

**15th ISCA International  
Conference on Parallel and  
Distributed Computing Systems  
2002**

**Louisville, Kentucky, USA  
19-21 September 2002**

**Editors:**

**W.W. Smari  
M. Guizani**

**ISBN: 978-1-61839-824-6**

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

Copyright© (2002) by the International Society for Computers and Their Applications  
All rights reserved. Reproduction in any form without the written consent of ISCA is prohibited.

Original ISBN: 1-880843-44-7 (Out of Print)  
Reprint ISBN: 978-1-61839-824-6

Printed by Curran Associates, Inc. (2012)

For permission requests, please contact the International Society for Computers and Their Applications  
at the address below.

International Society for Computers and Their Applications  
975 Walnut Street, Suite 132  
Cary, NC 27511-4216

Phone: (919) 467-5559  
Fax: (919) 467-3430

[isca@ipass.net](mailto:isca@ipass.net)

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2634  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# INTERNATIONAL SOCIETY FOR COMPUTERS AND THEIR APPLICATIONS

## 15<sup>th</sup> International Conference on Parallel and Distributed Computing Systems

September 19-21, 2002  
The Galt House Hotel, Louisville, Kentucky USA

## TECHNICAL PAPER INDEX

### DISTRIBUTED SERVICES AND APPLICATIONS

|   |    |
|---|----|
| <b>Robust Approach for Supporting Inter-Application Communication and Device Handling in Integrated Modular Avionics</b><br><i>Mohamed Younis (University of Maryland Baltimore County, USA), Mohamed Aboutabl (James Madison University, USA), and Daeyoung Kim (Info. &amp; Communications University, Korea)</i> ..... | 1  |
| <b>Messaging for Integration of COTS Products and the J2EE Framework</b><br><i>Shengru Tu (University of New Orleans, USA), Gongqin Li (OTIS, Inc., USA) and Paul Augustin (NOLA Computer Service, USA)</i> .....   | 7  |
| <b>Optimized Delivery of Continuous-Media Documents using Distributed Servers</b><br><i>Gerassimos Barlas (American University of Sharjah, UAE) and Bharadwaj Veeravalli (The National University of Singapore, Singapore)</i> .....  | 13 |
| <b>XML-Socket Language-Independent Distributed Object Computing Model</b><br><i>Hazem El-Ashmawi and Ahmed Sameh (The American University in Cairo, Egypt)</i> .....  | 20 |
| <b>Building Distributed Applications using XML-RPC &amp; SOAP</b><br><i>Vibhu Sinha, Anup Kumar, R. K. Ragade (University of Louisville, USA)</i> .....   | 28 |

### ALLOCATION, AND SCHEDULING TECHNIQUES

|  |    |
|--|----|
| <b>Adaptive Processor Allocation for Time-Varying Workload in Loosely Synchronous Parallel Computation</b><br><i>Kuo-Chan Huang, Min Chen, Hsi-Ya Chang (National Center for High-Performance Computing, Taiwan)</i> .....   | 34 |
| <b>Scheduling Synchronous Parallel Programs with Task Duplication for Deadlock Resolution</b><br><i>Bassel R. Arafah (Sultan Qaboos University, Oman)</i> .....  | 41 |
| <b>A Cost Effective Scheduling Algorithm for Message Passing Multiprocessor Systems</b><br><i>Savina Bansal, Padam Kumar, Kuldip Singh (Indian Institute of Technology, Roorkee, India)</i> .....  | 47 |
| <b>A Global Scheduling Facility for Clusters Executing Communication Bound Parallel Applications</b><br><i>Andrzej Goscinski, Paul Fikkens and Bing Zhou (Deakin University, Australia)</i> .....  | 53 |
| <b>The Effect of System Parameters Variation on Parametric Schedulability of Distributed Real-Time Systems</b><br><i>Sameh M. Elsharkawy (FirstWave Intelligent Optical Networks, USA) and Ashok K. Agrawala (University of Maryland at College Park, USA)</i> ..... | 60 |

## **NETWORKING and ROUTING TECHNIQUES and ALGORITHMS**

- Prefix Routing in Mobile Ad-Hoc Networks**  
X. Chen (Southwest Texas State University, USA), J. Wu (Florida Atlantic University, USA) and  
X. D. Jia (Southwest Texas State University, USA) ..... 66

- Enhanced Route Maintenance for Dynamic Source Routing in Mobile Ad Hoc Networks**  
Bin Xiao, Qingfeng Zhuge, Edwin H.-M. Sha (University of Texas at Dallas, USA) and  
Chantana Chantrapornchai (Silpakorn University, Thailand) ..... 72

- The kDRR Scheduling Algorithms for Multi-Server Packet Switches**  
Mei Yang, S. Q. Zheng (University of Texas at Dallas, USA) and Dominique Verchere (Alcatel, USA) ..... 78

- Parallel Algorithms for Controlling Group Switches**  
Enyue Lu and S. Q. Zheng (University of Texas at Dallas, USA) ..... 84

## **FRAMEWORKS AND MIDDLEWARE FOR PARALLEL AND DISTRIBUTED COMPUTING**

- A Framework for Smart Proxies and Interceptors in RMI**  
Nuno Santos, Paulo Marques, Luis Silva (University of Coimbra, Portugal) ..... 90

- Structured Performance Modeling and Analysis for Object Based Distributed Software Systems**  
P. Katsaros and C. Lazos (Aristotle University of Thessaloniki, Greece) ..... 96

- Dynamic Choice of a Communication Model and its Utility to Large Scale Applications**  
Victor Budau and Guy Bernard (Institut National des Telecommunications, France) ..... 103

- Agent-Based Parallel Java for Heterogeneous Systems**  
Jameela Al-Jaroodi, Nader Mohamed, Hong Jiang, and David Swanson (University of Nebraska-Lincoln, USA) ..... 109

## **MULTIMEDIA SYSTEMS, DSP, AND IMAGE PROCESSING TECHNIQUES**

- A Self-Organizing Neural Network Using Cascaded Adaptive Resonance Theory (CART)**  
Mostafa Abd-El-Barr and Ahmed Fadol (King Fahd University of Petroleum & Minerals, Saudi Arabia) ..... 117

- MPEG-4 Video Codec on BOPS Parallel DSP**  
D. I. Petrescu, D. S. Searles, and G. G. Pechanek (BOPS, Inc., USA) ..... 122

- Design of an Integrated Focal Plane Architecture for Efficient Image Processing**  
William H. Robinson and D. Scott Wills (Georgia Institute of Technology, USA) ..... 128

- A Dynamically Reconfigurable, Decentralized Multiparty Teleconferencing System Over IP**  
Sarma V. Nedunuri, Mostafa H. Dahsan, and John Y. Cheung (University of Oklahoma, USA) ..... 136

## **WEB-BASED COMPUTING AND SERVICES**

- Data Replication Technique for Web Server Clusters**  
M. Mat Deris, M. Y. Saman, M. Rabiei (University College Science & Technology, Malaysia),  
M. N. Rose, W. A. W. Suryani and M. Zarina (KUSZA College, Malaysia) ..... 141

- Spider: A Multi-Agent Architecture for Internet Distributed Computing System**  
Arturo I Concepcion, Jianhua Ruan and Rodelyn R. Samson (California State University, USA) ..... 147

|   |     |
|---|-----|
| <b>UDDI in a Home Networking Environment</b>  |     |
| <i>Luyin Zhao (Philips Research USA), Jin Lu (Sandbridge Technologies (USA), and Kwok Pun Lee (Philips Research USA) .....</i>        | 153 |
| <b>Web-based System Modeling: A Systematic Approach</b>   |     |
| <i>Mara Nikolaidou (University of Athens, Greece) and Dimosthenis Anagnostopoulos (Harokopion University of Athens, Greece) .....</i> | 159 |

## PERFORMANCE EVALUATION AND MODELING TOOLS

|   |     |
|---|-----|
| <b>Selecting Simulation Models when Predicting Parallel Program Behavior</b>  |     |
| <i>Magnus Broberg, Lars Lundberg, and Hakan Grahn (Blekinge Institute of Technology, Sweden).....</i>                   | 165 |
| <b>MapCenter: An Open Grid Status Visualization Tool</b>  |     |
| <i>Franck Bonnassieux, Fabien Chanusot (CNRS, France) and Robert Harakaly, Pascale Primet (INRIA, France) .....</i>     | 173 |
| <b>Runtime Evaluation of a Distributed Assert Statement</b>   |     |
| <i>Sharon J. Simmons (University of West Florida, USA) and Phil Kearns (The College of William and Mary, USA) .....</i> | 179 |
| <b>Formulation at the Framework of Multimedia Traffic in MPLS</b>   |     |
| <i>N. Ahmed, G. M. Chaudhry, and F. A. Shaikh (University of Missouri-Kansas City, USA).....</i>                        | 187 |

## DATA MANAGEMENT AND I/O TECHNIQUES

|   |     |
|---|-----|
| <b>A Scalable High Performance Storage System Architecture</b>  |     |
| <i>N. Seetharama Krishna, Pravin Yadav and Dheeraj Bhardwaj (Pune University, India).....</i>                             | 193 |
| <b>Database Management System Support for Architecture with Intelligent Memories</b>                                      |     |
| <i>Igor Gejdos, Zina Ben Miled, Jin Liu, Omran Bukhres (Indiana University Purdue University Indianapolis, USA) .....</i> | 199 |
| <b>Runtime Data Declustering based on Bandwidth- on-Demand and its Evaluation over SAN- connected PC Cluster</b>          |     |
| <i>Masato Oguchi, Masaru Kitsuregawa (Chuo University, Japan) .....</i>   | 206 |
| <b>Environmental Data Management System - From Data Monitoring, Acquisition, Presentation to Analysis</b>                 |     |
| <i>Lijian Sun, Steve Lei, Yitung Chen, Hsuan-Tsung Hsieh, Darrel Pepper (University of Nevada Las Vegas, USA) .....</i>   | 214 |

## RELIABILITY AND FAULT TOLERANCE

|   |     |
|---|-----|
| <b>An Analytic Approach to Assess the Performability of Parallel &amp; Distributed Systems</b>                                    |     |
| <i>P. M. Fiorini, Colin Campbell (University of Southern Maine, USA) and Lester Lipsky (University of Connecticut, USA) .....</i> | 219 |
| <b>Theoretical and Experimental Results of Processing N Tasks in the Presence of Processor Failures</b>                           |     |
| <i>Gehan Weerasinghe and Lester Lipsky (University of Connecticut, USA) .....</i>   | 225 |
| <b>A Fault-Tolerant Generating Sequence-Numbers Scheme for Total Ordering in Distributed System</b>                               |     |
| <i>Chih-Ming Hsiao and Ge-Ming Chiu (National Taiwan University of Science and Technology, Taiwan) .....</i>                      | 231 |
| <b>Proactive QoS Negotiation in Asynchronous Real-Time Distributed Systems</b>  |     |
| <i>Peng Li and Binoy Ravindran (Virginia Polytechnic Institute and State University, USA) .....</i>                               | 237 |
| <b>A New Architectural Approach for Self-Verification and Fault-Tolerance of Enterprise Servers</b>                               |     |
| <i>Shambhu J. Upadhyaya, and Suranjan Pramanik (State University of New York at Buffalo, USA).....</i>                            | 243 |

## TRAFFIC ENGINEERING

|   |     |
|---|-----|
| <b>Seamlessly Merging MPLS and IP QoS - The 26 to 20 Algorithm(s)</b><br><i>Istvan Matyasovszki and Colin Flanagan (University of Limerick, Ireland)</i> .....  | 249 |
| <b>Quality-of-Service Routing for Networks with Rate-Controlled Service Nodes</b><br><i>Sibelius Lellis Vieira (Catholic University of Goiás (Brasil))</i> .....  | 254 |
| <b>Adaptive Shifting Algorithm for Load Balancing in MPLS Networks</b><br><i>Mábia D. Cavalcante, Tullius M. R. Lima, Vinicius L. da Costa (FEEC - UNICAMP, Brasil)</i> .....   | 260 |
| <b>An Algorithm to Reduce Internet Data Traffic Congestion</b><br><i>Syed Misbahuddin (King Fahd University of Petroleum and Mineral, Saudi Arabia), Nizar Al-Holou (The University of Detroit Mercy, USA) and Tariq Ibn Aziz (King Fahd University of Petroleum and Mineral, Saudi Arabia)</i> ..... | 266 |
| <b>A Policy Management Architecture for MPLS Networks</b><br><i>M. A. Siqueira, M. F. Magalhães, E. Cardozo (FEEC, UNICAMP, Brazil)</i> .....   | 271 |

## LOAD BALANCING AND SHARING ALGORITHMS

|  |     |
|--|-----|
| <b>A Heuristic Scheduling Algorithm for Stochastic Tasks in Distributed Multiprocessor Systems</b><br><i>Ehab Abdel Maksoud (Cairo University, Egypt) and Reda A. Ammar (University of Connecticut, USA)</i> ..... | 277 |
| <b>Load Balancing Multi-Weight Geometric Problems</b><br><i>Andrew A. Poe (Northern Michigan University, USA)</i> .....  | 283 |
| <b>DYLAPSI: A Dynamic Load-Balancing Architecture for Image Processing Applications</b><br><i>Scott Piersall and Sherif Elfayoumy (University of North Florida, USA)</i> .....                                     | 288 |
| <b>Efficient Declustering Techniques for keyword-based Information Retrieval</b><br><i>Sanjiv Behl and Rakesh Verma (University of Houston, USA)</i> .....   | 294 |
| <b>Effects of Spatial and Temporal Heterogeneity on Performance of a Target Task in Heterogeneous Computing Environments</b><br><i>J. Huang and S.-Y. Lee (Auburn University, USA)</i> .....                       | 301 |

## NETWORK COMMUNICATIONS, ROUTING, AND PROTOCOLS

|   |     |
|---|-----|
| <b>Secure Group Key Distribution Protocols</b><br><i>X. Chen and J. Shen (Southwest Texas State University, USA)</i> .....  | 307 |
| <b>A Framework for Resource Security in Mobile Computing</b><br><i>Weijiang Yu and Aloysius K. Mok (University of Texas at Austin, USA)</i> .....   | 312 |
| <b>A Virtual Backbone-based Multicast Routing Protocol for Ad-hoc Wireless Networks</b><br><i>J. H. Lin, C. R. Dow, K. T. Chen and S. F. Hwang (Feng Chia University, Taiwan)</i> .....                   | 318 |
| <b>Evolutionary Computing in a Multi-Service Routing Switch Packet Scheduling</b><br><i>Min Song (Old Dominion University, USA) and Mansoor Alam, Sachin Shetty (The University of Toledo, USA)</i> ..... | 324 |
| <b>Load Balancing in Computer Networks</b><br><i>Ming-Chang Huang, S. Hossein Hosseini and K. Vairavan (University of Wisconsin-Milwaukee, USA)</i> .....   | 331 |
| <b>Optimal Converter-Placement in Tree Networks</b><br><i>Sukhamay Kundu and Tong Yi (Louisiana State University, USA)</i> .....  | 337 |
| <b>A Limited-Global Fault Information Model for Dynamic Routing in 3-D Meshes</b><br><i>Zhen Jiang (West Chester University, USA) and Jie Wu (Florida Atlantic University, USA)</i> .....                 | 343 |

## **INTELLIGENT AND KNOWLEDGE BASED SYSTEMS**

|   |     |
|---|-----|
| <b>An Intelligent Architecture for Personal Information Management</b><br><i>Tsung-Chuan Huang, Chu-Sing Yang, Sheng-Wen Bai, and Chia-Hung Kao (National Sun Yat-Sen University, Taiwan)</i> ..... | 349 |
| <b>A Geographically Distributed Processing Environment for Intelligent Systems</b><br><i>Charles Hannon (Texas Christian University, USA)</i> .....   | 355 |
| <b>A Framework for Distributed Intelligent Tutoring</b><br><i>Eman El-Sheikh, and Mohannad Bataineh (University of West Florida, USA)</i> .....   | 361 |

## **PARALLEL AND DISTRIBUTED ALGORITHMS**

|   |     |
|---|-----|
| <b>Advancing Drug Discovery through Parallel Inductive Logic Programming</b><br><i>Ahmed H. Kamal, James H. Graham (University of Louisville, USA), and C. D. Page (University of Wisconsin, USA)</i> .....                     | 367 |
| <b>Software Simulation of DNA Computing</b><br><i>Sanjeev Baskiyar (Auburn University, USA)</i> .....   | 373 |
| <b>A Parallel Algorithm for Solving a Tridiagonal Linear System with the ADI Method</b><br><i>Lixing Ma and Frederick C. Harris, Jr. (University of Nevada, Reno, USA)</i> .....  | 379 |
| <b>An Optimal Sorting Algorithm on a Linear Array with Reconfigurable Pipelined Bus System</b><br><i>M. He (Louisiana State University, USA) and Si Qing Zheng (University of Texas at Dallas, USA)</i> .....                   | 386 |
| <b>An Asynchronous Multithreaded Algorithm for a Class of Linear Programming Problems</b><br><i>Parimala Thulasiraman (University of Manitoba, Canada) and Ashfaq A. Khokhar (University of Illinois at Chicago, USA)</i> ..... | 392 |
| <b>On Solutions to a Seating Problem</b><br><i>Fei Dai, Mohit Dhawan, Changfu Wu, and Jie Wu (Florida Atlantic University, USA)</i> .....   | 398 |

## **HIGH PERFORMANCE WIRELESS NETWORKS**

|  |     |
|--|-----|
| <b>An Adaptive Multi-Channel Allocation Scheme for Multimedia Services in Large-Scale Wireless Mobile Networks</b><br><i>Chyi-Ren Dow and Jia-Shin Lai (Feng Chia University, Taiwan)</i> .....                    | 404 |
| <b>Performance Analysis of TCP over Static Ad Hoc Wireless Networks</b><br><i>Venkatesh Ramarathinam and Miguel A. Labrador (University of South Florida, USA)</i> .....   | 410 |
| <b>Advances and Applications in Optical Networking and Switching</b><br><i>Mohamed A. Bourouha, Mohannad M. Bataineh, and Eman M. El-Sheikh (University of West Florida, USA)</i> .....                            | 416 |
| <b>Adaptive Multi-Clustering Approach for Base Station Locations Management in Mobile Cellular Networks</b><br><i>Mostafa M. El-Said, Anup Kumar, and Adel S. Elmaghreby (University of Louisville, USA)</i> ..... | 425 |

## **CLUSTER AND GRID COMPUTING AND SERVICES**

|  |     |
|--|-----|
| <b>Scheduling Real Time Conditional and Loop Structures on Cluster Computing</b><br><i>Reda Ammar and Abdulrahman Alhamadan (University of Connecticut, USA) and<br/>Ayman El-Dessouky (Electronics Research Institute, Egypt)</i> | 431 |
| <b>Key Concepts and Services of a Grid Information Service</b><br><i>Beth Plale (Indiana University, USA), Peter Dinda (Northwestern University, USA), and<br/>Gregor von Laszewski (Argonne National Lab, USA)</i>                | 437 |
| <b>Comparative Evaluation of Parallel Genetic Algorithms on Message Passing and Software Shared-Memory Clusters</b><br><i>Ekkasit Tiamkaew, Sushil J. Louis, and Angkul Kongmunvattana (University of Nevada, Reno, USA)</i>       | 443 |
| <b>ViPIOS Islands: Utilizing I/O Resources on Distributed Clusters</b><br><i>Erich Schikuta and Thomas Fuerle (University of Vienna, Austria)</i>  | 449 |

## **SECURITY, NAMING, AND AUTHENTICATION**

|  |     |
|--|-----|
| <b>Development of a String Metric for Dynamic Authentication</b><br><i>M. M. McMahon (United States Naval Academy, USA)</i>                                | 455 |
| <b>An Authentication Scheme for a Jini-based Ad Hoc Network</b><br><i>M. M. McMahon, J. B. Datko, and D. M. Needham (United States Naval Academy, USA)</i> | 462 |

## **RECONFIGURABLE ARCHITECTURES**

|   |     |
|---|-----|
| <b>Model and Synthesis Directed Task Assignment for Systems On A Chip</b><br><i>J. R. Armstrong, P. Adipathi, J.M. Baker, Jr. (Virginia Tech, USA)</i>  | 468 |
| <b>Parallel Image Processing With Agent-based Reconfigurable Hardware</b><br><i>Hamid Reza Naji, Letha Etzkorn, Reza Adhami and B. Earl Wells (The University of Alabama in Huntsville, US)</i> | 476 |

## **INSTRUCTION-LEVEL PARALLELISM, LANGUAGES AND COMPILERS**

|   |     |
|---|-----|
| <b>Using Retiming to Minimize Inter-Iteration Dependencies</b><br><i>Timothy W. O'Neil (University of Akron, USA) and Edwin H.-M. Sha (University of Texas at Dallas, USA)</i>  | 482 |
| <b>Compiler and Runtime Support for Adaptive Sparse Computations on a Multithreaded Architecture</b><br><i>Gary M. Zoppetti (University of Delaware, USA) and Gagan Agrawal (Ohio State University, USA)</i>  | 488 |
| <b>Hori: A Global Compiler-Aided Branch Resolution Scheduling Method Implementing Hardware Tail Duplication</b><br><i>Pei You Song, Anyu Zhou, Kirilka Nikolova, Yoshinaga Tsutomu, and Sowa Masahiro (University of Electro Communications, China)</i> | 494 |

## **MESSAGE PASSING AND DISTRIBUTED SHARED MEMORY PARADIGMS**

|   |     |
|---|-----|
| <b>Shared Data or Message-Passing - A Human Factor in Technical Choices?</b><br><i>A. C. Sodan (University of Windsor, Canada) and L. F. Capretz (University of Western Ontario, Canada)</i> .....                                  | 500 |
| <b>Improving Both Fault Tolerance and Performance by Replicating Control Data in Scope Consistent Software DSMs</b><br><i>Alba Cristina Magalhaes Alves de Melo, Leonardo Nunes da Silva (University of Brasilia, Brazil)</i> ..... | 507 |
| <b>Modeling Parallel Applications with UML</b><br><i>S. Pllana and T. Fahringer (University of Vienna, Austria)</i> .....   | 513 |
| <b>A Comparative Study of Programming And Performance of MPI and Treadmarks on Distributed Networks</b><br><i>W.J. Sandman III, Anup Kumar, Khaled Kamel (University of Louisville, USA)</i> .....                                  | 519 |

## **DISTRIBUTED SYSTEMS AND PROCESSING**

|   |     |
|---|-----|
| <b>The Propagation Solutions for Multi Replication Definition</b><br><i>Jing Zhe, and Yufang Sun (Chinese Academy of Sciences, China)</i> .....                         | 525 |
| <b>Data-flow Distribution in FICAS Service Composition Infrastructure</b><br><i>David Liu, Kincho H. Law, Gio Wiederhold (Stanford University, USA)</i> .....           | 531 |
| <b>Inaccuracies in Concurrency Maps</b><br><i>Dennis L. Edwards (University of West Florida) and Phil Kearns (The College of William and Mary, USA)</i> .....           | 537 |
| <b>A-DFS: An Agent-Based Serverless Distributed File System</b><br><i>Boris Gelfand, Matt Mutka and Abdol-Hossein Esfahanian (Michigan State University, USA)</i> ..... | 545 |

## **MOBILE COMPUTING AND SYSTEMS**

|   |     |
|---|-----|
| <b>A Caching Strategy for Distributed Location Services</b><br><i>Hisham Al-Mubaid (University of Houston - Clear Lake, USA)</i> .....  | 552 |
| <b>Deviation based Update Strategies for Location Dependent Continuous Query</b><br><i>Dong Yi (Huazhong University of Science and Technology, China) and Edward Chan (City University of Hong Kong, Hong Kong)</i> ..... | 557 |