Federated Computing Research Conference

20th Annual International Symposium on Computer Architecture

25th Annual ACM Symposium on Theory of Computing

4th ACM SIGPLAN Symposium on Principles and Practices of Parallel Programming

9th Annual ACM Symposium on Computational Geometry

Structure in Complexity Theory, 8th Annual IEEE Conference

Workshop on Parallel Algorithms

7th Workshop on Parallel and Distributed Simulation

ACM/ONR Workshop on Parallel and Distributed Debugging

CRA Workshop on Academic Careers for Women

Guest Speakers

Richard Karp

Maurice Wilkes

Policy Maker

Guy L. Steele, Jr.

László Babai

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May 14–22, 1993

San Diego, California

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The Computing Research Association and FCRC thank Jean Jackson of the Computer Science Department at Purdue University, who produced this announcement. The substantial contribution of Purdue's Computer Science Department in providing her time is gratefully acknowledged.

CRA, with support from the National Science Foundation, has taken the lead in organizing the first Federated Computing Research Conference, which will be held May 14–22, 1993, at the Sheraton Harbor Island Hotel in San Diego. By providing a common time and meeting place for several established research meetings, FCRC '93 is creating a major research conference that will not lose the scientific benefits of the computing research field's smaller, more specialized meetings.

FCRC '93 is retaining the intellectual benefits and research identities of the smaller constituent meetings, while providing greater visibility for the field. FCRC '93 also is providing the opportunity for researchers to meet with their peers in other specialties. Because of the unified nature of the conference, more people in the computing research community will be able to learn about important findings in the specialized subfields.

Each participating conference will be independently administered, and each organizing group will be responsible for their meeting's structure, content and proceedings. All attendees will register for at least one participating conference and will be able to buy the proceedings from the other meetings. During their *home* conference, to the extent facilities will allow, attendees will be free to sit in on other meetings.

Each morning will start with a plenary talk on a topic of broad appeal to the community. The conference features two plenary evening social events. In planning FCRC '93, CRA received support and assistance from the other sponsoring organizations. The Association for Computing Machinery has been particularly active in providing support and planning expertise. For more information on FCRC '93, contact CRA at (202) 234-2111.

Confirmed participants in FCRC '93 are as follows (Other smaller, ad-hoc workshops also are being added to the program.)

- 20th Annual International Symposium on Computer Architecture (ISCA '93)
- 25th Annual ACM Symposium on the Theory of Computing (STOC)
- 4th ACM SIGPLAN Symposium on Principles and Practices of Parallel Programming (PPoPP 93)
- 9th Annual ACM Symposium on Computational Geometry (SCG)
- Structure in Complexity Theory, 8th Annual IEEE Conference (STRUCTURES)
- Workshop on Parallel Algorithms (WOPA '93)
- 7th Workshop on Parallel and Distributed Simulation (PADS)
- ACM/ONR Workshop on Parallel and Distributed Debugging (WPDD)
- CRA Workshop on Academic Careers for Women

CONTENTS

Invited Speakers

P1

Richard Karp

Monday, May 17, 1993
8:00 – 9:00 am
Room: Burgundy/Chablis

Mapping the Genome: Some Combinatorial Problems Arising in Molecular Biology

Richard M. Karp was born Jan. 3, 1935 in Boston, Mass. He studied at Boston Latin School and Harvard University, receiving the B. A. in Mathematics in 1955 and the Ph. D. in Applied Mathematics in 1959. From 1959 to 1968 he was a Research Staff Member at the IBM Thomas J. Watson Research Center. Since 1968 he has been a Professor at Berkeley, where he currently holds appointments in Computer Science, Mathematics and Operations Research. He is also a Research Scientist at the International Computer Science Institute, Berkeley, California. From 1973 to 1975 he served as Associate Chairman for Computer Science at Berkeley, and during 1985–86 he was co-chair of the Complexity Year at the Mathematical Sciences Research Institute in Berkeley.

Karp's research centers around the design and analysis of combinatorial algorithms. He is best known for his early work on NP-completeness. He is a member of the National Academy of Sciences and the National Academy of Engineering and is the recipient of awards in the fields of Computer Science, Mathematics, Applied Mathematics, Operations Research and Management Science, including the ACM's A.M. Turing Award. He has received Berkeley's Distinguished Teaching Award and is the recipient of four honorary degrees.

P2

Maurice Wilkes

Tuesday, May 18, 1993
8:00 – 9:00 am
Room: Burgundy/Chablis

Achievements and Challenges in VLSI Processor Design

Maurice V. Wilkes was for many years head of the Computer Laboratory of the University of Cambridge. Since 1980 he has worked in industry. His current affiliation is with Olivetti. He is a Distinguished Fellow of the British Computer Society, a Fellow of the Royal Society, and a Fellow of the Royal Academy of Engineering. He is a Foreign Associate of both the US National Academy of Sciences and the US National Academy of Engineering. He was the recipient of the 1992 Kyoto Prize for Advanced Technology.

In 1967, Wilkes delivered the Turing Lecture and in 1980 he received the Eckert-Mauchly award. In 1985 he published *Memoirs of a Computer Pioneer* (MIT Press). He writes a regular column under the title *Computing Perspectives* in Communications of the ACM.

P3

Policy Maker

Wednesday, May 19, 1993
8:00 – 9:00 am
Room: Burgundy/Chablis

A senior science policy maker will discuss the changes taking place in Federal Science and Technology policy.

P4

Guy L. Steele, Jr.

Thursday, May 20, 1993
8:00 – 9:00 am
Room: Burgundy/Chablis

Guy L. Steele Jr. is a Senior Scientist at Thinking Machines Corporation. He received his Ph. D. from M.I.T. in 1980 and has been an assistant professor at Carnegie-Mellon University and a member of the technical staff at Tartan Laboratories.

He is the author or co-author of three books and more than two dozen papers on the subject of the Lisp language and implementation. He holds ACM's Forsythe and Hopper awards in his own right and led the team that received a 1990 Gordon Bell Prize. A fellow of AAAI, he has served on program committees for 24 conferences and was program chair for two.

He has served on the standards committees for C, Fortran, Scheme, and currently chairs Common Lisp, as well as representing Thinking Machines in the High Performance Fortran Forum. He is responsible for the design and implementation of parallel programming languages and other systems software for the Connection Machine.

P5

László Babai

Friday, May 21, 1993
8:00 – 9:00 am
Room: Burgundy/Chablis

Transparent (Holographic) Proofs

László Babai is Professor of Computer Science at the University of Chicago and Professor of Mathematics at Eötvös University, Budapest. He received his degrees from Eötvös University, Budapest and the Hungarian Academy of Sciences. Having joined the Chicago faculty in 1984, he helped build the new computer science department there.

He has worked in the theory of computing and in related areas of mathematics. He has published over 100 research papers, including 20 presented at the ACM STOC and IEEE FOCS symposia.

His research contributions include the 1985 co-invention of *interactive proofs* which culminated in the 1991 discovery of *transparent* or *holographic* proofs a development which has recently had a surprising impact on approximate discrete optimization for problems in areas including job scheduling, DNA sequencing and VLSI layout. He has also done extensive research on computational group theory and randomized algorithms including coining the term *Las Vegas algorithm*.

An invited speaker at major conferences, Babai is known for his entertaining lecturing style.

FCRC Town Meeting

Continental Breakfast Daily
7:30 – 8:15 am
Room: Sautene

M

Town Hall Meeting

Wednesday, May 19, 1993
8:30 pm
Room: Burgundy/Chablis

CRA Town Meeting: a plenary session/panel on contemporary policy issues of broad interest to the Computing Research community.

Plenary Invited Speaker
Daily
8:00 — 9:00 pm
Room: Burgundy/Cablis

Registration for the 20th Annual International Symposium On Computer Architecture includes a reception, SIGARCH/TCCA business meeting, an Evening at Sea World, Eckert-Mauchly Award Lunch, coffee breaks, and conference proceedings. Student registration fee includes all of the above except An Evening at Sea World and Eckert-Mauchly Award Lunch. The conference is sponsored by ACM Special Interest Group on Computer Architecture, IEEE Computer Society and the IEEE-CS Technical Committee on Computer Architecture (TCCA).

Sessions and Tutorials

T1

Rishiyur S. Nikhil
Digital Equipment Corporation

Sunday, May 16, 1993
8:30 am – 5:30 pm

Room: Cabernet

Multithreaded Architectures

General-purpose programs for large multiprocessors make frequent non-local accesses (with long, variable latencies) and have frequent, fine-grain synchronizations. After examining the high overheads incurred on conventional MPPs, we focus on solutions using *multithreading*: when a thread waits for a non-local access or for synchronization, the processor avoids idling by rapidly switching to another thread. We examine a variety of hardware/software schemes for rapid thread creation, thread multiplexing, message sending and handling, and synchronization, as exhibited by *real* commercial and research machines like HEP, Tera, Monsoon, J-Machine, Alewife, EM-4, and *T (displaying a fascinating unification of von Neumann and dataflow architectures). We also examine languages and language implementations that exploit multithreading.

Who Should Attend
People interested in understanding limitations of current massively parallel systems, and understanding possible solutions. People interested in modern dataflow architectures. A general knowledge of uniprocessor architectures and some knowledge of multiprocessors is assumed.

T2

Allan Fisher and Peter Steenkiste
Carnegie Mellon University

Sunday, May 16, 1993
8:30 am – 5:30 pm

Room: Chenin/Colombard

Introduction to ATM for Computer Architects

The Asynchronous Transmission Mode (ATM) approach to high-speed networking is widely viewed as a likely future infrastructure for data and multimedia communication on scales ranging from the desktop to international networks. This tutorial will review the history of ATM and the ongoing development of related standards; technical aspects including segmentation and reassembly, switching and congestion control; applications including internetworking, multimedia and distributed computation, with implications for quality of service; current and future implementations including host interfaces, switches and chipsets; local and wide-area deployment; and implications for computer architecture.

Who Should Attend
This tutorial is intended for computer architects interested in learning about the concepts, vocabulary and state of the art in ATM networking.

T3

J. Ramanujam
Louisiana State University

Sunday, May 16, 1993
8:30 am – 12:30 pm

Gamay/Riesling

Compiling for Distributed Memory Machines

This tutorial will cover the basic aspects of compiling for distributed memory machines. While distributed memory machines offer a great degree of scalability and performance, programming them is difficult. As a result, parallelizing compilers for such machines have received great attention recently. This tutorial will start with a quick review of dependence testing and elementary loop transformations. We will then go on to cover issues in compiling using user specified data distribution as in HPF (an emerging standard), FORTRAN-D, Vienna Fortran etc. In addition, the tutorial will discuss program transformations aimed at communication optimization, program partitioning, data alignment and distribution, locality enhancement and runtime compilation.

Who Should Attend
Researchers in high performance computing, graduate students; compiler writers for high performance m/c.

T4

David R. Kaeli
IBM T. J. Watson Research Center

Sunday, May 16, 1993
1:30 – 5:30 pm

Room: Gamay/Riesling

Issues in Trace-Driven Simulation

This tutorial covers the many aspects of the input traces used in trace-driven simulation. First, a review of the many trace types, tracing methodologies, and trace-length reduction techniques, is presented. This tutorial provides an overview of these topics for both instruction and address traces. The second part of this tutorial focuses on the correctness and suitability of traces. Examples of common trace misuse will be provided, illustrating the importance of this issue. Also covered is the suitability of the traced workload. Finally, the issues of trace length and multiprocessor tracing are discussed.

Who Should Attend
The intended audience for this tutorial is anyone who uses instruction or memory address traces in the evaluation of computer system performance. The goal is to provide modelers with sufficient background so that they can be more critical of the content of the traces used to drive their simulation models.

T5

Umakishore Ramachandran
Georgia Institute of Technology

Sunday, May 16, 1993
8:30 am – 12:30 pm

Mission Courts

Multigranular Computing

This tutorial will cover the granularity spectrum—rom fine-grained to coarse-grained— of parallel computation. The topics to be covered include architectural examples from discrete points in this granularity spectrum (including Maspar MP-2, KSR-1, and CM-5); application domains that could benefit from such a multigranular environment; analysis of kernels of applications to identify types of parallelism; determining the match between algorithms and architectures; performance metrics for making the right architectural choice for algorithms; and several case studies drawn from reconfigurable architectures to networked parallel computers of different granularities.

Who Should Attend
Practitioners who are designing and developing parallel architectures and software tools for parallel machines; and university researchers (both architects and application developers) working in specific points of the granularity spectrum. The assumed background is a basic understanding of computer architecture, a rudimentary knowledge of parallel programming, and an appreciation for algorithm design.

T6

John Paul Shen
Carnegie Mellon University

Andrew Wolfe
Princeton University

Sunday, May 16, 1993
1:30 – 5:30 pm

Room: Mission Courts

Superscalar Processor Design

This tutorial presents the fundamental principles and practical

Sessions and Tutorials

techniques for designing and implementing superscalar processors. Topics covered include: limits of instruction-level parallelism; superpipelined, superscalar, and VLIW machines; register renaming, scoreboarding, reservation stations, Tomasulo's algorithm, prediction, branch compilation, out-of-order and speculative/predicated execution; weak memory ordering; survey of current implementations: MIPS R4000, Intel i960CA, HP PA-RISC, Cypress HyperSPARC, IBM RS/6000, DEC Alpha 21064, Motorola MC88110, TI SuperSPARC, Intel Pentium, and IBM/Motorola PowerPC; static code scheduling approach, VLIW vs. superscalars, Multiflow TRACE, and Philips Research single-chip LIFE; future trends in superscalar design.

Who Should Attend
Processor architects and designers, microprocessor-based system designers, researchers in instruction-level parallelism, instructors of processor design and implementation courses.

S1

Opening Session

Monday, May 17, 1993
9:20 – 10:30 am

Room: Bel Aire N/S

Lubomir Bic, Chair
University of California, Irvine

9:20 am
Opening Address

9:40 am
Invited Paper
Speaker: TBA

10:30 am Coffee break

S2

Architectural Characteristics of Scientific Applications

Monday, May 17, 1993
11:00 am – 12:00 pm

Room: Bel Aire N/S

Chair: TBD

11:00 am
Architectural Requirements of Parallel Scientific Applications with Explicit Communication
R. Cypher, A. Ho, S. Konstantinidou
IBM Almaden Research Center
P. Messina, *California Institute of Technology*

11:30 am
Reflections on Cache Size and Node Granularity for Large-Scale Multiprocessors
E. Rothberg, J. Singh, A. Gupta
Stanford University

12:00 – 2:00 pm
Lunch (on your own)

S3

TLBs and Memory Management

Monday, May 17, 1993
11:00 am – 12:00 pm

Room: Palmor

Chair: TBD

11:00 am
Design Tradeoffs for Software-Managed TLBs
R. Uhlig, D. Nagle, T. Stanley, S. Sechrest, T. Mudge, R. Brown
University of Michigan

11:30 am
Architectural Support for Translation Table Management in Large Address Space Machines
J. Huck, *Hewlett-Packard*
J. Hays, *EcoSystems*

12:00 – 2:00 pm
Lunch (on your own)

S4

Input/Output

Monday, May 17, 1993
2:00 – 3:30 pm

Room: Bel Aire N/S

Chair: TBD

2:00 pm
The TickerTAIP Parallel RAID Architecture
P. Cao, *Princeton University*
S. Lim, *University of Illinois at Urbana-Champaign*
S. Venkataraman, *University of Wisconsin at Madison*
J. Wilkes, *HP Labs at Palo Alto*

2:30 pm
Parity Logging: Overcoming the Small Write Problem in Redundant Disk Arrays
D. Stodolsky, G. Gibson, M. Holland
Carnegie Mellon University

3:00 pm
The Architecture of a Fault-Tolerant Cached RAID Controller
J. Menon, J. Cortney
IBM Research at San Jose

3:30 – 4:00 Coffee break

S5

Multiprocessor Caches

Monday, May 17, 1993
2:00 – 3:30 pm

Room: Palomar

Chair: TBD

2:00 pm
The Detection and Elimination of Useless Misses in Multiprocessors
M. Dubois, L. Ricciulli, K. Ramamurthy
University of Southern California
J. Skeppstedt, P. Stenstrom
Lund University

2:30 pm
Adaptive Cache Coherency for Detecting Migratory Shared Data
A. Cox, *Rice University*
R. Fowler, *University of Rochester*

3:00 pm
An Adaptive Cache Coherence Protocol Optimized for Migratory Sharing
P. Stenstrom, M. Brorsson, L. Sandberg
Lund University

3:30 – 4:00 pm Coffee break

S6

Panel I

Monday, May 17, 1993
4:00 – 5:30 pm

Room: Bel Aire N/S

David Kuck, Chair
University of Illinois at Urbana-Champaign

An Evening at Sea World

Monday, May 17, 1993
6:30 – 10:30 pm

S7

Cache Design I

Tuesday, May 18, 1993
9:30 – 10:30 am

Room: Palomar

Chair: TBD

9:30 am
Performance of Cached DRAM Organizations in Vector Supercomp
W.-C. Hsu, J. Smith
Cray Research, Inc.

10:00 am
Tradeoffs in Two-Level On-Chip Caching
N. Jouppi, D. Wong
Digital Equipment Corporation

10:30 – 11:00 am Coffee break

S8

Mechanisms for Creating Shared Memory

Tuesday, May 18, 1993
9:30 – 10:30 am

Room: Terrace A/B

Chair: TBD

9:30 am
An Evaluation of Software Distributed Shared Memory for Next-Generation Processors and Networks
S. Dwarkadas, P. Keleher, A. Cox, W. Zwaenepoel
Rice University

10:00 am
Mechanisms for Cooperative Shared Memory
D. Wood, S. Chandra, B. Falsafi, M. Hill, J. Larus, A. Lebeck, J. Lewis, S. Mukherjee, S. Palacharla, S. Reinhardt
University of Wisconsin at Madison

10:30 – 11:00 am Coffee break

S9

Cache Design II

Tuesday, May 18, 1993
11:00 am – 12:30 pm

Room: Palomar

Chair: TBD

11:00 am
A Case for Two-Way Skewed-Associative Caches

Sessions and Tutorials

A. Seznec, *IRISA, Campus de Beaulieu*

11:30 am
Column-Associative Caches: A Technique for Reducing the Miss Rate of Direct-Mapped Caches
A. Agarwal, S. Pudar
Massachusetts Institute of Technology

12:00 pm
Cache Write Policies and Performance
N. Jouppi, *Digital Equipment Corporation*

12:30 – 2:00 pm
Eckert-Mauchly Award Lunch
Room: Chablis

S10

Evaluations of Machines I

Tuesday, May 18, 1993
11:00 am – 12:30 pm
Room: Palomar
Chair: TBD

11:00 am
Hierarchical Performance Modeling with MACS: A Case Study of the Convex C-240
E. Boyd, E. Davidson
University of Michigan

11:30 am
The Cedar System and an Initial Performance Study
D. Kuck, E. Davidson, D. Lawrie, D. Padua, R. Dowing, M. Haney, P. C. Yew, A. Veidenbaum, R. Eigenmann, P. Emrath, K. Gallivan, J. Konicek, T. Murphy
University of Illinois at Urbana-Champaign

12:00 pm
The J-Machine Multicomputer: An Architectural Evaluation
M. Noakes, D. Wallach, W. Dally
Massachusetts Institute of Technology

12:30 – 2:00 pm
Eckert-Mauchly Award Lunch
Room: Chablis

S11

Processor Architecture and Implementation

Tuesday, May 18, 1993
2:00 – 3:30 pm
Room: Palomar
Chair: TBD

2:00 pm
16-Bit vs. 32-Bit Instructions for Pipelined Microprocessors
J. Bunda, D. Fussell, R. Jenevein
University of Texas at Austin
W. C. Athas, *University of Southern California*

2:30 pm
Register Connection: A New Approach to Add Registers into Instruction Set Architectures
T. Kiyohara, *Matsushita Electric Industrial Co., Ltd.*
S. Mahlke, J. Gyllenhaal, W.-M. Hwu
University of Illinois at Urbana-Champaign

3:00 pm
A Comparison of Dynamic Branch Predictors that use Two Levels of Branch History
T.-Y. Yeh, Y. Patt
University of Michigan

3:30 – 4:00 pm Coffee break

S12

Multiprocessor Memory Systems

Tuesday, May 18, 1993
2:00 – 3:30 pm
Room: Terrace A/B
Chair: TBD

2:00 pm
The Performance of Cache-Coherent Ring-Based Multiprocessors
L. Barroso, M. Dubois
University of Southern California

2:30 pm
Limitations of Cache Prefetching on a Bus-based Multiprocessors
S. Eggers, D. Tullsen
University of Washington

3:00 pm
Transactional Memory: Architectural Support for Lock-Free Data Structures
M. Herlihy, *DEC at Cambridge*
J. E. Moss, *University of Massachusetts at Amherst*

3:30 – 4:00 pm Coffee break

S13

Panel II

Tuesday, May 18, 1993
4:00 – 5:30 pm
Room: Palomar
Yale Patt and Ravi Iyer, Co-Chair
University of Michigan, Ann Arbor

R

Reception

Tuesday, May 18, 1993
6:30 pm
Room: Chablis/Burgundy

M1

SIGARCH Business Meeting

Tuesday, May 18, 1993
8:00 – 9:30 pm
Room: Cabernet/Chardonney

M2

TCCA Business Meeting

Tuesday, May 18, 1993
9:30 – 11:00 pm
Room: Cabernet/Chardonney

S14

Memory Systems and Interconnection

Wednesday, May 19, 1993
9:30 – 11:00 am
Room: Terrace A/B
Chair: TBD

9:30 am
The Chinese Remainder Theorem and the Prime Memory System
Q. Gao, *Chinese Academy of Sciences*

10:00 am
Odd Memory Systems May Be Quite Interesting
A. Seznec, J. Lenfant
IRISA, Campus de Beaulieu

10:30 am
A Comparison of Wormhole Routing Algorithms Based on Adaptivity
R. Boppana, *University of Texas at San Antonio*
S. Chalasani, *University of Wisconsin-Madison*

S15

Evaluation of Machines II

Wednesday, May 19, 1993
9:30 – 10:30 am
Room: Palomar
Chair: TBD

9:30 am
Evaluation of Mechanisms for Fine-Grained Parallel Programs in the J-Machine and the CM-5
E. Spertus, W. Dally
Massachusetts Institute of Technology
S. Goldstein, K. Schauser, T. von Eicken, D. Culler
University of California, Berkeley

10:00 am
Effect of Message Communication on Distributed-Memory Parallel Computer Performance
T. Horie, K. Hayashi, T. Shimizu, H. Ishihata
Fujitsu Labs, Ltd.

S16

Multithreading Support

Wednesday, May 19, 1993
11:00 am – 12:00 pm
Room: Palomar
Chair:TBD

11:00 am
Register Relocation: Flexible Contexts for Multithreading
C. Waldspurger, W. Weihl
Massachusetts Institute of Technology

11:30 am
Multiple Threads on Cyclic Register Windows
Y. Hidaka
University of Tokyo

20th Annual International Symposium On Computer Architecture

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25th Annual ACM Symposium on Theory of Computing

Plenary Invited Speaker
Daily
8:00 — 9:00 pm
Room: Burgundy/Cablis

Registration for the 25th Annual ACM Symposium on Theory of Computing includes a reception, business meeting, an Evening at Sea World, luncheons, coffee breaks, and conference proceedings. The conference is sponsored by ACM Special Interest Group on Algorithms and Computation Theory (SIGACT).

Sessions

R

Reception
Saturday, May 15, 1993
7:00 – 10:00 pm
Room: Harbor Terrace

S1 A

Sunday, May 16, 1993
9:20 – 10:30 am
Room: Chablis
Pravin Vaidya, Chair
University of Illinois at Urbana-Champaign

9:20 am
Some Complexity Issues on the Simply Connected Regions of the Two-Dimensional Plane
A. Chou, *Clark University*
K. Ko, *SUNY at Stony Brook*

9:45 am
Quantum Complexity Theory
E. Bernstein, U.Vazirani
University of California at Berkeley

10:10 am
Thermodynamics of Computation and Information Distance
C. H. Bennett, *IBM T. J. Watson Research Center*
P. Gács, *Boston University*
M. Li, *University of Waterloo*
P. Vitányi, *CWI and University of Amsterdam*
W. Zurek, *Los Alamos National Laboratories and Santa Fe Institute*

10:30 am Coffee break

S1 B

Sunday, May 16, 1993
9:20 – 10:30 am
Room: Palomar
David Peleg, Chair
Weizmann Institute, Israel

9:20 am
Fully Polynomial Byzantine Agreement in t+1 Rounds
J. Garay, *IBM T. J. Watson Research Center*
Y. Moses, *Weizmann Institute*

9:45 am
Fast Asynchronous Byzantine Agreement with Optimal Resilience
R. Canetti, *Technion*
T. Rabin, *Hebrew University*

10:10 am
Asynchronous Secure Computation
M. Ben-Or, *Hebrew University*
R. Canetti, O. Goldreich
Technion

10:30 am Coffee break

S2 A

Sunday, May 16, 1993
11:00 am – 12:10 pm
Room: Chablis
Pravin Vaidya, Chair
University of Illinois at Urbana-Champaign

11:00 am
***k* One-Way Heads Cannot Do String-Matching**
T. Jiang, *McMaster University*
M. Li, *University of Waterloo*

11:25 am
A Theory of Parameterized Pattern Matching: Algorithms and Applications
B. Baker, *AT&T Bell Laboratories*

11:50 am
Multiple Matching of Rectangular Patterns
R. Idury, A. Schäffer
Rice University

Sessions

12:10 – 2:00 pm
Luncheon
Room: Burgundy

S2 B

Sunday, May 16, 1993
11:00 am – 12:10 pm
Room: Palomar

David Peleg, Chair
Weizmann Institute, Israel

11:00 am
Generalized FLP Impossibility Result for t-Resilient Asynchronous Computations
E. Borowsky, E. Gafni
University of California at Los Angeles

11:25 am
Wait-Free k-set Agreement is Impossible: The Topology of Public Knowledge
M. Saks, *Rutgers University and University of California at San Diego*
F. Zaharoglou, *Univ. of California at San Diego*

11:50 am
The Asynchronous Computability Theorem for t-Resilient Tasks
M. Herlihy, *DEC Cambridge Research Laboratories*
N. Shavit, *Tel-Aviv University*

12:10 – 2:00 pm
Luncheon
Room: Burgundy

S3 A

Sunday, May 16, 1993
2:00 – 3:35 pm
Room: Chablis

Michael Goodrich, Chair
The Johns Hopkins University

2:00 pm
Linear Programming Without the Matrix
C. Papadimitriou, *University of California at San Diego*
M. Yannakakis, *AT&T Bell Laboratories*

2:25 pm
Comparison-Based Search in the Presence of Errors
R. Borgstrom, S. Kosaraju
The Johns Hopkins University

2:50 pm
A Robust Model for Finding Optimal Evolutionary Trees
M. Farach, *DIMACS*
S. Kannan, *University of Arizona*
T. Warnow, *Sandia National Laboratories*

3:15 pm
Maximum k-Chains in Planar Point Sets: Combinatorial Structure and Algorithms
S. Felsner, L. Wernisch
Technische Universitaet Berlin

3:35 pm Coffee break

S3 B

Sunday, May 16, 1993
2:00 – 3:35 pm
Room: Palomar

Anna Karlin, Chair
DEC Systems Research Center

2:00 pm
Lower Bounds for Randomized Mutual Exclusion
E. Kushilevitz, M. Rabin
Harvard University
Y. Mansour, *Tel-Aviv University and IBM T. J. Watson Research Center*
D. Zuckerman, *Massachusetts Institute of Technology*

2:25 pm
Competitive Distributed File Allocation
B. Awerbuch, *Massachusetts Institute of Technology*
Y. Bartal, A. Fiat
Tel-Aviv University

2:50 pm
Contention in Shared Memory Algorithms
C. Dwork, O. Waarts
IBM Almaden Research Center
M. Herlihy, DEC Cambridge Research Laboratories

3:15 pm
What Can be Computed Locally?
M. Naor, L. Stockmeyer
IBM Almaden Research Center

3:35 pm Coffee break

S4 A

Sunday, May 16, 1993
4:00 – 6:00 pm
Room: Chablis

Michael Goodrich, Chair
The Johns Hopkins University

4:00 pm
Reinventing the Wheel: An Optimal Data Structure for Connectivity Queries
R. Cohen, *US Coast Guard Academy*
G. Di Battista, *University di Roma*
A. Kanevsky, *Texas A & M University*

4:25 pm
Locality Based Graph Coloring
M. Szegedy, *AT&T Bell Laboratories*
S. Vishwanathan, *University of Chicago*

4:50 pm
Separator Based Sparsification for Dynamic Planar Graph Algorithms
D. Eppstein, *University of California at Irvine*
Z. Galil, *Columbia University and Tel-Aviv University*
G. Italiano, *IBM T. J. Watson Research Center*
T. Spencer, *University of Nebraska at Omaha*

5:15 pm
Polynomial Space Polynomial Delay Algorithms for Listing Families of Graphs
L. Goldberg, *Sandia National Laboratories*

5:40 pm
A Linear Time Algorithm for Finding Tree-Decompositions of Small Treewidth
H. Bodlaender, *Utrecht University*

S4 B

Sunday, May 16, 1993
4:00 – 6:00 pm
Room: Palomar

Andrew C.-C. Yao, Chair
Princeton University

4:00 pm
More Deterministic Simulation in Logspace
N. Nisan, *Hebrew University*
D. Zuckerman, *Massachusetts Institute of Technology*

4:25 pm
Expanders that Beat the Eigenvalue Bound: Explicit Construction and Applications
A. Wigderson, *Hebrew University*
D. Zuckerman, *Massachusetts Institute of Technology*

4:50 pm
The Biased Coin Problem
R. Boppana, B. Narayanan
New York University

5:15 pm
Efficient Construction of a Small Hitting Set for Combinatorial Rectangles in High Dimension
N. Linial, *Hebrew University*
M. Luby, *ICSI and University of California at Berkeley*
M. Saks, *Rutgers University and University of California at San Diego*
D. Zuckerman, *Massachusetts Institute of Technology*

5:40 pm
Constructing Small Sample Spaces Satisfying Given Constraints
D. Koller, *Stanford University and IBM Almaden Research Center*
N. Megiddo, *IBM Almaden Research Center and Tel-Aviv University*

M

Business Meeting

Sunday, May 16, 1993
9:00 pm
Room: Chablis

S5 A

Monday, May 17, 1993
9:20 – 10:30 am
Room: Cuyamaca

Richard Beigel, Chair
Yale University

9:20 am
On the Hardness of Approximating Minimization Problems
C. Lund, M. Yannakakis
AT&T Bell Laboratories

9:45 am
Efficient Probabilistically Checkable Proofs: Applications to Approximation
M. Bellare, *IBM T. J. Watson Research Center*
S. Goldwasser, A. Russell
Massachusetts Institute of Technology
C. Lund, *AT&T Bell Laboratories*

Sessions

10:10 am
Probabilistically Checkable Debate Systems and Approximation Algorithms for PSPACE-Hard Functions
A. Condon, *University of Wisconsin at Madison*
J. Feigenbaum, C. Lund, P. Shor
AT&T Bell Laboratories

10:30 am Coffee break

S5 B

Monday, May 17, 1993
9:20 – 10:30 am

Room: Laguna

Avrim Blum, Chair
Carnegie Mellon University

9:20 am
Efficient Learning of Typical Finite Automata from Random Walks
Y. Freund, *University of California at Santa Cruz*
M. Kearns, R. Schapire, *AT&T Bell Laboratories*
D. Ron, *Hebrew University*
R. Rubinfeld, *Cornell University*
L. Sellie, *University of Chicago*

9:45 am
Finiteness Results for Sigmoidal "Neural" Networks
A. Macintyre, *University of Oxford*
E. Sontag, *Rutgers University*

10:10 am
Bounds for the Computational Power and Learning Complexity of Analog Neural Nets
W. Maass, *Technische Universitaet Graz*

10:30 am Coffee break

S6 A

Monday, May 17, 1993
11:00 am – 12:10 pm

Room: Cuyamaca

Michael Paterson, Chair
University of Warwick

11:00 am
Proportionate Progress: A Notion of Fairness in Resource Allocation
S. Baruah, N. Cohen, C. Plaxton, D. Varvel
University of Texas at Austin

11:25 am
Self-Routing Superconcentrators
N.Pippenger, *University of British Columbia*

11:50 am
Space-Efficient Scheduling of Multithreaded Computations
R. Blumofe, C.Leiserson
Massachusetts Institute of Technology

12:10 – 2:00 pm
Luncheon
Room: Burgundy

S6 B

Monday, May 17, 1993
11:00 am – 12:10 pm

Room: Laguna

Avrim Blum, Chair
Carnegie Mellon University

11:00 am
Cryptographic Hardness of Distribution-Specific Learning
M. Kharitonov, *Stanford University*

11:25 am
How to Use Expert Advice
N. Cesa-Bianchi, *Univ. di Milano*
Y. Freund, D. Haussler, D. Helmbold, M. Warmuth
University of California, Santa Cruz
R. Schapire, *AT&T Bell Laboratories*

11:50 am
Efficient Noise-Tolerant Learning from Statistical Queries
M. Kearns, *AT&T Bell Laboratories*

12:10 – 2:00 pm
Luncheon
Room: Burgundy

S7 A

Monday, May 17, 1993
2:00 – 3:35 pm

Room: Cuyamaca

Chee Yap, Chair
New York University

2:00 pm
Online Load Balancing and Network Flow
S. Phillips, *Stanford University*
J. Westbrook, *Yale University*

2:25 pm
Markov Chains, Computer Proofs, and Average-Case Analysis of Best Fit Bin Packing
E. Coffman, D. Johnson, P. Shor
AT&T Bell Laboratories
R. Weber, *Cambridge University*

2:50 pm
On-Line Algorithms for Cache Sharing
M. Bern, D. Greene
Xerox PARC
A. Raghaunathan, *University of California at Davis*

3:15 pm
Angles of Planar Triangular Graphs
G. DiBattista, L. Vismara
Università di Rome, La Sapienza

3:35 pm Coffee break

S7 B

Monday, May 17, 1993
2:00 – 3:35 pm

Room: Laguna

Joe Kilian, Chair
NEC Research Institute

2:00 pm
Many Birds with One Stone: Multi-Objective Approximation Algorithms
R. Ravi, *Brown University*
M. Marathe, S. Ravi, D. Rosenkrantz, H. Hunt
SUNY at Albany

2:25 pm
A Parallel Approximation Algorithm for Positive Linear Programming
M. Luby, *ICSI and University of California at Berkeley*
N. Nisan, *Hebrew University*

2:50 pm
Randomness-Optimal Unique Element Isolation, with Applications to Perfect Matching and Related Problems
S. Chari, P. Rohatgi, A. Srinivasan
Cornell University

3:15 pm
Decision Trees: Old and New Results
R. Fleischer, *Max-Planck Institute*

3:35 pm Coffee break

S8 A

Monday, May 17, 1993
4:00 – 5:35 pm

Room: Cuyamaca

Alok Aggarwal, Chair
IBM Research Division

4:00 pm
A Deterministic Algorithm for the Three-Dimensional Diameter Problem
J. Matoušek, *Universita Karlova and Free University, Berlin*
O. Schwarzkopf, *Universiteit Utrecht*

4:25 pm
Matrix Searching with the Shortest Path Metric
J. Hershberger, *DEC Systems Research Center*
S. Suri, *Bell Communications Research*

4:50 pm
Improved Bounds on Weak Epsilon-Nets for Convex Sets
B. Chazelle, M. Grigni
Princeton University
H. Edelsbrunner, *University of Illinois at Urbana-Champaign*
L. Guibas, *DEC Systems Research Center and Stanford University*
M. Sharir, *Tel-Aviv University*
E. Welzl, *Freie University, Berlin*

5:15 pm
Piecewise Linear Paths Among Convex Obstacles
M. de Berg, O. Schwarzkopf
Universiteit Utrecht
J. Matoušek, *Universita Karlova and Freie University*

S8 B

Monday, May 17, 1993
4:00 – 6:00 pm

Room: Laguna

Andrew C.-C. Yao, Chair
Princeton University

4:00 pm
Depth Reduction for Noncommutative Arithmetic Circuits
E. Allender, *Princeton University*
J. Jiao, *Rutgers University*

4:25 pm
Modified Ranks of Tensors and the Size of Circuits
P.Pudlak, *Universität Dortmund*
V. Rödl, *Emory University*

Sessions

4:50 pm
Characterizing Non-Deterministic Circuit Size
M. Karchmer, *Massachusetts Institute of Technology*
A. Wigderson, *Hebrew University*

5:15 pm
Size-Depth Trade-Offs for Threshold Circuits
R. Impagliazzo, R. Paturi
University of California at San Diego
M. Saks, *Rutgers University and University of California at San Diego*

5:40 pm
Simulating Threshold Circuits by Majority Circuits
M. Goldmann, *Royal Institute of Technology*
M. Karpinski, *University of Bonn*

An Evening at Sea World

Monday, May 17, 1993
6:30 – 10:30 pm

S9 A

Tuesday, May 18, 1993
9:20 – 10:30 am

Room: Cuyamaca

Michael Paterson, Chair
University of Warwick

9:20 am
Multi-Scale Emulation: A Technique for Reconfiguring Arrays with Faults
R. Cole, *New York University*
B. Maggs, *NEC Research Institute*
R. Sitaraman, *Princeton University*

9:45 am
How Much Can Hardware Help Routing?
A. Borodin, *University of Toronto and IBM Center for Advanced Research*
P. Raghavan, B. Schieber
IBM T. J. Watson Research Center
E. Upfal, *IBM Almaden Research Center and Weizmann Institute*

10:10 am
Routing Permutations on Graphs via Matchings
N. Alon, *Tel-Aviv University*
F. Chung, *Bell Communications Research and Harvard University*
R. Graham, *Bell Communications Research and Rutgers University*

10:30 am Coffee break

S9 B

Tuesday, May 18, 1993
9:20 – 10:30 am

Room: Laguna

Paris Kannelakis, Chair
Brown University

9:20 am
Parametric Real-Time Reasoning
R. Alur, *AT&T Bell Laboratories*
T. Henzinger, *Cornell University*
M. Vardi, *IBM Almaden Research Center*

9:45 am
Constant Time Factors Do Matter
N. Jones, *University of Copenhagen*

10:10 am
Monotone Monadic SNP and Constraint Satisfaction
T. Feder, M. Vardi
IBM Almaden Research Center

10:30 am Coffee break

S10 A

Tuesday, May 18, 1993
11:00 am – 12:10 pm

Room: Cuyamaca

Sandeep Bhatt, Chair
Bell Communications Research

11:00 am
On-Line Load Balancing with Applications to Machine Scheduling and Virtual Circuit Routing
J. Aspnes, O. Waarts
IBM Almaden Research Center
Y. Azar, *DEC Systems Research Center*
A. Fiat, *Tel-Aviv University*
S. Plotkin, *Stanford University*

11:25 am
Wait-Free Approximate Load Balancing
W. Aiello, *Bell Communications Research*
B. Awerbuch, *Massachusetts Institute of Technology*
B. Maggs, S. Rao
NEC Research Institute

11:50 am
Optimal Online Scheduling of Parallel Jobs with Dependencies
A. Feldmann, J. Sgall
Carnegie Mellon University
M. Kao, *Duke University*
S. Teng, *Massachusetts Institute of Technology*

12:10 – 2:00 pm
Joint Lunch with STRUCTURES
Room: Chablis/Burgundy

S10 B

Tuesday, May 18, 1993
11:00 am – 12:10 pm

Room: Laguna

David Peleg, Chair
Weizmann Institute, Israel

11:00 am
Time Optimal Self-Stabilizing Synchronization
B. Awerbuch, B. Patt-Shamir
Massachusetts Institute of Technology
S. Kutten, *IBM T. J. Watson Research Center*
Y. Mansour, *Tel-Aviv University and IBM T. J. Watson Research Center*
G. Varghese, *DEC*

11:25 am
Fast Perfect-Information Leader-Election Protocol with Linear Immunity
J. Cooper, N. Linial
Hebrew University

11:50 am
Cryptographic Defense Against Traffic Analysis
C. Rackoff, D. Simon
University of Toronto

12:10 – 2:00 pm
Joint Lunch with STRUCTURES
Room: Chablis/Burgundy

S11 A

Tuesday, May 18, 1993
2:00 – 3:35 pm

Room: Cuyamaca

F. Tom Leighton, Chair
Massachusetts Institute of Technology

2:00 pm
Excluded Minors, Network Decomposition, and Multicommodity Flow
P. Klein, *Brown University*
S. Plotkin, *Stanford University*
S. Rao, *NEC Research Insititute*

2:25 pm
Improved Bounds on the Max-Flow Min-Cut Ratio for Multicommodity Flows
S. Plotkin, *Stanford University*
E. Tardos, *Cornell University*

2:50 pm
Approximate Max-Flow Min-(Multi)Cut Theorems and Their Applications
N. Garg, V. Vazirani
IIT Delhi
M. Yannakakis, *AT&T Bell Laboratories*

3:15 pm
A Primal-Dual Approximation Algorithm for Generalized Steiner Network Problems
D. Williamson, M. Goemans
Massachusetts Institute of Technology
M. Mihail, *Bell Communications Research*
V. Vazirani, *IIT Delhi*

3:35 pm Coffee break

S11 B

Tuesday, May 18, 1993
2:00 – 3:35 pm

Room: Laguna

Martin Tompa, Chair
University of Washington, Seattle

2:00 pm
Time-Space Trade-Offs for Undirected ST-Connectivity on a JAG
J. Edmonds, *University of Toronto*

2:25 pm
Short Random Walks on Graphs
G. Barnes, *Max-Planck Institute*
U. Feige, *Weizmann Institute*

2:50 pm
Matchings in Lattice Graphs
C. Kenyon, *Ecole Normale Superiere de Lyon*
D. Randall, *University of California at Berkeley*
A. Sinclair, University of Edinburgh at ICSI

Sessions

3:15 pm
Deterministic Coding for Interactive Communication
L. Schulman, *University of California, Berkeley*

3:35 pm Coffee break

S12 A

Tuesday, May 18, 1993
4:00 – 5:15 pm

Room: Cuyamaca

F. Tom Leighton, Chair
Massachusetts Institute of Technology

4:00 pm
An $\tilde{O}(n^2)$ Algorithm for Minimum Cuts
D. Karger, *Stanford University*
C. Stein, *Dartmouth College*

4:25 pm
Finding Minimum-Quotient Cuts in Planar Graphs
J. Park, C. Phillips
Sandia National Lababoratories

4:50 pm
The Network Inhibition Problem
C. Phillips, *Sandia National Laboratories*

S12 B

Tuesday, May 18, 1993
4:00 – 5:15 pm

Room: Laguna

Joe Kilian, Chair
NEC Research Insititute

4:00 pm
Checking Approximate Computations Over the Reals
S. Ar, *Princeton University*
M. Blum, P. Gemmell
University of California at Berkeley
B. Codenotti, *ICSI at Berkeley*

4:25 pm
On the Generation of Multivariate Polynomials which are Hard to Factor
A. Shamir, *Weizmann Institute*

4:50 pm
Counting Points on Curves Over Finite Fields
J. von zur Gathen, *University of Toronto*
M. Karpinski, *University of Bonn*
I. Shparlinski, *Macquarie University*

Committees

Alok Aggarwal
Chair

Richard Beigel

Sandeep Bhatt

Avrim Blum

Michael Goodrich

Paris Kanellakis

Joe Kilian

Anna Karlin

Tom Leighton

Michael Paterson

David Peleg

Martin Tompa

Pravin Vaidya

Chee Yap

Andrew Yao

Plenary Invited Speaker Daily
8:00 — 9:00 pm
Room: Burgundy/Cablis

Registration for the 4th ACM SIGPLAN Symposium on Principles and Practices of Parallel Programming includes a business meeting, an Evening at the Aerospace Museum, two session luncheons, one tutorial luncheon, coffee breaks, and conference proceedings. The conference is sponsored by ACM Special Interest Group on Programming Languages (SIGPLAN).

Sessions and Tutorials

T1

Geoffrey C. Fox
Syracuse University and Northeast Parallel Architectures Center

Wednesday, May 19, 1993
9:20 am – 12:20 pm

Room: (G) Bel Aire North

High Performance Computing Enabling Technologies for the Real World

We present and discuss the results of a survey of the relevance of parallel computing in New York State Industry. We divide applications into 18 fields varying broadly from large scale simulation to information processing and including the support of an interactive virtual world for the state's children. We then examine software and algorithmic technologies which appear to be needed to support the different applications. Software systems include databases, languages (high performance Fortran and C++) and the integration software at various levels, including tele-virtuality operating environments. Algorithms include matrix algebra, irregular mesh generation and large scale scheduling methods. We discuss which application areas appear to need which technologies.

T2

David A. Padua
University of Illinois at Urbana-Champaign

Wednesday, May 19, 1993
9:20 am – 12:20 pm

Room: Palomar

Compiler Techniques for Parallel and Vector Computers

The tutorial will present an overview of the issues that arise in the development of compilers for parallel and vector computers. Both shared- and distributed-memory machines will be discussed. The source languages considered include both sequential languages such as Fortran 77, extended with compiler assertions, and parallel dialects such as PCF Fortran and HPF Fortran.

The transformation and analysis techniques to be covered include:
(1) Dependence analysis of sequential code and conflict analysis of parallel code.
(2) Transformations to detect and exploit implicit parallelism and to enhance explicit parallelism. These include loop transformation techniques such as partitioning and distribution and other strategies such as induction variable recognition and variable renaming.
(3) Transformations to decrease communication and control overhead, to enhance the locality of parallel loops, and algorithms to generate efficient code for synchronization, communication, and prefetching.
(4) Compile-time data manipulation techniques such as privatization, alignment and data partitioning across memory modules.
(5) Run-time techniques for

Sessions and Tutorials

scheduling and parallelism detection and their relationship to language constructs and translation strategies.

Experimental measurements of the effectiveness of several of the translation and analysis techniques will be presented throughout the tutorial.

T3

Tom LeBlanc
Mark Crovella
University of Rochester

Wednesday, May 19, 1993
2:15 – 5:15 pm

Room: Palomar

Runtime Tools for Parallel Programming

This tutorial will describe tools and techniques for the dynamic (runtime) analysis of parallel programs. The discussion will first present the foundational concepts related to debugging and performance tuning of parallel programs; then the talk will explore those concepts using a survey of available tools. The concepts to be discussed include: parallel execution as a partial order; one time vs. cyclic execution analysis; intrusive vs. non-intrusive monitoring; tradeoffs between monitoring overhead and precision; performance metrics for parallel programs; sources of inefficiency in parallel execution; and techniques for displaying debugging and performance information. The tool survey will examine how these concepts affect the design and utility of representative tools. We will examine tools from four categories: profiling tools (e.g, Pixie, Quartz, Forge); tools for event monitoring and display (e.g., Gist, Pablo, Instant Replay); tools for analyzing memory hierarchy usage (e.g. MTool); and tool systems for debugging and performance analysis (e.g, IPS, PPuTTs).

T4

Guy L. Steele Jr.
Thinking Machines Corporation

Wednesday, May 19, 1993
2:15 – 5:15 pm

Room: (G) Bel Aire North

High Performance Fortran

The goal of High Performance Fortran (HPF) is to extend Fortran 90 to provide additional support for data parallel programming (defined as a style of programming with a single conceptual thread of control, a global name space, and loosely synchronous parallel computation) to facilitate top performance on MIMD and SIMD computers with non-uniform memory access costs, while also promoting, or at least not impeding, performance on other machines. The idea is to promote portability of Fortran programs over a larger class of computers: distributed-memory MPP (massively parallel processor), shared-memory MPP, vector computers, multihead vector computers, shared-memory multicomputers, mainframes, and workstations.

In this tutorial we will cover all aspects of the definition of High Performance Fortran, including directives for controlling data alignment and distribution; the FORALL statement; new intrinsic and library functions; extrinsic and local procedures; the treatment of storage association, COMMON, and EQUIVALENCE; and the relationship of High Performance Fortran to Fortran 90.

S1

Thursday, May 20, 1993
9:20 – 10:50 am

Room: Palomar

Aki Yonezawa, Chair
University of Tokyo

9:20 – 9:50 am
Log P: Towards a Realistic Model of Parallel Computation
D. Culler, R. Karp, D. Patterson, A. Sahay, K.E. Schauser, E. Santos, R. Subramonian, and T. von Eicken
University of California at Berkeley

9:50 – 10:20 am
Programming Task and Data Parallelism on a Multicomputer
J. Subhlok, J. M. Stichnoth, D. R. O'Hallaron, and T. Gross
Carnegie Mellon University

10:20 – 10:50 am
ActorSpaces: An Open Distributed Programming Paradigm
G. Agha and C. Callsen
University of Illinois at Urbana-Champaign

10:50 am Coffee break

S2

Thursday, May 20, 1993
11:20 am – 12:20 pm

Room: Palomar

Dan Reed, Chair
University of Illinois at Urbana-Champaign

11:20 – 11:50 am
Experiences Using the ParaScope Editor: an Interactive Parallel Programming Tool
M. W. Hall, *Stanford University*
T. J. Harvey, *Rice University*
K. Kennedy, *Rice University*
N. McIntosh, *Rice University*
K. S. McKinley, *ENSMP (CRI)*
J. D. Oldham, *Stanford University*
M. H. Paleczny, *Rice University*
G. Roth, *Rice University*

11:50 am –12:20 pm
Perturbation Analysis of High Level Instrumentation for SPMD Programs
S. R. Sarukkai, *Indiana University*
A. Malony, *University of Oregon*

12:20 — 1:30 pm
Luncheon
Room: Harbor Terrace

S3

Thursday, May 20, 1993
2:00 – 4:00 pm

Room: Palomar

Monica Lam, Chair
Stanford University

2:00 – 2:30 pm
Integrating Message-Passing and Shared-Memory: Early Experience
D. Kranz, K. Johnson, A. Agarwal, J. Kubiatowicz, and B.-H. Lim
Massachusetts Institute of Technology

2:30 – 3:00 pm
Using Scheduler Information to Achieve Optimal Barrier Synchronization Performance
L. Kontothanassis and R. Wisniewski
University of Rochester

3:00 – 3:30 pm
A Concurrent Copying Garbage Collector for Languages that Distinguish (Im)mutable Data
L. Huelsbergen and J. R. Larus
University of Wisconsin, Madison

3:30 – 4:00 pm
Improving the Performance of Runtime Parallelization
S.-T. Leung and J. Zahorjan
University of Washington

4:00 pm Coffee break

D1

Panel Discussion

Thursday, May 20, 1993
4:30 – 6:00 pm

Room: Palomar

Chair: TBA

An Evening at the Aerospace Museum

Thursday, May 20, 1993
6:30 – 10:30 pm

S4

Friday, May 21, 1993
9:20 – 10:50 am

Room: Palomar

Guy Steele, Chair
Thinking Machines Corporation

9:20 – 9:50 am
High Performance Fortran Without Templates: A New Model for Distribution and Alignment
B. M. Chapman, *University of Vienna*
P. Mehrotra, *ICASE*
H. P. Zima, *University of Vienna*

9:50 – 10:20 am
Implementation of a Portable Nested Data-Parallel Language
G. E. Blelloch, J. Hardwick, J. Sipelstein, M. Zagha
Carnegie Mellon University
S. Chatterjee, RIACS

10:20 – 10:50 am
An Equational Language for Data-Parallelism
P. Rao and C. Walinsky
Dartmouth College

10:50 am Coffee break

Sessions and Tutorials

S5

Friday, May 21, 1993
11:20 am – 12:20 pm

Room: Palomar

Hans Zima, Chair
University of Vienna

11:20 – 11:50 am
Transforming High-Level Data-Parallel Programs into Vector Operations
J. F. Prins and D. W. Palmer
University of North Carolina

11:50 am – 12:20 pm
Non-concurrency Analysis
S. P. Masticola and B. G. Ryder
Rutgers University

12:20 – 2:00 pm
Luncheon
Room: Burgundy

S6

Friday, May 21, 1993
2:00 – 3:30 pm

Room: Palomar

Michael Wolfe, Chair
Oregon Graduate Institute

2:00 – 2:30 pm
Explicit Data Placement (XDP): A Methodology for Explicit Compile-Time Representation and Compile-Time Representation and Optimization
V. Bala, J. Ferrante
IBM T. J. Watson Research Center

2:30 – 3:00 pm
Generating Local Address and Communication Sets for Data-Parallel Programs
S. Chatterjee, *RIACS*
J. R. Gilbert, *Xerox PARC*
F. J. E. Long, *University of California at Santa Cruz*
R. Schreiber, *RIACS*
S.-H. Teng, *Massachussetts Institute of Technology*

3:00 – 3:30 pm
Data Flow Equations for Explicitly Parallel Programs
D. Grunwald and H. Srinivasan
University of Colorado at Boulder

3:30 pm Coffee break

S7

Friday, May 21, 1993
4:00 – 5:30 pm

Room: Palomar

Olaf Lubeck, Chair
Los Alamos National Laboratory

4:00 – 4:30 pm
Implementing an Irregular Application on a Distributed Memory Multiprocessor
S. Chakrabarti and K. Yelick
University of California-Berkeley

4:30 – 5:00 pm
Parallelizing Algorithms for Symbolic Computation Using ||MAPLE||
K. Siegl
Johannes Kepler University

5:00 – 5:30 pm
Experience with Fine-Grain Synchronization in MIMD Machines for Preconditioned Conjugate Gradient
D. Yeung and A. Agarwal
Massachusetts Institute of Technology

M

PPoPP Business Meeting

Friday, May 21, 1993
5:30 – 6:00 pm

Room: Palomar

S8

Saturday, May 22, 1993
9:20 – 10:50 am

Room: Palomar

Robert Halstead, Chair
DEC Cambridge Research Lab

9:20 – 9:50 am
Procs and Locks: A Portable Multiprocessing Platform for Standard ML of New Jersey
J. G. Morrisett, *Carnegie Mellon University*
A. Tolmach, *Portland State University*

9:50 – 10:20 am
Leapfrogging: A Portable Technique for Implementing Efficient Futures
D. B. Wagner and B. G. Calde
University of Colorado at Boulder

10:20 – 10:50 am
An Efficient Implementation Scheme of Concurrent Object-Oriented Languages on Stock Multicomputers
K. Taura, S. Matsuoka, and A. Yonezawa
University of Tokyo

10:50 am Coffee break

S9

Saturday, May 22, 1993
11:05 am – 12:35 pm

Room: Palomar

David Callahan, Chair
Tera Computer Company

11:05 – 11:35 am
The Shared Regions Approach to Software Cache Coherence on Multiprocessors
H. S. Sandhu, B. Gamsa, and S. Zhou
University of Toronto

11:35 am – 12:05 pm
Computation Migration: Enhancing Locality for Distributed-Memory Parallel Systems
W. Hsieh, P. Wang, and W. E. Weihl
Massachusetts Institute of Technology

12:05 pm – 12:35 pm
Data Locality and Load Balancing in COOL
R. Chandra, A. Gupta, and J. L. Hennessy
Stanford University

Committees

Marina Chen
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Conference Chair

Robert Halstead
DEC Cambridge Research Lab
Program Chair

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University of Tokyo

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University of Vienna

9th Annual ACM Symposium on Computational Geometry

Plenary Invited Speaker
Daily
8:00 — 9:00 pm
Room: Burgundy/Cablis

Registration for the 9th Annual ACM Symposium on Computational Geometry includes a reception, business meeting, an Evening at the Aerospace Museum, coffee breaks, and conference proceedings. The conference is sponsored by ACM SIGACT and ACM Special Interest Group on Graphics (SIGGRAPH).

Sessions

R

Reception

Tuesday, May 18, 1993
7:00 – 10:00 pm

Room: Harbor Terrace

S1

Wednesday, May 19, 1993
9:20 – 10:20 am

Room: Cuyamaca

Mark Overmars, Chair
Utrecht University

9:20 am
Generalized Hidden Surface Removal
M. de Berg, *Utrecht University*

9:40 am
New Bounds for Lower Envelopes in Three Dimensions, with Applications to Visibility in Terrains
D. Halperin, *Tel Aviv University*
M. Sharir, *Tel Aviv University and New York University*

10:00 am
On Lines Missing Polyhedral Sets in 3-space
M. Pellegrini, *King's College*

10:20 am Coffee break

S2

Wednesday, May 19, 1993
10:50 am – 12:10 pm

Room: Cuyamaca

Bernard Chazelle, Chair
Princeton University

10:50 am
Complexity of Translating a Box in Polyhedral 3-space
D. Halperin, *Tel Aviv University*
C-K. Yap, *New York University*

11:10 am
An Optimal Algorithm for the ($\leq k$)-levels with Applications to Separation and Transversal
H. Everett, *Université du Québec á Montréal*
J-M. Robert, *Université du Québec á Chicoutimi*
M. van Kreveld, *McGill University*

11:30 am
Computing the Discrepancy
D. Dobkin, *Princeton University*
D. Eppstein, *University of California at Irvine*

11:50 am
Very Sparse Spanners in 3-dimensional Euclidean Space
G. Das, P. Heffernan, G. Narasimhan
Memphis State University

12:30 –2:00 pm
Luncheon
Room: Burgundy

S3

Wednesday, May 19, 1993
2:00 – 3:40 pm

Room: Cuyamaca

Helmut Alt, Chair
Free University Berlin

2:00 pm
Helly Theorems and Generalized Linear Programming
N. Amenta
University of California at Berkeley

2:20 pm
Geometric Partitioning Made Easier, Even in Parallel
M. Goodrich
The Johns Hopkins University

2:40 pm
Computing a Centerpoint of a Finite Planar Set of Points in Linear Time
S. Jadhav, A. Mukhopadhyay
Indian Institute of Technology at Kanpur

3:00 pm
Approximating Center Points with and without Linear Programming
D. Eppstein, *University of California at Irvine*
G. Miller, *Carnegie Mellon University*
C. Sturtivant, *University of Minnesota*
S-H. Teng, *Massachusetts Institute of Technology*

3:20 pm
A Deterministic Linear Time Algorithm for Geometric Separators and its Applications
D. Eppstein, *University of California at Irvine*
G. Miller, *Carnegie Mellon University*
S-H. Teng, *Massachusetts Institute of Technology*

3:40 pm Coffee break

S4

Wednesday, May 19, 1993
4:10 – 5:30 pm

Room: Cuyamaca

Klara Kedem, Chair
Ben-Gurion University

4:10 pm
On the Topological Shape of Planar Voronoi Diagrams
A. Corbalan, M. Mazon, T. Recio, F. Santos
Universidad de Cantabria

4:30 pm
Convex Distance Functions in 3-space are Different
C. Icking, R. Klein, N-M. Le, L. Ma
Fern Universität Hagen

4:50 pm
A Linear-time Randomized Algorithm for the Bounded Voronoi Diagram of a Simple Polygon
R. Klein, *Fern Universität Hagen*
A. Lingas, *Lund University*

5:10 pm
Tentative Prune-and-Search for Computing Voronoi Vertices
D. Kirkpatrick, J. Snoeyink
University of British Columbia

S5

Thursday, May 20, 1993
9:20 – 10:20 am

Room: Cuyamaca

Godfried Toussaint, Chair
McGill University

9:20 am
Optimal Motion Planning for a Rod in the Plane Subject to Velocity Constraints
Y-B. Chen, D. Ierardi
University of Southern California

9:40 am
A Compaction Algorithm for Non-convex Polygons and Its Application
Z. Li, V. Milenkovic
Harvard University

10:00 am
Efficient Exact Arithmetic for Computational Geometry
S. Fortune, *AT&T Bell Laboratories*
C. van Wyk, *Drew University*

10:20 am Coffee break

S6

Thursday, May 20, 1993
10:50 am – 12:10 pm

Room: Cuyamaca

Jean-Daniel Boissonnat, Chair
INRIA Sophia-Antipolis

10:50 am
Area Optimization of Simple Polygons
S. Fekete, *SUNY Stony Brook*
W. Pulleyblank, *IBM T. J. Watson Research Center*

11:10 am
Worst-case Bounds for Subadditive Geometric Graphs
M. Bern, *Xerox Palo Alto Research Center*
D. Eppstein, University of California at Irvine

11:30 am
Finding a Minimum Weight *K*-link Path in Graphs with Monge Property and Applications
A. Aggarwal, B. Schieber, T. Tokuyama
IBM T. J. Watson Research Center

11:50 am
An Expander-based Approach to Geometric Optimization
M. Katz, *Tel Aviv University*
M. Sharir, *Tel Aviv University and New York University*

Sessions

12:30 –2:00 pm
Joint Lunch with STRUCTURES
Room: Chablis

S7

Thursday, May 20, 1993
2:00 – 3:40 pm
Room: Cuyamaca
Peter Gritzmann, Chair
Universität Trier

2:00 pm
Dominance Range-query, the One-reporting Case
T. Dubé
New York University

2:20 pm
Algorithms for the Union of Balls in Euclidean Space
H. Edelsbrunner
University of Illinois at Urbana-Champaign

2:40 pm
An Incremental Algorithm for Betti Numbers of Simplicial Complexes
C. Delfinado, H. Edelsbrunner
University of Illinois at Urbana-Champaign

3:00 pm
Dehn-Sommerville Relations, Upper Bound Theorem and Levels in Arrangements
K. Mulmuley
University of Chicago

3:20 pm
Objects that Cannot be Taken Apart with Two Hands
J. Snoeyink, *University of British Columbia*
J. Stolfi, *University of Campinas*

3:40 pm Coffee break

M

Business Meeting

Thursday, May 20, 1993
4:10 – 5:30 pm
Room: Cuyamaca

An Evening at the Aerospace Museum

Thursday, May 20, 1993
6:30 – 9:30 pm

S8

Friday, May 21, 1993
9:20 – 10:20 am
Room: Cuyamaca
Bernard Chazelle, Chair
Princeton University

9:20 am
Long Non-crossing Configurations in the Plane
N. Alon, *Tel Aviv University*
S. Rajagopalan, *University of California at Berkeley*
S. Suri, *Bellcore*

9:40 am
Some Geometric Applications of Dilworth's Theorem
J. Pach, *New York University*
J. Törocsik, *Hungarian Academy of Sciences*

10:00 am
Counting Triangle Crossings and Halving Planes
T. Dey, H. Edelsbrunner
University of Illinois at Urbana-Champaign

10:20 am Coffee break

S9

Friday, May 21, 1993
10:50 am – 12:10 pm
Room: Cuyamaca
Klara Kedem, Chair
Ben-Gurion University

10:50 am
Guaranteed-quality Mesh Generation for Curved Surfaces
P. Chew, *Cornell University*

11:10 am
Compatible Tetrahedralizations
N. Alon, *Tel Aviv University*

11:30 am
An NC^1 Parallel 3D Convex Hull Algorithm
N. M. Amato, *University of Illinois at Urbana-Champaign*
F. P. Preparata, *Brown University*

11:50 am
Scalable Parallel Geometric Algorithms for Coarse Grained Multicomputers
F. Dehne, *Carleton University*
A. Fabri, *INRIA Sophia-Antipolis*
A. Rau-Chaplin, *Carleton University*

12:30 – 2:00 pm
Luncheon

S10

Friday, May 21, 1993
2:00 – 3:40 pm
Room: Cuyamaca
Günter Rote, Chair
Technische Universität Graz

2:00 pm
Shortest Paths Among Obstacles in the Plane
J. Mitchell, *State University of New York*

2:20 pm
Dynamic Ray Shooting and Shortest Paths Via Balanced Geodesic Triangulations
M. Goodrich, *The Johns Hopkins University*
R. Tamassia, *Brown University*

2:40 pm
The Visibility Complex
M. Pocchiola, *L'école Normale Supérieure Paris*
G. Vegter, *Groningen University*

3:00 pm
Can Visibility Graphs be Represented Compactly?
P. Agarwal, *Duke University*
N. Alon, *Tel Aviv University*
B. Aronov, *Polytechnic University New York*
S. Suri, *Bellcore*

3:20 pm
An Optimal Algorithm for the Two-guard Problem
P. Heffernan
Memphis State University

3:40 pm Coffee break

S11

Friday, May 21, 1993
4:10 – 5:30 pm
Room: Cuyamaca
Helmut Alt, Chair
Free University Berlin

4:10 pm
Area-efficient Upward Tree Drawings
A. Garg, *Brown University*
M. Goodrich, *The Johns Hopkins University*
R. Tamassia, *Brown University*

4:30 pm
Decision Trees for Geometric Models
E. Arkin, *State University of New York*
H. Meijer, *Queen's University*
J. Mitchell, *State University of New York*
D. Rappaport, *Queen's University*
S. Skiena, *State University of New York*

4:50 pm
The Power of Geometric Duality and Minkowski Sums in Optical Computational Geometry
Y. Karasik, *Tel Aviv University*
M. Sharir, *Tel Aviv University and New York University*

Committees

Chee Yap
Courant Institute, New York University
Conference Chair

Mark Overmars
Utrecht University
Program Chair

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Jiří Matoušek
Charles University

Günter Rote
Technische Universität Graz

Godfried Toussaint
McGill University

Structure in Complexity Theory, 8th Annual IEEE Conference

Plenary Invited Speaker
Daily
8:00 — 9:00 pm
Room: Burgundy/Cablis

Registration for the Structure in Complexity Theory, 8th Annual IEEE Conference includes a reception, business meeting with refreshments, two Rump Sessions a joint lunch with STOC, a joint lunch with SCG, coffee breaks, and conference proceedings. Please note that student registration does *not* include lunches.The conference is sponsored by IEEE Technical Committee on Mathematical Foundations of Computing.

Sessions

R

Reception

Monday, May 17, 1993
7:00 — 10:00 pm

Room: (G) Garden Terrace

S1

Session 1

Tuesday, May 18, 1993
9:30 am – 12:20 pm

Room: (G) Bel Aire

Howard Straubing, Chair
Boston College

9:30 am
Towards Uncheatable Benchmarks
Jin-yi Cai, *Princeton University*

10:10 am
On Limited Nondeterminism and the Complexity of the V-C Dimension
Christos Papadimitriou, *University of California/San Diego*
Mihalis Yannakakis, *AT&T Bell Laboratories*

10:50 am Coffee break

11:20 am
On Monadic NP versus Monadic co-NP
Ronald Fagin, Larry Stockmeyer, Moshe Vardi
IBM/Almaden

11:50 am
Polynomial-Time Optimization, Parallel Approximation and Fixpoint Logic
Phokion G. Kolaitis, Madhukar N. Thakur
University of California/Santa Cruz

12:30 –2:00 pm
Joint Lunch with STOC
Room: Chablis/Burgundy

S2

Session 2

Tuesday, May 18, 1993
2:30 – 5:00 pm

Room: (G) Bel Aire

Eric Allender, Chair
Rutgers University

2:30 pm
Selective Self-Reducible Sets: A New Characterization of P
Harry Buhrman, Peter van Helden, Leen Torenvliet
University of Amsterdam

2:50 pm
P-selective Sets, and Reducing Search to Decision versus Self-Reducibility
Ashish Naik, Alan Selman
State University of New York/Buffalo
Mitsunori Ogiwara, *University of Electro-Communications*

3:30 pm Coffee break

4:00 pm
Isomorphisms of NP-complete Problems on Random Instances
Jay Belanger, Jie Wang
Wilkes University

4:30 pm
Polynomial Isomorphisms of 1-L-Complete Sets
Manindra Agrawal, Somenath Biswas
Indian Institute of Technology/Kanpur

M

Rump Session

Tuesday, May 18, 1993
7:00 — 9:00 pm

Room: Cuyamaca

S3

Session 3

Wednesday, May 19, 1993
9:30 am – 12:30 pm

Room: (G) Bel Aire

Joan Feigenbaum, Chair
AT&T Bell Laboratories

9:30 am
The Polynomial Method in Circuit Complexity
Richard Beigel, *Yale University*

10:20 am
Lower Bounds on Representing Boolean Functions as Polynomials in Z_m
Shi-Chun Tsai, *The University of Chicago*

10:40 am Coffee break

11:10 am
On Span Programs
Mauricio Karchmer, *Massachusetts Institute of Technology*
Avi Wigderson, *Hebrew University*

11:50 am
On Proving Lower Bounds for Circuit Size
Mauricio Karchmer, *Massachusetts Institute of Technology*

12:30 – 2:00 pm
Luncheon
Room: Chablis

S4

Session 4

Wednesday, May 19, 1993
2:30 – 5:10 pm

Room: (G) Bel Aire

Richard Beigel, Chair
Yale University

2:30 pm
An Oracle Builder's Toolkit
Stephen Fenner
University of Southern Maine
Lance Fortnow, Stuart Kurtz, Lide Li
The University of Chicago

3:10 pm
Relationships between NP and co-NP Sets Relative to Random Oracles
Nikolai Vereshchagin, *Institute of New Technologies*

3:40 pm Coffee break

4:10 pm
On Closure Properties of #P in the Context of PF #P
Mitsunori Ogiwara, Seinosuke Toda
University of Electro-Communications
Thomas Thierauf
Universität Ulm
Osamu Watanabe
Tokyo Institute of Technology

4:50 pm
On the Power of Generalized MOD-Classes
Johannes Köbler, *Universität Ulm*
Seinosuke Toda, *University of Electro-Communications*

M

Business Meeting

Wednesday, May 19, 1993
8:00 pm

Room: Cabernet/Chardonnay

S5

Session 5

Thursday, May 20, 1993
9:30 am – 12:00 pm

Room: Laguna

Jacobo Torán, Chair
Universitat Politècnica de Catalunya

9:30 am
The Quantitative Structure of Exponential Time
Jack Lutz, *Iowa State University*

10:20 am
On Completeness under Random Reductions
Suresh Chari, Pankaj Rohatgi
Cornell University

11:00 am Coffee break

11:30 am
With Quasi-Linear Queries, EXP is not Polynomial-Time Turing Reducible to Sparse Sets
Bin Fu, *Beijing Computer Institute*

12:30 – 2:00 pm
Joint Lunch with SCG
Room: Chablis

S6

Session 6

Thursday, May 20, 1993
2:30 – 5:20 pm

Room: Laguna

Klaus-Jörn Lange, Chair
Technische Universität München

Sessions

2:30 pm
Sperner's Lemma and Robust Machines
P. Crescenzi, R. Silvestri
Università di Roma/La Sapienza

3:00 pm
On the Power of Polynomial Bit-Reductions
Ulrich Hertrampf
Universität Trier
Clemens Lautemann, Thomas Schwentick
Universität Mainz
Heribert Vollmer, Klaus W. Wagner
Universität Würzburg

3:40 pm Coffee break

4:10 pm
Sparse Reduces Conjunctively to Tally
Harry Buhrman, Edith Spaan
University of Amsterdam
Luc Longpré, *Northeastern University*

4:50 pm
Relativized Limitations of the Left Set Technique and Closure Classes of Sparse Sets
Sanjeev Saluja, *Tata Institute*

M

Rump Session

Thursday, May 20, 1993
7:00 — 9:00 pm

Room: Cuyamaca

S7

Session 7

Friday, May 21, 1993
9:30 am–12:30 pm

Room: Laguna

Jin-yi Cai, Chair
Princeton University

9:30 am
Complexity Structure in Formal Language Theory
Klaus-Jörn Lange, *Technische Universität München*

10:20 am
Pointers versus Arithmetic in PRAMs
Patrick Dymond, *York University*
Faith Fich, *University of Toronto*
Naomi Nishimura, Prabhakar Ragde
University of Waterlo
Walter Ruzzo, *University of Washington*

11:00 am Coffee break

11:30 am
Some Structural Complexity Aspects of Neural Computation
José Balcázar, Ricard Gavaldá
Universitat Politècnica de Catalunya
Hava Siegelmann, Eduardo Sontag
Rutgers University

12:00 pm
Alternating Time versus Deterministic Time: A Separation
Sanjay Gupta, *The Ohio State University*

12:30 – 2:00 pm
Luncheon
Room: Chenin/Colombard/Gamay/Riesling

S8

Session 8

Friday, May 21, 1993
2:30 – 5:30 pm

Room: Laguna

Jack Lutz, Chair
Iowa State University

2:30 pm
Computing Functions with Parallel Queries to NP
Jacobo Torán, *Universitat Politècnica de Catalunya*

3:10 pm
Taking It to the Limit: On Infinite Versions of NP-Complete Problems
Tirza Hirst, David Harel
Weizmann Institute of Science

3:50 pm Coffee break

4:20 pm
NP-Complete Problems Have a Version That's Hard to Approximate
David Zuckerman, *Massachusetts Institute of Technology*

5:00 pm
The Complexity of Selecting Maximal Solutions
Zhi-Zhong Chen, *Mie University*
Seinosuke Toda, *University of Electro-Communications*

Committees

PROGRAM COMMITTEE
Steven Homer
Boston University
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Eric Allender
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Richard Beigel
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Princeton University

Joan Feigenbaum
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der Technischen Universität München

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University of Arizona
Chair/FCRC Liaison

Workshop on Parallel Algorithms

Plenary Invited Speaker Daily
8:00 — 9:00 pm
Room: Burgundy/Cablis

Registration for the Workshop on Parallel Algorithms includes a reception, luncheons, and coffee breaks. WOPA is sponsored by the Defense Advanced Research Projects Agency, the National Science Foundation, the Office of Naval Research, and the University of Maryland Institute for Advanced Computer Studies. WOPA is organized in cooperation with the Association for Computing Machinery's Special Interest Group on Algorithms and Computation Theory.

Sessions

S1

Wednesday, May 19, 1993
9:20 am – 12:20 pm

Room: Chenin/Columbard/Gamay

9:20 – 10:20 am
Massively Parallel Multigrid Algorithms (invited presentation)
Lesley R. Matheson and Robert E. Tarjan
Princeton University

10:20 – 10:50 am
Shared Memories: Practice and Theory
Philip B. Gibbons, *AT&T Bell Laboratories*

10:50 –11:20 am Coffee break

11:20 am – 12:20 pm
Executing Large-grained Parallel Programs via Self-advancing Asynchronous Clock Constructions (invited presentation)
Krishna V. Palem, *IBM T. J. Watson Research Center*

12:30 – 2:00 pm
Luncheon
Room: Mission Courts South

S2

Wednesday, May 19, 1993
2:00 – 6:00 pm

Room: Chenin/Columbard/Gamay

2:00 – 3:00 pm
Architecture of the KSR1 Computer System (invited presentation)
James B. Rothnie, *Kendall Square Research*

3:00 – 3:30 pm
Information Dissemination in the Postal Model for Message Passing Systems
Amotz Bar-Noy and Shlomo Kipnis
IBM T. J. Watson Research Center

3:30 – 4:00 pm
Hashing and Rehashing in PRAM Emulations
Jörg Keller, *Centrum voor Wiskunde en Informatica*

4:00 – 4:30 pm Coffee break

4:30 – 6:00 pm
Panel Discussion

R

Reception
Wednesday, May 19, 1993
6:30 – 8:00 pm

Room: (G) Garden Terrace

S3

Thursday, May 20, 1993
9:20 am–12:20 pm

Room: Gamay/Rieslins

9:20 – 10:20 am
Parallel Algorithm Design Using the LogP Model (invited presentation)
Richard M. Karp, *University of California at Berkeley*

10:20 – 10:50 am
Highly Parallel Randomized Algorithmics
Yossi Matias, *AT&T Bell Laboratories*

10:50 – 11:20 am Coffee break

11:20 am – 12:20 pm
Parallel Optimization of Complex Systems (invited presentation)
John E. Dennis, *Rice University*

12:30 pm – 2:00 pm
Luncheon
Room: Cabernet/Chardonnay

S4

Thursday, May 20, 1993
2:00 – 6:00 pm

Room: Gamay/Rieslins

2:00 – 3:00 pm
Fault Tolerance in Meshes and Other Networks (invited presentation)
Richard J. Cole, *New York University*

3:00 – 4:00 pm
Programming Parallel Algorithms (invited presentation)
Guy E. Blelloch,
Carnegie Mellon University

4:00 – 4:30 pm Coffee break

4:30 – 5:00 pm
Parallel Approximation Classes
Josep Díaz, Maria J. Serna, and Jacobo Tóran
Universitat Politècnica de Catalunya

5:00 – 5:30 pm
An Overview of the Parallel Asynchronous Recursion Model
Lisa Higham and Eric Schenk
University of Calgary

5:30 – 6:00 pm
Parallel and Dynamic Graph Algorithms: A Combined Perspective
Saraim Subramanian, *Brown University*

Committees

STEERING COMMITTEE

Richard Cole
New York University

Zvi M. Kedem
New York University
Program Chair

Alan Siegel
New York University

Uzi Vishkin
University of Maryland and Tel Aviv University
Workshop Chair

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University of Texas at Austin

John H. Reif
Duke University

Burton Smith
Tera Computer

Leslie Valiant
Harvard University

7th Workshop on Parallel and Distributed Simulation

Plenary Invited Speaker
Daily
8:00 — 9:00 pm
Room: Burgundy/Cablis

Registration for the7th Workshop on Parallel and Distributed Simulation includes a reception, an Evening at Sea World, a business meeting, work in progress session, coffee breaks, and conference proceedings. The conference is sponsored by ACM Special Interest Group on Simulation (SIGSIM), IEEE Computer Society, IEEE-CS Technical Committee on Simulation (TCSIM) and the Society for Computer Simulation (SCS).

Sessions and Tutorials

T

Richard M. Fujimoto
Georgia Institute of Technology

Rajive Bagrodia
UCLA

Sunday, May 16, 1993
1:00 – 5:00 pm

Room: Chardonnay

Tutorial: 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, VLSI circuits and battlefield strategies, to mention a few. This tutorial will review techniques using parallel computation to speed up the execution of such simulation programs. First and second generation synchronization algorithms will be discussed. Experiences using this technology will be reviewed. Techniques to simplify the development of simulation models for efficient concurrent execution will be described, as well as current trends in the area of simulation languages.

The goal of this tutorial is to introduce researchers and practitioners to the current state of the art in parallel discrete event simulation. The intended audience includes researchers interested in the parallel discrete event simulation field and practioners with large scale simulation problems that could benefit from concurrent execution.

R

Reception

Sunday, May 16, 1993
7:00 – 9:00 pm

Room: Bayview

S1

Impact of PADS on Concurrency and Simulation

Monday, May 17, 1993
9:20 – 10:30 am

Room: Mission Courts South

K. Mani Chandy, Speaker
Caltech

10:30 — 11:00 am Coffee break

S2

Methodology

Monday, May 17, 1993
11:00 am – 12:30 pm

Room: Mission Courts South

11:00 — 11:30 am
Selecting the Optimal Checkpoint Interval in Time Warp Parallel Simulation
Yi-Bing Lin, *Bellcore*
Bruno R. Preiss, Wayne M. Loucks
University of Waterloo
Edward Lazowska, *University of Washington*

11:30 am — 12:00 pm
Parallel Algorithms for Simulating Continuous Time Markov Chains
David M. Nicol, *The College of William and Mary*
Phil Heidelberger, *IBM, T. J. Watson Research Center*

12:00 — 12:30 pm
Determining Initial States for Time-Parallel Simulations
Marc Abrams, Jain J. Wang
Virginia Tech

12:30 – 2:00 pm
Lunch (on your own)

S3

Algorithms

Monday, May 17, 1993
2:00 – 3:30 pm

Room: Mission Courts South

2:00 — 2:30 pm
Global Synchronization for Optimistic Parallel Discrete Event Simulation
David M. Nicol, *The College of William and Mary*

2:30 — 3:00 pm
An Algorithm for Minimally Latent Global Virtual Time
Alexander I. Tomlinson, Vijay K. Garg
The University of Texas at Austin

3:00 — 3:30 pm
On a Parallel Partitioning Technique for Use with Conservative Parallel Simulation
Biswajit Nandy, Wayne M. Loucks
University of Waterloo

3:30 — 4:00 pm Coffee break

S4

Potpourri

Monday, May 17, 1993
4:00 – 5:30 pm

Room: Mission Courts South

4:00 — 4:30 pm
Disseminating Critical Target-Specific Synchronization Information in Parallel Discrete Event Simulations
Carmen M. Pancerella, Paul F. Reynolds, Jr.
University of Virginia

4:30 — 5:00 pm
Unsolved Problems in Discrete-Event Simulation (invited paper)
Boris Lubachevsky, *AT&T Bell Laboratories*

5:00 — 5:30 pm
Shared Variables in Distributed Simulation (invited paper)
Horst Mehl, *University of Kaiserslautern, Germany*

An Evening at Sea World

Monday, May 17, 1993
6:30 – 10:30 pm

S5

Parallel Simulation of Hardware

Tuesday, May 18, 1993
9:20 – 10:50 am

Room: Mission Courts South

9:20 am
High Performance Parallel Logic Simulation on a Network of Workstations
Naraig Manjikian, Wayne M. Loucks
University of Waterloo

9:50 — 10:20 am
Corolla Partitioning for Distributed Logic Simulation of VLSI-Circuits
Christian Sporrer, Herbert Bauer
Technical University of Munich

10:20 — 10:50 am
How Using Busses in Multicomputer Programs Affects Conservative Parallel Simulation
Mary L. Bailey, Michael A. Pagels, Kachung Kevin Wong
University of Arizona

10:50 — 11:10 am Coffee break

S6

Parrallel Simulation: Realizing the Potential

Tuesday, May 18, 1993
11:10 am–12:30 pm

Room: Mission Courts South

12:30 – 2:00 pm
Lunch (on your own)

S7

Time Warp

Tuesday, May 18, 1993
2:00 – 3:30 pm

Room: Mission Courts South

2:00 — 2:30 pm
Efficient Implementation of Event Sets in Time Warp

Sessions and Tutorials

Robert Ronngren, Rassul Ayani
The Royal Institute of Technology, Sweden
Richard M. Fujimoto, Samir R. Das
Georgia Institute of Technology

2:30 — 3:00 pm
Breathing Time Warp
Jeff Steinman, *Jet Propulsion Laboratory, Caltech*

3:00 — 3:30 pm
The Local Time Warp Approach to Parallel Simulation
Hassan Rajaei, Rassul Ayani, Lars-Erik Thorelli
The Royal Institute of Technology, Sweden

3:30 — 4:00 pm Coffee break

S8

Work in Progress Session

Tuesday, May 18, 1993
4:00 – 5:30 pm

Room: Mission Courts South

Brief, informal presentations of on-going work in parallel simulation. Participation is open to all attendees. Prospective speakers will be invited to propose a presentation at the conference.

M

PADS Business Meeting

Tuesday, May 18, 1993
5:45 – 6:30 pm

Room: Mission Courts South

S9

Performance

Wednesday, May 19, 1993
9:20 – 10:50 am

Room: Santa Barbara/San Carlos

9:20 — 9:50 am
An Analytical Comparison of Periodic Checkpointing and Incremental State Saving
Avinash C. Palaniswamy, Philip A. Wilsey
University of Cincinatti

9:50 — 10:20 am
A Performance Study of the Cancelback Protocol for Time Warp
Samir R. Das, Richard M. Fujimoto
Georgia Institute of Technology

10:20 — 10:50 am
A Parallel Simulation of Communicating Finite State Machines
Carl Tropper, Azzedine Boukerche
Jet Propulsion Laboratory, Caltech

10:50 — 11:10 am Coffee break

S10

Short Papers

Wednesday, May 19, 1993
11:10 am–12:30 pm

Room: Santa Barbara/San Carlos

11:10 — 11:30 am
The Effect of Synchronization Requirements on the Performance of Distributed Simulations
Murali Shanker, B. Eddy Patuwo
Kent State University

11:30 — 11:50 am
Performance of a Riskfree Time Warp Operating System
Steven Bellenot, *Florida State University*

11:50 am — 12:10 pm
Restructuring a Parallel Simulation to Improve Cache Behavior in a Shared-Memory Multiprocessor: The Value of Distributed Synchronization
David R. Cheriton, Hendrik A. Goosen, Philip Machanick
Stanford University

12:10 — 12:30 pm
Time Warp Simulation in Time Constrained Systems
Kaushik Ghosh, Richard M. Fujimoto, Karsten Schwan
Georgia Institute of Technology

Committees

Richard Fujimoto
Georgia Institute of Technology
General Chair

Brian Unger
Jade Simulations International
Associate General Chair

Rajive Bagrodia
University of California, Los Angeles
Program Chair

David Jefferson
University of California, Los Angeles
Associate Program Chair

PROGRAM COMMITTEE

Marc Abrams
Virginia Tech

Ian Akyildiz
Georgia Institute of Technology

Mary Bailey
University of Arizona

Robert Felderman
University of Southern California, Information Sciences Institute

Richard Fujimoto
Georgia Institute of Technology

Jason Lin
Bellcore

Boris Lubachevsky
AT&T Bell Laboratories

Vijay Madisetti
Georgia Institute of Technology

David Nicol
College of William & Mary

Peter Reiher
University of California, Los Angeles

Paul Reynolds
University of Virginia

Brian Unger
Jade Simulations International

ACM/ONR Workshop on Parallel and Distributed Debugging

Plenary Invited Speaker
Daily
8:00 — 9:00 pm
Room: Burgundy/Cablis

Registration for the ACM/ONR Workshop on Parallel and Distributed Debugging includes a reception, Le Cafe & Discussion, luncheons, coffee breaks, and conference proceedings. The conference is sponsored the Office of Naval Research, ACM SIGPLAN and the ACM Special Interest Group on Operating Systems.

Sessions

R

Reception

Sunday, May 16, 1993
7:00 – 10:00 pm

Room: Harbor Terrace

Opening Remarks

Monday, May 17, 1993
9:20 – 9:30 am

Room: Cheninblanc/Colombard/Gamay

Bart Miller
University of Wisconsin

S1

Session 1

Monday, May 17, 1993
9:30 – 10:40 am

Room: Cheninblanc/Colombard/Gamay

Bart Miller, Chair
University of Wisconsin

9:30 — 10:00 am
Optimal Tracing and Replay for Debugging Shared-Memory Parallel Programs
Robert H.B. Netzer
Brown University

10:00 — 10:30 am
On-the-Fly Topological Sort-A Basis for Interactive Debugging and Live Visualization of Parallel Programs
Doug Kimelman, *IBM T. J. Watson Research Center*
Dror Zernik, *The Technion*

10:30 — 10:40 am Discussion

10:40 am Coffee break

S2

Session 2

Monday, May 17, 1993
10:55 am – 12:40 pm

Room: Cheninblanc/Colombard/Gamay

Keith Marzullo, Chair
University of California, San Diego

10:55 — 11:25 am
Detecting Relational Global Predicates in Distributed System
Alexander I. Tomlinson, Vijay Garg
University of Texas, Austin

11:25 — 11:55 am
Detecting Atomic Sequences of Predicates in Distributed Computations
Michel Hurfin, Noel Plouzeau, x Michel Raynal
IRISA

11:55 am — 12:25 pm
Characterizing the Accuracy of Distributed Timestamps
Céline Valot, *INRIA*

12:25 — 12:40 pm Discussion

12:40 – 2:00 pm
Luncheon
Room: Harbor Terrace

S3

Session 3

Monday, May 17, 1993
2:00 – 3:45 pm

Room: Cheninblanc/Colombard/Gamay

Joan Francioni, Chair
University of Southwestern Lousiana

2:00 — 2:30 pm
Visualization, Auralization, and Analysis Methods
Diane T. Rover, Abdul Waheed
Michigan State University

2:30 — 3:00 pm
Customizable Portrayals of Program Structure
Cherri Pancake, *Oregon State University*

3:00 — 3:30 pm
Process Clustering for Distributed Debugging
Thomas Kunz, *Technische Hochschule Darmstadt*

3:30 — 3:45 pm Discussion

3:45 pm Coffee break

D1

Panel Discussion 1 Program Visualization: Are you Drawing Useful Pictures

Monday, May 17, 1993

4:00 – 5:15 pm

Room: Cheninblanc/Colombard/Gamay

Charlie McDowell, Moderator
University of California, Santa Cruz

M

Le Cafe & Discussion

Monday, May 16, 1993
7:00 – 10:00 pm

Room: San Antonio

S4

Session 4

Tuesday, May 18, 1993
9:20 – 10:30 am

Room: Cheninblanc/Colombard/Gamay

Dan Reed, Chair
University of Illinois, Urbana-Champaign

9:20 — 9:50 am
The Ariadne Debugger: Scalable Application of Event-Based Abstraction
Janice E. Cuny, Alfred Hough, x Joydip Kundu
University of Massachusetts, Amherst
George Forman, Calvin Lin, x Lawrence Snyder
University of Washington, Seattle

9:50 — 10:20 am
Panorama: A Portable, Extensible Parallel Debugger
John May, Francine Berman
University of California, San Diego

10:20 — 10:30 am Discussion

10:30 am Coffee break

S5

Session 5

Tuesday, May 18, 1993
10:45 am – 12:30 pm

Room: Cheninblanc/Colombard/Gamay

Jong Choi, Chair
IBM T. J. Watson Research Center

10:45 — 11:15 am
On-the-fly Detection of Access Anomolies in Nested Parallel Loops
Yong-Kee Jun, *Gyeongsang National University*
Kern Koh, *Seoul National University*

11:15 — 11:45 am
Nondeterminacy: Testing and Debugging Message Passing Parallel Programs
Suresh K. SamodaranKamal, Joan Francioni
University of Southwestern Lousiana

11:45 am — 12:15 pm
Compile-time Support for Efficient Data Race Detection in Shared-Memory Parallel Programs
John Mellor-Crummey, *Rice University*

12:15 — 12:30 pm Discussion

12:30 – 2:00 pm
Luncheon
Room: Harbor Terrace

S6

Session 6

Tuesday, May 18, 1993
2:00 – 3:45 pm

Room: Cheninblanc/Colombard/Gamay

Jeff Brown, Chair
Los Alamos National Laboratory

2:00 — 2:30 pm
Performance Debugging Using Parallel Performance Predicates
Mark E. Crovella, Thomas J. LeBlanc
University of Rochester

ACM/ONR Workshop on Parallel and Distributed Debugging

Sessions

2:30 — 3:00 pm
High Level Tools for the Debugging of Real Time Multiprocessor Systems
M. Timmerman, F. Gielen, P. Lambrix
Royal Military Academy, Belgium

3:00 — 3:30 pm
Developing Parallel Applications Using High-Performance Simulation
Eric A. Brewer and William E. Weihl
Massachusetts Institute of Technology

3:30 — 3:45 pm Discussion

3:45 — 4:00 pm Coffee break

D2

Panel Discussion 2 The Users' View of Debugging

Tuesday, May 18, 1993
4:00 – 5:15 pm

Room: Cheninblanc/Colombard/Gamay

Moderator: TBA

Committees

Bart Miller
University of Wisconsin-Madison
Co-Chair

Charlie McDowell
University of California, Santa Cruz
Co-Chair

Thomas Bemmerl
Intel European Supercomputer Development Center

Don Breazeal
Intel Supercomputer Systems Division

Jeff Browne
Los Alamos National Laboratory

Jong Choi
IBM T. J. Watson Research Center

Joan Francioni
University of Southwest Louisiana
Local Arrangements
Program Committee

Keith Marzullo
University of California, Santa Diego

Dan Reed
University of Illinois, Urbana Champaign

Zary Segall
Carnegie Mellon University

Plenary Invited Speaker Daily
8:00 — 9:00 pm
Room: Burgundy/Cablis

Registration for the CRA Workshop on Academic Careers for Women includes luncheon, and coffee breaks. The conference is sponsored by the CRA's Committee on the Status of Women.

Sessions

Introduction and Welcome

Saturday, May 15, 1993
8:00 – 8:15 am

Room: (G) Terrace AB

Cynthia Brown
Northeastern University

The purpose of workshop is to give women who are starting or ready to start academic careers the practical information they need to succeed. The program is intended for people who will be at research universities where a substantial research program is critical to success.

S1

The Tenure Decision

Saturday, May 15, 1993
8:15 – 9:15 am

Room: (G) Terrace AB

Maria Klawe
University of British Columbia

Panelists:
Thelma Estrin
Mary Jane Irwin

Overview of what's needed (and what's not needed). Typical successful research record at top and second-tier places. What's needed in teaching. What's needed in service. Need for letters. What to keep track of so you can write a good tenure dossier. Choosing references, and the protocol of how to approach them. Common pitfalls and mistakes. (This gives an overview; several topics will be expanded on later.)

S2

Getting the Job and Getting Established

Saturday, May 15, 1993
9:15 – 10:15 am

Room: (G) Terrace AB

Fran Berman
University of California at San Diego

Panelists:
Valerie Taylor
Northwestern University

Jill Mesirov
Thinking Machines Corporation

Getting the job: Industry or academia? Interviewing, what to ask and what to ask for. The two body problem. Getting established. Making the right impression. Establishing yourself in the department—balancing research, teaching, students and real life.

10:15 — 10:30 am Coffee break

S3

Building Your Research Program

Saturday, May 15, 1993
10:30 – 11:30 am

Room: (G) Terrace AB

Nancy Leveson
University of California at Irvine

Panelists:
Mary Vernon
University of Wisconsin
TBA

Going beyond your thesis. *Taste*. Choosing research problems. Pros and cons of collaborating. Journal versus conference publication. Balancing theory and experiment. What referees look for. How much to put in one paper. Good writing style. Choosing a journal or conference to submit it to. Differences between journal and conference standards. What to do when a paper is rejected.

S4

Obtaining External Funding

Saturday, May 15, 1993
11:30 am – 12:30 pm

Room: (G) Terrace AB

Susan Eggers
University of Washington

Panelists:
Marina Chen
TBA

Strategies for obtaining funding from the federal government (both peer-reviewed and government-reviewed funding) and industry. Strategies for obtaining funding in areas where funding is tight. Structure of a typical good proposal. Protocol of contacting grant officers. Resources the University may have to help you. Asking for matching funds.

12:30 – 2:00 pm
Luncheon
(G) Terrace C

Sessions

S5

Teaching

Saturday, May 15, 1993
2:00 – 3:00 pm

Room: (G) Terrace AB

Joan Francioni
University of Southwestern Louisiana

Panelists:
Virginia Lo
University of Oregon
TBA

How to be a good teacher. Common mistakes of new teachers. How much time to put into it. What you should ask to teach. Dealing with problem students. Special problems encountered by women faculty.

S6

Making Connections

Saturday, May 15, 1993
3:00 – 4:00 pm

Room: (G) Terrace AB

Judy Goldsmith
University of Manitoba

Panelists:
Joan Feigenbaum, *AT&T Bell Laboratories*
Naomi Nishimura, *University of Waterloo*

The importance of attending conferences. How to meet people at conferences. Having a five-minute description of your work prepared. How to look and sound professional. How to deal with inappropriate comments and harassment. Why having a network is important, and how to maintain it after the conference. Being part of the *young girls' network*.

S7

Time Management

Saturday, May 15, 1993
4:15 – 5:30 pm

Room: (G) Terrace AB

Jan Cuny
University of Massachusetts at Amherst

Panelists:
Leah Jamieson, *Purdue University*
Laurie Dillon, *University of California at Santa Barbara*

How hard do you have to work? How much time should you be spending on teaching, research, service? How to protect yourself from unreasonable teaching and service demands. How people who had children while they were untenured coped. What they would do differently if they had to do it over.

Committee

Cynthia Brown
Northeastern University
Organizer and Chair

Frederick Weingarten
Computing Research Association
Organizer

Fran Berman
University of California at San Diego
Session 2

Jan Cuny
University of Massachusetts at Amherst
Session 7

Susan Eggers
University of Washington
Session 4

Joan Francioni
University of Southwestern Louisiana
Session 5

Judy Goldsmith
University of Manitoba
Session 6

Maria Klawe
University of British Columbia
Session 1

Nancy Leveson
University of California at Irvine
Session 3

Multiple Conference Registration

STOC/STRUCTURES

Since STOC and STRUCTURES overlap on Tuesday, May 18, people who register for both conferences are eligible for a registration discount. To take advantage of the discount, registrants must specify which conference they consider to be *primary*.

Those non-students who specify STOC as primary will have the Monday night excursion to Sea World included in their registration, but not the Monday night STRUCTURES reception. Non-student registrants who choose STRUCTURES get the reception instead of the excursion. The discount is $65 for those choosing STOC as primary conference, and $100 for those choosing STRUCTURES.

Students who specify STOC will have the Tuesday luncheon included in their registration, but neither the Sea World excursion nor the STRUCTURES reception. (Student registration for STOC includes lunches but not the excursion.) Students specifying STRUCTURES receive the STRUCTURES reception, but not the Tuesday luncheon. (Student registration for STRUCTURES does not include lunches on any days.) In both cases the discount is $25.

The discounts are available to late as well as early registrants, but if you register on-time for one conference and late for the other, your primary conference must be the one for which you registered first. Registrants who do not want to choose their events ahead of time may forego the discount and need not specify a primary conference.

Additional FCRC Programs

To request additional FCRC program announcements:

(800) 388-1786

+1 (415) 380-0405 (out of the country)

72571.1341@compuserve.com (email)

Advance Registration Deadline April 25, 1993

Sheratons on Harbor Island

1380 Harbor Island Drive
San Diego, CA 92102–1092
(619) 291-2900

Location/Transportation Facts

Year-round 19 acre resort-style hotel complex located on San Diego Bay's Harbor Island. 4 km/2-1/2 miles from downtown San Diego. 8 km/5 miles from Seaport Village, Sea World, and the San Diego Zoo. 1/2 km/1/4 mile from San Diego International Airport; courtesy transportation is provided.

Climate

The average temperatures in May are a high of 69.4 degrees and a low of 59.1 degrees

Accommodations

The modern 1060-room complex consists of the Sheraton Harbor Island Hotel and the Sheraton Grand on Harbor Island. The two hotels are 275 m/300 yards apart and are connected by a marina walkway as well as continuous shuttle service. The Sheraton Harbor Island houses 710 rooms including 48 suites in either the 3-story Lanai building or the 12-story tower. The Grand is an 11-story tower with 350 oversized waterview-rooms including 22 suites. All rooms have private balcony or patio, color TV with free ESPN and CNN, in-room coffee service, automatic wakeup and message service, and 2 double or king-size beds.

Dining/Entertainment

Merlano's offers fine Italian dining and entertainment nightly. Spencer's features California cuisine and offers all-day dining. Cafe Del Sol offers breakfast, lunch, and dinner daily. Joe's Deli offers sandwiches and light snacks. Two lounges and Telly's sports bar which features major sporting events, simulated golf, entertainment, pub food and libations. Poolside bars serve cocktails in season. 24-hour room service.

Services/Facilities/Shops

Gift shop, jewelry store. Concierge and tour desk. Multilingual staff. Valet parking.

Child Care

If you will require child care support such as babysitting; please call the Concierge at the hotel. The direct number is (619) 692-2216.

Recreational/Amusement Facilities

Three heated swimming pools and children's pools outside. Health club, whirlpool, saunas, jogging and parcourse. Sunning beach. Private dock for bay cruises or fishing excursions and boat slips. 4 lighted tennis courts with pro. Children's playground, bike rentals.

Attractions

Old Town is the site of the first permanent European settlement in what is the new California. Many of the original buildings have been restored and others have been rebuilt. Park rangers conduct free tours daily at 2:00 pm.

Balboa Park, situated on more than 1,000 acres of landscaped grounds, offers a variety of activities and places of interest. The most famous, perhaps, is the *San Diego Zoo* which contains over 3, 900 animals in a luch subtropical 100-acre garden, an amphitheater, auditiorium and special facilities for groups up to 1,000. Gorilla Tropics features a gorilla habitat set in a re-created African rain forest. Also, the popular Scripps Aviary will offer elevated wooden walways for an up-close view of the exotic birds. Open daily 9 am – 4 pm.

The *Wild Animal Park*, adevelopment of the zoo located 30 miles north of downtown San Diego in the San Pasqual Valley is dedicated to the conservation of endangered species. Featured are the Nairobi Village, the Kilimanjaro hiking trail and a five-mile Safari aboard the Wgasa Bush Line, an electric monorail train which takes visitors into otherwise inaccessible animal habitats.

Also housed in Balboa Park are the *Natural History Museum* which features dinosaur skeletons and exhibits on ecology and evolution; the *San Diego Museum of Art* which features collections of paintings from all over the world; the *Aerospace Museum* which traces the history of aviation aerospace and offers a collection of aircraft and spacecraft artifacts; the *San Diego Automotive Museum* which offers an extensive collection of automobiles and automobile memorabilia; the *Museum of Photographic Arts*, the *Botanical Building* and many other museums and attractions.

Sea World, the 150-acre family entertainment park, features 20 marine exhibits, 7 major shows, a live shark exhibit, 1 320-ft, sky-tower and a 1/4-mile long cable car skyride over Mission Bay. Thje much-acclaimed Penguin Encounter houses over 300 penguins, all happily at home amon the icy ledges and rocks of the multi-million-dollar Antarctic chamber. Baby Shamu is the star performer at Shamu Stadium, the largest marine mammal habitat ever built, with giant interconnecting performance, research and breeding pools for the park's group of killer wales. The latest exhibit, Shark Encounter, features a 680,000-gallon tank filled with thousands of colorful fish and sharks. Forbidden Reef, incorporates two displays. Bat Ray Feeding Shallows and Moray Eel Caverns.

The *San Diego Maritime Museum*, located on North Harbor Drive's Embarcadero, includes the *Star of India*, the oldest merchant vessel still afloat. A completely restored 275-foot windjammer, she began as the full-rigged British ship *Euter-pe* and still carries her original wooden figurehead, a carving of that musical Muse. Her adventures include 21 round-the-world voyages and disasters from storm to stranding. The 1800's ferryboat *Berkeley*, and WWI vintage luxury steam yacht Medea are also part of the Maritime Museum.

HOTEL REGISTRATION FORM

Credit Authorization

In order to expedite your check-in process, please complete this credit authorization form and return with your reservation.

Name ______________________ **Arrival Date** ____________ **Arrival Time** ____________

I hereby authorize Sheraton Harbor Island Hotels to process all charges incurred during my stay on the dates listed below, on the credit card number provided.

Credit card type ❑ American Express ❑ Diners Club ❑ Discover ❑ Master Charge ❑ Visa

Credit card number ______________________ **Expiration date** ____________

Print name as it appears on the card ______________________

Signature ______________________

Reservation Request

We would like to welcome you as a participant in **FCRC '93**. This form can also be used to telefax your reservation request rather than mailing it to the hotel. Fax number (619) 296-5297

Arrival date ____________ (Check-in time: after 3:00 p.m.)

Expected time of arrival ____________ AM/PM

Departure date ____________ (Check out time: 12 noon)

Please verify your departure date in order to avoid early departure charges. Rates do not include tax. Tax subject to change without notice. If requested rate is not available, next available rate will be confirmed.

❑ One person @ $115

❑ Two people @ $115

❑ Non-smoking room requested

Suites are available. Rates upon request from hotel reservations at (619) 291-2900.

Preferred Bedding:

❑ 1 king ❑ 2 doubles

If the requested bed type is not available, alternate bedding will be assigned.

Name ______________________ **Sharing with** ______________________

Organization ______________________ **Telephone** (   ) ______________

Address ______________________ **City** ____________ **State** ________ **Zip** ________

Sheraton Club International Number/Special Requests ______________________

Advance Deposit

Deadline April 25, 1993

Reservations received after April 25, 1993, will be on a space and rate available basis. All reservations must be guaranteed for late arrival with a credit card or one night's deposit plus 9% tax. Group rates can only be confirmed by using this reservation form or calling the hotel directly. For any questions or further information regarding your request, please call our Reservation Office at (619) 692-2265 or contact the hotel directly at (619) 291-2900.

All guaranteed reservations not claimed or cancelled 48 hours prior to the date of arrival will be charged one night's room and tax.

(A) Enclosed is a **check** or **money order** payable to Sheraton Harbor Island for $ ______________________

(B) Credit card for guarantee ❑ American Express ❑ Diners Club ❑ Discover ❑ Master Charge ❑ Visa

Credit card number ______________________ **Expiration date** ____________

Print name as it appears on the card ______________________

Signature ______________________

Other major credit cards are welcome for check-out: however, only those credit cards listed above may be used for guaranteeing your reservation.

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

Please circle the appropriate amount and write total in the Conference Total box on the next page. Check membership box if applicable. Refer to individual conference pages for additional information about what is included in each conference. **EARLY REGISTRATION DEADLINE APRIL 18, 1993.**

Single Conference Registration

		Member		Non-member		Student	
		By 4/18	*After 4/18*	*By 4/18*	*After 4/18*	*By 4/18*	*After 4/18*
1.	20th Annual International Symposium on Computer Architecture (ISCA 93) May 17–19	$350	$380	$380	$450	$150	$180
1A.	Half day Tutorial	$200	$250	$250	$290	$150	$180
1B.	Full day Tutorial	$260	$310	$310	$350	$150	$180
❑	*ACM SIGARCH, IEEE membership #*____________						
	Conference Proceedings only	$35	$35	$35	$35	$35	$35
2.	25th Annual ACM Symposium on Theory of Computing (STOC) May 16–18	$290	$350	$350	$410	$90	$130
❑	*ACM SIGACT membership #*____________						
3.	4th ACM SIGPLAN Symposium on Principles and Practices of Parallel Programming (PPoPP 93) May 19–21	$300	$350	$350	$400	$125	$175
❑	*ACM SIGPLAN membership #*____________						
4.	9th Annual ACM Symposium on Computational Geometry (SCG) May 19–21	$275	$320	$310	$355	$120	$155
❑	*ACM SIGACT, SIGGRAPH membership #*____________						
5.	Structure in Complexity Theory, 8th Annual IEEE Conference (STRUCTURES) May 18–21	$260	$315	$325	$395	$95	$125
❑	*ACM SIGACT, EATCS, IEEE membership #*____________						
	Conference Proceedings only	$30	$35	$30	$35	$30	$35
6.	Workshop on Parallel Algorithms* (WOPA 93) May 19–20	$75	$100				
❑	*ACM SIGACT membership #*____________						
7.	7th Workshop on Parallel and Distributed Simulation (PADS) May 16–19	$300	$350	$350	$400	$125	$150
7A.	Tutorial	$150	$200	$150	$200	$150	$200
❑	*ACM SIGSIM, SCS, IEEE membership #*____________						
8.	ACM/ONR Workshop on Parallel and Distributed Debugging (WPDD) May 16–18	$225	$275	$250	$300		
❑	*ACM SIGPLAN, SIGOPS membership #*____________						
9.	FCRC Workshop on Academic Careers for Women	$40		$40		$25	

Multiple Conference Registration

* Registration at any conference (except WOPA*) includes access to any other conference meetings at the same time. Some extra proceedings will be available on site.

Subtract this amount if you are jointly registering for STOC and STRUCTURES. Please refer to page 23 for detailed information.

10A.	STOC/STRUCTURES (STOC is primary)	$65	$65	$65	$65	$25	$25
10B.	STRUCTURES/STOC (STRUCTURES is primary)	$100	$100	$100	$100	$25	$25

One Day Add-on Registration

Includes only the technical sessions for day selected. Lunches, proceedings, etc. must be purchased separately. Available only with a full conference registration.

11.	Friday, May 14	$150	$150	N/A
12.	Saturday, May 15	$150	$150	N/A
13.	Sunday, May 16	$150	$150	N/A
14.	Monday, May 17	$150	$150	N/A
15.	Tuesday, May 18	$150	$150	N/A
16.	Wednesday, May 19	$150	$150	N/A
17.	Thursday, May 20	$150	$150	N/A
18.	Friday, May 21	$150	$150	N/A
19.	Saturday, May 22	$150	$150	N/A

✂ 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
c/o Event Registration Services
407 Magee Avenue
Mill Valley, CA 94941–1862
or fax to:
FCRC Conference
1–415–388-7506

- **Cancellations**
Cancellation refund requests must be done 30 days prior to the conference.

Conference Proceedings

To order additional conference proceedings please check the appropriate box and transfer the amount to the box at the bottom of the page.

❑ 20th Annual International Symposium on Computer Architecture (ISCA 93)
$35

❑ Structure in Complexity Theory, 8th Annual IEEE Conference (STRUCTURES)
$30 (After 4/18 $35)

Identification

First name, Middle initial, Surname

Name

Position

Organization

Street

Address

City, State/Province, Postal Code, Country

Electronic Mail Address

Area code, Number

Phone

Area code, Number

Fax

❑ 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

❑ Extra Evening at Sea World (May 17) ______ @ $56 per person

❑ Extra Evening at the Aerospace Museum (May 20) ______ @ $48 per person

Conference Totals

Conference Totals	$
Conference Proceedings Totals	$
Social Excursions	$
Total Payment Enclosed	**$**

Method of Payment

❑ Visa

❑ Master Charge

Number

Exp date

Name exactly as it appears on credit card

❑ Check or money order
U.S. bank only
Payble to:
FCRC '93

Send your registration to:

FCRC Conference
c/o Event Registration Services
407 Magee Avenue
Mill Valley, CA 94941–1862

Signature

✂ Cut along dotted line

EXCURSIONS

An Evening at Sea World

Guests will have the opportunity to explore the Forbidden Reef and Shark Exhibit during the reception. The Forbidden Reef Exhibit offers an eerie look at Bat Ray Shallows and California Eels from below the water's surface. The Shark Exhibit offers guests a unique opportunity to walk along the bottom of a man-made oceanic environment filled with sharks. The acrylic tube walkway takes them through the aquarium while sharks swim overhead.

Following cocktails, dinner will be served in the Sea World Nautilus Pavilion. Here guests will enjoy a spectacular view of Mission Bay while dining.

At the conclusion of dinner, guests will be escorted to the five million gallon Shamu Stadium for the action packed Killer Whale Show.

The FCRC "Sea World Evening" will include:

- Deluxe motorcoach round trip transportation
- Narration enroute on the motorcoach
- Admission to Sea World and private use of area in the park
- Cash bar reception in the Forbidden Reef and Shark Exhibit
- Dinner in the Nautilus Pavilion
- Killer Whale Show

Date: Monday, May 17, 1993
Time: 6:30 – 10:30 pm
Cost: $56 per person
(For guest tickets or if not included in your conference registration fee, see page 27.)

An Evening at the Aerospace Museum

FCRC will thoroughly enjoy the memorabilia of the Aerospace Museum. The collection dates back to 1785 and looks ahead to the 21st century. Docents will provide interesting insights and information for each exhibit.

A jazz trio will provide background music.

The FCRC "Aerospace Evening will include:

- Deluxe motorcoach round trip transportation
- Narration enroute on the motorcoach
- Docent tours of exhibits
- Buffet dinner
- Cash bar
- Jazz trio

Date: Thursday, May 20, 1993
Time: 6:30 – 10:30 pm
Cost: $48 per person
(For guest tickets or if not included in your conference registration fee, see page 27.)

Airline Discount

Delta Air Lines, Inc., in cooperation with FCRC, is offering special rates to the conference.

Special zone fares are available from cities within the contiguous 48 states to San Diego, CA. Should published fares which provide a greater savings be available, reservations may be confirmed at that rate provided all applicable restrictions are met.

To take advantage of this discount, follow these simple steps:

1. Call Delta, or have your travel agent call, at 1-800-241-6760 for reservations 8:00 am – 11:00 pm, Eastern Time—daily.
2. Refer to File Number: H0683
3. Certain restrictions may apply and seats are limited.
4. These discounts are available only through Delta's toll-free number, so call today.

PROGRAM AT A GLANCE

	Saturday, May 15			Sunday, May 16			Monday, May 17			Tuesday, May 18		
	morning	afternoon	evening	morning	afternoon	evening	morning	afternoon	evening	morning	afternoon	evening
FCRC							P1			P2		
ISCA 93				T1, T2, T3, T5	T1, T2, T4, T6		S1, S2, S3	S4, S5, S6		S7, S8, S9, S10	L, S11, S12, S13	R, M1, M2
STOC			R	S1 A, S1 B, S2 A, S2 B	S3, S3 B, S4 A, S4 B	M	S5 A, S5 B, S6 A, S6 B	S7 A, S7 B, S8 A, S8 B		S9 A, S9 B, S10 A, S10 B	S11 A, S11 B, S12 A, S12 B	
PPoPP 93												
SCG												R
Structures									R	S1	S2	M
WOPA 93												
PADS					T	R	S1, S2	S3, S4		S5, S6	S7, S8	M
WPDD						R	S1, S2	S3, D1	M	S4, S5	S6, D2	
Womens Workshop	S1, S2, S3, S4	S5, S6, S7										

S	Session	D	Panel Discussion	P	Invited Speaker
T	Tutorial	M	Meeting	R	Reception

	Wednesday, May 19 morning	Wednesday, May 19 afternoon	Wednesday, May 19 evening	Thursday, May 20 morning	Thursday, May 20 afternoon	Thursday, May 20 evening	Friday, May 21 morning	Friday, May 21 afternoon	Friday, May 21 evening	Saturday, May 22 morning	Saturday, May 22 afternoon	Saturday, May 22 evening
FCRC	P3		M	P4			P5					
ISCA 93	S14 S15 S16											
STOC												
PPoPP 93	T1 T2	T3 T4		S1 S2	S3 D1		S4 S5	S6 S7	M			
SCG	S1 S2	S3 S4		S5 S6	S7	M	S8 S9	S10 S11				
Structures	S3	S4	M	S5	S6	M	S7	S8				
WOPA 93	S1	S2	R	S3	S4							
PADS	S9 S10											
WPDD												
Womens Workshop												

L Lunch — Aerospace Museum — Sea World