Lecture Notes in Computer Science

3779

Commenced Publication in 1973
Founding and Former Series Editors:
Gerhard Goos, Juris Hartmanis, and Jan van Leeuwen

Editorial Board

David Hutchison

Lancaster University, UK

Takeo Kanade

Carnegie Mellon University, Pittsburgh, PA, USA

Josef Kittler

University of Surrey, Guildford, UK

Jon M. Kleinberg

Cornell University, Ithaca, NY, USA

Friedemann Mattern

ETH Zurich, Switzerland

John C. Mitchell

Stanford University, CA, USA

Moni Naor

Weizmann Institute of Science, Rehovot, Israel

Oscar Nierstrasz

University of Bern, Switzerland

C. Pandu Rangan

Indian Institute of Technology, Madras, India

Bernhard Steffen

University of Dortmund, Germany

Madhu Sudan

Massachusetts Institute of Technology, MA, USA

Demetri Terzopoulos

New York University, NY, USA

Doug Tygar

University of California, Berkeley, CA, USA

Moshe Y. Vardi

Rice University, Houston, TX, USA

Gerhard Weikum

Max-Planck Institute of Computer Science, Saarbruecken, Germany

Hai Jin Daniel Reed Wenbin Jiang (Eds.)

Network and Parallel Computing

IFIP International Conference, NPC 2005 Beijing, China, November 30 - December 3, 2005 Proceedings



Volume Editors

Hai Jin Huazhong University of Science and Technology Cluster and Grid Computing Lab Wuhan 430074, P.R. China E-mail: hjin@hust.edu.cn

Daniel Reed University of North Carolina at Chapel Hill Institute for Renaissance Computing CB 3175, Sitterson Hall, Chapel Hill, NC 27599-3175, USA E-mail: dan reed@unc.edu

Wenbin Jiang
Huazhong University of Science and Technology
Cluster and Grid Computing Lab
Wuhan 430074, P.R. China
E-mail: wenbinjiang@hust.edu.cn

Library of Congress Control Number: 2005935533

CR Subject Classification (1998): C.2, F.2, D.2, H.4, H.5, D.4, K.6

ISSN 0302-9743

ISBN-10 3-540-29810-X Springer Berlin Heidelberg New York ISBN-13 978-3-540-29810-6 Springer 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. Violations are liable to prosecution under the German Copyright Law.

Springer is a part of Springer Science+Business Media

springeronline.com

 $\ensuremath{\mathbb{G}}$ IFIP International Federation for Information Processing 2005 Printed in Germany

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India Printed on acid-free paper SPIN: 11577188 06/3142 5 4 3 2 1 0

Preface

These proceedings contain the papers presented at the 2005 IFIP International Conference on Network and Parallel Computing (NPC 2005), held in Beijing, China, between November 30 and December 3, 2005. The goal of the conference was to establish an international forum for engineers and scientists to present their ideas and experiences in network and parallel computing.

A total of 320 submissions were received in response to our Call for Papers. These papers were from the following countries or regions: Australia, Canada, China, France, Germany, Hong Kong, India, Iran, Italy, Japan, Korea, Luxemburg, Nepal, Netherlands, Taiwan, United Arab Emirates, and United States. Each submission was sent to at least three reviewers. Each paper was judged according to its originality, innovation, readability, and relevance to the expected audience. Based on the reviews received, a total of 68 papers were retained for inclusion in the proceedings. Among the 68 papers, 48 were accepted as full papers for presentation at the conference. We also accepted 20 papers as short papers for a possible brief presentation at the conference, followed by discussion during a poster session. Thus, only 21% of the total submissions could be included in the final program.

The IFIP NPC conference emerged from initial email exchanges between Kemal Ebcioğlu, Guojie Li, and Guang R. Gao in the year 2002, with a vision toward establishing a new, truly international conference for fostering research and collaboration in parallel computing. We are happy to see that the NPC conference, with its eminent team of organizers, and its high-quality technical program, is well on its way to becoming a flagship conference of IFIP.

We wish to thank the contributions of the other members of the Organizing Committee. We thank the Publicity Chair, Cho-Li Wang, for his hard work to publicize NPC 2005 under a very tight schedule.

We are deeply grateful to the Program Committee members. The large number of submissions received and the diversified topics made this review process a particularly challenging one.

July 2005 Hai Jin Daniel Reed

Conference Committees

General Co-chairs

Jean-Luc Gaudiot (University of California, Irvine, USA) Lionel Ni (Hong Kong University of Science and Technology, Hong Kong, China)

Steering Committee Chair

Kemal Ebcioğlu (IBM T.J. Watson Research Center, USA)

Program Co-chairs

Daniel Reed (University of North Carolina, USA) Hai Jin (Huazhong University of Science and Technology, China)

Steering Committee Members

Jack Dongarra (University of Tennessee, USA) Guangrong Gao (University of Delaware, USA) Jean-Luc Gaudiot (University of California, Irvine, USA) Guojie Li (Institute of Computing Technology, CAS, China) Yoichi Muraoka (Waseda University, Japan) Daniel Reed (University of North Carolina, USA)

Program Committee Members

Ishfaq Ahmad (University of Texas at Arlington, USA)

Makoto Amamiya (Kyushu University, Japan)

David A. Bader (Georgia Institute of Technology, USA)

Luc Bouge (IRISA/ENS Cachan, France)

Pascal Bouvry (University of Luxembourg, Luxembourg)

Wentong Cai (Nanyang Technological University, Singapore)

Jiannong Cao (Hong Kong Polytechnic University, Hong Kong, China)

Xueqi Cheng (Institute of Computing Technology, CAS, China)

Jong-Deok Choi (IBM T. J. Watson Research Center, USA)

Toni Cortes (Universitat Politècnica de Catalunya, Spain)

Chen Ding (University of Rochester, USA)

Jianping Fan (Institute of Computing Technology, CAS, China)

Xiaobing Feng (Institute of Computing Technology, CAS, China)

Guangrong Gao (University of Delaware, USA)

Minyi Guo (University of Aizu, Japan)

Yanbo Han (Institute of Computing Technology, CAS, China)

Anura Jayasumana (Colorado State Univeristy, USA)

Chris R. Jesshope (Universiteit van Amsterdam, Netherlands)

Jin Suk Kim (University of Seoul, Korea)

Chung-Ta King (National Tsing Hua University, Taiwan, China)

Ricky Kwok (The University of Hong Kong, Hong Kong)

Kuan-Ching Li (Providence University, Taiwan, China)

Chuang Lin (Tsinghua University, China)

Geyong Min (University of Bradford, UK)

Soo-Mook Moon (Seoul National University, Korea)

John Morrison (University College Cork, Ireland)

Yi Pan (Georgia State University, USA)

Wolfgang Rehm (Chemnitz University of Technology, Germany)

Sartaj Sahni (University of Florida, USA)

Simon See (Sun Microsystems Inc., USA)

Selvakennedy Selvadurai (University of Sydney, Australia)

Franciszek Seredynski (Polish Academy of Sciences, Poland)

Hong Shen (Japan Advanced Institute of Science and Technology, Japan)

Xiaowei Shen (IBM T. J. Watson Research Center, USA)

Ninghui Sun (Institute of Computing Technology, CAS, China)

El-Ghazali Talbi (University of Lille, France)

Domenico Talia (University of Calabria, Italy)

David Taniar (Monash University, Australia)

Mitchell D. Theys (University of Illinois at Chicago, USA)

Cho-Li Wang (The University of Hong Kong, Hong Kong)

Weng-Fai Wong (National University of Singapore, Singapore)

Chao-Tung Yang (Tunghai University, Taiwan, China)

Laurence T. Yang (St. Francis Xavier University, Canada)

Qing Yang (University of Rhode Island, USA)

Lixin Zhang (IBM Austin Research Laboratory, USA)

Xiaodong Zhang (The College of William and Mary, USA)

Weimin Zheng (Tsinghua University, China)

Publicity Chair

Cho-Li Wang (The University of Hong Kong, Hong Kong, China)

Publication Chair

Wenbin Jiang (Huazhong University of Science and Technology, China)

Local Arrangements Chair

Wen Gao (Institute of Computing Technology, CAS, China)

Table of Contents

Special Session on Grid and System Software	
TeraGrid: A Foundation for US Cyberinfrastructure Charles E. Catlett	1
Globus Toolkit Version 4: Software for Service-Oriented Systems Ian Foster	2
System Software for China National Grid Li Zha, Wei Li, Haiyan Yu, Xianghui Xie, Nong Xiao, Zhiwei Xu	14
Session 1: Grid Computing	
CGSV: An Adaptable Stream-Integrated Grid Monitoring System Weimin Zheng, Lin Liu, Meizhi Hu, Yongwei Wu, Liangjie Li, Feng He, Jing Tie	22
Performance Modeling and Analysis for Resource Scheduling in Data Grids Yajuan Li, Chuang Lin, Quanlin Li, Zhiguang Shan	32
Study on π -Calculus Based Equipment Grid Service Chain Model Yuexuan Wang, Cheng Wu, Ke Xu	40
A Performance-Based Parallel Loop Self-scheduling on Grid Computing Environments Wen-Chung Shih, Chao-Tung Yang, Shian-Shyong Tseng	48
A Resource-Based Server Performance Control for Grid Computing Systems Naixue Xiong, Xavier Défago, Yanxiang He, Yan Yang	56
IBP: An Index-Based XML Parser Model Haihui Zhang, Xingshe Zhou, Yang Gang, Xiaojun Wu	65
A Stochastic Control Model for Hierarchical Grid Service Zhimin Tian, Liu Li, Yang Yang, Zhengli Zhai	72

Service-Based Grid Resource Monitoring with Common Information Model	
Hongyan Mao, Linpeng Huang, Minglu Li	80
Distributed Gridflow Model and Implementation Cheng Bo, Qihe Liu, Guowei Yang	84
Session 2: Peer-to-Peer Computing	
A Secure P2P Video Conference System for Enterprise Environments Fuwen Liu, Hartmut Koenig	88
Adaptive Query-Caching in Peer-to-Peer Systems Zuoning Yin, Hai Jin, Chao Zhang, Quan Yuan, Chucheng Zhao	97
Design and Deployment of Locality-Aware Overlay Multicast Protocol for Live Streaming Services Xuping Tu, Hai Jin, Dafu Deng, Chao Zhang, Quan Yuan	105
Session 3: Web Techniques	
Dynamic Thread Management in Kernel Pipeline Web Server Shan-Shan Li, Xiang-Ke Liao, Yu-Song Tan, Jin-Yuan Liu	113
QoS Aware Service Composition with Multiple Quality Constraints Bixin Liu, Quanyuan Wu, Yan Jia, Bin Zhou	123
Session 4: Cluster Computing	
Performance Modelling and Optimization of Memory Access on Cellular Computer Architecture Cyclops64 Yanwei Niu, Ziang Hu, Kenneth Barner, Guang R. Gao	132
TCP-ABC: From Multiple TCP Connections to Atomic Broadcasting Zhiyuan Shao, Hai Jin, Wenbin Jiang, Bin Cheng	144
A Parallel File System Based on Spatial Information Object Keying Huang, Guoqing Li, Dingsheng Liu, Wenyi Zhang	153
Topology-Aware Multi-cluster Architecture Based on Efficient Index Techniques	
Yun He, Qi Zhao, Jianzhong Zhang, Gongyi Wu	163

Performance Modelling of Pipelined Circuit Switching in Torus with

An Incremental Compilation Approach for OpenMP Applications

Maurizio Giordano, Mario Mango Furnari

245

249

Hot Spot Traffic

Enhanced Congestion Control Algorithm for High-Speed TCP Young-Soo Choi, Sung-Hyup Lee, You-Ze Cho	253
Advanced Software On-Demand Based on Functional Streaming Jeong Min Shim, Won Young Kim, Wan Choi	257
Can Out-of-Order Instruction Execution in Multiprocessors Be Made Sequentially Consistent? Lisa Higham, Jalal Kawash	261
Efficiently Passive Monitoring Flow Bandwidth Zhiping Cai, Jianping Yin, Fang Liu, Xianghui Liu, Shaohe Lv	266
A Heuristic for Scheduling Parallel Programs with Synchronous Communication Model in the Network Computing Environments Mingyu Zhao, Tianwen Zhang	270
A Formal Model for Network Processor Workload Zhang Xiao Ming, Sun Zhi Gang, Zhang Min Xuan	274
Coping with Data Dependencies of Multi-dimensional Array References Lin Qiao, Weitong Huang, Zhizhong Tang	278
Session 6: Network Architecture	
QoS-Based Dynamic Channel Allocation for GSM/GPRS Networks Jun Zheng, Emma Regentova	285
Distributed Active Measuring Link Bandwidth in IP Networks Zhiping Cai, Jianping Yin, Fang Liu, Xianghui Liu, Shaohe Lv	295
Preferential Bandwidth Allocation for Short Flows with Active Queue Management Having Thomas Live Ligager Vices Weephys Day	2∩2
Heying Zhang, Liu Lu, Liquan Xiao, Wenhua Dou	303
Adaptive Control Heying Zhang, Baohong Liu, Liquan Xiao, Wenhua Dou	310
Research on Multi-agent System Automated Negotiation Theory and Model	
Weijin Jiang, Yusheng Xu, Ding Hao, Shangyou Zhen	317
Adaptive Congestion Control in ATM Networks Farzad Habibipour, Mehdi Galily, Masoum Fardis, Ali Yazdian	321

Session 7: Network Security

Secure Password Pocket for Distributed Web Services Jae Hyung Koo, Dong Hoon Lee	327
The Modified DTW Method for On-Line Automatic Signature Verification	
Dong Uk Cho, Young Lae J. Bae, Il Seok Ko	335
A Secure On-Demand Routing with Distributed Authentication for Trust-Based Ad Hoc Networks Meng-Yen Hsieh, Yueh-Min Huang	343
Probabilistic Packet Filtering Model to Protect Web Server from DDoS Attacks	
Jung-Taek Seo, Cheol-Ho Lee, Jungtae Kim, Taeshik Shon, Jongsub Moon	351
An Identity Authentication Protocol for Acknowledgment in IEEE 802.15.4 Network Joon Heo, Choong Seon Hong	355
A Design of the Digital Content Distribution System Based on the Public Key and the Hierarchical Web Caching Structure Yun Ji Na, Ko Il Seok, Gun Heui Han	359
Session 8: Network Storage	
Cluster-Aware Cache for Network Attached Storage Bin Cai, Changsheng Xie, Qiang Cao	363
Design and Implementation of a SAN Agent for Windows NT Architecture	
Ran Meng, Jiwu Shu, Wei Xue	371
MagicStore: A New Out-of-Band Virtualization System in SAN Environments	070
Guangyan Zhang, Jiwu Shu, Wei Xue, Weimin Zheng	379
A Content Delivery Accelerator in Data-Intensive Servers Joon-Woo Cho, Hyun-Jin Choi, Seung-Ho Lim, Kyu-Ho Park	387
A Systematic Scheme to Resolve QoS Dissatisfaction for Storage Cluster Young Jin Nam, Chanik Park	396

Secure Anonymous Communication with Conditional Traceability Zhaofeng Ma, Xibin Zhao, Guo Zhi, Gu Ming, Jiaguang Sun	405
Session 9: Multimedia Service	
Real-Time Video over Programmable Networked Devices Tien Pham Van	409
A New Raid-Disk Placement Method for Interactive Media Server with an Accurate Bit Count Control Yo-Won Jeong, Seung-Ho Lim, Kyu-Ho Park	417
A New Region of Interest Image Coding for Narrowband Network: Partial Bitplane Alternating Shift Li-Bao Zhang	425
Using Route Probing to Derive Link Traffic Load with Edge-Based Measurements Guofeng Zhao, Tang Hong, Zhang Yi, Shangyu Gu	433
Scheduling Multicast Traffic in a Combined Input Separate Output Queued Switch Ximing Hu, Xingming Zhang, Binqiang Wang, Zhengrong Zhao	441
A QoS-Based Scheduling Mechanism for Overlay Aggregate Traffics Yunbo Wu, Zhishu Li, Zhihua Chen, Yunhai Wu, Li Wang, Tun Lu	449
Session 10: Ubiquitous Computing	
Energy Conservation by Peer-to-Peer Relaying in Quasi-Ad Hoc Networks Andrew Ka-Ho Leung, Yu-Kwong Kwok	453
Developing Energy-Efficient Topologies and Routing for Wireless Sensor Networks Hui Tian, Hong Shen, Teruo Matsuzawa	461
The Efficient Transmission Scheme in Wireless Crypto Communication Jinkeun Hong, Kihong Kim	470
Constructing k-Connected k-Cover Set in Wireless Sensor Networks Based on Self-pruning Jiang Jie, Minghua Han, Guofu Wu, Wenhua Dou	478

GCMPR: Gateway-Centric Multi-path Routing for Internet	
Connectivity of Wireless Mobile Ad Hoc Network	
Yongqiang Liu, Wei Yan, Yafei Dai	487
A Semantic and Adaptive Context Model for Ubiquitous Computing Yunting Tang, Qing Wu	495
Research of Survival-Time-Based Dynamic Adaptive Replica Allocation	
Algorithm in Mobile Ad Hoc Networks	
Yijie Wang, Yang Kan	503
Author Index	511

Table of Contents

XV