IBM T.J. Watson Research Center

Experiences with Building Distributed Debuggers
Michael S. Meier, Kevan L. Miller, Donald P. Pazel and Josyula R. Rao
IBM T.J. Watson Research Center

KDB: A Multi-Threaded Debugger for Multi-Threaded Applications
Peter A. Buhr
University of Waterloo
Martin Karsten
Universitaet Mannheim

10:40 am Coffee Break

S5

Performance Analysis

Thursday, May 23, 1996
10:45 am – 12:30 pm

Diane Rover, Chair
Michigan State University

Automatic Performance Prediction to Support Cross Development of Parallel Programs
Matthias Schumann
Technische Universitaet Muenchen

Three Performance Tool Design Issues and CHITRA's Solutions
Marc Abrams, Randy Ribler and Anup Mathur
Virginia Polytechnic Institute and State University

Event Graph Visualization for Debugging Large Applications
Dieter Kranzlmueller and Jens Volkert
Johannes Kepler University Linz

L

12:30 pm – 2:00 pm
Luncheon

S6

Debugger Interfaces

Thursday, May 23, 1996
2:00 pm – 3:20 pm

Doug Pase, Chair
IBM Power Parallel Systems

The Mantis Parallel Debugger
Steven S. Lumetta and David E. Culler
University of California, Berkeley

The p2d2 Project: Building a Portable Distributed Debugger
Robert Hood
NASA Ames Research Center

3:20 pm Coffee Break

D2

New Frontiers, or Back to the Future

Thursday, May 23, 1996
3:45 pm – 5:00 pm

Dan Reed, Moderator
University of Illinois, Urbana-Champaign

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Jeffrey Hollingsworth
University of Maryland, College Park

4th Annual ACM/IEEE Workshop on I/O in Parallel and Distributed Systems (IOPADS)

Continental Breakfast
Daily
7:15 am – 8:00 am
Room: Franklin Hall

Registration for the Fourth Annual Workshop on I/O in Parallel and Distributed Systems (IOPADS) includes proceedings published by ACM Press, technical sessions, continental breakfast, lunch, and coffee breaks. Student registration fee includes all of the above. The conference is sponsored by ACM SIGACT, ACM SIGARCH, ACM SIGOPS, and IEEE TCOS, in cooperation with ACM SIGMETRICS.

Sessions

S1

Applications and Language Support

Monday, May 27, 1996
9:00 am – 10:30 am

Charles Koelbel, Chair
Rice University

9:00 am
Efficient Data-Parallel Files via Automatic Mode Detection
Jason A. Moore
Oregon State University
Philip J. Hatcher
University of New Hampshire
Michael J. Quinn
Oregon State University

9:30 am
Tuning the Performance of I/O Intensive Parallel Applications
Anurag Acharya, Mustafa Uysal, Robert Bennett, Assaf Mendelson, Michael Beynon, Jeffrey K. Hollingsworth, Joel Saltz and Alan Sussman
University of Maryland

10:00 am
The Design and Implementation of SOLAR, a Portable Library for Scalable Out-of-Core Linear Algebra Computations
Sivan Toledo and Fred G. Gustavson
IBM T. J. Watson

10:30 am Coffee Break

S2

Caching and Architectural Issues

Monday, May 27, 1996
11:00 am – 12:30 pm

John Wilkes, Chair
Hewlett-Packard Laboratories

11:00 am
Evaluating Approximately Balanced Parity-Declustered Data Layouts for Disk Arrays
Eric J. Schwabe, Ian M. Sutherland and Bruce K. Holmer
Northwestern University

11:30 am
ENWRICH: A Compute-Processor Write Caching Scheme for Parallel File Systems
Apratim Purakayastha and Carla Schlatter Ellis
Duke University
David Kotz
Dartmouth College

12:00 pm
Prefetching in Segmented Disk Cache for Multi-Disk Systems
Valery V. Soloviev
North Dakota State University

L

12:30 pm – 2:00 pm
Luncheon

S3

File Systems

Monday, May 27, 1996
2:00 pm – 3:30 pm

David Womble, Chair
Sandia National Laboratories

2:00 pm
Performance of the Galley Parallel File System
Nils Nieuwejaar and David Kotz
Dartmouth College

2:30 pm
HFS: A Performance-Oriented Flexible File System Based on Building-Block Compositions
Orran Krieger and Michael Stumm
University of Toronto

3:00 pm
Scalable Message Passing in Panda
Y. Chen, M. Winslett, K. E. Seamons, S. Kuo, Y. Cho and M. Subramaniam
University of Illinois

3:30 pm Coffee Break

S4

Theory and Algorithms

Monday, May 27, 1996
4:00 pm – 5:00 pm

Jeffrey Vitter, Chair
Duke University

4:00 pm
Bounds on the Separation of Two Parallel Disk Models
Chris Armen
University of Hartford

4:30 pm
Structured Permuting in Place on Parallel Disk Systems
Leonard F. Wisniewski
Dartmouth College

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A recent FBI Crime index

SIAM Symposium on Networks and Information Management (NIM)

Continental Breakfast
Daily
7:15 am – 8:00 am
Room: Franklin Hall

Registration for the Symposium on Networks and Information Management includes continental breakfasts and coffee breaks. The Symposium on Networks and Information Management is sponsored by the Society for Industrial and Applied Mathematics (SIAM) in cooperation with the Department of Computer and Information Science, University of Pennsylvania

Sessions

S1

Session 1

Monday, May 27, 1996
9:30 am – 11:45 am

Sampath Kannan, Chair
University of Pennsylvania

9:30 am
Clyde Monma
Bellcore

Telecommunications Network Design: Opportunities and Challenges for the Mathematical Sciences

The telecommunications industry is going through a period of very rapid change due to many factors, including the impact of new and emerging technologies; the convergence of computing, communications and entertainment; and government regulatory policies in response to global competition.

The current situation provides an exciting opportunity for the mathematical and computational sciences to make a significant impact and to help shape the future of the telecommunications industry.

This talk will describe some of the opportunities and challenges for researchers in this new environment. The talk will also include some specific examples illustrating the impact which research advances in mathematics and computing are already having on the telecommunications industry.

10:30 am Coffee Break

10:45 am
Title to be determined
Van Jacobson
Lawrence Berkeley Laboratory

S2

Session 2

Monday, May 27, 1996
1:15 pm – 3:30 pm

Jill P. Mesirov, Chair
STSS, IBM
Boston University

1:15 pm
Udi Manber
University of Arizona

Finding Useful Information Through the Internet

Information is now available in vast amounts from numerous diverse sources on every topic. But finding the right information and figuring what to do with it is still hard. There is a great need for better tools to locate relevant information and process it. I will discuss several new search and filtering systems we developed (Glimpse, GlimpseHTTP, Warmlist, Siff, Harvest) ranging from searching one disk to searching the whole Internet. I will also discuss how to combine global data with local processing to make Internet access much more productive.

2:30 pm
Joan Feigenbaum
AT&T Research

Managing Trust in Large Networks

The speaker will identify the "trust management problem" as a distinct and important component of security in network services. Aspects of the trust management problem include formulating security policies and security credentials, determining whether particular sets of credentials satisfy the relevant policies, and specifying and deferring trust to third parties. Existing systems that support security in networked applications, including X.509 and PGP, address only narrow subsets of the overall trust management problem and often do so in a manner that is appropriate to only one application. This paper presents a comprehensive approach to trust management, based on a simple language for specifying trusted actions and trust relationships. It also describes a prototype implementation of a new "trust management system," called "PolicyMaker," that will facilitate the development of security features in a wide range of network services. (Joint work with Matt Blaze and Jack Lacy.)

3:30 pm Coffee Break

S3

Panel Discussion

Monday, May 27, 1996
3:45 pm – 5:15 pm

Barry Leiner
ARPA
Henry Bayard
MITRE Corporation
Peter Weinberger
AT&T Research

The panel will discuss the future of networks research and the role of mathematics and theoretical computer science in this area. Panelists will include people from academia, industry, and funding agencies.

PROGRAM ORGANIZERS:
Sampath Kannan
Department of Computer and Information Science
University of Pennsylvania
Jill Mesirov
Department of Computer Science
STSS, IBM
Boston University

"From its bustling downtown streets to its numerous historic sites... Philadelphia can compete with almost anything Europe has to offer."
Cox News Service

"Best Restaurant City in America"
Conde Nast Traveler

Advance Hotel Registration Deadline April 19, 1996

Philadelphia Marriott Hotel

1201 Market Street
Philadelphia PA 19107
Phone: (215) 625-2900
FAX: (215) 625-6097

Location/Transportation Facts

Connected to Pennsylvania Convention Center and Gallery Mall in downtown Philadelphia. Eight miles from Philadelphia International Airport. Two blocks from City Hall, six blocks from Independence Hall and four blocks from the cultural district.

From International Airport: Take I-95 North to 676 West to Broad Street exit. Left on Vine Street, right on 12th Street, right on Filbert Street. Hotel is on the left.

Climate

In May, the average temperature is 53 to 73 degrees Fahrenheit. Average rainfall is 3.3 inches.

Accommodations

Philadelphia's newest convention hotel, *The Philadelphia Marriott* at 1201 Market Street, is conveniently located in Center City, walking distance to shopping, cultural and historic attractions and easily accessible by car or train. All FCRC sessions will take place at the Marriott.

Additional housing is available at the *Holiday Inn Express*, 1305 Walnut Street (two blocks from the Marriott) and at the *Best Western Center City*, 501 N. 22nd Street (approximately 13 blocks from the Marriott).

Dining/Entertainment

Allie's American Grille serves breakfast, lunch and dinner. *Outdoor Cafe* for breakfast, lunch and dinner. *JW's Steakhouse* serves dinner. *Lobby Bar*, *Atrium Lounge* and *Champions Restaurant and Sports Bar* offer a variety of locations for your enjoyment.

Reading Terminal Market, next door to the Marriott, offers dozens of food stands with a variety of choices at low prices.

Services/Facilities/Shops

Valet parking daily parking fee $20, Express Check-In, airline desk, car rental desk, gift shop, teleconferencing, safe-deposit boxes.

Child Care

Attendees requiring child care should contact the hotel independently.

Recreational/Amusement Facilities

Indoor pool, health club, sauna, whirlpool, game room. Tennis nearby.

Attractions

Even before ACM was created, groups were meeting in Philadelphia. Founded in 1682 by William Penn, whose statue now looks over his city from atop City Hall, the First Continental Congress met at Carpenters' Hall in 1774 and at the State House, later renamed Independence Hall, patriots declared independence in 1776.

World famous art exhibits at some of the world's finest museums; a lively and colorful historic district; exciting new arts and entertainment venues; a renaissance along the Delaware River waterfront...all are part of the "new" Philadelphia.

The second largest city on the East Coast and the fifth largest city in the U.S., Philadelphia is home to more than 1.6 million people, the metropolitan population is approximately 5.78 million.

The city's cultural treasures line the Benjamin Franklin Parkway. Included are the art treasures of the Philadelphia Museum of Art; the great sculptures of the Rodin Museum; one of America's leading science museums at the Franklin Institute Science Museum (site of FCRC Excursions on Wednesday and Saturday evenings); the world's best dinosaur exhibit and natural history at the Academy of Natural Sciences; and the Free Library. The Pennsylvania Academy of the Fine Arts, the Philadelphia Museum of Art, the Rodin Museum and the Barnes Foundation in Merion, comprise the strongest collection of Impressionist paintings in the world outside of Paris.

Fairmount Park, the largest landscaped city park in the world, is graced by several historic mansions, a Japanese house and garden, a Horticulture Center, two outdoor theaters, the Philadelphia Zoo, and outstanding sculpture.

HOTEL REGISTRATION FORM

Reservation Request

Advance Deposit Deadline April 19, 1996

We would like to welcome you as a participant in **FCRC '96**. You may make your reservation by contacting the hotel of your choice directly. Be sure to indicate you are attending FCRC to obtain the special conference rates. The room block will be held until April 19, 1996.

Philadelphia Marriott Hotel Conference Headquarters
1201 Market Street
Philadelphia, PA 19107
(215) 625-2900 Fax: (215) 625-6097

- ❑ Single $133
- ❑ Triple $153
- ❑ Double $133
- ❑ Quad $173
- ❑ Non-smoking room requested

Name _____

Position/title _____

Organization _____

Address _____

City _____ **State** _____ **Zip** _____

Phone _____ **Fax** _____

Arrival date _____

Expected time of arrival _____ AM/PM

Departure date _____

A limited number of economy rate rooms have been set aside for attendees at the following nearby hotels.

Holiday Inn Express
1305 Walnut Street (two blocks from the Marriott)
Philadelphia, PA 19107
(215) 735-9300 Fax: (215) 732-2682

- ❑ Single $95
- ❑ Double, Triple, and Quad $100
- ❑ Non-smoking room requested

Best Western Center City
501 N. 22nd Street (approximately 13 blocks from the Marriott)
Philadelphia, PA 19130
(215) 568-8300 Fax: (215) 557-9448

- ❑ Single $63
- ❑ Double $69
- ❑ Non-smoking room requested

Credit Authorization

Name _____ **Arrival Date** _____ **Arrival Time** _____

Credit card type ❑ American Express ❑ MasterCard ❑ Visa

Credit card number _____ **Expiration date** _____

Print name as it appears on the card _____

Signature _____

To avoid duplication, please do not mail in this form if you make your reservation by telephone or telefax.

PLEASE MAKE SURE ALL INFORMATION IS COMPLETE BEFORE SEALING ENVELOPE.

REGISTRATION FORM

Conference Selection

EARLY REGISTRATION DEADLINE APRIL 26, 1996

Please circle the appropriate amount(s), compute the total, and write it in the Conference Total box on the next page. Check membership box and provide number if applicable. Refer to individual conference pages for information about what is included in the fee for each conference. To the extent the facilities allow, attendees are free to attend technical sessions of other conferences being held at the same time as the conferences they are registered for.

Individual Conference Registration

		Member		Non-member		Student	
		By 4/26	*After 4/26*	*By 4/26*	*After 4/26*	*By 4/26*	*After 4/26*
1	Careers	$136	$136	$136	$136	$124	$124
2	ISCA	325	405	415	495	100	125
	Half day Tutorial	175	250	220	250	55	70
	Full day Tutorial	250	300	310	375	100	125
❑	*ACM or IEEE membership #*_____						
3.	ICS	330	405	385	460	125	175
	Full day Tutorial	200	250	250	300	200	200
❑	*ACM membership #*_____						
4.	METRICS	300	375	350	425	105	155
	Tutorial with Conference	485	640	585	740	180	260
	Tutorial only	225	280	275	330	85	120
❑	*ACM membership #*_____						
5.	STOC	290	365	365	440	125	175
❑	*ACM membership #*_____						
6.	Complexity	325	390	405	485	125	175
❑	*ACM, EATCS, or IEEE membership #*_____						
7.	PODC	305	365	385	445	100	130
❑	*ACM membership #*_____						
8.	SCG	270	310	310	350	125	155
❑	*ACM membership #*_____						
9.	WACG	150	175	175	200	125	150
❑	*ACM membership #*_____						
10.	WOPA	180	225	210	255	95	125
❑	*ACM membership #*_____						
11.	PLDI	275	375	375	450	115	150
	Half day Tutorial (T1 or T2 or (T3 and T4))	55	75	75	90	30	40
	Full day Tutorial (T1 and (T2 or (T3 and T4)))	110	150	150	175	60	80
❑	*ACM or IEEE membership #*_____						
12.	ICFP	325	385	385	450	125	150
❑	*ACM membership #*_____						
13.	FLIC	55	55	65	65	55	55
❑	*ACM membership #*_____						
14.	PADS	290	340	340	390	125	150
	Half day Tutorial	150	200	200	250	150	150
	Full day Tutorial	280	380	380	480	280	280
❑	*ACM, SCS, or IEEE membership #*_____						
15.	SPDT	240	270	260	295	105	130
❑	*ACM membership #*_____						
16.	IOPADS	150	180	195	235	50	60
❑	*ACM or IEEE membership #*_____						
17.	NIM	80	90	80	90	15	15
	TOTAL	$_____	$_____	$_____	$_____	$_____	$_____

Multiple Conferences Registration

Subtract $50 (non-student) or $25 (student) from the Conference Total if registering for any one of the following pairs of conferences: STOC and Complexity, STOC and PODC, or STOC and SCG.

Subtract $25 (non-students only) from the Conference Total if registering for both SCG and WACG.

Single Day Registration

Single day registration rates are $175 for May 22, May 23, May 24, May 25, or May 26; $150 for May 27: and $100 for May 28.

Registration includes breakfast, coffee breaks, and admission to the technical sessions, exhibits, and plenary for the day selected.

Available ONLY with one full conference registration.

Continued on next page

✂ Cut along dotted line

REGISTRATION FORM (continued)

Registration Information

• Complete both sides of this form. Use the back side of this form to select options and calculate costs.
• Enclose payment.

• Mail or fax both sides to:

FCRC Conference
3 Church Circle, Suite 194
Annapolis, MD 21401
or fax to:
FCRC Conference
(410) 267-0332

• Cancellations
You may cancel and receive a refund less a $50 processing fee if a request is received in writing on or before April 19, 1996, at the Annapolis address shown on this form. Substitutions are acceptable.

Identification

Name (First name, Middle initial, Surname)

Position

Organization

Address (Street)

(City, State/Province, Postal Code, Country)

Electronic Mail Address

Phone (Area code, Number)

Fax (Area code, Number)

❑ Do you have any special needs?_____

My name and address may be distributed beyond the FCRC attendance list:
❑ Approved (unlimited use) ❑ Limited to sponsor and sister organizations ❑ Attendee list only

❑ Evening at Franklin Institute (Wednesday, May 22) _____ @ $60 per person

❑ Evening at Franklin Institute (Saturday, May 25)_____ @ $60 per person

Conference Totals

Conference Totals (from prior page)	$
Franklin Institute	$
Total Payment Enclosed	**$**

Method of Payment

❑ Visa

❑ Master Card

Number Exp date

Name exactly as it appears on credit card

Signature

❑ Check or money order
U.S. bank only
Payble to:
FCRC '96

Send your registration to:

FCRC Conference
3 Church Circle, Suite 194
Annapolis, MD 21401

✂ Cut along dotted line

EXCURSIONS

An Evening of Fellowship and Fun at the Franklin Institute

Dominated by a gigantic statue of Benjamin Franklin, Franklin Hall is just one part of the Franklin Institute Science Museum that will be open to those participating in the Wednesday, May 22 or the Saturday, May 25 Excursions. Participants will enjoy Philadelphia style food and beverage while viewing fun, hands-on science exhibits in the Halls of Inventions, Electricity and Aviation. Approximately 11 blocks from the Marriott Hotel, round trip bus service will be provided.

The fee for the Evening at the Franklin Institute Science Museum is included in most of the participating Conferences' Registration fee. Additional tickets can be ordered in advance at $60.00 each. See the Registration form of page 41. Tickets will be sold on-site for $65.00 each up to 24 hours prior to each event *if space is available.*

Date: Wednesday, May 22 or Saturday, May 25
Time: 6:00 pm – 10:00 pm
Cost: $60 per person with advance registration
$65 per person on-site *if space is available.*

EXHIBITS

E

Exhibits

FCRC week also features exhibits consisting of book and educational software displays and demostrations.

Date: Wednesday, May 22 through Sunday, May 26
Time: 9:00 am – 6:00 pm
Room: Franklin Hall

TRANSPORTATION

Airline Discount

USAir agrees to offer an exclusive low fare for the attendees of the Federated Computing Research Conference, May 20-28, 1996, in Philadelphia, PA. This special fare will offer a 5% discount off First Class and any published USAir promotional round trip fares. A 10% discount off unrestricted coach fares will apply with 7 day advance reservations and ticketing required. These discounts are valid providing all fare rules and restrictions are met and is applicable for travel from the Continental United States, Bahamas, Bermuda, Canada, and San Juan, PR. Meeting discounts are not combinable with other discounts or promotions.

Additional restrictions may apply on international travel.

These meeting discounts are valid between May 17-31, 1996.

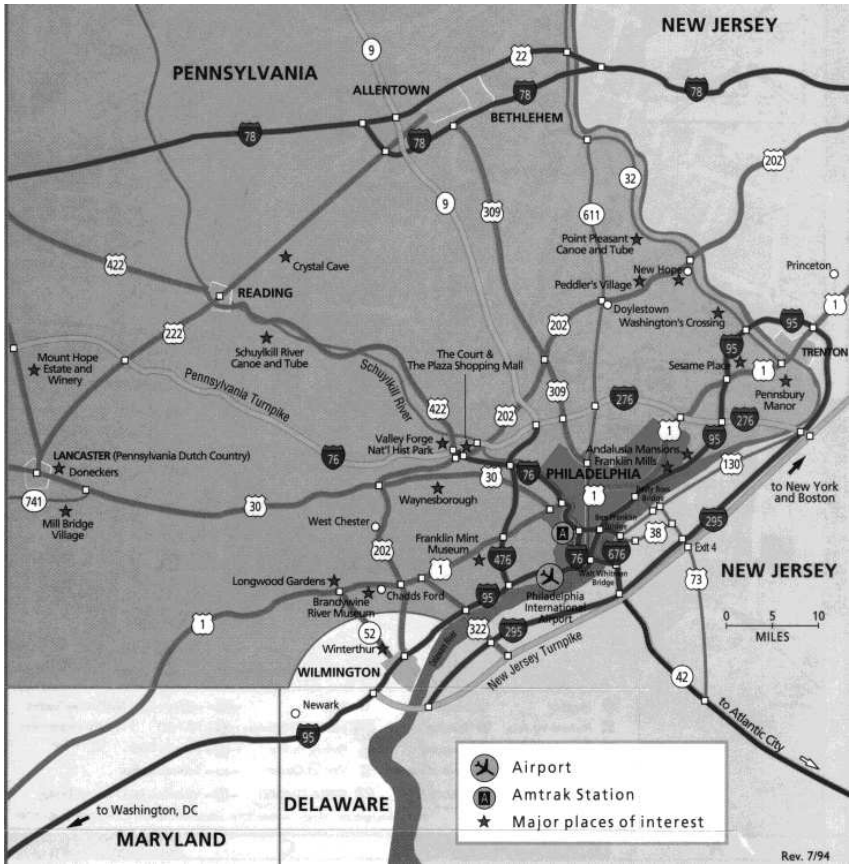
For reservations call USAir's Meeting and Convention Reservation Office

1-800-334-8644
8:00 AM - 9:00 PM (Eastern Time)

Refer to Gold File Number 63930014

Once your reservations are confirmed, we will mail the tickets to you or suggest several other convenient methods of purchase.

If you normally use the services of a travel agent or corporate travel department, please have them place the call so that they may obtain the same advantages for you. The special meeting fare is only available through the Meeting and Convention Reservation Office.



HOTEL MAP

HOTEL MAP

NOTES

NOTES

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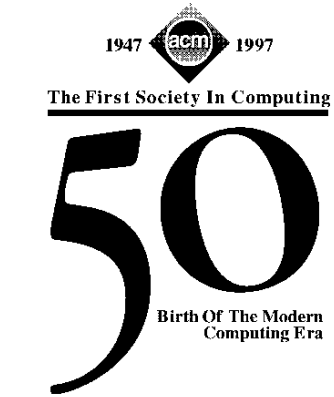

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