ADVANCE PROGRAM

The 3rd International Conference on

DISTRIBUTED COMPUTING SYSTEMS

Miami/Ft. Lauderdale, Florida • October 18-22, 1982

TUTORIALS

Four full-day tutorials will cover key areas of distributed computing systems. Each is supported by a specially prepared notebook (copies of slides) and most are accompanied by a tutorial text (copies of reprints). Two free two-hour mini-tutorials will be presented in the evenings.

Monday, October 18, 1982, 9:00 am to 4:30 pm

1. Distributed Control
by Robert E. Larson, Paul E. McEntire (Systems Control Technology, Inc.) and John G. O'Reilly (Ford Aerospace)

This tutorial summarizes the theory available on the subject of decentralized control and indicates how it can be applied to distributed computing. Concepts are explained in detail and illustrated by example. Four major areas stressed are: (1) Introduction to distributed control; (2) Distributed control techniques; (3) Dynamic programming; and (4) Adaptive and stochastic control. The mathematical level requires only a background in calculus, linear algebra, and differential equations. However, many of the examples are representative of realistic control environments and are appropriate for attendees who are already well versed in distributed control theory.

Monday, October 18, 1982, 9:00 am to 4:30 p.m.

2. A Pragmatic View of Distributed Processing Systems
by Kenneth J. Thurber (Architecture Technology Corp.)

This tutorial provides an overview of current concepts and problems associated with implementing a distributed processing system. The elements of a distributed system are defined and contemporary models of such systems are explored. This is followed by a survey of design issues associated with system software, interconnection systems, topology, and hardware. Selected case studies of distributed systems are used to highlight the previously discussed concepts and to indicate the direction of distributed systems. The tutorial concludes with observations on future systems and supporting technologies.

Friday, October 22, 1982, 9:00 am to 4:30 pm

3. Microcomputer Networks
by Harvey A. Freeman (Architecture Technology Corp.)

This introductory level tutorial describes the latest steps in the logical progression of computer architecture—the interconnection of microcomputers. Whether to share information, share resources, or to cooperate in accomplishing large processing tasks, these networks of small computers, intelligent terminals, work stations, or specialized devices are installed in a wide variety of application environments. This tutorial first traces the origins of microcomputer networks and their relationships to distributed systems and local networks. Techniques and issues relating to interconnecting and installing these types of networks are covered next. The important software aspects, such as network operating systems, are reviewed and discussed. Case studies of a number of microcomputer networks are included to illustrate the successful implementation of various design concepts. Future directions and the impact of technology advances conclude the tutorial.

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Association for Computing Machinery (ACM)
Information Processing Society of Japan (IPSJ)
Institut National de Recherche en Informatique et en Automatique (INRIA)
4. Fault-Tolerant Computing
by Victor P. Nelson (Auburn Univ.) and Bill D. Carroll (Univ. of Texas at Arlington)
The tutorial covers the fundamental aspects of fault tolerant computing including definition of terms, reliability models, hardware redundancy techniques, software fault tolerance techniques, and system approaches. A number of case studies will be presented to illustrate the application of various techniques in actual systems. In a fault tolerant system, four basic elements must be considered: fault detection, fault identification, system repair, and system recovery. Hardware and software approaches to implementing these elements will be examined for uniprocessor and multiprocessor systems in both real-time and non-real-time applications. Methods for modeling and evaluating the cost and effectiveness of the various approaches will be presented.

5. Mathematical Foundations of Systems Design
by Victor P. Nelson (Auburn Univ., U.S.A.)
Systems design often reduces to a sequence of choices among sets of alternatives for which precise parametric descriptions are not possible. When a suitable model is available, an exact solution is frequently available. Computation resources. The topologies covered will emphasize discrete mathematics, methods of approximation, and satisfaction (as opposed to optimal or statistical) solutions. Specific topics will include graph theory, Petri nets and automata, combinatorial programming with multiple objectives, approximate solutions to queuing problems, and combinatorics.

6. Computer Networking
by Marshall D. Abrams (The Mitre Corp.)
If you are concerned with design, operations, or cost alternatives for data/computer communications, and have some data communications background, this tutorial is for you. A brief outline is: (1) Concepts and terminology; (2) Evolution of computer networks; (3) Benefits and problems; (4) Data communications systems components; (5) Communications interfaces; (6) Link control protocols; (7) Open system interconnection (OSI); (8) Local data networks; (9) Value added and public data networks; (10) Network control center; and (11) Major cost control and regulatory trends.

CONFERENCE AT A GLANCE

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Friday, October 22, 9:00 am to 4:30 pm
OPENING REMARKS BY:
H. J. Siegel, General Chairman
Charles R. Vick, Standing Committee Chairman
Bob Larson, President, IEEE
Oscar Garcia, President, IEEE Computer Society
Carl Davis, Program Committee Chairman

Session 1A - Data Base Systems
TRANSACTIONS MODELING IN DISTRIBUTED ENVIRONMENTS
C. Rolland, C. Richard, Universite Paris 1, Paris, France

SITE SELECTION IN DISTRIBUTED QUERY PROCESSING
An-Chi Liu, North Dakota State University, Fargo, ND, USA; Shi-Kuo Chang, University of Illinois at Chicago Circle, Chicago, IL, USA

SOME ESTIMATION PROBLEMS IN DISTRIBUTED QUERY PROCESSING
C. T. Yu, Y. C. Lin, University of Illinois at Chicago Circle, Chicago, IL, USA

Session 1B - Scheduling and Control in Distributed Operating Systems
SCHEDULING TECHNIQUES FOR CONCURRENT SYSTEMS
John K. Ousterhout, University of California, Berkeley, CA, USA

DECENTRALIZED EXECUTIVE CONTROL OF COMPUTERS
E. Douglas Jensen, Carnegie-Mellon University, Pittsburgh, PA, USA

DYNAMIC PROCESS CONTROL FOR DISTRIBUTED COMPUTING
Amnon B. Barak, The Hebrew University of Jerusalem, Jerusalem, Israel

Session 1C - Multiprocessor Architectures
A DISTRIBUTED PARALLEL COMPUTATION STATION MODEL FOR SYSTEM, ENVIRONMENT, AND THREAT SIMULATION
Edward C. Bronson, Leah J. Siegel, Purdue University, West Lafayette, IN, USA

A DISTRIBUTED SIGNAL PROCESSING ARCHITECTURE
A. E. Filipp, Massachusetts Institute of Technology, Lexington, MA, USA

A MULTI-PORT MEMORY ORGANIZATION FOR USE IN DISTRIBUTED COMPUTING SYSTEMS
Prashant S. Sawkar, Timothy J. Forquer, Edward J. Schernecke, RCA, Moorestown, NJ, USA; Hungwen Li, RCA, Camden, NJ, USA

Session 1D - Fault Tolerance Methods
A FAULT TOLERANCE SCHEME FOR DISTRIBUTED TRANSACTION COMMITMENT
M. Leszak, H. Breitwiezer, Kernforschungszentrum Karlsruhe, Karlsruhe, West Germany

A DISTRIBUTED ALGORITHM FOR POST-FAILURE LOAD REDISTRIBUTION
G. Barigazzi, A. Ciuffoletti, Oto Melara, S.p.A., Pisa Italy; L. Strigini, Selena, S.p.A., Pisa, Italy

RHEA: A FAULT AND DAMAGE-TOLERANT HIERARCHICAL COMMUNICATION SUPPORT SYSTEM FOR LOCAL AREA COMPUTER SYSTEMS WITH DESCRIPTION OF ENVIRONMENTS
G. Caumont, J. C. Laprie, D. R. Powell, Centre National de la Recherche Scientifique, Toulouse, France

BANQUET — Keynote Speaker: Edith W. Martin, Deputy Undersecretary of Defense

Session 2A - Data Base Management Systems
SOFTWARE DESIGN AND PERFORMANCE ANALYSIS OF A LOCAL DATA NETWORK FOR VERY LARGE DISTRIBUTED DATABASES
James J. Lin, Ming T. Liu, The Ohio State University, Columbus, OH, USA

PHLOX - DATA BASE MANAGEMENT SYSTEMS FOR MICRO-COMPUTERS
Beatrice Del Vecchio, Arlette Ferrier, SIRIUS, INRIA, Le Chesnay, France

JOBLIST - A GENERAL DATA STRUCTURE FOR COMMUNICATING, MANIPULATING AND MANAGING INFORMATION IN A DISTRIBUTED ENVIRONMENT
P. A. D. deMaine, Carl G. Davis, Ballistic Missile Defense Advanced Technology Center, Huntsville, AL, USA

Session 2B - Distributed Operating Systems
RESOURCE ALLOCATION FOR A CLASS OF PROBLEM STRUCTURES IN MULTISTAGE INTERCONNECTION NETWORK-BASED SYSTEMS
E. Oppe, M. Malek, University of Texas at Austin, Austin, TX, USA

ANALYSIS OF MULTIPLE-QUEUE TASK SCHEDULING ALGORITHMS FOR MULTIPLE-SIMD MACHINES
David Lee Tuomenoksa, Howard Jay Siegel, Purdue University, West Lafayette, IN, USA

DISTRIBUTED PROCESSOR OPERATING SYSTEM FOR RESOLVING MEMORY CONTENTION
Steven I. Kartashe, Dynamic Computer Architecture, Inc., Lincoln, NE, USA; Svetlana P. Kartashe, University of Nebraska, Lincoln, NE, USA

IMPLEMENTATION OF HIGHLY AVAILABLE SERVICES IN THE CHORUS DISTRIBUTED SYSTEM
J. S. Banino, J. C. Fabre, INRIA, Le Chesnay, France

Session 2C - Bus Oriented Multiprocessor Systems
THE DELTA 2 — A DISTRIBUTED COMPUTER
Max Stern, Delphi Communications Corp., Inglewood, CA, USA

ENHANCED CONCURRENCY IN m-n MULTIPROCESSOR SYSTEMS
Amar Gupta, Hoo-min D. Toong, Massachusetts Institute of Technology, Cambridge, MA, USA

APPLICATION OF FAULT TOLERANT DISTRIBUTED COMPUTING TECHNIQUES TO MILITARY STANDARD BUS ARCHITECTURES
J. W. Thomas, J. N. Patel, M. D. Vojta, D. Bhatt, Honeywell, Minneapolis, MN, USA

Session 2D - Design of Fault Tolerant Systems
GRACEFUL FAULT TOLERANCE IN LARGE NETWORKS OF MICROCOMPUTERS
Dharma P. Agrawal, Bhuwan K. Agrawal, Girsih C. Pathak, Wayne State University, Detroit, MI, USA

SELF-CHECKING SOFTWARE IN DISTRIBUTED SYSTEMS
J. M. Ayache, J. P. Courtiart, M. Diaz, Centre National de la Recherche Scientifique, Toulouse, France

THE DESIGN OF A FAULT-TOLERANT COMPUTING ELEMENT FOR DISTRIBUTED DATA PROCESSORS
Andrew D. Hurt, System Control Technology, Inc, Huntsville, AL, USA; J. Robert Heath, University of Kentucky, Lexington, KY, USA

Session 3A - Data Base Machines
THE ACTIVE GRAPH DATABASE MACHINE
Lubomir Bic, Robert L. Hartmann, James Todhunter, University of California, Irvine, CA, USA

A GENERIC MACHINE FOR DISTRIBUTED DATA MANAGEMENT
C. V. Ramamoorthy, S. T. Dong, S. L. Ganesh, C. H. Jen, W. T. Tsi, University of California, Berkeley, CA, USA

PERFORMANCE ANALYSIS FOR PARALLEL PROCESSING SCHEMES OF RELATIONAL OPERATIONS AND A RELATIONAL DATABASE MACHINE ARCHITECTURE WITH OPTIMAL SCHEME SELECTION MECHANISM
Yasushi Kiyokai, Michio Isoda, Kiyonobu Kojima, Kouichi Tanaka, Ayako Minematsu, Hideo Also, Keio University, Yokohama, Japan
Session 3B - Network Operating Systems
A REPORT ON PROCESS MANAGEMENT IN A GUEST DISTRIBUTED SYSTEM
Ilya Gertner, Prime Computer, Inc., Framingham, MA, USA
MIMAS - A NETWORK OPERATING SYSTEM FOR STRATHNET
G. S. Blair, D. Hutchison, W. D. Shepherd, University of Strathclyde, Glasgow, Scotland
VIRTUAL MEMORY SERVICE IN LOCAL AREA NETWORK
A. Ferravante, M. Martelli, F. Tarini, P. Zini, CNUCE - Istituto del C.N.R., Pisa, Italy

Session 3C - Microprocessor Networks
AN EXPERIMENTAL REAL TIME KERNEL FOR A MULTIMICROPROCESSOR PROTOTYPE
F. Gregoretti, Istituto di Elettronica e Tele comunicazioni, Torino, Italy
AN ANALYTICAL MODEL OF THE MICRONET DISTRIBUTED DATABASE MANAGEMENT SYSTEM
Thomas B. Gendusko, Stanley Y. W. Su, University of Florida, Gainesville, FL, USA
MULTIMICRO ARCHITECTURE AND DISTRIBUTED OPERATING SYSTEM FOR REAL TIME CONTROL
R. Rivoira, A. Serra, Istituto di Elettrotecnica del Politecnico di Torino, Torino, Italy

Session 3D - Developing Highly Reliable Distributed Systems
PANEL DISCUSSION

Session 4A - Replicated Data Bases
ALLOCATION SCHEMES OF MULTIPLE COPIES OF DATA IN DISTRIBUTED DATABASE SYSTEMS
Yutaka Matsushita, Makoto Yoshida, Atsushi Wakino, Lim Teow Beng, Ok Electric Industry Co., Ltd., Tokyo, Japan
A PROPOSED PARITY STRUCTURE FOR LARGE REMOTELY LOCATED DUPLICATE DATA FILES
John J. Metzner, Oakland University, Rochester, MI, USA
HOW EXPENSIVE IS DATA REPLI CATION? AN EXAMPLE
Daniel Barbara, Hector Garcia-Molina, Princeton University, Princeton, NJ, USA
THE EXCLUSIVE-WRITER PROTOCOL: A LOW COST APPROACH FOR UPDATING REPLICA TED FILES IN DISTRIBUTED REAL TIME SYSTEMS
Wesley W. Chu, Joseph Hellerstein, Min-Tsung Lan, University of California, Los Angeles, CA, USA

Session 4B - Design of Distributed Computing Systems
ON COMMUNICATION IN THE DESIGN OF SOFTWARE COMPONENTS OF DISTRIBUTED COMPUTER SYSTEMS
S. S. Yau, S. M. Shat, Northwestern University, Evanston, IL, USA
OBJECT-ORIENTED STRUCTURED DESIGN OF LAYERED PROTOCOL SYSTEMS
R. J. A. Buhr, S. Michal, Carleton University, Ottawa, Canada
AN EXPERIMENT IN DISTRIBUTED PROGRAM DESIGN, USING CONTROL ENRICHMENT
Marc Shapiro, Boston College, Chestnut Hill, MA, USA

Session 4C - Network Topology
PARTITIONABILITY AND DIAGNOSABILITY OF A CLASS OF PROCESSOR INTERCONNECTION TOPOLOGIES
D. K. Pradhan, Oakland University, Rochester, MI, USA

Session 4D - Distributed Computing Testbeds
A DISTRIBUTED SYSTEM EXPERIMENTATION FACILITY
Helmut K. Berg, Marc G. Smith, Honeywell Corporate Computer Sciences Center, Bloomington, MN, USA
A COMPREHENSIVE APPROACH TO INSTRUMENTATION FOR EXPERIMENTATION IN A DISTRIBUTED COMPUTING ENVIRONMENT
Devesh Bhatt, Michael Schroeder, Honeywell, Inc, Minneapolis, MN, USA
ADNET: AN EXPERIMENT IN COMPUTER NETWORKING FOR THE ROYAL NAVY
J. A. Gadsden, Admiralty Surface Weapons Establishment, Portsmouth, England

Session 5A - Mutual Exclusion and Synchronization
ABSTRACTION AND NONDETERMINISM IN CONCURRENT SYSTEMS
George J. Milne, California Institute of Technology, Pasadena, CA, USA
AN OPTIMALITY THEORY FOR MUTUAL EXCLUSION ALGORITHMS IN COMPUTER NETWORKS
Ichiro Suzuki, Tadao Kasami, Osaka University, Toynaka, Japan
PRIORITY DRIVEN COMMUNICATION PROTOCOL DESIGN
Hui-An Lin, Ming T. Liu, The Ohio State University, Columbus, OH, USA

Session 5B - Distributed Software Tools and Methods
FORMAL SPECIFICATION AND VERIFICATION OF DISTRIBUTED SYSTEMS
Bo-Shoe Chen, Raymond T. Yeh, University of Maryland, College Park, MD, USA
RELIABILITY OPTIMIZATION IN THE DESIGN OF DISTRIBUTED SYSTEMS
C. S. Raghavendra, M. Geir, A. Avizienis, University of California, Los Angeles, CA, USA
ARGUS: A DEBUGGING SYSTEM FOR PARALLEL PROGRAMMING ENVIRONMENTS
Ron Curtis, Larry Wittle, State University of New York at Buffalo, Amherst, NY, USA
PROGRAMMING TECHNIQUES ON THE LUCAS ASSOCIATIVE ARRAY COMPUTER
Christer Fernstrom, Lund University, Lund, Sweden

Session 5C - Advanced Distributed Architectures
PANEL DISCUSSION

Session 5D - Distributed Testbeds For Real Time Systems
A HARDWARE ARCHITECTURE FOR A FLEXIBLE DISTRIBUTED COMPUTING TESTBED
T. G. Williams, W. C. McDonald, M. W. Beasley, System Development Corporation, Huntsville, AL, USA; G. W. Cox, R. L. Jung, General Research Corporation, Huntsville, AL, USA
Session 6A - Concurrency Control Techniques

ON THE TERMINATION OF TRANSACTIONS IN THE DELTA SYSTEM
Krithivasan Ramamritham, University of Massachusetts, Amherst, MA, USA

CLASSES OF SERIALIZABLE HISTORIES AND SYNCHRONIZATION ALGORITHMS IN DISTRIBUTED DATABASE SYSTEMS
Bharat Bhargava, Cecil T. Hua, University of Pittsburgh, Pittsburgh, PA, USA

QUEUEING ANALYSIS OF THE ORDERING ISSUE IN A DISTRIBUTED DATABASE CONCURRENCY CONTROL MECHANISM: A GENERAL CASE
F. Kamoun, Centre National de l'Informatique, Tunis, Tunisia; M. Ben Djerad, Tunis Campus Universitaire, Tunis, Tunisia; G. Le Lann, INRIA, Le Chesnay, France

Session 6B - AD HOC Techniques Versus Formalism in Distributed System Design

PANEL DISCUSSION

Session 6C - Communication Networks

SOME COMPARATIVE MEASUREMENTS OF COMPUTER INTERCONNECTION
Mark Paulk, System Development Corporation, Huntsville, AL, USA

A MASS TRANSPORT SERVICE ON HIGH TRANSMISSION RATE SATELLITE CIRCUITS—SOME DESIGN CONSIDERATIONS
Jean Louis Grange, Project Pilote NADIR, Le Chesnay, France

FURTHER SIMULATION RESULTS ON THE PERFORMANCE OF A NEW DOUBLE-LOOP COMPUTER NETWORK
S. Leventis, G. Papadopoulos, University of Patras, Patras, Greece

Session 6D - Distributed Systems—Practice and Experiences

A REAL-TIME DISTRIBUTED COMPUTER NETWORK EXPERIMENT FOR BMD TERMINAL DEFENSE
Shiang F. Liu, The Aerospace Corporation, Los Angeles, CA, USA, Robert W. Parker, Kenneth K. Okikawa, McDonnell Douglas Astronautics Company, Huntington Beach, CA, USA

EXPERIENCES WITH DISTRIBUTED SOFTWARE DESIGN IN DDTs
Cory Devor, Honeywell, Inc, Bloomington, MN, USA

EXPERIENCES WITH DISTRIBUTING GRAPHIC SOFTWARE BETWEEN PROCESSORS
Griff Hamlin, James E. George, Los Alamos National Laboratory, Los Alamos, NM, USA

EFFECT OF RESOURCE ALLOCATION ON DISTRIBUTED SYSTEM RESPONSE—A CASE STUDY
R. G. Schluter, McDonnell Douglas Astronautics Co., Huntington Beach, CA, USA; J. C. Shih, T. L. Machleit, Compunet, Inc., Ingelwood, CA, USA

Session 7A - Deadlock Detection

A DEADLOCK DETECTION AND RESOLUTION SCHEME FOR DISTRIBUTED SYSTEMS
R. Jagannathan, University of Waterloo, Waterloo, Canada; R. Vasudevan, University of Calgary, Calgary, Canada

Session 7B - High Level Languages for Distributed Systems

DPL-82: A LANGUAGE FOR DISTRIBUTED PROCESSING
Lars Warren Ericson, Carnegie-Mellon University, Pittsburgh, PA, USA

THE DESIGN OF A PROGRAMMING LANGUAGE BASED ON COMMUNICATION NETWORKS
Arthur B. MacCabe, Richard J. LeBlanc, Georgia Institute of Technology, Atlanta, GA, USA

PASCAL + CSP, MERGING PASCAL AND CSP IN A PARALLEL PROCESSING ORIENTED LANGUAGE
J. M. Adamo, Universite Claude-Bernard, Lyon Villeurbanne, France

DISTRIBUTED COMPILATION: A CASE STUDY
John A. Miller, Richard J. LeBlanc, Georgia Institute of Technology, Atlanta, GA, USA

Session 7C - Multistage Network Performance

AN APPROXIMATE QUEUEING MODEL FOR PACKET SWITCHED MULTISTAGE INTERCONNECTION NETWORKS
T. N. Mudge, B. A. Makrucki, University of Michigan, Ann Arbor, MI, USA

MINIMIZATION OF PATH LENGTHS IN SINGLE-STAGE CONNECTION NETWORKS
J. E. Wirsching, T. Kishi, University of California, Livermore, CA, USA

A BANDWIDTH ANALYSIS OF BUTTERFLY NETWORKS
John M. Frankovich, Massachusetts Institute of Technology, Lexington, MA, USA

Session 7D - Distributed Computing Research Needs and Directions

PANEL DISCUSSION

Session 8A - Evaluation of Concurrency Control Mechanisms

PANEL DISCUSSION

Session 8B - Distributed Simulation

STRUCTURE OF A DISTRIBUTED SIMULATION SYSTEM
Thomas Christopher, Martha Evans, Radha Raman Gargeya, Thomas Leonhardt, Illinois Institute of Technology, Chicago, IL, USA

DYNAMIC ROUTING IN WISPC: A CONTINUOUS SYSTEMS SIMULATION MACHINE
Julio Castillo, S. Diane Smith, University of Wisconsin, Madison, WI, USA

ADAPTING A SIMULATION LANGUAGE TO A DISTRIBUTED ENVIRONMENT
Jean Bezivin, Herve Imbert, Universite de Bretagne Occidentale, Brest, France
### Session 8C - Network Evaluation

**VLSI PERFORMANCE OF MULTISTAGE INTERCONNECTION NETWORKS USING 4x4 SWITCHES**
L. N. Bhuyan, Dharma P. Agrawal, Wayne State University, Detroit, MI, USA

**A COMPARISON OF CUBE TYPE AND DATA MANIPULATOR TYPE NETWORKS**
Robert J. McMillen, Howard Jay Siegel, Purdue University, West Lafayette, IN, USA

**PERFORMANCE OF PACKET SWITCHING IN BUFFERED SINGLE-STAGE SHUFFLE-EXCHANGE NETWORKS**
Pin-Yee Chen, Pen-Chung Yew, Duncan H. Lawrie, University of Illinois at Urbana-Champaign, Urbana, IL, USA

### Session 8D - Data Flow Architectures

**A DISTRIBUTED COMPUTER ARCHITECTURE FOR REAL-TIME, DATA DRIVEN APPLICATIONS**
J. Robert Heath, Andrew Hurt, George D. Broomell, University of Kentucky, Lexington, KY, USA

**A DECENTRALIZED CONTROLLED MULTI-PROCESSOR SYSTEM BASED ON THE DATA-DRIVEN SCHEME**
Hiroaki Nishikawa, Katsuhiko Asada, Hiroaki Terada, Osaka University, Osaka, Japan

**A DESCRIPTION METHOD AND A CLASSIFICATION SCHEME FOR DATA FLOW ARCHITECTURES**
Amitava Hazra, Southern Illinois University, Carbondale, IL, USA

### Session 9A - Communication Protocol Modeling

**PETRI NET SPECIFICATION OF A NEW PROTOCOL FOR CONTROLLING A DISTRIBUTED SYSTEM ORGANIZATION**
P. Estrallier, Universite Pierre et Marie Curie, Paris, France

**MODELING OF DISTRIBUTED DATABASE CONCURRENCY CONTROL MECHANISMS USING A GENERALIZED PETRI-NET FORMALISM**
M. Tamer Ozsu, Bruce W. Weide, The Ohio State University, Columbus, OH, USA

**ALGORITHMS FOR A BROADCAST PROTOCOL MULTIPROCESSOR**
Steven P. Levitan, University of Massachusetts, Amherst, MA, USA

### Session 9B - Software Transportability

**THE PROGRAMMABLE COMPILER**
Gabriel Ruiz-Huerta, National Autonomous University of Mexico, Mexico

**MML: A PROGRAMMABLE LINE FOR MULTIPLE—MICROPROCESSOR SYSTEMS**
M. Boari, Universita di Bologna, Bologna, Italy; S. Crespi Reghizzi, Politecnico di Milano, Italy; A. Dapra, Zeltrun, Milan, Italy; A. Natali, Universita di Bologna, Bologna, Italy

**PORTABLE SCIENTIFIC SOFTWARE XTL: AN EXAMPLE**
Robert J. Munn, James M. Stewart, University of Maryland, College Park, MD, USA

### Session 9C - Performance Evaluation of Distributed Computer Systems

**A STOCHASTIC NETWORK MODEL WITH APPLICATIONS TO DISTRIBUTED COMPUTING SYSTEMS**
Austin J. Lemolne, Lewis Meier, Systems Control Technology, Inc., Palo Alto, CA, USA

**VALIDATION OF A PERFORMANCE MODEL FOR A DECENTRALIZED COMPUTER SYSTEM**
Robert J. Souza, University of Connecticut, Storrs, CT, USA; Edward E. Balkovich, Digital Equipment Corp., Hudson, MA, USA

**PERFORMANCE OF MEASURES FOR DISTRIBUTED COMPUTING SYSTEMS**
Cay Weitzman, TRW, Inc., Redondo Beach, CA, USA

**AN APPROACH TO REAL TIME SYSTEMS MODELING**
P. Caspi, N. Halbwachs, IMAG Laboratory, Grenoble, France

### Session 9D - Data Flow Languages

**APPLICATION OBJECTS AS PROCESSES**
J. R. Kennaway, M. R. Sleep, University of East Anglia, Norwich, England

**A SCHEME FOR HANDLING ARRAYS IN DATA-FLOW SYSTEMS**
J-L Gaudiot, TRW, El Segundo, CA, USA; M. D. Ercegovac, University of California, Los Angeles, CA, USA

**STREAMS AND ITERATION IN VAL ADDITIONS TO A DATA FLOW LANGUAGE**
James R. McGraw, Stephen K. Skedzielewski, University of California, Livermore, CA, USA

### Session 10A - Communication Protocols

**METHOD FOR TESTING DATA COMMUNICATION PRODUCTS THAT IMPLEMENT STANDARD PROTOCOLS**
Shizuo Yoshitake, Masahiko Mashio, Shinsuke Ideguchi, Masashi Katsumata, Yokosuka Electrical Communication Laboratory, NTT, Kanagawa-ken, Japan

**AN EFFICIENT COLLISION-FREE ACCESS-PROTOCOL FOR PACKET-RADIO NETWORKS WITH LESS-THAN-FULL CONNECTIVITY OR: SOSAM FOR “HIDDEN NODES”**
Yaron I. Gold, The University of Connecticut, Storrs, CT, USA; W. R. Franta, The University of Minnesota, Minneapolis, MN, USA

**A DISTRIBUTED FAILSAFE ROUTE TABLE UPDATE ALGORITHM**
Jacob Hagouel, International Business Machines, Yorktown Heights, NY, USA; Mischa Schwartz, Columbia University, New York, NY, USA

### Session 10B - Local Area Networks

**CABLENET: HARDWARE DESIGN FOR MULTI-USE LOCAL AREA COMMUNICATIONS NETWORKS**
Isaac (Zak) Kong and Scott A. Wright, AMDAX CORP., Irvine, CA, USA

**A VLSI-BASED LOCAL NETWORK FOR DISTRIBUTED PROCESS-CONTROL**
Gerard Michel, Jacques Rouillard, Gerard Charles, Centre National d’Etudes des Telecommunications, Meylan, France; Daniel Tranvaux, Regie Renault, Rueil-Malmaison, France

**TH-NET: A MICROPROCESSOR-BASED LOCAL NETWORK**
W. T. Chen, H. C. Wang, J. W. Tsai, J. Y. Wei, National Tsing Hua University, Taiwan, China

### Session 10C - Performance Evaluation of Multiprocessor Systems

**SYNTHETIC WORKLOAD GENERATION FOR EXPERIMENTATION WITH MULTIPROCESSORS**
Ajay Singh, Tandem Computers, Cupertino, CA, USA; Zary Segall, Carnegie-Mellon University, Pittsburgh, PA, USA

**AN ANALYTICAL MODEL FOR EVALUATION OF DISTRIBUTED MULTIPROCESSOR SYSTEMS WITH SHARED COMMON RESOURCES**
George H. Franzkowiak, Vestal, NY, USA; Richard W. Naro, General Electric Co, Binghamton, NY, USA

**BOUNDS ON BUS AND MEMORY INTERFERENCE IN A CLASS OF MULTIPLE BUS MULTIPROCESSOR SYSTEMS**
Marco Ajmone Marsan, Istituto di Elettronica e Telecomunicazioni, Torino, Italy

### Session 10D - Parallel Processing

**SYSTOLIC ALGORITHMS FOR MONTE CARLO SIMULATIONS**
Peter G. Hibbard, Robert A. Whiteside, Neil O. Ostlund, Carnegie-Mellon University, Pittsburgh, PA, USA

**CONCURRENCY DETECTION IN LANGUAGE-ORIENTED PROCESSING SYSTEMS**
Robert G. Wedig, Michael J. Flynn, Stanford University, Stanford, CA, USA

**EAGER EVALUATION OF APPLICATIVE PROGRAMS AND A SUPPORTING INTERCONNECTION STRUCTURE**
D. H. Grit, R. L. Page, Colorado State University, Ft. Collins, CO, USA
### Session 11A - Message Oriented Mechanisms

**MAILROOM:** A COMPUTER-BASED MESSAGING SYSTEM MODEL FOR PERSON-TO-PERSON AND PROCESS-TO-PROCESS COMMUNICATION  
R. J. A. Buhr, D. A. MacKinnon, Carleton University, Ottawa, Canada  
**MENYMAIS—A MESSAGE ORIENTED LANGUAGE FOR SYSTEM APPLICATIONS**  
A. Koch, Compro Computer Products AG/LTD, Bruttisellen, Switzerland; T.S.E. Malbaum, Imperial College of Science and Technology, London, England  
**ENCHERE: A DISTRIBUTED AUCTION BIDDING SYSTEM**  
Michel Banatre, Universite de Rennes, Rennes, France; Guy Lapalme, Universite de Montreal, Montreal, Canada

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Sandra A. Mamrak, Hongchih Kuo, Dilip Soni, The Ohio State University, Columbus, OH, USA  
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S. Mamrak, J. Gomez, S. Janardan, P. Maurath, C. Nicholas, The Ohio State University, Columbus, OH, USA

### Session 11C - Issues In Performance Evaluation

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