Proceedings

The Fourth International Conference/Exhibition on High Performance Computing in the Asia-Pacific Region

Beijing, China
May 14-17, 2000

IEEE Computer Society
Los Alamitos, California
Washington • Brussels • Tokyo
Table of Contents

The Fourth International Conference on High-Performance Computing in the Asia-Pacific Region

General Chairs’ Message......................................................................................................xxi
Program Chair’s Message..................................................................................................xxii
Organizing Committees.....................................................................................................xxiii

VOLUME I

Keynote Speeches

The PC+ Era, When Computing, Storage, and Bandwidth Are Free. The Challenges
Gordon Bell

High-Performance Computing, Numerical Libraries and Trends
Jack Dongarra

The Grid: Adventures in Wide Area Computing
Ian Foster

Freedomware: The Free Software Movement and the GNU/Linux System
Richard Stallman

Plenary Speeches

Processor and Memory Architecture

A High-Performance Memory Allocator for Memory Intensive Applications.......................... 6
J. Chang, Y. Hasan, W. Lee

A Dynamic Data Prefetching Method of Improving the Memory Latency.............................. 13
J. Tu, Y. Wang, L. Wang

Necessity of Timing Dependency in Parallel Programming Languages................................. 19
Y. Matsubara

Shared Memory Multistage Clustering Structure, An Efficient Structure for
Massively Parallel Processing Systems .............................................................................. 22
H. Shahhoseini, M. Naderi, R. Buyya

Modeling Architectural Improvements in Superscalar Processors..................................... 28
Y. Zhu, W. Wong

Storage and I/O Techniques

A Storage Strategy Considering Characteristics of Video Objects on Video-On-Demand Storage Servers........................................... 32
Y. Ahn, Y. Won

v
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Distributed Naming Mechanism in Scalable Cluster File System</td>
<td>37</td>
</tr>
<tr>
<td>Implementation and Evaluation of Scalable I/O API on Cluster System</td>
<td>42</td>
</tr>
<tr>
<td>H. Zhang, N. Sun</td>
<td></td>
</tr>
<tr>
<td>No Address Space Operating System and its Implementation</td>
<td>47</td>
</tr>
<tr>
<td>F. Liu, J. You</td>
<td></td>
</tr>
<tr>
<td>Networking</td>
<td></td>
</tr>
<tr>
<td>A Lossy Handover Scheme in the Wireless ATM Networks</td>
<td>52</td>
</tr>
<tr>
<td>D. Kim, Y. Cho</td>
<td></td>
</tr>
<tr>
<td>Optimal Location Assignment of Wireless Access Switches in a Mobile ATM Network</td>
<td>58</td>
</tr>
<tr>
<td>S. Cheng, C. Chen, J. Lin</td>
<td></td>
</tr>
<tr>
<td>An Efficient Integrated Network Management for Heterogeneous LANs and WANs</td>
<td>61</td>
</tr>
<tr>
<td>D. Kim, Y. Cho</td>
<td></td>
</tr>
<tr>
<td>QoS in Next Generation Internet</td>
<td>65</td>
</tr>
<tr>
<td>D. Wan</td>
<td></td>
</tr>
<tr>
<td>A Simulation Model for ATM WAN</td>
<td>71</td>
</tr>
<tr>
<td>Z. Yu, W. Han</td>
<td></td>
</tr>
<tr>
<td>Efficient Communication</td>
<td></td>
</tr>
<tr>
<td>Design and Implementation of a Synchronization and Communication Controller for Cluster Computing Systems</td>
<td>76</td>
</tr>
<tr>
<td>K. Hayakawa, S. Sekiguchi</td>
<td></td>
</tr>
<tr>
<td>Efficient Multidestination Multicast on Regular Router-based Networks</td>
<td>82</td>
</tr>
<tr>
<td>Z. Zhou, W. Shi, Z. Tang</td>
<td></td>
</tr>
<tr>
<td>DPVM: PVM for Dawning Cluster Systems</td>
<td>88</td>
</tr>
<tr>
<td>X. Wu, N. Sun</td>
<td></td>
</tr>
<tr>
<td>Myrinet-based High Performance Communication Library for Software DSMs</td>
<td>94</td>
</tr>
<tr>
<td>Y. Mao, W. Shi, M. Zhu</td>
<td></td>
</tr>
<tr>
<td>A Quick Broadcasting Algorithm in Wormhole-Routed Multicomputers</td>
<td>98</td>
</tr>
<tr>
<td>X. Zhuang, P. Yu, Y. Zhang</td>
<td></td>
</tr>
<tr>
<td>McD Ley: From Point-to-Point to Collective Communications</td>
<td>102</td>
</tr>
<tr>
<td>T. Es-Sqalli, E. Fleury, E. Dillon, J. Guyard</td>
<td></td>
</tr>
<tr>
<td>An Attempt to Completely Utilize the Bandwidth Capability of PCI-X 133Mhz Devices in a 66Mhz PCI-X Local Bus</td>
<td>106</td>
</tr>
<tr>
<td>K. Prakash</td>
<td></td>
</tr>
<tr>
<td>A Simplified Communication Protocol on Dawning 2000</td>
<td>110</td>
</tr>
<tr>
<td>M. Jie</td>
<td></td>
</tr>
<tr>
<td>Efficient All-to-All Broadcast in Switch-based Networks with Irregular Topology</td>
<td>112</td>
</tr>
<tr>
<td>J. Han, C. Han</td>
<td></td>
</tr>
</tbody>
</table>
Interconnection Networks

Topological Properties and Optimal Routing Algorithms for Three Dimensional Hexagonal Networks
J. Carle, J. Myoupo

116

ATOLL — A Next Generation System Area Network

122

A Deadlock-Free Routing for Hierarchical Interconnection Network: TESH
Y. Miura, S. Horiguchi

128

Hierarchical Interconnection Networks with Folded Hypercubes as Basic Clusters
Y. Shi, Z. Hou, J. Song

134

Two-Dimensional Extensions of Cascade Correlation Networks
S. Li, S. Guan

138

Optimal Routing and Multicasting in Wormhole-Routed Honeycomb Networks
J. Song, Z. Hou, Y. Shi

142

BNR: The Tool to Analyze and Design the Minimal Deadlock-Free Fully Adaptive Routing Algorithm
D. Bo, X. Hu, X. Yang

145

Distributed Shared Memory

Running Real Applications on Software DSMs
W. Hu, L. Ren, F. Zhang, W. Shi, Z. Tang

148

Dynamic Limited Directory Scheme using Data Locality
D. Lee, H. Kweon, B. Ahn

154

Dynamic Home Node Reallocation on Software Distributed Shared Memory

158

Hiding Latency through Bulk Transfer and Prefetching in Distributed Shared Memory Multiprocessors
Y. Roh, B. Seong, D. Park

164

Compile-Support Software Pipelining for DSMs
J. Hong, G. Chen, Z. Zhang

167

Linux Technology

ReiserFS: A Small Step towards Unifiable Name Spaces in the OS
H. Reiser, V. Saveliev, C. Mason, Y. Rupasov, I. Zagovskiy, R. Pozlevich, A. Zarochtencev

170

Quasi-Static Dynamic Channel Assignment using a Linux PC Cluster
Y. Kwok

176

Scaling Internet Services by LinuxDirector
W. Zhang, S. Jin, Q. Wu

184

High Performance Communication Subsystem for Clustering Standard High-Volume Servers using Gigabit Ethernet
W. Zhu, D. Lee, C. Wang
Compiler and Program Optimization

High-Performance Parallel FFT Algorithms for the Hitachi SR8000
D. Takahashi ................................................................. 192

PoLAPACK: Parallel Factorization Algorithms with Algorithmic Blocking
J. Choi ........................................................................... 200

High Performance Implementation of Tridiagonalization on the SR8000
K. Naono, Y. Yamamoto, M. Igai, H. Hirayama ...................... 206

Data Dependence Analysis in Presence of Inheritance and Polymorphism
X. Li, D. Chen, L. Xie ........................................................ 220

Transformation of Programs to Remove Nonlocal Control Flow
G. Chen, B. Huang, C. Zhu ............................................. 229

Parallelizing Programs by Sequential Scanning
H. Rong, Z. Tang .......................................................... 234

A Combination Technique Enabling Parallelization of Nested Loops with Non-Uniform Dependences
S. Jeong, M. Lee ............................................................ 239

ICU-PFC: An Automatic Parallelizing Compiler
H. Kim, Y. Yoon, S. Na, D. Han ......................................... 243

Block Size Selection of Parallel LU Factorization
Y. Zhang ........................................................................... 247

Flexible Dependence and Software Pipelining
H. Rong, Z. Tang .......................................................... 250

The Study and Implementation of Architecture-Dependent Optimization in GCC
L. Wang, B. Lu, L. Zhang .................................................. 253

On Optimal Tiling of Iteration Spaces
S. Sathe, P. Nawghare ..................................................... 256

Eliminate Self-Interference Misses of Cache through Modifying Data Layout of Arrays
L. Xinda, J. Chen ............................................................ 259

Structure-based Automatic Extraction of the Program Heterogeneity
G. Zeng, X. Lu, J. Wang, D. Zhou ...................................... 261

Multi-View Intermediate Representation based on Algebraic Data Type
C. Wu, W. Hu, Z. Zhang, X. Qiao .................................... 263

Resource Management and Scheduling

A Task Scheduling Algorithm for Parallel Logic Programming Systems
J. Tao, J. Ju ................................................................. 266

Parallel Two-Processor Scheduling for Interval Ordered Tasks
Y. Chung, H. Kwon ........................................................... 272

Analysis of JSQ Policy on Soft Real-Time Scheduling in Cluster
W. Zhu ............................................................................ 277
<table>
<thead>
<tr>
<th>Title</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nimrod/G: An Architecture for a Resource Management and Scheduling System in a Global Computational Grid</td>
<td>283</td>
</tr>
<tr>
<td>R. Buyya, D. Abramson, J. Giddy</td>
<td></td>
</tr>
<tr>
<td>Scheduling Dynamically Evolving Parallel Programs using the Genetic Approach</td>
<td>290</td>
</tr>
<tr>
<td>B. Gan, S. Huang</td>
<td></td>
</tr>
<tr>
<td>Novel Neighborhood Search for Multiprocessor Scheduling with Pipelining</td>
<td>296</td>
</tr>
<tr>
<td>K. Leung, N. Yang, P. Cheung</td>
<td></td>
</tr>
<tr>
<td>A Cost-Effective Scheduling with Load Balancing for Multiprocessor Systems</td>
<td>302</td>
</tr>
<tr>
<td>S. Lee, C. Yang, S. Tseng, C. Tsai</td>
<td></td>
</tr>
<tr>
<td>GTCS: A Greedy Task Clustering and Scheduling Algorithms for Distributed Memory Processors Architecture</td>
<td>310</td>
</tr>
<tr>
<td>B. Piyatamrong, S. Ohara, S. Kantakajorn</td>
<td></td>
</tr>
<tr>
<td>Proposal to Solve Workload Problems in the Simulator of the Wolf Architecture</td>
<td>315</td>
</tr>
<tr>
<td>M. Cavenaghi, J. Martini, A. Neto</td>
<td></td>
</tr>
<tr>
<td>Resource Balancing using Traders. Performance Evaluation</td>
<td>319</td>
</tr>
<tr>
<td>C. Daval-Frerot, M. Lacroix, H. Guyennet</td>
<td></td>
</tr>
<tr>
<td>A DAG-based Partitioning-Reconfiguring Scheduling Algorithm in Network of Workstations</td>
<td>323</td>
</tr>
<tr>
<td>J. Zhou, W. Zheng</td>
<td></td>
</tr>
<tr>
<td>An Scheduling Algorithm for an Out-Tree DAG</td>
<td>327</td>
</tr>
<tr>
<td>Z. Liu, B. Fang, Y. Zhang, J. Tang</td>
<td></td>
</tr>
<tr>
<td>An Online Algorithm for the Job Scheduling Problem</td>
<td>329</td>
</tr>
<tr>
<td>J. Jun, Y. Sun, Q. Yang</td>
<td></td>
</tr>
</tbody>
</table>

**Reconfigurable Computing and Novel Architecture**

<table>
<thead>
<tr>
<th>Title</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Power Arithmetic Units using Pass Logic</td>
<td>332</td>
</tr>
<tr>
<td>D. Radhakrishnan</td>
<td></td>
</tr>
<tr>
<td>Quantitative Evaluation of Three Reconfiguration Strategies on FPGAs: A Case Study</td>
<td>337</td>
</tr>
<tr>
<td>J. Cadenas, G. Megson, T. Plaks</td>
<td></td>
</tr>
<tr>
<td>An Effective High-Level Synthesis Approach for Dynamically Reconfigurable Systems</td>
<td>343</td>
</tr>
<tr>
<td>X. Zhang, K. Ng</td>
<td></td>
</tr>
<tr>
<td>Residue Arithmetic with a Signed-Digit Number System</td>
<td>349</td>
</tr>
<tr>
<td>S. Wei, K. Shimizu</td>
<td></td>
</tr>
<tr>
<td>SCIMA: A Novel Processor Architecture for High Performance Computing</td>
<td>355</td>
</tr>
<tr>
<td>M. Kondo, H. Okawara, H. Nakamura, T. Boku, S. Sakai</td>
<td></td>
</tr>
<tr>
<td>An Embedded RISC Core Design for Variable Length Coding</td>
<td>361</td>
</tr>
<tr>
<td>Y. Zhang, K. Ma</td>
<td></td>
</tr>
<tr>
<td>Time-Memory Trade-Off Cryptanalysis on FPG-based Parallel Machine RASH</td>
<td>366</td>
</tr>
<tr>
<td>K. Takahashi, M. Iida, K. Nakajima</td>
<td></td>
</tr>
<tr>
<td>Double Context Microprocessor Architecture</td>
<td>370</td>
</tr>
<tr>
<td>W. Qin</td>
<td></td>
</tr>
</tbody>
</table>
Performance Evaluation

Performance Comparison of Various Cache Systems for Texture Mapping .................................................. 374
C. Choi, G. Park, J. Lee, W. Park, T. Han

Performance Modeling for Interconnection Network .................................................................................. 380
X. Sun, X. Wu

Evaluation of a High-Performance Object Reuse Dynamic Memory Allocation Policy for C++ Programs .......... 386
W. Lee, J. Chang, Y. Hasan

Performance Evaluation of some MPI Implementations on Workstation Clusters ...................................... 392
Z. Ba, H. Zhou, H. Zhang, Z. Yang

Some Factors of Affecting Performance of Numerical Parallel Computation ........................................... 395
X. Chi

The Effect of Communication Performance on the Speedup of MPP ......................................................... 399
X. Xiao, S. Jin, Y. Jiang, L. Cao

A Practical Scalability Metric ....................................................................................................................... 403
J. Chen, X. Li

A Scalability Metric for Algorithm-Machine on NOW and MPP ................................................................. 405
Y. Ji, H. An, W. Ding, G. Chen

Fault Tolerance and High Availability

SFIDA: A Software Implemented Fault Injection Tool for Distributed Dependable Applications .................. 410
H. Lee, Y. Song, H. Shin

Parity-Distribution: A Shortcut to Reliable Cluster Computing System ....................................................... 417
S. Wu, H. Jin, J. Zhang, D. Feng

Designing GIS for High Availability and High Performance ................................................................. 423
D. Brady

Z. Wu, B. Fang

The Design of High Availability in the Dawning Server Consolidation System .......................................... 436
M. Chen, W. Gao, W. Zhang, L. Wu

Design and Implementation of a Low-Overhead File Checkpointing Approach ....................................... 439
D. Pei, D. Wang, M. Shen, W. Zheng

MNLIRS Routing: A Framework for Compressed Routing Table and Fault-Tolerant Routing in Networks of Clusters ................................................................. 442
X. Feng

Parallel and Distributed Programming Environment

Performance Visualization in the GRADE Parallel Programming Environment ........................................... 446
P. Kacsuk
The M²D² Framework: A Combination of Multi-Language Programming, Mobile Objects, Data Interoperability, and Dynamic Compilation for Effective Real-Time Computing on the Internet ........................................451
A. Wong, A. Lam, R. Wu

C40PVM: A PVM Runtime Environment for C40 Systems .................................................................457
W. Cai, M. Chong, W. Leong, D. Iyer

TACO — Template based Collections for Distributed Computing Platforms .........................................463
J. Nolte, M. Sato, Y. Ishikawa

The Design and Analysis of User’s Environments of Dawning-2000II ..................................................470
M. Wu, G. Chen, N. Sun, J. Wu

Optimal Record and Replay for Debugging of Nondeterministic MPI/PVM Programs .........................473
Q. Zheng, G. Chen, L. Huang

Java Technology

A Java Graphical User Interface for Large-Scale Scientific Computations in Distributed Systems ........478
X. Shen, G. Thiruvathukal, W. Liao, A. Choudhary, A. Singh

Flow-Sensitive Alias Analysis with Referred-Set Representation for Java ...........................................485
J. Woo, J. Woo, J. Gaudiot

Parallel PIC Code using Java on PC Cluster ...........................................................................................495
Q. Lu, D. Cai

netCFD: A Ninf CFD Component for Global Computing, and its Java Applet GUI .................................501
M. Sato, K. Kusano, H. Nakada, S. Sekiguchi, S. Matsuoka

An XML-based Component Model for Wrapping Legacy Codes as Java/CORBA Components ..........507
M. Li, O. Rana, D. Walker

Hardware Support for Concurrent Garbage Collection in SMP Systems ..............................................513
J. Chang, W. Srisa-an, C. Lo

A Personalized Intelligent Navigation System PINS based on CORBA and Java Technologies ............518
L. Dong, J. Li, K. Wang

Retargetable Code Generator for Java Bytecode ......................................................................................522
S. Jung, S. Lee, K. Ko

Platform Independence Issues in Compiling Java Bytecode to Native Code ........................................530
H. Ye, W. Tong, W. Yao

PJMPI: Pure Java Implementation of MPI .................................................................................................533
W. Tong, H. Ye, W. Yao

Distributed Systems

A Mobile Agent-based Architecture for On-Demand Processing of Remote-Sensing Archive ..............538
Y. Yang, O. Rana, D. Walker, R. Williams

The Design of QoS Management Framework based on CORBA A/V Stream Architecture ..................542
X. Chen, X. Lu, H. Wang
Distributed Electronic Payment System based on Bank Union ................................................................. 548  
Q. Xu, H. Zhao

High Performance Distributed Real-Time Object Computing Environment .................................................. 552  
X. Zhou, G. Huang, Y. Li, Y. Li

Distributed Object Access Service in TANGRAM ................................................................................. 556  
G. Zhou, Y. Yong

GSCRIPT: A Script Language that Supports both COM and CORBA ...................................................... 558  
F. Yan

Mobile Agents in Distributed Virtual Systems ...................................................................................... 563  
Q. Ji, B. Hong, D. Wang

Design and Implementation of the Tele-Interaction System based on OP-Channel .................................. 565  
Z. Huang, Y. Hou, R. Beun, Y. Deng, J. Liang

A Client/Server based Distributed Parallel Approach for Achieving Real-Time Complex Scene Rendering 568  
H. Sun, J. Ren, S. Liu

Analysing Three Tier C/S Application with the LPT Algorithm .............................................................. 570  
Z. Chen, Z. Zeng, X. Tang

VOLUME II

Algorithms

Parallelization of Decision Tree Algorithm and its Performance Evaluation ............................................. 574  
K. Kubota, A. Nakase, H. Sakai, S. Oyanagi

Construction of a Parallel and Shortest Routing Algorithm on Recursive Circulant Networks .................. 580  
I. Chung

Efficient Algorithms for Protein Solvent Accessible Surface Area .......................................................... 586  
N. Futamura, S. Aluru, D. Ranjan, K. Mehrotra

An Efficient Parallel Algorithm for Lagrange Interpolation and its Performance .................................. 593  
H. Sarbazi-Azad, L. Mackenzie, M. Ould-Khaoua, G. Min

Programming FFT on DSM Multiprocessors ........................................................................................... 599  
H. Shan, J. Feng, H. Shan

Parallel Complexity for Solving Tridiagonal Linear Systems with Multiple Right-Hand Sides on 599  
2-D Torus Interconnection Networks ...................................................................................................... 607  
E. Santos, E. Santos, E. Santos, Jr.

A Fast Digital Terrain Simplification Algorithm with a Partitioning Method ........................................... 613  
Y. Kang, T. Lee, S. Yang, W. Park

Average Optimal Branch-and-Bound Algorithm on Distributed Memory Systems .................................. 619  
J. Wu, X. Zhang, X. Xie, G. Chen

An Identification Scheme based on the Elliptic Curve Discrete Logarithm Problem .................................. 624  
C. Popescu

xii
A Quick Adjustable Large Page B-Tree on Multi-Processors: QALPB-Tree
Q. Li, H. Sui

Three Term Weighting and Classification Algorithms in Text Automatic Classification
Q. Diao, H. Diao

A Kind of Four-Term-Recursion Method of Minimal Residual
G. Xie

A New Approach for Implementing the Arithmetic Fourier Transform (AFT)
X. Zhang, Y. Wan, G. Chen

BSP-based Parallel Simplex Method
W. Dong, H. Baosheng, P. Qinke, T. Yudong

Knowledge and Intelligence Applications

Two-Stage Parallel Partial Retraining Scheme for Defective Multi-Layer Neural Networks
K. Yamamori, T. Abe, S. Horiguchi

Queueing Analysis of Polling System with Mixed Serve
Z. Wang, H. Yu, T. Wang

Performance Potentials based Stochastic Optimization and Parallel Algorithm for a Class of CQN
X. Tan, B. Yin, H. Xi

A GA-based Systematic Reasoning Approach for Solving Traveling Salesman Problems using an Orthogonal Array Crossover
S. Ho, J. Chen

Memory Function in Loops Including Multi-Layer Neural Network: FIFO and Vector Register
T. Aoyama, H. Zhu

Parameter-Free Genetic Algorithm in Distributed Manner
J. Wang, X. Lu, G. Zeng

Logical Properties of Rough Sets
F. Zhu, H. He

A Method to Build Ontology
N. Wang, X. Xu

A General Evolutionary Algorithm and its Property Analysis
G. Li, F. Tong

An MIS Security Strategy based on Client/Server Architecture
Y. Zhang, Z. Xiong

An Integrated Development Environment for Concurrent Software Developing based on Object Oriented Petri Nets
A. Ren

Multimodal and Multimedia Techniques

A Novel Data Placement Scheme on Continuous Media Servers with Zone-Bit-Recording Disks
S. Zhai, T. Chan
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A RISC Implementation of MPEG-2 TS Packetization</td>
<td>688</td>
</tr>
<tr>
<td>C. Zhaohui, K. Subramanian, M. Aidong, J. Yong</td>
<td></td>
</tr>
<tr>
<td>Selective Magnitude Subtraction for Speech Enhancement</td>
<td>692</td>
</tr>
<tr>
<td>I. Soon, S. Koh, C. Yeo</td>
<td></td>
</tr>
<tr>
<td>An Effective Method to Extract Fingerprint Singular Point</td>
<td>696</td>
</tr>
<tr>
<td>C. Hsieh, Y. Zhaung, L. Tan, M. Kung</td>
<td></td>
</tr>
<tr>
<td>PVH-3DDCT: An Algorithm for Layered Video Coding and Transmission</td>
<td>700</td>
</tr>
<tr>
<td>J. Song, Z. Xiong, X. Liu, Y. Liu</td>
<td></td>
</tr>
<tr>
<td>The Study of the Voice Gateway Architecture</td>
<td>704</td>
</tr>
<tr>
<td>Y. Huang, D. Feng, J. Zhang</td>
<td></td>
</tr>
<tr>
<td>Internet and Web Techniques</td>
<td>708</td>
</tr>
<tr>
<td>5E: A Framework to Yield High Performance in Real-time Data Mining</td>
<td></td>
</tr>
<tr>
<td>A. Wong, R. Wu</td>
<td></td>
</tr>
<tr>
<td>Genetic based Web Cluster Dynamic Load Balancing in Fuzzy Environment</td>
<td>714</td>
</tr>
<tr>
<td>C. Cheong, V. Ramachandran</td>
<td></td>
</tr>
<tr>
<td>Compression-based Ray Casting of Very Large Volume Data in Distributed Environments</td>
<td>720</td>
</tr>
<tr>
<td>C. Bajaj, I. Ihm, S. Park, D. Song</td>
<td></td>
</tr>
<tr>
<td>Dynamic Application-Level Bandwidth Negotiations for WWW</td>
<td>726</td>
</tr>
<tr>
<td>C. Hung, L. Hong</td>
<td></td>
</tr>
<tr>
<td>A Prototype of Web-based Distributed Simulation Environment</td>
<td>732</td>
</tr>
<tr>
<td>D. Gang, X. Wang, Z. Wensong, J. Shiyou</td>
<td></td>
</tr>
<tr>
<td>Improving World-Wide-Web Performance using Domain-Top Approach to</td>
<td>738</td>
</tr>
<tr>
<td>Prefetching</td>
<td></td>
</tr>
<tr>
<td>S. Shin, B. Seong, D. Park</td>
<td></td>
</tr>
<tr>
<td>Adaptive Proxy-based Content Transformation Framework for the World-Wide Web</td>
<td>747</td>
</tr>
<tr>
<td>C. Hung, L. Hong</td>
<td></td>
</tr>
<tr>
<td>Digging for Gold on the Web: Experience with the WebGather</td>
<td>751</td>
</tr>
<tr>
<td>J. Liu, M. Lei, J. Wang, B. Chen</td>
<td></td>
</tr>
<tr>
<td>The Design of HTTP-based Cardholder Registration Software for SET</td>
<td>756</td>
</tr>
<tr>
<td>S. Tang, W. Ma</td>
<td></td>
</tr>
<tr>
<td>Design and Implementation of CORBA Group Component</td>
<td>759</td>
</tr>
<tr>
<td>D. Tan, X. Liu</td>
<td></td>
</tr>
<tr>
<td>The Design of a Software Technology Architecture for Mobile Computing</td>
<td>762</td>
</tr>
<tr>
<td>Z. Kan, J. Luo, J. Hu</td>
<td></td>
</tr>
<tr>
<td>Signal, Graphics and Image Processing</td>
<td>766</td>
</tr>
<tr>
<td>An Object-based Parallel Rendering System</td>
<td></td>
</tr>
<tr>
<td>J. Park, M. Choi, W. Hong, W. Park, S. Kim</td>
<td></td>
</tr>
<tr>
<td>On the Design of 2-Band FIR QMF Filter Banks using WLS Technique</td>
<td>772</td>
</tr>
<tr>
<td>F. Al-Namiy, M. Nigam</td>
<td></td>
</tr>
<tr>
<td>Title</td>
<td>Page</td>
</tr>
<tr>
<td>---------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Efficient Image Segmentation using a Generic and Non-Parametric Approach</td>
<td>777</td>
</tr>
<tr>
<td>S. Ho, K. Lee</td>
<td></td>
</tr>
<tr>
<td>Enhanced Streamline Texture Synthesis for Vector Field Visualization</td>
<td>782</td>
</tr>
<tr>
<td>W. Zhang, X. Li</td>
<td></td>
</tr>
<tr>
<td>Parallel Volume Rendering on Virtual Machines</td>
<td>786</td>
</tr>
<tr>
<td>J. Deng, Z. Tang</td>
<td></td>
</tr>
<tr>
<td>A Parallel Algorithm for Image Information Restoration</td>
<td>790</td>
</tr>
<tr>
<td>W. Li, D. Zhang, Z. Liu, X. Qiao</td>
<td></td>
</tr>
<tr>
<td>A Smoothing Algorithm for Engineering Drawing and its Parallel Implementation</td>
<td>794</td>
</tr>
<tr>
<td>D. Wang, Q. Li, X. Tian</td>
<td></td>
</tr>
<tr>
<td>3-D Deformable Models for Femur Shape Recovery from Volumetric Images</td>
<td>797</td>
</tr>
<tr>
<td>X. Zhao, F. Qi, H. Huang, J. Zhan</td>
<td></td>
</tr>
<tr>
<td>Analysis and Evaluation of Some Image Compression Techniques</td>
<td>799</td>
</tr>
<tr>
<td>H. Zhang, X. Zhang, S. Cao</td>
<td></td>
</tr>
<tr>
<td>Databases</td>
<td></td>
</tr>
<tr>
<td>KingBase Lite: A Smart Mobile Embedded Database System</td>
<td>806</td>
</tr>
<tr>
<td>X. Zhang, X. Meng, S. Wang</td>
<td></td>
</tr>
<tr>
<td>A Graphi-based Multilevel Partitioning Scheme for Reducing Disk Access Cost of Spatial Join Processing</td>
<td>812</td>
</tr>
<tr>
<td>J. Xiao, Y. Zhang, X. Jia</td>
<td></td>
</tr>
<tr>
<td>Query Optimisation in a Non-Uniform Bandwidth Distributed Database System</td>
<td>818</td>
</tr>
<tr>
<td>A. Ip, W. Rahayu, S. Singh</td>
<td></td>
</tr>
<tr>
<td>Aggregate-Join Query Processing in Parallel Database Systems</td>
<td>824</td>
</tr>
<tr>
<td>D. Taniar, Y. Jiang, K. Liu, C. Leung</td>
<td></td>
</tr>
<tr>
<td>Sorting in Parallel Database Systems</td>
<td>830</td>
</tr>
<tr>
<td>D. Taniar, J. Rahayu</td>
<td></td>
</tr>
<tr>
<td>Replicated Data Management for Transactions Sharing in Distributed Database</td>
<td>836</td>
</tr>
<tr>
<td>M. Deris, A. Mamat, M. Hamzah</td>
<td></td>
</tr>
<tr>
<td>Distributed Multimedia Database: A Design and Application Study</td>
<td>842</td>
</tr>
<tr>
<td>F. Thio, H. Kong</td>
<td></td>
</tr>
<tr>
<td>Hierarchically Distributed Data Warehouse</td>
<td>848</td>
</tr>
<tr>
<td>S. Zhou, A. Zhou, X. Tao, Y. Hu</td>
<td></td>
</tr>
<tr>
<td>Multiple Query Optimization in PBASE/3</td>
<td>854</td>
</tr>
<tr>
<td>H. Chen, S. Zhou, S. Wang</td>
<td></td>
</tr>
<tr>
<td>A Multi-Dimensional Data Model and Its Application</td>
<td>859</td>
</tr>
<tr>
<td>X. Tian, Z. Li, Y. Liu</td>
<td></td>
</tr>
<tr>
<td>Analysis and Evaluation of Resources Utility Strategies for Parallel Path Expression Algorithms on DSVM</td>
<td>862</td>
</tr>
<tr>
<td>Q. Fang, G. Wang, G. Yu</td>
<td></td>
</tr>
<tr>
<td>Incorporate Components into Workflow Application Systems</td>
<td>865</td>
</tr>
<tr>
<td>W. Tian, G. Yu, G. Wang, B. Song</td>
<td></td>
</tr>
</tbody>
</table>
Preface ............................................................................................................................................................................ 871

Keynote Address: Tools and Performance Enhancements for Clusters

Jack Dongarra

Superclusters: TeraClass Computing ........................................................................................................................................ 874

F. Gilfeather, P. Kovatch

Parallel Stratified and Rotating Turbulence Simulation based on MPIs .................................................................................. 884

S. Yang, B. Kim

Distributed Object Replication in a Cluster of Workstations .................................................................................................. 889

W. Zhou, L. Wang

An Optimized MPI Library for VIA/SCI Cards .......................................................................................................................... 895

S. Schindler, W. Rehm, C. Dinkelmann

Impact of Configurable Network Features in ATOLL ............................................................................................................... 904


Hybrid Cluster Computing with Mobil Objects ..................................................................................................................... 909

L. Cheng, A. Wanchoo, I. Marsic

Evaluation and Analysis of a Dynamic Allocation Scheme on a C++-based Parallel Programming Library .............................. 915

T. Tezuka, B. Apduhan, T. Sueyoshi, I. Arita

Benchmarking and Performance Evaluation of NCHC PC Cluster ......................................................................................... 923

H. Chang, C. Shen, C. Chou, S. Tcheng, K. Huang

Efficient Reliable Broadcast for Commodity Clusters ............................................................................................................... 929

K. Wong, C. Wang

System Management Framework and Tools for Beowulf Cluster ............................................................................................... 935

P. Uthayopas, S. Paisithenchapol, T. Angskun, J. Maneesilp

A Scalable, High Performance Internet Cluster Server ........................................................................................................ 941

J. Liu, L. Xu, G. Gu, J. Zhang

The Differences of Parallel Efficiency between the Two Models of Parallel Genetic Algorithms on PC Cluster Systems ........... 945

T. Hiroyasu, M. Miki, Y. Tanimura

A Dynamic Load Balancing Algorithm based on Distributed Database System ................................................................... 949

Y. Feng, D. Li, Y. Zhang, H. Wu

Methods of Improving Communication Performance in PC Clusters .................................................................................... 953

Y. Tan, B. Hu, Q. Peng, H. Xu

Scheduling Algorithms for a Fork DAG in a NOWs .................................................................................................................. 959

Z. Liu, B. Fang, Y. Zhang, J. Tang

Network Publishing System based on Cluster Computing Technology ..................................................................................... 961

C. Wang, M. Zhong

Research on Data Replica Distribution Pattern for Web Server Clusters .................................................................................. 966


xvi
Workshop on Scientific Computation and Software

Parallel Implementation of 2-D Prestack Depth Migration .................................................. 970
G. Zhang, W. Zhang

Relationships between Efficiency of Dynamic Load Balancing and Particle Concentration for Parallel Molecular Dynamics Simulation ................................................................. 976
R. Hayashi, S. Horiguchi

Approaches to Performance Improvement and Experiments on a Cluster System THNPSC-I ................................................................. 984
Z. Du, S. Li, Q. Ma, G. Zhou, P. Shi

The Parallel Computing for Photon Transport on HPC ...................................................... 990
H. Qingnan, L. Xiaoguang, Z. Lifa

Developing High Performance BLAS, LAPACK, and ScaLAPACK on Hitachi SR8000 ................................................................. 993
C. Xuebin, L. Yucheng, S. Jiachang, Z. Yunquan, Z. Peng

Lagrange Multiplier based Domain Decomposition Method with Non-Matching Grids for Time-Dependent Equations ................................................................. 998
W. Hong, S. Pengtao

Diagonally Symmetricable Positive Real Matrices .............................................................. 1001
C. Xiongda, S. Jiachang

New Iterative Algorithm on a Kind of Nonsymmetric Linear Systems ................................ 1004
W. Li

The “Category” of Program Structure and its Applications in Parallelization .......................... 1007
P. Feng

A New Two-Level Schwarz Method ................................................................................... 1010
L. Hongwei

Scalability and Parallel Efficiency of Block-Pipelined Algorithm for Direct Simulation of Turbulent Compressible Mixing Layer Flows .................................................. 1013
Z. Linbo, F. Dexun, M. Yanwen

How to Prevent Pressure Oscillations in Multicomponent Flow Calculations ...................... 1016
J. Gao

A Comparison based Tool for Checking Parallelized Large Sequential Programs ................. 1019
H. Zha, J. Cao

A Coupled Numerical Method for Relaxed Minimizers and Inhomogeneous Microstructures ................................................................. 1022
Z. Li

Solving Large-Scale BEM Problem in a Cluster Environment ............................................ 1025
X. Yin, J. Cheng, Z. Yao

An Arnoldi Method for Unsymmetric Eigenproblems and its Parallel Implementation .......... 1028

A Coarse Granular Parallel Algorithm for Dynamic Responses of Time-Variant Structures ................................................................. 1031

Considerations for Scalable CAE on the SGI ccNUMA Architecture ................................ 1171
S. Posey, C. Liao, M. Kremenetsky

xvii
A Model for Comparing Memory Strategies for Large Scale Matrix in Linear Equation and One Experimental Case

Y. Zhenxiao, Z. Haichang, B. Zhixin

Workshop on HPC Applications

Data Parallel Implementation Methods of a Stiff Chemical Non-equilibrium Flow Solver: Parallelization, Vectorization and I/O

S. Diao, T. Fujiwara

Parallel Flow Computation with Domain based SOR Type Interface Preconditioner

D. Lee, M. Yu

Parallel Computation for Three-Dimensional Multi-Stage Turbomachinery Flow Simulation on PC Cluster Environment

L. Lee, C. Shen, S. Chen

Parallel Simulation of AGVs in Container Port Operations

R. Ye, V. Vee, W. Hsu, S. Shah

Across-Platform Computing of Groundwater and Adaptive Grid

C. Kuo, Z. Wu, W. Tsai, S. Chen, R. Wu


S. Janakiraman, J. Rainam, A. Kaginalkar

Parallel Computation for High Speed Duct Flow of Weakly Ionized Plasma

T. Matsuo, M. Shimasaki

Study of Structural Analysis by Large Scale Parallel Multi-Body Dynamic Simulation

M. Yoshida, O. Okamoto, H. Kamimura, K. Ishihara

An Optimal Replacement Policy for Cooling of 3D Stacked Mesh Array

Y. Inoguchi, T. Matsuzawa, S. Horiguchi

ESCAPE 2.0: Parallel Exhaustive Conformational Search System of Peptides with Conformational Libraries as Building Blocks

M. Ando, Y. Akiyama, H. Matsuda

Development of Molecular Dynamics Programs for Proteins with a Parallelized Barnes-Hut Tree Code

K. Misoo, Y. Akiyama, Y. Shizawa, M. Saito

Optimal Configuration Design of Elastic Structures for Stability

H. Cheng, K. Chiang, T. Chen

Calculation of Electron-Surface Inelastic Interaction Cross-Section and Monte Carlo Simulation of Surface Excitation

Z. Ding, H. Li, X. Tang

HPC Application in DSM/VDSM IC Chip Planning

W. Zhuang, F. Hanyang, S. Zhaoxuan, D. Rajesh

HPC Industrial Applications for Analog Circuit Optimization in Singapore

W. Zhuang, P. Bai, Q. Shi

ANUPAM-ALPHA Parallel Computer for Operational Weather Forecasting

B. Jagadeesh, K. Rajesh, R. Mundada, A. Phoolchand, P. Dhekne, H. Kaura
A Class of Parallel Algorithms for Solving Large Sparse Linear Systems on Multiprocessors .............................................. 1146
  X. Wang, R. Chen, X. Wu, X. An

HPC Application in 3-D Parameter Extraction and Hard IP Migration for DSM IC Design .................................................. 1150
  W. Zhuang, H. Foo, Q. Shi

Parallel Discrete-Event Simulation of a Supply-Chain in Semiconductor Industry .......................................................... 1154
  Y. Low, B. Gan, S. Jain, W. Cai, W. Hsu, S. Huang, S. Turner

Research to the Application of Parallelism MM4 in Dawn-1000 in Jianghuai Basin ......................................................... 1158
  L. Bai, Z. Kun, A. Hong

Simulation of Vertical Displacement Instability in Tokamak on Parallel Computer Dawning 1000 ........................................... 1160
  G. Yu, S. Zhu

The Reservoir Cluster Optimal Scheduling Algorithm of the Huaihe River and Its Parallel Implementation ................................ 1162
  M. Rui, H. Liusheng, C. Huaping, C. Guoliang

POM — A Mobile Agent Security Model against Malicious Hosts ....................................................................................... 1165
  X. Guan, Y. Yang, J. You

Architecture of the Simplified Chinese Embedded System STARTH ................................................................................. 1167
  P. Mao, Z. Tang, M. Chen, Y. Zhang, V. Zheng

Index of Authors .......................................................................................................................................................... 1173