Proceedings

Ninth International Conference on Parallel and Distributed Computing, Applications and Technologies

Dunedin, New Zealand
1–4 December, 2008

Sponsors
KAREN — The Kiwi Advanced Research and Education Network
University of Otago
World 45
# Table of Contents

**PDCAT 2008**

**Message from the General Chairs**  
**Message from the Programme Committee Chairs**  
**Conference Organization**  
**Program Committee**  
**Reviewers**

**Keynotes**

- Looking toward Exascale Computing ................................................................. 3  
  Pete Beckman
- Virtual Organizations by the Rules ...................................................................... 4  
  Carl Kesselman
- Case Studies in Computer Network Measurement ................................................ 5  
  Tony McGregor

**Grid Computing Systems**

- A Layered Virtual Organization Architecture for Grid ......................................... 9  
  Yongqiang Zou, Li Zha, Xiaoning Wang, Haojie Zhou, and Peixu Li
- Operating System-Level Virtual Organization Support in XtreemOS .................... 17  
  An Qin, Haiyan Yu, Chengchun Shu, Xiaoqian Yu, Yvon Jegou, and Christine Morin
- Scalable Contract Net Based Resource Allocation Strategies for Grids ............... 25  
  Ravish Mahajan and Arobinda Gupta
- An Experimental Analysis for Memory Usage of GOS Core ............................... 33  
  Xiaoyi Lu, Qiang Yue, Yongqiang Zou, and Xiaoning Wang
Parallel/Distributed Algorithms

A Data-Parallel Algorithm to Reliably Solve Systems of Nonlinear Equations
Frédéric Goualard and Alexandre Goldsztejn

A New Iterative Elliptic PDE Solver on a Distributed PC Cluster
Norhashidah M. Ali and Ng Kok Fu

An Effective Structure for Algorithmic Design and a Parallel Prefix Algorithm on Metacube
Yamin Li, Shietung Peng, and Wanming Chu

A Parallel Algorithm for Block Tridiagonal Systems
Heng Zhang, Wu Zhang, and Xian-He Sun

An Efficient Parallel Algorithm for H.264/AVC Encoder
Shuwei Sun and Shuming Chen

Parallelization and Acceleration Scheme of Multilevel Fast Multipole Method
Wu Wang, Yangde Feng, and Xuebin Chi

Parallel Approximate Multi-Pattern Matching on Heterogeneous Cluster Systems
Cheng Zhong, Zeng Fan, and Defu Su

Parallel/Distributed Architecture

Switch-Based Packing Technique for Improving Token Coherence Scalability
Blas Cuesta, Antonio Robles, and José Duato

Location Consistency Model Revisited: Problem, Solution and Prospects
Guoping Long, Nan Yuan, and Dongrui Fan

An Enhancer of Memory and Network for Cluster and its Applications
Noboru Tanabe and Hironori Nakajo

Honeycomb: A Community-Based System for Distributed Data Integration and Sharing
Wenlong Huang, Taoying Liu, and Yi Zhao

Efficient Use of GUIDs
Christof Lutteroth and Gerald Weber

Tupleware: A Distributed Tuple Space for Cluster Computing
Alistair Kenneth Atkinson

Interconnection Networks

Set-to-Set Disjoint Paths Routing in Dual-Cubes
Keiichi Kaneko and Shietung Peng

Are Uniform Networks Scalable?
Takashi Yokota, Kanemitsu Ootsu, and Takanobu Baba

High Performance Computing

Overheads in Accelerating Molecular Dynamics Simulations with GPUs
Tetsu Narumi, Ryuji Sakamaki, Shun Kameoka, and Kenji Yasuoka

GPU as a General Purpose Computing Resource
Qihang Huang, Zhiyi Huang, Paul Werstein, and Martin Purvis

Feasibility Study of Implementing Multi-Channel Correlation for DSP Applications on Reconfigurable CPU+FPGA Platform
Maxim Leonov and Vyacheslav V. Kitaev
Efficient Parallelization of a Protein Sequence Comparison Algorithm on Manycore Architecture .......................................................... 167
Xiaochun Ye, Van Hoa Nguyen, Dominique Lavenier, and Dongrui Fan

Optimized Component Labeling Algorithm for Using in Medium Sized FPGAs ................................................................. 171
Yasuaki Ito and Koji Nakano

Bargain Cache: Using File-System Metadata to Reduce the Cache Miss Penalty .......................................................... 177
Yingjie Zhao and Nong Xiao

Sensor Networks
An Effective PSO-Based Node Localization Scheme for Wireless Sensor Networks .................................................. 187
Po-Jen Chuang and Cheng-Pei Wu

Periodic Mobile Multi-Gateway Scheduling .................................................................................................................. 195
Khaled Almi’ani, Selvakennedy Selvadurai, and Anastasios Viglas

GRE: Graded Residual Energy Based Lifetime Prolonging Algorithm for Pipeline Monitoring Sensor .................. 203
Zhong-wen Guo, Hanjiang Luo, Feng Hong, and Peng Zhou

Maximizing Networking Lifetime in Wireless Sensor Networks with Regular Topologies ............................................ 211
Hui Tian, Hong Shen, and Matthew Roughan

Portable Object Thermal Awareness: Modeling Intelligent Sensor Networks for Cool Store Applications .......... 218
Naresh Yamani, Adnan Al-Anbuky, and Amoakoh Gyasi-Agyei

Fault-Tolerance and Reliability
An Adaptive Checkpointing Scheme for Peer-to-Peer Based Volunteer Computing Work Flows .................................................. 227
Lei Ni and Aaron Harwood

SWPM: An Incremental Fault Localization Algorithm Based on Sliding Window with Preprocessing Mechanism ............................... 235
Cheng Zhang, Jianxin Liao, and Xiaomin Zhu

Checkpointing Process Groups in a Grid Environment .................................................................................................. 243
John Mehnert-Spahn, Michael Schöttner, and Christine Morin

LBG-SQUARE — Fault-Tolerant, Locality-Aware Co-Allocation in P2P Grids .................................................. 252
Gérard Dethier, Cyril Briquet, Pierre Marchot, and Pierre-Arnoul de Marneffe

On Improving the Reliability of Internet Services through Active Replication .................................................. 259
Narjess Ayari, Denis Barbarou, and Laurent Lefèvre

A Fast-Start, Fault-Tolerant MPI Launcher on Dawning Supercomputers .................................................. 263
Xu Liu, Bibo Tu, Jianfeng Zhan, and Dan Meng

Formal Methods and Programming Languages
Formal Semantics of a Subset of the Paderborn’s BSPlib .......................................................................................... 269
Frédéric Gava and Jean Fortin

Formal Analysis of PANA Authentication and Authorisation Protocol .................................................. 277
Steven Gordon

Conceptual Modelling and Program Generation for Dynamic Interactive Systems .................................................. 285
Courtney Powell, Kiyoshi Akama, and Toshihiro Wakatsuki
## Intelligent Computing

Finding Interaction Partners Using Attitude-Based Decision Strategies ........................................... 297  
*Toktam Ebadi, Maryam Purvis, and Martin Purvis*

Parallel Pattern Recognition Using a Single-Cycle Learning Approach within Wireless Sensor Networks .................................................. 305  
*Anang Hudaya Muhamad Amin and Asad I. Khan*

## Task Scheduling and Resource Allocation

Scheduling Algorithm Based on Force Directed Clustering ........................................................................ 311  
*Alistair Palmer and Oliver Sinnen*

Efficient Algorithms for jitterless Real-Time Tasks to DVS Schedules .................................................. 319  
*Da-Ren Chen, Shu-Ming Hsieh, and Ming-Fong Lai*

Optimal Scheduling of Task Graphs on Parallel Systems ....................................................................... 323  
*Ahmed Zaki Semar Shahul and Oliver Sinnen*

A Dynamic Provisioning Framework for Multi-Tier Internet Applications in Virtualized Data Center .................................................................................................................. 329  
*Yi Jin, Xu Liu, Jianfeng Zhan, and Shuang Gao*

## Computer Networks

Trust Enhanced Anonymous Routing in Mobile Ad-Hoc Networks ...................................................... 335  
*Min-Hua Shao and Shin-Jia Huang*

Node-Disjoint Alternative Dual-Path Routing for Data Salvation in Mobile Ad Hoc Networks ................. 342  
*Chu-Hsing Lin, Fuu-Cheng Jiang, Jen-Chieh Chang, and Frode Eika Sandnes*

Performance and Evaluation of Message Transmission Mechanism in Operation Management Platform of ForCES Routers ............................................................................................................ 350  
*Ke Qian, Weiming Wang, and Ming Gao*

DCSVS: Distributed Collaborative Set-Top-Box Video Service ................................................................ 354  
*Chao Liu, Hao Chen, and Dejian Ye*

## Algorithms for Cryptographic Applications

Operation of Super Long Integers in Cryptographic Applications ......................................................... 363  
*Shenghui Su, Jian Li, and Lei Shi*

Redundant Radix-2<sup>r</sup> Number System for Accelerating Arithmetic Operations on the FPGAs .... 370  
*Kensuke Kawakami, Koji Shigemoto, and Koji Nakano*

## Power-Aware Computing

Chasing Gaps between Bursts: Towards Energy Efficient Large Scale Experimental Grids .................. 381  
*Anne-Cécile Orgerie, Laurent Lefèvre, and Jean-Patrick Gelas*

A Low-Power Proxy to Allow Unattended Jabber Clients to Sleep ......................................................... 390  
*Paul Werstein and Wannes Vossen*
PDCAT 2008 Workshops

New Zealand Workshop in High Performance and Grid Computing (NZ HPC)

Application-Specific Disk I/O Optimisation for a Search Engine .......................................................... 399
   Xiangfei Jia, Andrew Trotman, Richard O’Keefe, and Zhiyi Huang
Stream Processing of Integral Images for Real-Time Object Detection .................................................. 405
   Chris Messom and Andre Barczak
The GReIC Portal: A Ubiquitous and Seamless Way to Manage Grid Databases ................................. 413
   Sandro Fiore, Alessandro Negro, Salvatore Vadacca, Emanuele Verdesca, Alessio Leone,
   and Giovanni Aloisio

Sensor Networks and Ambient Intelligence (SeNAml 2008)

RSDA: Reputation-Based Secure Data Aggregation in Wireless Sensor Networks ................................. 419
   Hani Alzaid, Ernest Foo, and Juan Gonzalez Nieto
Agent Migration and Communication in WSNs ...................................................................................... 425
   Conor Muldoon, Gregory M.P. O’Hare, Michael J. O’Grady, and Richard Tynan
Decision Experiment of Attenuation Constant During Location Estimation in RSSI ............................ 431
   Kazuya Tateishi and Tetsushi Ikegami
Human Body Detection Using MIMO-UWB Radar Sensor Network
   in an Indoor Environment .................................................................................................................. 437
   Go Shingu, Kenichi Takizawa, and Tetsushi Ikegami
Dynamic Network Formation in Ambient Information Networking ..................................................... 443
   Naoki Wakamiya and Masayuki Murata
Energy-Efficient Resource Management in Distributed Wireless Imaging Sensor Networks ............ 449
   Cheng Fu, Bang Wang, and Hock Beng Lim
Developing an Ambient Home Care System: Context Toolkit-Based
   Design and Implementation ............................................................................................................. 455
   Ana Hristova, Ana M. Bernardos, and José R. Casar
Cross-Layer Design in Wireless Cognitive Networks ............................................................................ 462
   Yenumula Brahmananda Reddy and Clifton Bullmaster
A Sensor Grid Infrastructure for Large-Scale Ambient Intelligence ..................................................... 468
   Mudasser Iqbal, Hock Beng Lim, Wenqiang Wang, and Yuxia Yao

Programming Parallel Applications for Multi-Cores (PPAM 2008)

Exploring the Emerging Applications for Transactional Memory ......................................................... 474
   Jiaqi Zhang, Wenguang Chen, Xinmin Tian, and Weimin Zheng
Virtual Aggregated Processor in Multi-Core Computers ........................................................................ 481
   Zhiyi Huang, Andrew Trotman, Jiaqi Zhang, Xiangfei Jia, Mariusz Nowostawski,
   Nathan Rountree, and Paul Werstein
A Framework for Concurrency in Numerical Simulations Using Lock Free Data Structures:
   The Graph Parallel Architecture — GraPA ....................................................................................... 489
   Peter Klein, Dimo Maleshkov, and Dimitar Asenov
The Layer Disruption Model: A Runtime Approach to Multi-Core Processors and Serial Code

Javier Iparraguirre and Mitchell D. Theys

Multi-Core Defense System (MSDS) for Protecting Computer Infrastructure against DDoS Attacks

Ashley Chonka, Soon Keow Chong, Wanlei Zhou, and Yang Xiang

### Workshop on High Performance Data Grid (HPDataGrid ’08)

A Parallel Recovery Scheme for Update Intensive Main Memory Database Systems

Xiongpai Qin, Yanqin Xiao, Wei Cao, and Shan Wang

MIM: Multimedia Integration Middleware, a Multimedia Services Platform for Grid Environments

Leonardo Enrique Mancilla-Amaya, and Claudia Lucía Jiménez-Guarín

Popularity-Driven Dynamic Replica Placement in Hierarchical Data Grids

Mohammad Shorfuzzaman, Peter Graham, and Rasit Eskicioglu

iGRelC: A Dashboard Implementation for Grid Environments

Sandro Fiore, Alessandro Negro, Salvatore Vadacca, and Giovanni Aloisio

Advances in the ProGenGrid Workflow Management System

Maria Mirto, Massimo Cafaro, Italo Epicoco, and Giovanni Aloisio

### Author Index

Maria Mirto, Massimo Cafaro, Italo Epicoco, and Giovanni Aloisio