

Yeh-Ching Chung José E. Moreira (Eds.)

Advances in Grid and Pervasive Computing

First International Conference, GPC 2006
Taichung, Taiwan, May 3-5, 2006
Proceedings



Springer

Volume Editors

Yeh-Ching Chung
National Tsing Hua University
Department of Computer Science
Hsin-Chu, Taiwan 300, ROC
E-mail: ychung@cs.nthu.edu.tw

José E. Moreira
IBM Systems & Technology Group
Blue Gene Software Systems
Rochester, MN 55901, USA
E-mail: jmoreira@us.ibm.com

Library of Congress Control Number: 2006924367

CR Subject Classification (1998): F.1, F.2, D.1, D.2, D.4, C.2, C.4, H.4, K.6

LNCS Sublibrary: SL 1 – Theoretical Computer Science and General Issues

ISSN 0302-9743
ISBN-10 3-540-33809-8 Springer Berlin Heidelberg New York
ISBN-13 978-3-540-33809-3 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

springer.com

© Springer-Verlag Berlin Heidelberg 2006
Printed in Germany

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India
Printed on acid-free paper SPIN: 11745693 06/3142 5 4 3 2 1 0

Message from the General Chairs

It is our great pleasure to welcome you to the beautiful campus of Tunghai University, Taiwan, and the first annual event of the International Conference on Grid and Pervasive Computing (GPC). Grid computing addresses the needs for coordinating and sharing large-scale heterogeneous resources for problem solving in dynamic, multi-institutional virtual organizations. Extending the resource concept into our physical surroundings and everyday objects, it is not hard to see the overlapping of grid and pervasive computing. It is with this view that GPC 2006 was established to serve as the premier forum covering the emerging research and development on blending and extending grid and pervasive technologies.

An international conference of this scale requires the support of many people. First of all, we would like to thank the Steering Committee Chair, Hai Jin, and the committee members for nourishing the conference and guiding its course. We also like to express our sincere appreciation to the Program Chairs, Yeh-Ching Chung and Jose Moreira, who, together with the exceptional Program Committee members, put together a highly selective and very exciting technical program. We are also indebted to the members of the Organizing Committee. Particularly, we thank Chao-Tung Yang, Kuan-Ching Li, Cho-Li Wang and Ching-Hsien Hsu for their devotions and efforts to make this conference a real success. Our heartfelt gratitude also goes to the Honorary General Chair, President of Tunghai University, Haydn H.D. Chen for his full support of this conference. Finally, we would like to take this opportunity to thank all the authors, reviewers and participants for their contributions to making GPC 2006 a grand success.

It has been an honor for us to serve as General Chairs for the first event of this great conference and to work with a group of dedicated and capable people. We trust that you will enjoy the proceedings of GPC 2006.

May 2006

Sajal K. Das and Chung-Ta King
General Co-chairs

Message from the Program Co-chairs

We are proud to present the proceedings of the First International Conference on Grid and Pervasive Computing 2006, held at Tunghai University during May 3-5.

Grid and Pervasive Computing (GPC) is an annual international conference on the emerging areas of merging grid computing and pervasive computing, aimed at providing an exciting platform and paradigm for all the time, everywhere services. This emergence is a natural outcome of the advances in cluster computing, high-performance computing, utility computing, service-oriented computing, peer-to-peer computing, mobile computing, sensor networks, and smart devices technologies. The aim of GPC 2006 was to be the premier event on grid and pervasive computing, focusing on all aspects of grid and pervasive computing and providing a high-profile, leading edge forum for researchers and engineers alike to present their latest research.

In order to guarantee high-quality proceedings, we put extensive effort into reviewing the scientific papers and processing the proceedings. We received 267 papers from 24 countries. All submissions were peer reviewed by three or four program or technical committee members or external reviewers. It was extremely difficult to select the presentations for the conference because there were so many excellent and interesting ones. In order to include as many papers as possible and keep the high quality of the conference, we finally decided to accept 64 papers for oral presentations. We believe all of these papers and topics will not only provide novel ideas, new results, work in progress and state-of-the-art techniques in this field, but will also stimulate future research activities in the area of grid and pervasive computing with applications.

This conference would not have been possible without the support of many people and organizations that helped in various ways to make it a success. The exciting program for this conference was the result of the hard and excellent work of many people. We would like to express our sincere thanks to the invited speakers who delivered such high-quality lectures at GPC 2006 and all authors for their valuable contributions. We thank the Program Committee members for their excellent job of reviewing the submissions and thus guaranteeing the quality of the conference and the proceedings under a very tight schedule.

May 2006

Yeh-Ching Chung and Jose E. Moreira
Program Co-chairs

Organization

Conference Committees

Honorary General Chair

Haydn H.D. Chen, Tunghai University, Taiwan

Steering Committee Chair

Hai Jin, Huazhong University of Science and Technology, China

Steering Committee Members

Jean-Luc Gaudiot, University of California - Irvine, USA

Chung-Ta King, National Tsing Hua University, Taiwan

Jysoo Lee, KISTI, Korea

Kuan-Ching Li, Providence University, Taiwan

Satoshi Sekiguchi, AIST, Japan

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

Chao-Tung Yang, Tunghai University, Taiwan

Albert Y. Zomaya, The University of Sydney, Australia

General Co-chairs

Sajal K. Das, The University of Texas at Arlington, USA

Chung-Ta King, National Tsing Hua University, Taiwan

Program Committee Co-chairs

Jose E. Moreira, IBM Systems and Technology Group, USA

Yeh-Ching Chung, National Tsing Hua University, Taiwan

Publicity Co-chairs

Hao-Hua Chu, National Taiwan University, Taiwan

Kuan-Ching Li, Providence University, Taiwan

Publication Co-chairs

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

Ching-Hsien Hsu, Chung Hua University, Taiwan

Finance Co-chairs

Chao-Tung Yang, Tunghai University, Taiwan
Wen-Chung Chiang, Hsiuping Institute of Technology, Taiwan

Registration Co-chairs

Liang-Teh Lee, Tatung University, Taiwan
Kun-Ming Yu, Chung Hua University, Taiwan

Local Arrangement Co-chairs

Chu-Hsing Lin, Tunghai University, Taiwan
Hsiao-Hsi Wang, Providence University, Taiwan

Best Paper Award Committee Chair

Jemal Abawajy, Deakin University, Australia

Best Paper Award Committee

Yong-Kee Jun, Gyeongsang National University, Korea
Wang-Chien Lee, Penn State University, USA
Ivan Stojmenovic, University of Ottawa, Canada

International Program Committee

Jemal Abawajy, Deakin University, Australia
Jose Nelson Amaral, University of Alberta, Canada
Hamid R. Arabnia, University of Georgia, USA
Mark Baker, University of Portsmouth, UK
Rajkumar Buyya, University of Melbourne, Australia
Jiannong Cao, Hong Kong Polytechnic University, China
Christophe Cerin, Universite de Paris XIII, France
Jerry Hsi-Ya Chang, NCHC, Taiwan
Ruay-Shiung Chang, National Dong Hwa University, Taiwan
Wenguang Chen, Tsinghua University, China
Hao-Hua Chu, National Taiwan University, Taiwan
Walfredo Cirne, UFCG, Brazil
Toni Cortes, Universitat Politecnica de Catalunya, Spain

Alvaro L.G.A. Coutinho, UFRJ, Brazil
Luiz DeRose, Cray Research, USA
Rudolf Eigenmann, Purdue University, USA
Dan Grigoras, University College Cork, Ireland
Minyi Guo, University of Aizu, Japan
Xiangjian He, University of Technology Sydney, Australia
Hung-Chang Hsiao, National Cheng Kung University, Taiwan
Ching-Hsien Hsu, Chung Hua University, Taiwan
Kuo-Chan Huang, Hsing Kuo University of Management, Taiwan
Stephen Jenks, University of California - Irvine, USA
Yong-Kee Jun, Gyeongsang National University, Korea
Daniel S. Katz, Jet Propulsion Laboratory, USA
Francis C.M. Lau, The University of Hong Kong, China
Wang-Chien Lee, Penn State University, USA
Jianzhong Li, Harbin Institute of Technology, China
Kuan-Ching Li, Providence University, Taiwan
Ming-Lu Li, Shanghai Jiaotong University, China
Damon Shing-Min Liu, National Chung Cheng University, Taiwan
Pangfeng Liu, National Taiwan University, Taiwan
Celso L. Mendes, University of Illinois at Urbana-Champaign, USA
Matt Mutka, Michigan State University, USA
Mohamed Ould-Khaoua, University of Glasgow, UK
Yi Pan, Georgia State University, USA
Ronald Perrott, Queen's University, UK
Cynthia A. Phillips, Sandia National Laboratories, USA
Ali Pinar, Lawrence Berkeley National Laboratory, USA
Cristina M. Pinotti, University of Perugia, Italy
Omer F. Rana, Cardiff University, UK
Sanjay Ranka, University of Florida, USA
Liria Matsumoto Sato, University of Sao Paulo, Brazil
Mitsuhisa Sato, Tsukuba University, Japan
Ce-Kuen Shieh, National Cheng Kung University, Taiwan
Seung-Jung Shin, Hansei University, Korea
Siang Wun Song, University of Sao Paulo, Brazil
Ivan Stojmenovic, University of Ottawa, Canada
John Pui-fai Sum, Chung Shan Medical University, Taiwan
Putchong Uthayopas, Kasetsart University, Thailand
Chien-Min Wang, Academia Sinica, Taiwan

XII Organization

Cho-Li Wang, University of Hong Kong, China

Frank Zhigang Wang, Cranfield University, UK

Sheng-De Wang, National Taiwan University, Taiwan

Andrew Wendelborn, University of Adelaide, Australia

Weng Fai Wong, National University of Singapore, Singapore

Jingling Xue, University of New South Wales, Australia

Chao-Tung Yang, Tunghai University, Taiwan

Guangwen Yang, Tsinghua University, China

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

Table of Contents

Session 1: Best Paper Awards

Optimizing Server Placement in Hierarchical Grid Environments <i>Chien-Min Wang, Chun-Chen Hsu, Pangfeng Liu, Hsi-Min Chen, Jan-Jan Wu</i>	1
Using OGRO and CertiVeR to Improve OCSP Validation for Grids <i>Jesus Luna, Manel Medina, Oscar Manso</i>	12
Efficient Target Detection for RNA Interference <i>Shibin Qiu, Cundong Yang, Terran Lane</i>	22
Smart Instant Messenger in Pervasive Computing Environments <i>Chun-Fai Law, Xiaolei Zhang, Sung-Ming Chan, Cho-Li Wang</i>	32

Session 2: Grid Scheduling

Negotiation Strategies for Grid Scheduling <i>Jiadao Li, Ramin Yahyapour</i>	42
An Enhanced Grid Scheduling with Job Priority and Equitable Interval Job Distribution <i>HyoYoung Lee, DongWoo Lee, R.S. Ramakrishna</i>	53
Average Schedule Length and Resource Selection Policies on Computational Grids <i>Uei-Ren Chen, Chien-Hsun Wang, Woei Lin</i>	63
A Performance-Based Approach to Dynamic Workload Distribution for Master-Slave Applications on Grid Environments <i>Wen-Chung Shih, Chao-Tung Yang, Shian-Shyong Tseng</i>	73

Session 3: Peer-to-Peer Computing

The Peering Problem in Tree-Based Master/Worker Overlays <i>Hung-Chang Hsiao, Hao Liao</i>	83
---	----

MUREX: A Mutable Replica Control Scheme for Structured Peer-to-Peer Storage Systems
Jehn-Ruey Jiang, Chung-Ta King, Chi-Hsiang Liao 93

The Subscription-Cover Based Routing Algorithm in Content-Based Publish/Subscribe
HongLiang Yuan, ChangGuo Guo, Peng Zou 103

Alliitrust: A Trustable Reputation Management Scheme for Unstructured P2P Systems
Jeffrey Gerard, Hailong Cai, Jun Wang 115

Session 4: Web/Grid Services

A Fault-Tolerant Distributed Scheme for Grid Information Services
Ming-Jeng Yang, Chin-Lin Kuo, Shih-Hsiang Lin, Yao-Ming Yeh 126

A Market-Oriented Model for Grid Service Management
Huan Wang, Zhihui Du, Lei Wu, Suihui Zhu, Erfan Shang 137

Pricing Web Services
Kevin Ho, John Sum, Gilbert S. Young 147

A Performance Improvement of Web Service System Based on the Probability Distribution Characteristics
Il Seok Ko, Yun Ji Na 157

Session 5: High Performance Computing

An Optimal Scheduling Algorithm for an Agent-Based Multicast Strategy on Irregular Networks
Yi-Fang Lin, Zhe-Hao Kang, Pangfeng Liu, Jan-Jan Wu 165

Methods for Partitioning Data to Improve Parallel Execution Time for Sorting on Heterogeneous Clusters
Christophe Cérin, Jean-Christophe Dubacq, Jean-Louis Roch 175

Detecting Unaffected Message Races in Parallel Programs
Mi-Young Park, Yong-Kee Jun 187

A Combined Technique of Non-uniform Loops
Sam Jin Jeong, Kun Hee Han, Young Chul Park 197

Session 6: Ad Hoc Networks

Neighbor-Aided Multicast Protocol for Streaming Transmission on MANETs <i>Min-Ping Lin, Chung-Ta King, Ming-Tsung Sun</i>	207
An Entropy-Based Stability QoS Multicast Routing Protocol in Ad Hoc Network <i>Baolin Sun, Layuan Li, Qiu Yang, Yang Xiang</i>	217
On the Performance of a Hybrid Routing Protocol for Blueweb: A Bluetooth-Based Multihop Ad Hoc Network <i>Chih-Min Yu, Chia-Chi Huang</i>	227
An Adaptive and Scalable Resource Advertisement and Discovery Strategy for Mobile Ad Hoc Networks <i>Donggeon Noh, Heonshik Shin</i>	237

Session 7: Wireless Sensor Networks

Binding Multiple Applications on Wireless Sensor Networks <i>Ali Hammad Akbar, Ahmad Ali Iqbal, Ki-Hyung Kim</i>	250
Model-Aided Metadata Management for Wireless Sensor Networks <i>Chongqing Zhang, Haibing Guan, Minglu Li, Min-You Wu, Wenzhe Zhang, Feilong Tang</i>	259
Availability Considerations for Wireless Sensor Grids <i>Ali Hammad Akbar, Ki-Hyung Kim, Seung-Jin Bang, Waleed Mansoor, Won-Sik Yoon</i>	269
An Energy-Aware Position-Based Routing Strategy <i>Linfeng Yuan, Zongkai Yang, Liang Ou, Wenqing Cheng, Xu Du</i>	279

Session 8: Grid Applications 1

Introduction of Grid Computing Application Projects at the NASA Earth Science Technology Office <i>Kai-Dee Chu, Liping Di, Peter Thornton</i>	289
Modeling Message-Passing Overhead on NCHC Formosa PC Cluster <i>Chau-Yi Chou, Hsi-Ya Chang, Shuen-Tai Wang, Shou-Cheng Tcheng</i>	299

Evaluation of the Device Driver Availability in Dawning4000A
Yuanxia You, Dan Meng, Gang Xue, Jie Ma 308

HyMPI – A MPI Implementation for Heterogeneous High Performance
Systems
*Franciso Isidro Massetto, Augusto Mendes Gomes Junior,
Liria Matsumoto Sato* 314

Session 9: Data Grid

Performance Improvement by Data Management Layer in a Grid RPC
System
*Yoshiaki Aida, Yoshihiro Nakajima, Mitsuhsisa Sato, Tetsuya Sakurai,
Daisuke Takahashi, Taisuke Boku* 324

Effective Dynamic Replica Maintenance Algorithm for the Grid
Environment
Rashedur M. Rahman, Ken Barker, Reda Alhajj 336

A Lightweight Cyclic Reference Counting Algorithm
Chin-Yang Lin, Ting-Wei Hou 346

Distributed Garbage Collection for Mobile Actor Systems: The Pseudo
Root Approach
Wei-Jen Wang, Carlos A. Varela 360

Session 10: Pervasive Applications 1

A Grid-Based Node Split Algorithm for Managing Current Location
Data
*Jae-Kwan Yun, Seung-Won Lee, Dong-Suk Hong, Dong-Oh Kim,
Ki-Joon Han* 373

Cicada: A Highly-Precise Easy-Embedded and Omni-Directional Indoor
Location Sensing System
*Hongliang Gu, Yuanchun Shi, Yu Chen, Bibo Wang,
Wenfeng Jiang* 385

Searchable Virtual File System: Toward an Intelligent Ubiquitous
Storage
*YongJoo Song, YongJin Choi, HyunBin Lee, Donggook Kim,
Daeyeon Park* 395

A Collaborative Privacy-Enhanced Alibi Phone <i>Hsien-Ting Cheng, Ching-Lun Lin, Hao-hua Chuinst</i>	405
---	-----

Session 11: Semantic Web / Semantic Grid

The Semantic Grid: Requirements, Infrastructure and Methodology <i>Kashif Iqbal, Stefan Decker, Mark Baker</i>	415
MPLS Inter Domain Services Routing Architecture and Model Based on P2P Semantic Grid <i>Chongying Cao, Jing Yang, Guoqing Zhang</i>	427
Semantic Metadata Models in References Sharing and Retrieval System SemreX <i>Hao Wu, Hai Jin</i>	437
Clustering Large Scale of XML Documents <i>Tong Wang, Da-Xin Liu, Xuan-Zuo Lin, Wei Sun, Gufran Ahmad</i>	447

Session 12: Grid Load Balancing

QoS-Driven Grid Resource Selection Based on Novel Neural Networks <i>Xianwen Hao, Yu Dai, Bin Zhang, Tingwei Chen, Lei Yang</i>	456
Towards Decentralized Load Balancing in a Computational Grid Environment <i>Kai Lu, Riky Subrata, Albert Y. Zomaya</i>	466
A Resource-Autonomy Based Monitoring Architecture for Grids <i>Meizhi Hu, Guangwen Yang, Weimin Zheng</i>	478
Machine Learning-Based Adaptive Load Balancing Framework for Distributed Object Computing <i>Tarek Helmy, S.A. Shahab</i>	488

Session 13: Wireless Ad Hoc/Sensor Networks

VWMAc: An Efficient MAC Protocol for Resolving Intra-flow Contention in Wireless Ad Hoc Networks <i>Wanrong Yu, Jiannong Cao, Xingming Zhou, Xiaodong Wang, Keith C.C. Chan, Alvin T.S. Chan, H.V. Leong</i>	498
--	-----

A Coloring Based Backbone Construction Algorithm in Wireless Ad Hoc Network
Zhiwei Lin, Li Xu, Dajin Wang, Jianliang Gao 509

Route Error Reporting Schemes for On-Demand Routing in 6LoWPAN
Won-Do Jung, Shafique Ahmad Chaudhry, Young-Ho Sohn, Ki-Hyung Kim 517

Are Low PANs a PAN or an Internet of PANs?
Ki-Hyung Kim, Ali Hammad Akbar 527

Session 14: Grid Applications 2

Ensuring Secure and Robust Grid Applications – From a Formal Method Point of View
Ke Xu, Yuexuan Wang, Cheng Wu 537

Supporting the OpenMP Programming Interface on Teamster-G
Tyng-Yeu Liang, Shih-Hsien Wang, Jyh-Biau Chang, Ce-Kuen Shieh 547

Key Techniques of Software Sharing for on Demand Service-Oriented Computing
Xiaoshe Dong, Yinfeng Wang, Fang Zheng, Zhongsheng Qin, Hua Guo, Guofu Feng 557

Embedding a Middleware for Networked Hardware and Software Objects
David Villa, Felix Jesús Villanueva, Francisco Moya, Fernando Rincón, Jesús Barba, Juan Carlos López 567

Session 15: Mobile Computing

Mechanism of Authenticating a MAP in Hierarchical MIPv6
Jonghyoun Choi, Youngsong Mun 577

Reducing Binding Updates in High Speed Movement Environment Based on HMIPv6
Dae Won Lee, Kwang Sik Jung, Sung-Ju Roh, KwangHee Choi, Heon Chang Yu..... 587

A Low-Overhead Non-block Checkpointing Algorithm for Mobile Computing Environment <i>Bidyut Gupta, Shahram Rahimi, Rishad A. Rias, Guru. Bangalore</i>	597
Applying Dynamic Handoff to Increase System Performance on Wireless Cellular Networks <i>Chow-Sing Lin, Cheng-Chi Lu</i>	609
Session 16: Pervasive Applications 2	
A Paradigm of a Pervasive Multimodal Multimedia Computing System for the Visually-Impaired Users <i>Ali Awde, Manolo Dulva Hina, Chakib Tadj, Amar Ramdane-Cherif, Yacine Bellik</i>	620
Context-Aware Adaptation for Media Delivery in Pervasive Computing Environment <i>Wenzhe Zhang, Haibing Guan, Minglu Li, Min-You Wu, Chongqing Zhang, Feilong Tang</i>	634
CAMPS: A Middleware for Providing Context-Aware Services for Smart Space <i>Weijun Qin, Yue Suo, Yuanchun Shi</i>	644
A Novel Power Management Scheme for E-Textiles <i>Nenggan Zheng, Zhaohui Wu, Zhigang Gao, Yanfie Liu</i>	654
Author Index	665