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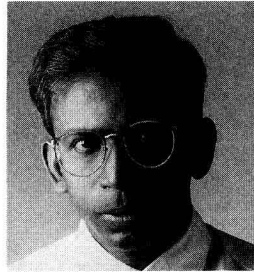
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Foreword



The papers in this volume were presented at the Seventh International Parallel Processing Symposium, held April 13 through April 16, 1993 in Newport Beach, California. The symposium was sponsored by the newly established IEEE Computer Society Technical Committee on Parallel Processing (TCPP) and was held in cooperation with ACM SIGARCH. This year we were honored by the chairmanship of professor H.T. Kung.

The program committee met on December 4, 1992 and, from the 290 manuscripts submitted in response to the call for papers, selected 126 for presentation at the symposium. Their decisions were based on criteria of originality, technical quality, and relevance to the theme of the symposium. My thanks to the program committee and the referees who read and evaluated the submissions.

Of the selected manuscripts, 31 were accepted as extended papers (designated by an asterisk in the table of contents). All submissions were refereed. Since a number of papers represent reports of continuing research, it is anticipated that many of them will appear in a more polished and complete form in scientific journals. On behalf of the program committee, I would like to thank all authors for an impressive response to our call for papers.

The symposium is the lead-off activity of the recently formed Technical Committee on Parallel Processing. Details on formation and composition of the committee follow the technical matter of these proceedings. I am looking forward to building the TCPP in its role of service to the community through research and educational activities and invite readers to participate.

Organizing this and previous symposiums would not have been possible without the energy and talent of many persons. I especially appreciate of the continued leadership and enthusiasm provided by Larry Canter. Also, the ongoing involvement of Orange County Computer Group members in organizational support roles has helped ensure continuity in development of the symposium, and this has been reinforced by the professionalism of the Society's conference department in the persons of Anne Marie Kelly, Maggie Johnson, Janet Harward, and Nancy Wise. I want to take this opportunity to thank both groups and individuals who have done their job well and in so doing contributed to the success of IPPS and established it as a major technical event in the area of parallel processing. Finally, I would like to express my personal appreciation to Sally Jelinek and Ashfaq Khokhar for their tireless efforts in the organization of this and previous meetings.

V.K. Prasanna (Kumar), *IPPS 1993 Program Chair*

Message from the Chairman Emeritus



Welcome to the Seventh International Parallel Processing Symposium. I would like to thank the IEEE Computer Society for their strong support of this year's symposium and for the efforts of the parallel processing symposium organization to provide a forum where new and exciting developments in parallel processing can be introduced. Each year new ways are explored for improving the quality and scope of the symposium. Last year the parallel systems fair was introduced to provide an arena where new products under development in both industry and academia can be discussed. Also, a well-attended workshop on heterogeneous processing was held on the first day of the event. This concept has been expanded this year to include workshops on this and four other topics:

- Real-time parallel and distributed systems;
- Strategic directions in computing;
- I/O in parallel systems; and
- Scalability and performability of parallel systems.

The IPPS organizing committee continues to welcome other ideas for increasing the scope and intensity of this event. Again this year a significant portion of the papers submitted were from individuals outside the United States. This year and in the years to come, we are including more formal commercial exhibits and presentations so that the theoretical and practical considerations of parallel processing remain closely linked. I am pleased by the growth in participation by companies, agencies, and research centers including

BellCore, CDAC, DEC, ETH, Hecht-Nielsen, IBM, Intel, Kendall Square Research, Kuck and Associates, MasPar Computer Corporation, Minnesota and Pittsburgh Supercomputing Centers, NASA Langley, N-Cube, NEC Research Institute, NRaD, NSF, NTT, ONR, ParaSoft Corporation, Sandia National Labs, Thinking Machines, TIFR, and Worlton Associates.

This continued growth of the symposium is due primarily to the many hundreds of hours of work performed by past and present members of the organizing committee. I would like to extend my thanks to H.T. Kung for his participation as symposium chairman, and to the program chairman, Viktor Prasanna, for providing the leadership necessary to continue the growth and importance of this event. With the dramatic increase in the number of manuscripts reviewed, a larger effort was required to critically review all the submissions. On the publicity side, Sally Jelinek continues her excellent work on the advanced ads, the advance program, and the IPPS poster. Our financial chairman, William Pitts, organized the budget and managed our cost control program. George Westrom, the steering committee chairman, provided support and coordinated inputs from the Orange County Computer Group, Susamma Barua coordinated local arrangements, and Donna Quammen was responsible for the commercial exhibits. Finally, the financial sponsorship of key companies continues to make it possible for the symposium to expand. In such light, we would like to recognize Hecht-Nielsen, ParaSoft Corporation, and MasPar Computer Corporation.

Again, thanks to all the authors who submitted their papers and who participated in this year's symposium.

Larry H. Canter, *Chairman Emeritus*

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*IPPS '93 could not have taken place without the
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Table of Contents

Foreword	v
Message from the Chairman Emeritus	vi
Acknowledgments	vii
Referees	x

Keynote Address

Why BSP Computers?	2
<i>L.G. Valiant</i>	

Session 1: Architectures – I

Chair: J.-L. Baer

*A Parallel Prolog Execution Model Theoretical Approach and Experimental Results	7
<i>J.P. Bodeveix and E. Bizouarn</i>	
*Cache Protocols with Partial Block Invalidations	16
<i>Y.-S. Chen and M. Dubois</i>	
*A High Speed Dataflow Processing Element and its Performance Compared to a von Neumann Mainframe	24
<i>J.N. Coleman</i>	
*Linked List Cache Coherence for Scalable Shared Memory Multiprocessors	34
<i>M. Thapar, B. Delagi, and M.J. Flynn</i>	
A Performance Comparison of Several Superscalar Processor Models with a VLIW Processor	44
<i>J. Lenell and N. Bagherzadeh</i>	
Cache Coherence for Shared Memory Multiprocessors Based on Virtual Memory Support	49
<i>K. Petersen and K. Li</i>	

Session 2: Algorithms – I

Chair: O. Ibarra

*Maintaining Bipartite Matchings in the Presence of Failures	57
<i>E.H.-M. Sha and K. Steiglitz</i>	
*Parallel Algorithms for Rectilinear Link Distance Problems	65
<i>A. Lingas, A. Maheshwari, and J.-R. Sack</i>	
Sorting n^2 Numbers on $n \times n$ Meshes	73
<i>M. Nigam and S. Sahni</i>	
On the Power of Segmenting and Fusing Buses	79
<i>R.K. Thiruchelvan, J.L. Trahan, and R. Vaidyanathan</i>	
A Separation Between Reconfigurable Mesh Models	84
<i>P.D. MacKenzie</i>	
Sorting-Based Selection Algorithms for Hypercube Networks	89
<i>P. Berthomé, A. Ferreira, B.M. Maggs, S. Perennes, and C.G. Plaxton</i>	

Session 3: Mapping/Scheduling – I

Chair: A. Khokhar

*Mapping a Class of Run-Time Dependencies onto Regular Arrays _____	97
<i>G.M. Megson</i>	
*Parallel Algorithms for Hypercube Allocation _____	105
<i>Y. Chang and L.N. Bhuyan</i>	
Scheduling a Computational Dag on a Parallel System with Communication Delays and Replication of Node Execution _____	113
<i>P. Markenscoff and Y.Y. Li</i>	
Scheduling Independent Tasks of Partitionable Hypercube Multiprocessors _____	118
<i>B. Narahari and R. Krishnamurti</i>	
Mapping Realistic Data Sets on Parallel Computers _____	123
<i>R. Ponnusamy, N. Mansour, A. Choudhary, and G.C. Fox</i>	
Load Balancing of DOALL Loops in the Perfect Club _____	129
<i>G. Elssesser, V. Ngo, S. Bhattacharya, and W.-T. Tsai</i>	

Session 4: Architectures – II

Chair: M.J. Irwin

Hierarchical Interconnection Cache Networks _____	135
<i>S.Wei and E. Schenfeld</i>	
A Multi-Level Hierarchical Cache Coherence Protocol for Multiprocessors _____	142
<i>C. Anderson and J.-L. Baer</i>	
‘Unstable Threads’ Kernel Interface for Minimizing the Overhead of Thread Switching _____	149
<i>S. Inohara, K. Kato, and T. Masuda</i>	
Global Combine on Mesh Architectures with Wormhole Routing _____	156
<i>M. Barnett, R. Littlefield, D.G. Payne, and R. van de Geijn</i>	
Impact of Multiple Consumption Channels on Wormhole Routed k -ary n -cube Networks _____	163
<i>S. Balakrishnan and D.K. Panda</i>	
New Degree Four Networks: Properties and Performance _____	168
<i>G.A. Gessesse and S. Chalasani</i>	

Session 5: Algorithms – II

Chair: M. Atallah

*Sorting n Numbers on $n \times n$ Reconfigurable Meshes with Buses _____	174
<i>M. Nigam and S. Sahni</i>	
Optimal Mesh Computer Algorithms for Simple Polygons _____	182
<i>S. Guha</i>	
An Efficient Parallel Algorithm for Min-Cost Flow on Directed Series-Parallel Networks _____	188
<i>A. Jain and N. Chandrasekharan</i>	
Towards Optimal Parallel Radix Sorting _____	193
<i>R. Vaidyanathan, C.R.P. Hartmann, and P.K. Varshney</i>	
On the Shortest Path Problems for Permutation Graphs _____	198
<i>O.H. Ibarra and Q. Zheng</i>	
A Parallel MSF Algorithm for Planar Graphs on a Mesh and Applications to Image Processing _____	205
<i>D. Nassimi</i>	

Session 6: Mapping/Scheduling – II

Chair: S. Yalamanchili

*A Cluster-M Based Mapping Methodology _____	213
<i>M.M. Eshaghian and M.E. Shaaban</i>	
*Scheduling in and Out Forests in the Presence of Communication Delays _____	222
<i>T.A. Varvarigou, V.P. Roychowdhury, and T. Kailath</i>	
*A Load Balancing Strategy for Prioritized Execution of Tasks _____	230
<i>A.B. Sinha and L.V. Kalé</i>	
*Mapping onto Three Classes of Parallel Machines: A Case Study Using the Cyclic Reduction Algorithm _____	238
<i>G. Saghi, H.J. Siegel, and J.L. Gray</i>	
Mapping to Reduce Contention in Multiprocessor Architectures _____	248
<i>L. Schwiebert and D.N. Jayasimha</i>	
Static Scheduling of Uniform Nested Loops _____	254
<i>L.-F. Chao and E.H.-M. Sha</i>	

Session 7: Networks – I

Chair: H.J. Siegel

*The Connection Cubes: Symmetric, Low Diameter Interconnection Networks with Low Node Degree _____	260
<i>N.K. Singhvi</i>	
*Simulating Interconnection Networks in RAW _____	268
<i>W.B. Ligon III and U. Ramachandran</i>	
*A Trip-Based Multicasting Model for Wormhole-Routed Networks with Virtual Channels _____	276
<i>Y.-C. Tseng and D.K. Panda</i>	
Efficient Off-Line Routing of Permutations on Restricted Access Expanded Delta Networks _____	284
<i>I.D. Scherson and R. Subramanian</i>	
A Heuristic Approach for Embedding Communication Patterns in an Interconnection Cached Parallel Processing Network _____	291
<i>V. Gupta and E. Schenfeld</i>	
Permutation on the Mesh with Reconfigurable Bus: Algorithms and Practical Considerations _____	298
<i>Y.-W. Lu, J.B. Burr, and A.M. Peterson</i>	

Session 8: Algorithms – III

Chair: S. Rajashekaran

*A Parallel Algorithm for Multiple Edge Updates of Minimum Spanning Trees _____	310
<i>X. Shen and W. Liang</i>	
*Approximate Parallel Prefix Computation and its Applications _____	318
<i>M.T. Goodrich, Y. Matias, and U. Vishkin</i>	
Testing a Simple Polygon for Monotonicity Optimally in Parallel _____	326
<i>D.Z. Chen and S. Guha</i>	
2D and 3D Optimal Parallel Image Warping _____	331
<i>C.M. Wittenbrink and A.K. Somani</i>	
Gossiping on Interval Graphs _____	338
<i>S. Singh and M.A. Sridhar</i>	
Parallel Algorithms for Height Balancing Binary Trees _____	344
<i>S. Venkatraman, A. Kime, and K. Srinivas</i>	

Session 9: Mapping/Scheduling – III

Chair: C. Weems

*A Framework for Predicting Delay Due to Job Interactions in a 2-D Mesh Multicomputer	350
<i>D. Min and M.W. Mutka</i>	
A Partially Asynchronous and Iterative Algorithm for Distributed Load Balancing	358
<i>J. Song</i>	
Task Scheduling on a Hypercube with Link Contentions	363
<i>S. Kon'ya and T. Satoh</i>	
A Probabilistic Analysis of a Locality Maintaining Load Balancing Algorithm	369
<i>K. Mehrotra, S. Ranka, J.-C. Wang</i>	
Multiprocessors Scheduling for Imprecise Computations in a Hard Real-Time Environment	374
<i>A. Khemaka, K.V. Subrahmanyam, and R.K. Shyamasundar</i>	
Data Partitioning Schemes for the Parallel Implementations of the Revised Simplex Algorithm for LP Problems	379
<i>U. Sridhar and A. Basu</i>	

Keynote Address

Designing Efficient Parallel Algorithms: Models and Paradigms with Applications to Image Processing	385
<i>J. Já Já</i>	

Session 10: Networks – II

Chair: I. Scherson

*Complexity of Intensive Communications on Balanced Generalized Hypercubes	387
<i>J.K. Antonio, L. Lin, and R.C. Metzger</i>	
Analytical Models of Bandwidth Allocation in Pipelined k -ary n -cubes	395
<i>P.T. Gaughan and S. Yalamanchili</i>	
Reconfiguration of Binary Trees in Faulty Hypercubes	401
<i>P.-J. Yang and C.S. Raghavendra</i>	
On Synchronous Strictly Non-Blocking Concentrators and Generalized-Concentrators	406
<i>H.K. Dai</i>	
Design of Efficient Reconfigurable Networks	413
<i>A.K. Somani</i>	
New Wormhole Routing Algorithms for Multicomputers	419
<i>R.V. Boppana and S. Chalasani</i>	

Session 11: Applications – I

Chair: T. Lang

*Supporting Insertions and Deletions in Striped Parallel Filesystems	425
<i>T. Johnson</i>	
A Portable Parallel Algorithm for VLSI Circuit Extraction	434
<i>B. Ramkumar and P. Banerjee</i>	
Image Processing with the MGAP: A Cost Effective Solution	439
<i>R.S. Bajwa, R.M. Owens, and M.J. Irwin</i>	
Fast Parallel Algorithms for Model Checking Using BDDs	444
<i>I. Lee and S. Rajasekaran</i>	

Stereo and Image Matching on Fixed Size Linear Arrays _____	449
<i>A. Khokhar and W.-M. Lin</i>	
KSR1 Multiprocessor: Analysis of Latency Hiding Techniques in a Sparse Solver _____	454
<i>D. Windheiser, E.L. Boyd, E. Hao, S.G. Abraham, and E.S. Davidson</i>	

Session 12: Software – I

Chair: L. Jamieson

*Multiple Message Broadcasting in the Postal Model _____	463
<i>A. Bar-Noy and S. Kipnis</i>	
*Concurrent Programming with Shared Objects in Networked Environments _____	471
<i>C.L. Hartley and V.S. Sunderam</i>	
*Explicit Parallel Structuring for Rule-Based Programming _____	479
<i>S.-Y. Wu and J.C. Browne</i>	
CMMD I/O: A Parallel Unix I/O _____	489
<i>M.L. Best, A. Greenberg, C. Stanfill, and L.W. Tucker</i>	
Symbolic Synthesis of Parallel Processing Systems _____	496
<i>J.J. Liu and M.S. Ercegovic</i>	
Barrier Synchronization in Distributed-Memory Multiprocessing Using Rendezvous Primitives _____	501
<i>S.K.S. Gupta and D.K. Panda</i>	

Session 13: Networks – III

Chair: D.K. Panda

Least Common Ancestor Networks _____	507
<i>I.D. Scherson and C.-K. Chien</i>	
The Clustered-Star Graph: A New Topology for Large Interconnection Networks _____	514
<i>S. Latifi and N. Bagherzadeh</i>	
Dynamic Embeddings of Trees and Quasi-Grids into Hyper-de Bruijn Networks _____	519
<i>S. Öhring and S.K. Das</i>	
On the Hierarchical Hypercube Interconnection Network _____	524
<i>Q.M. Malluhi, M.A. Bayoumi, and T.R.N. Rao</i>	
Mapping Interconnection Networks into VEDIC Networks _____	531
<i>V. Chaudhary, B. Sabata, and J.K. Aggarwal</i>	
*Hypersphere Mapper: A Nonlinear Programming Approach to the Hypercube Embedding Problem _____	538
<i>J.K. Antonio and R.C. Metzger</i>	

Session 14: Applications – II

Chair: P. Wang

*Experimental Evidence for the Power of Random Samplings in Practical Parallel Algorithms _____	549
<i>M. Ghouse and M.T. Goodrich</i>	
Parallel Analog Algorithms for Processing Polygonal Images in a Systolic Screen _____	557
<i>S. Guha</i>	
Efficient Parallel Mappings of a Dynamic Programming Algorithm: A Summary of Results _____	563
<i>G. Karypis and V. Kumar</i>	
Fast Algorithms for Image Labeling on a Reconfigurable Network of Processors _____	569
<i>H.M. Alnuweiri</i>	