Lecture Notes in Computer Science 1586

José Rolim et al. (Eds.)

Parallel and Distributed Processing

11 IPPS/SPDP'99 Workshops
Held in Conjunction with the
13th International Parallel Processing Symposium and
10th Symposium on Parallel and Distributed Processing
San Juan, Puerto Rico, USA, April 1999
Proceedings

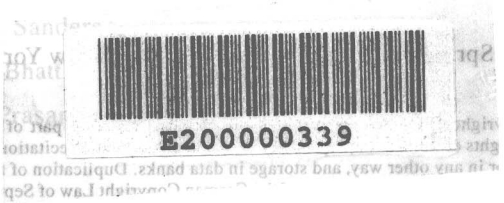
Springer

31-53
222.3
99

José Rolim et al. (Eds.)

Parallel and Distributed Processing

11th IPPS/SPDP'99 Workshops
Held in Conjunction with the
13th International Parallel Processing Symposium
and 10th Symposium on
Parallel and Distributed Processing
San Juan, Puerto Rico, USA, April 12-16, 1999
Proceedings



Springer

Series Editors

Gerhard Goos, Karlsruhe University, Germany
Juris Hartmanis, Cornell University, NY, USA
Jan van Leeuwen, Utrecht University, The Netherlands

Managing Volume Editor

José Rolim
Université de Genève , Centre Universitaire d'Informatique
24, rue General Dufour, CH-1211 Genève 4, Switzerland
E-mail: Jose.Rolim@cui.unige.ch

Cataloging-in-Publication data applied for

Die Deutsche Bibliothek - CIP-Einheitsaufnahme

Parallel and distributed processing : 11 IPPS/SPDP '99 workshops held in conjunction with the 13th International Parallel Processing Symposium and 10th Symposium on Parallel and Distributetd Processing, San Juan, Puerto Rico, USA, April 12 - 16, 1999 ; proceedings / José Rolim et al. (ed.). - Berlin ; Heidelberg ; New York ; Barcelona ; Hong Kong ; London ; Milan ; Paris ; Singapore ; Tokyo : Springer, 1999
(Lecture notes in computer science ; Vol. 1586)
ISBN 3-540-65831-9

CR Subject Classification (1998): C.1-4, B.1-7, D.1-4, F.1-2, G.1-2, E.1, H.2

ISSN 0302-9743
ISBN 3-540-65831-9 Springer-Verlag Berlin Heidelberg New York

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, re-use of illustrations, recitation, broadcasting, reproduction on microfilms or in any other way, and storage in data banks. Duplication of this publication or parts thereof is permitted only under the provisions of the German Copyright Law of September 9, 1965, in its current version, and permission for use must always be obtained from Springer-Verlag. Violations are liable for prosecution under the German Copyright Law.

© Springer-Verlag Berlin Heidelberg 1999
Printed in Germany

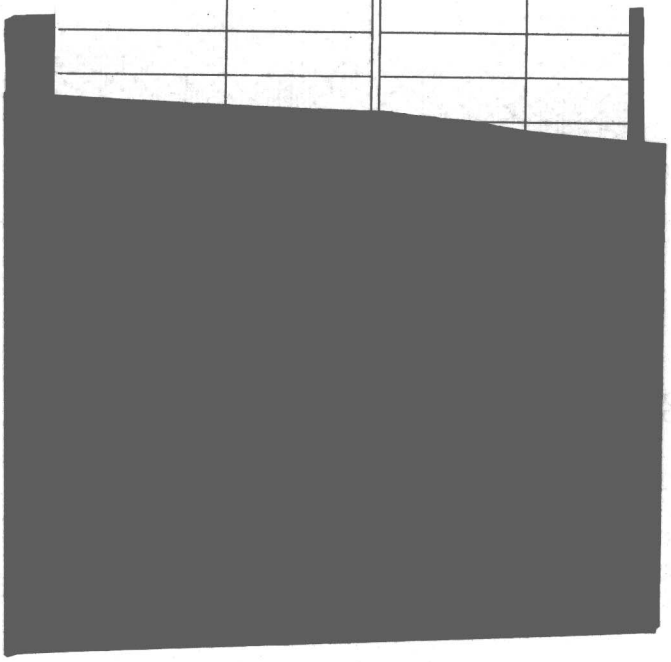
Typesetting: Camera-ready by author
SPIN: 10703197 06/3142 – 5 4 3 2 1 0 Printed on acid-free paper

Lecture Notes in Computer Science 1586

Edited by G. Goos, J. Hartmanis and J. van Leeuwen

TP31-53
P222.3
1999 200000339

Parallel and distributed
processing



Springer
Berlin
Heidelberg
New York
Barcelona
Hong Kong
London
Milan
Paris
Singapore
Tokyo

此为试读,需要完整PDF请访问: www.ertongbook.com

Volume Editors:

- José D.P. Rolim
- Frank Mueller
- Albert Y. Zomaya
- Fikret Ercal
- Stephan Olariu
- Binoy Ravindran
- Jan Gustafsson
- Hiroaki Takada
- Ron Olsson
- Laxmikant V. Kale
- Pete Beckman
- Matthew Haines
- Hossam ElGindy
- Denis Caromel
- Serge Chaumette
- Geoffrey Fox
- Yi Pan
- Keqin Li
- Tao Yang
- G. Chiola
- G. Conte
- L.V. Mancini
- Domenique Méry
- Beverly Sanders
- Devesh Bhatt
- Viktor Prasanna

Foreword

This volume contains proceedings from eleven workshops held in conjunction with the 13th International Parallel Symposium and the 10th Symposium on Parallel and Distributed Processing, *1999 IPPS/SPDP*, on 12-16 April 1999 in San Juan, Puerto Rico.

The workshops provide a forum for bringing together researchers, practitioners and designers from various backgrounds to discuss the state of the art in parallelism. They focus on different aspects of parallelism, from run-time systems to formal methods, from optics to irregular problems, from biology to PC networks, from embedded systems to programming environments. The Workshops on the following topics are represented in this volume:

- High-Level Parallel Programming Models and Supportive Environments
- Biologically Inspired Solutions to Parallel Processing Problems
- Parallel and Distributed Real-Time Systems
- Run-Time Systems for Parallel Programming
- Reconfigurable Architectures
- Java for Parallel and Distributed Computing
- Optics and Computer Science
- Solving Irregularly Structured Problems in Parallel
- Personal Computer Based Workstation Networks
- Formal Methods for Parallel Programming
- Embedded HPC Systems and Applications

All papers published in the workshops proceedings were selected by the program committee on the basis of referee reports. Each paper was reviewed by independent referees who judged the papers for originality, quality, and consistency with the themes of the workshops.

We would like to thank the General Co-Chair Charles Weems and the General Vice-Chair John Antonio for their support and encouragement, the Steering Committee Chairs, George Westrom and Victor Prasanna, for their guidance and vision, the Program Commitee and its chair, Mikhail Atallah, for its technical leadership in organizing the conference and the Finance Chair, Bill Pitts, for making this publication possible. Special thanks are due to Sally Jelinek, for her assistance with meeting publicity, to Susamma Barua for making local arrangements and to Prashanth Bhat for his tireless efforts in interfacing with the organizers.

We gratefully acknowledge sponsorship from the IEEE Computer Society and its Technical Committee of Parallel Processing and the cooperation of the ACM SIGARCH. Finally, we would like to thank Danuta Sosnowska and Germaine Gusthiot for their help in the preparation of this volume.

February 1999 José D. P. Rolim, Workshops Chair and General Co-Chair

Contents

Workshop on High-Level Parallel Programming Models and Supportive Environments 1
Frank Mueller

Efficient Program Partitioning Based on Compiler Controlled Communication 4
Ram Subramanian and Santosh Pande

SCI-VM: A Flexible Base for Transparent Shared Memory Programming Models on Clusters of PCs 19
Martin Schulz

Flexible Collective Operations for Distributed Object Groups 34
Joerg Nolte

SCALA: A Framework for Performance Evaluation of Scalable Computing 49
Xian-He Sun, Mario Pantano, Thomas Fahringer and Zhaohua Zhan

Recursive Individually Distributed Objects 63
Z. George Mou

The MuSE System: A Flexible Combination of On-Stack Execution and Work-Stealing 79
Markus Leberecht

Pangaea: An Automatic Distribution Front-End for Java 93
André Spiegel

Concurrent Language Support for Interoperable Applications 100
Eugene F. Fodor and Ronald A. Olsson

On the Distributed Implementation of Aggregate Data Structures by Program Transformation 108
Gabriele Keller and Manuel M. T. Chakravarty

A Transformational Framework for Skeletal Programs: Overview and Case Study 123
Sergei Gorlatch and Susanna Pelagatti

Implementing a Non-strict Functional Programming Language on a Threaded Architecture 138
Shigeru Kusakabe, Kentaro Inenaga, Makoto Amamiya, Xinan Tang, Andres Marquez and Guang R. Gao

Workshop on Biologically Inspired Solutions to Parallel Processing Problems 153
Albert Y. Zomaya, Fikret Ercal, Stephan Olariu

The Biological Basis of the Immune System as a Model for Intelligent Agents 156
Roger L. King, Aric B. Lambert, Samuel H. Russ, Donna S. Reese

A Formal Definition of the Phenomenon of Collective Intelligence and Its IQ Measure 165
Tadeusz Szuba

Implementation of Data Flow Logical Operations via Self-Assembly of DNA 174
Piotr Wąsiewicz, Piotr Borsuk, Jan J. Mulawka, Piotr Węgleński

A Parallel Hybrid Evolutionary Metaheuristic for the Period Vehicle Routing Problem 183
Dalessandro Soares Vianna, Luiz S. Ochi, Lúcia M.A. Drummond

Distributed Scheduling with Decomposed Optimization Criterion: Genetic Programming Approach 192
Franciszek Seredynski, Jacek Koronacki, Cezary Z. Janikow

A Parallel Genetic Algorithm for Task Mapping on Parallel Machines 201
S. Mounir Alaoui, O. Frieder, T. El-Ghazawi

Evolution-Based Scheduling of Fault-Tolerant Programs on Multiple Processors 210
Piotr Jedrzejowicz, Ireneusz Czarnowski, Henryk Szreder, Aleksander Skakowski

A Genetic-Based Fault-Tolerant Routing Strategy for Multiprocessor Networks 220
Peter K. K. Loh and Venson Shaw

Regularity Considerations in Instance-Based Locality Optimization 230
Claudia Leopold

Parallel Ant Colonies for Combinatorial Optimization Problems 239
El-ghazali Talbi, Olivier Roux, Cyril Fonlupt, Denis Robillard

An Analysis of Synchronous and Asynchronous Parallel Distributed Genetic Algorithms with Structured and Panmictic Islands 248
Enrique Alba, Jos M. Troya

GA-based Parallel Image Registration on Parallel Clusters 257
Prachya Chalermwat, Tarek El-Ghazawi, Jacqueline LeMoigne

Implementation of a Parallel Genetic Algorithm on a Cluster of Workstations: The Traveling Salesman Problem, A Case Study 266
Giuseppe Sena, Germinal Isem, Dalila Megherbi

Structural Biology Metaphors Applied to the Design of a Distributed Object System 275
Ladislau Bölöni, Ruibing Hao, Kyungkoo Jun, Dan C. Marinescu

Workshop on Parallel and Distributed Real-Time Systems 284
Binoy Ravindran, Jan Gustafsson, Hiroaki Takada

Building an Adaptive Multimedia System Using the Utility Mode 289
Lei Chen, Shahadat Khan, Kin F. Li, Eric G. Manning

Evaluation of Real-Time Fiber Communications for Parallel Collective Operations 299
P. Rajagopal and A. W. Apon

The Case for Prediction-Based Best-Effort Real-Time Systems 309
Peter A. Dinda, Loukas F. Kallivokas, Bruce Lowekamp, David R. O'Hallaron*

Dynamic Real-Time Channel Establishment in Multiple Access Bus Networks 319
Anita Mittal, G. Manimaran, C. Siva Ram Murthy

A Similarity-Based Protocol for Concurrency Control in Mobile Distributed Real-Time Database Systems 329
Kam-yiu Lam, Tei-Wei Kuo, Gary C.K. Law, Wai-Hung Tsang

From Task Scheduling in Single Processor Environments to Message Scheduling in a PROFIBUS Fieldbus Network 339
Eduardo Tovar, Francisco Vasques

An Adaptive Distributed Airborne Tracking System 353
Raymond Clark, E. Douglas Jensen, Arkady Kanevsky, John Maurer, Paul Wallace, Thomas Wheeler, Yun Zhang, Douglas Wells, Tom Lawrence, Pat Hurley

Non-preemptive Scheduling of Real-Time Threads on Multi-Level-Context Architectures 363
Jan Jonsson, Henrik Lönn, Kang G. Shin

QoS Control and Adaptation in Distributed Multimedia Systems 375
Farid Nat-Abdesselam, Nazim Agoulmine

Dependability Evaluation of Fault Tolerant Distributed Industrial Control Systems 384
J.C. Campelo, P. Yuste, F. Rodríguez, P.J. Gil, J.J. Serrano

An Approach for Measuring IP Security Performance in a Distributed Environment 389
Brett L. Chappell, David T. Marlow, Philip M. Irey IV, Karen O'Donoghue

An Environment for Generating Applications Involving Remote Manipulation of Parallel Machines 395
Luciano G. Fagundes, Rodrigo F. Mello, Clio E. Móron

Real-Time Image Processing on a Focal Plane SIMD Array 400
Antonio Gentile, Jos L. Cruz-Rivera, D. Scott Wills, Leugim Bustelo, Jos J. Figueroa, Javier E. Fonseca-Camacho, Wilfredo E. Lugo-Beauchamp, Ricardo Olivieri, Marlyn Quiñones-Cerpa, Alexis H. Rivera-Ríos, Iomar Vargas-Gonzáles, Michelle Viera-Vera

Metrics for the Evaluation of Multicast Communications 406
Philip M. Irey IV, David T. Marlow

Distributing Periodic Workload Uniformly Across Time to Achieve Better Service Quality 413
Jaeyong Koh, Kihan Kim and Heonshik Shin

A Dynamic Fault-Tolerant Mesh Architecture 418
Jyh-Ming Huang, Ted C. Yang

Evaluation of a Hybrid Real-Time Bus Scheduling Mechanism for CAN 425
Mohammad Ali Livani, Jörg Kaiser

System Support for Migratory Continuous Media Applications in Distributed Real-Time Environments 430
Tatsuo Nakajima, Mamadou Tadiou Kone, Hiroyuki Aizu

Dynamic Application Structuring on Heterogeneous, Distributed Systems 442
Saurav Chatterjee

Improving Support for Multimedia System Experimentation and Deployment 454
Douglas Niehaus

此为试读,需要完整PDF请访问: www.ertongbook.com

Workshop on Run-Time Systems for Parallel Programming 466
Ron Olsson, Laxmikant V. Kalé, Pete Beckman, Matthew Haines

Efficient Communications in Multithreaded Runtime Systems 468
Luc Bougé, Jean-François Méhaut, Raymond Namyst

Application Performance of a Linux Cluster Using Converse 483
Laxmikant Kalë, Robert Brunner, James Phillips, Krishnan Varadarajan

An Efficient and Transparent Thread Migration Scheme in the PM2 Runtime System 496
Gabriel Antoniu, Luc Bougë, Raymond Namyst

Communication-Intensive Parallel Applications and Non-Dedicated Clusters of Workstations 511
Kritchalach Thitikamol, Peter Keleher

A Framework for Adaptive Storage Input/Output on Computational Grids 519
Huseyin Simitci, Daniel A. Reed, Ryan Fox, Mario Medina, James Oly, Nancy Tran, Guoyi Wang

ARMCI: A Portable Remote Memory Copy Library for Distributed Array Libraries and Compiler Run-Time Systems 533
Jarek Nieplocha, Bryan Carpenter

Multicast-Based Runtime System for Highly Efficient Causally Consistent Software-Only DSM 547
Thomas Seidmann

Adaptive DSM-Runtime Behavior via Speculative Data Distribution 553
Frank Mueller

Reconfigurable Architectures Workshop 568
Hossam Elgindy

DEFACTO: A Design Environment for Adaptive Computing Technology 570
Kiran Bondalapati, Pedro Diniz, Phillip Duncan, John Granacki, Mary Hall, Rajeev Jain, Heidi Ziegler

A Web-Based Multiuser Operating System for Reconfigurable Computing 579
Oliver Diessel, David Kearney, Grant Wigley

Interconnect Synthesis for Reconfigurable Multi-FPGA Architectures 588
Vinoo Srinivasan, Shankar Radhakrishnan, Ranga Vemuri, Jeff Walrath

Hardwired-Clusters Partial-Crossbar: A Hierarchical Routing Architecture for Multi-FPGA Systems 597
Mohammed A.S. Khalid, Jonathan Rose

Integrated Block-Processing and Design-Space Exploration in Temporal Partitionning for RTR Architectures 606
Meenakshi Kaul, Ranga Vemuri

Improved Scaling Simulation of the General Reconfigurable Mesh 616
José Alberto Fernández-Zepeda, Ramachandran Vaidyanathan, Jerry L. Trahan

Bit Summation on the Reconfigurable Mesh 625
Martin Middendorf

Scalable Hardware-Algorithms for Binary Prefix Sums 634
R. Lin, K. Nakano, S. Olariu, M.C. Pinotti, J.L. Schwing, A.Y. Zomaya

Configuration Sequencing with Self Configurable Binary Multipliers 643
Mathew Wojko, Hossam ElGindy

Domain Specific Mapping for Solving Graph Problems on Reconfigurable Devices 652
Andreas Dandalis, Alessandro Mei, Victor K. Prasanna

MorphoSys: A Reconfigurable Processor Targeted to High Performance Image Application 661
Guangming Lu, Ming-hau Lee, Hertej Singh, Nader Bagherzadeh, Fadi J. Kurdahi, Eliseu M. Filho

An Efficient Implementation Method of Fractal Image Compression on Dynamically Reconfigurable Architecture 670
Hidehisa Nagano, Akihiro Matsuura, Akira Nagoya

Plastic Cell Architecture: A Dynamically Reconfigurable Hardware-Based Computer 679
Hiroshi Nakada, Kiyoshi Oguri, Norbert Imlig, Minoru Inamori, Ryusuke Konishi, Hideyuki Ita, Kouichi Nagami, Tsunemichi Shiozawa

Leonardo and Discipulus Simplex: An Autonomous, Evolvable Six-Legged Walking Robot 688
Gilles Ritter, Jean-Michel Puiatti, Eduardo Sanchez

Reusable Internal Hardware Templates 697
Ka-an Agun, Morris Chang

An On-Line Arithmetic-Based Reconfigurable Neuroprocessor 700
Jean-Luc Beuchat, Eduardo Sanchez

The Re-Configurable Delay-Intensive FLYSIG Architecture 703
Wolfram Hardt, Achim Rettberg, Bernd Kleinjohann

Digital Signal Processing with General Purpose Microprocessors, DSP and Reconfigurable Logic 706
Steffen Köhler, Sergej Sawitzki, Achim Gratz, Rainer G.Spallek

Solving Satisfiability Problems on FPGAs Using Experimental Unit Propagation Heuristic 709
Takayuki Suyama, Makoto Yokoo, Akira Nagoya

FPGA Implementation of Modular Exponentiation 712
Alexander Tiountchik, Elena Trichina

Workshop on Java for Parallel and Distributed Computing 716
Denis Caromel, Serge Chaumette, Geoffrey Fox

More Efficient Object Serialization 718
Michael Philippsen, Bernhard Haumacher

A Customizable Implementation of RMI for High Performance Computing 733
Fabian Breg, Dennis Gannon

mpiJava: An Object-Oriented Java Interface to MPI 748
Mark Baker, Bryan Carpenter, Geoffrey Fox, Sung Hoon Koo, Sang Lim

An Adaptive, Fault-Tolerant Implementation of BSP for Java-Based Volunteer Computing Systems 763
Luis F.G. Sarmenta

High Performance Computing for the Masses 781
Mark Clement, Quinn Snell, Glenn Judd

Process Networks as a High-Level Notation for Metacomputing 797
Darren Webb, Andrew Wendelborn, Kevin Maciunas

Developing Parallel Applications Using the JavaPorts Environment 813
Demetris G. Galatopoullos and Elias S. Manolakos

Workshop on Optics and Computer Science 829
Yi Pan, Keqin Li

Permutation Routing in All-Optical Product Networks 831
Weifa Liang, Xiaojun Shen

NWCache: Optimizing Disk Accesses via an Optical Network/Write Cache Hybrid 845
Enrique V. Carrera, Ricardo Bianchini

NetCache: A Network/Cache Hybrid for Multiprocessors 859
Enrique V. Carrera, Ricardo Bianchini

A Multi-Wavelength Optical Content-Addressable Parallel Processor (MW-OCAPP) for High-Speed Parallel Relational Database Processing: Architectural Concepts and Preliminary Experimental System 873
Peng Yin Choo, Abram Detofsky, Ahmed Louri

Optimal Scheduling Algorithms in WDM Optical Passive Star Networks 887
Hongjin Yeh, Kyubum Wee, Manpyo Hong

OTIS-Based Multi-Hop Multi-OPS Lightwave Networks 897
David Coudert, Afonso Ferreira, Xavier Muñoz

Solving Graph Theory Problems Using Reconfigurable Pipelined Optical Buses 911
Keqin Li, Yi Pan, Mounir Hamdi

High Speed, High Capacity Bused Interconnects Using Optical Slab Waveguides 924
Martin Feldman, Ramachandran Vaidyanathan, Ahmed El-Amawy

A New Architecture for Multihop Optical Networks 938
A. Jaekel, S. Bandyopadhyay, A. Sengupta

Pipelined Versus Non-pipelined Traffic Scheduling in Unidirectional WDM Rings 950
Xijun Zhang, Chunming Qiao

Workshop on Solving Irregularly Structured Problems in Parallel 964
Tao Yang

Self-Avoiding Walks over Adaptive Unstructured Grids 968
Gerd Heber, Rupak Biswas, Guang R. Gao

A Graph Based Method for Generating the Fiedler Vector of Irregular Problems 978
Michael Holzrichter, Suely Oliveira

Hybridizing Nested Dissection and Halo Approximate Minimum Degree for Efficient Sparse Matrix Ordering 986
Franois Pellegrini, Jean Roman, Patrick Amestoy

ParaPART: Parallel Mesh Partitioning Tool for Distributed Systems 996
Jian Chen, Valerie E. Taylor

Sparse Computations with PEI 1006
Frédérique Voisin, Guy-René Perrin

Optimizing Irregular HPF Applications Using Halos 1015
Siegfried Benkner

From EARTH to HTMT: An Evolution of a Multitheaded Architecture Model 1025
Guang R. Gao

Irregular Parallel Algorithms in Java 1026
Brian Blount, Siddhartha Chatterjee, Michael Philippsen

A Simple Framework to Calculate the Reaching Definition of Array References and Its Use in Subscript Array Analysis 1036
Yuan Lin, David Padua

Dynamic Process Composition and Communication Patterns in Irregularly Structured Applications 1046
C.T.H. Everaars, B. Koren, F. Arbab

Scalable Parallelization of Harmonic Balance Simulation 1055
David L. Rhodes, Apostolos Gerasoulis

Towards an Effective Task Clustering Heuristic for LogP Machines 1065
Cristina Boeres, Aline Nascimento, Vinod E.F. Rebello

A Range Minima Parallel Algorithm for Coarse Grained Multicomputers 1075
H. Mongelli, W. Song

Deterministic Branch-and-Bound on Distributed Memory Machines 1085
Kieran T. Herley, Andrea Pietracaprina, Geppino Pucci

Workshop on Personal Computer Based Networks of Workstations 1095
G. Chiola, G. Conte, L.V. Mancini

Performance Results for a Reliable Low-Latency Cluster Communication Protocol 1097
Stephen R. Donaldson, Jonathan M.D. Hill, David B. Skillicorn

Coscheduling through Synchronized Scheduling Servers - A Prototype and Experiments 1115
Holger Karl

High-Performance Knowledge Extraction from Data on PC-Based Networks of Workstations 1130
Cosimo Anglano, Attilio Giordana, Giuseppe Lo Bello

Addressing Communication Latency Issues on Clusters for Fine Grained Asynchronous Applications - A Case Study 1145
Umesh Kumar V. Rajasekaran, Malolan Chetlur, Girindra D. Sharma, Radharamanan Radhakrishnan, Philip A. Wilsey

Low Cost Databases for NOW 1163
Gianni Conte, Michele Mazzeo, Agostino Poggi, Pietro Rossi, Michele Vignali

Implementation and Evaluation of MPI on an SMP Cluster 1178
Toshiyuki Takahashi, Francis O'Carroll, Hiroshi Tezuka, Atsushi Hori, Shinji Sumimoto, Hiroshi Harada, Yutaka Ishikawa, Peter H. Beckman

Workshop on Formal Methods for Parallel Programming: Theory and Applications 1193
Dominique Méry, Beverly Sanders

From a Specification to an Equivalence Proof in Object-Oriented Parallelism 1197
Isabelle Attali, Denis Caromel, Sylvain Lippi

Examples of Program Composition Illustrating the Use of Universal Properties 1215
Michel Charpentier, K. Mani Chandy

A Formal Framework for Specifying and Verifying Time Warp Optimizations 1228
Victoria Chernyakhovsky, Peter Frey, Radharamanan Radhakrishnan, Philip A. Wilsey, Perry Alexander, Harold W. Carter

Verifying End-to-End Protocols Using Induction with CSP/FDR 1243
S.J. Creese, Joy Reed

Mechanical Verification of a Garbage Collector 1258
Klaus Havelund

A Structured Approach to Parallel Programming: Methodology and Models 1284
Berna L. Massingill

此为试读,需要完整PDF请访问: www.ertongbook.com