Lecture Notes in Computer Science 5931

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
Alfred Kobsa
   University of California, Irvine, CA, 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
   TU Dortmund University, Germany
Madhu Sudan
   Microsoft Research, Cambridge, MA, USA
Demetri Terzopoulos
   University of California, Los Angeles, CA, USA
Doug Tygar
   University of California, Berkeley, CA, USA
Gerhard Weikum
   Max-Planck Institute of Computer Science, Saarbruecken, Germany
Martin Gilje Jaatun  Gansen Zhao  Chunming Rong (Eds.)

Cloud Computing

First International Conference, CloudCom 2009  
Beijing, China, December 1- 4, 2009  
Proceedings

Springer
Preface

This volume contains the proceedings of CloudCom 2009, the First International Conference on Cloud Computing. The conference was held in Beijing, China, during December 1–4, 2009, and was the first in a series initiated by the Cloud Computing Association (www.cloudcom.org). The Cloud Computing Association was founded in 2009 by Chunming Rong, Martin Gilje Jaatun, and Frode Eika Sandnes. This first conference was organized by the Beijing Jiaotong University, Chinese Institute of Electronics, and Wuhan University, and co-organized by Huazhong University of Science and Technology, South China Normal University, and Sun Yat-sen University.

Ever since the inception of the Internet, a “Cloud” has been used as a metaphor for a network-accessible infrastructure (e.g., data storage, computing hardware, or entire networks) which is hidden from users. To some, the concept of cloud computing may seem like a throwback to the days of big mainframe computers, but we believe that cloud computing makes data truly mobile, allowing a user to access services anywhere, anytime, with any Internet browser. In cloud computing, IT-related capabilities are provided as services, accessible without requiring control of, or even knowledge of, the underlying technology. Cloud computing provides dynamic scalability of services and computing power, and although many mature technologies are used as components in cloud computing, there are still many unresolved and open problems.

The CloudCom 2009 conference provided a dynamic forum for engineers and scientists in academia, industry, and government to exchange ideas and experiences in developing: cloud/grid architectures; load balancing schemes; Optimal deployment configurations; consistency models; virtualization technologies; middleware frameworks; software as a service (SaaS); hardware as a service (HaaS); data grid & Semantic Web; Web services; security and risk; fault tolerance and reliability; auditing, monitoring and scheduling; utility computing; high-performance computing; and peer-to-peer computing, all within the concept of cloud computing.

Almost 200 papers were submitted, from all around the world. The Program Chairs rejected 20 clearly out-of-scope papers without review, and these are not included in the acceptance ratio calculation. All relevant submissions were reviewed by at least three Technical Program Committee members or external reviewers. In order to ensure a high quality, out of 167 papers in the submission and review system only 44 regular full-length papers were accepted for oral presentation and inclusion in the proceedings, reflecting a 27% acceptance rate. Since cloud computing is a relatively new field, we also included some contributions in the short paper sessions representing ongoing research and interesting ideas. All of these papers and topics provided novel ideas, new results, work in progress, and state-of-the-art techniques in this field. We thus made every
effort to stimulate the future research activities in the area of cloud computing, to encourage the dissemination of various research results and ideas, and to make CloudCom2009 a real forum for cloud computing research and technology. The program also included four invited talks from James Yeh, Geoffrey Fox, Chunming Rong, and Rajkumar Buyya.

Organization of conferences with a large number of submissions requires a lot of hard work and dedication from many people. We would like to take this opportunity to thank numerous individuals whose work made this conference possible and ensured its high quality. First and foremost, we thank the authors of submitted papers for contributing to the conference technical program. We are also grateful to the Program (Vice) Chairs, for their hard work and commitment to quality when helping with the paper selection. We would also like to thank all Program Committee members and external reviewers for their excellent job in the paper review process. We are indebted to the Publicity Chairs for advertising the conference, to the Local Organizing Committee for managing registration and other conference organization-related tasks, and to Beijing Jiatong University, Chinese Institute of Electronics, and Wuhan University for hosting the conference. We are also grateful to Liang Yan and Jie Lian for their intrepid efforts managing the two mirrors of the conference website, and to EasyChair for providing the conference management system.

Special thanks to Hamid R. Arabnia, University of Georgia, Han-Chieh Chao, National Ilan University, Frode Eika Sandnes, Oslo University College, Chunming Rong, University of Stavanger, and Hai Jin, Huangzhong University of Science and Technology, for organising special issues in the Journal of Supercomputing, the Journal of Internet Technology, and the Journal of Computer Science and Technology.

October 2009          Martin Gilje Jaatun
                     Gansen Zhao
                     Chunming Rong
Conference Organization

Honorary General Chair
Jichuan Wu
Chinese Institute of Electronics, China

General Chairs (Academic)
Deyi Li
Chinese Academy of Engineering, China
Hai Jin
Huazhong University of Science & Technology, China

General Chair (Organizing)
Yun Liu
Beijing Jiaotong University, China

Program Chairs
Martin Gilje Jaatun
SINTEF ICT, Norway
Gansen Zhao
South China Normal University/Sun Yat-sen University, China

Program Vice Chairs
Geoffrey Fox
Indiana University, USA
Ho-fung Leung
Chinese University of Hong Kong, China
Omer F. Rana
Cardiff University, UK
Waleed Smari
University of Dayton, USA
Luca Spalazzi
Università Politecnica delle Marche, Italy
Yun Yang
Swinburne University of Technology, Australia
Shi Ying
Wuhan University, China

Award Chair
David Bader
Georgia Institute of Technology, USA
Panel Chairs

Rajkumar Buyya  
University of Melbourne and Manjrasoft, Australia

Hai Jin  
Huazhong University of Science and Technology, China

Steering Committee

Chunming Rong  
University of Stavanger, Norway (Chair)

Hai Jin  
Huazhong University of Science and Technology, China

Martin Gilje Jaatun  
SINTEF, Norway

Rulin Liu  
Chinese Institute of Electronics, China

Advisory Committee

Hamid R. Arabnia  
University of Georgia, USA

Han-Chieh Chao  
National Ilan University, Taiwan, China

Geoffrey Fox  
Indiana University, USA

Benxiong Huang  
Huazhong University of Science and Technology, China

Chung-Ming Huang  
National Chung Kung University, Taiwan, China

Victor Leung  
University of British Columbia, Canada

Jianhua Ma  
Hosei University, Japan

Mark Musen  
Stanford University, USA

Jong Hyuk Park  
Kyungnam University, Korea

Frode Eika Sandnes  
Oslo University College, Norway

Cho-Li Wang  
University of Hong Kong, China

Zhiwei Xu  
Chinese Academy of Science, China

Laurence T. Yang  
St. Francis Xavier University, Canada

Finance Committee

Runhua Lin  
Chinese Institute of Electronics, China (Chair)

Zhenjiang Zhang  
Beijing Jiaotong University, China (Co-chair)

Gansen Zhao  
South China Normal University/Sun Yat-sen University, China (Co-chair)

Organizing Committee

Yong Li  
Beijing Jiaotong University, China (Chair)

Kaihong Dong  
Chinese Institute of Electronics, China (Co-chair)
Bing Li  
Wuhan University, China (Co-chair)

Yanning Zhang  
Beijing Jiaotong University, China (Co-chair)

Dan Tao  
Beijing Jiaotong University, China

Liang Yan  
University of Stavanger, Norway

Jin Liu  
Wuhan University, China

Yimin Zhang  
Chinese Institute of Electronics, China

Web Administration Chairs

Jie Lian  
Beijing Jiaotong University, China

Qing Liu  
Beijing Jiaotong University, China

Publicity Chair

Paul Van Binst  
Université Libre de Bruxelles, Belgium

Publication Chair

Wei Sun  
Sun Yat-sen University, China

European Liaison Chair

Erik Hjelmås  
Gjøvik University College, Norway

American Liaison Chair

Naixue Xiong  
Georgia State University, USA

Asia Liaison Chair

Robert Hsu  
Chung Hua University, Taiwan

Oceania Liaison Chair

Oliver Sinnen  
University of Auckland, New Zealand

Program Committee

Gagan Agrawal  
Ohio State University, USA

Ahmed Al-Dubai  
Napier University, UK

Bernady Apduhan  
Kyushu Sangyo University, Japan

Atta Badii  
University of Reading, UK
<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jörg Hähner</td>
<td>Leibniz University of Hannover, Germany</td>
</tr>
<tr>
<td>Luigi Lo Iacono</td>
<td>NEC Laboratories Europe, Germany</td>
</tr>
<tr>
<td>Alexandru Iosup</td>
<td>TU Delft, The Netherlands</td>
</tr>
<tr>
<td>Mike (Hua) Ji</td>
<td>Juniper Networks, USA</td>
</tr>
<tr>
<td>Thilo Kielmann</td>
<td>Vrije Universiteit, The Netherlands</td>
</tr>
<tr>
<td>Hiroaki Kikuchi</td>
<td>Tokai University, Japan</td>
</tr>
<tr>
<td>Romain Laborde</td>
<td>University Paul Sabatier, France</td>
</tr>
<tr>
<td>Bing Li</td>
<td>Wuhan University, China</td>
</tr>
<tr>
<td>Juanzi Li</td>
<td>Tsinghua University, China</td>
</tr>
<tr>
<td>Wenjun Li</td>
<td>Sun Yat-sen University, China</td>
</tr>
<tr>
<td>Xuhui Li</td>
<td>Wuhan University, China</td>
</tr>
<tr>
<td>Yan Li</td>
<td>Intel, China</td>
</tr>
<tr>
<td>Yong Li</td>
<td>Beijing Jiaotong University, China</td>
</tr>
<tr>
<td>Zhi Li</td>
<td>800APP, China</td>
</tr>
<tr>
<td>Peter Linington</td>
<td>University of Kent, UK</td>
</tr>
<tr>
<td>Jiming Liu</td>
<td>Hong Kong Baptist University, Hong Kong, China</td>
</tr>
<tr>
<td>Yun Liu</td>
<td>Beijing Jiaotong University, China</td>
</tr>
<tr>
<td>Peng Liu</td>
<td>PLA University of Science and Technology, China</td>
</tr>
<tr>
<td>Seng Wai Loke</td>
<td>La Trobe University, Australia</td>
</tr>
<tr>
<td>Shizhu Long</td>
<td>BORQS, China</td>
</tr>
<tr>
<td>Jinhu Lv</td>
<td>Chinese Academy of Science, China</td>
</tr>
<tr>
<td>Huadong Ma</td>
<td>Beijing University of Posts and</td>
</tr>
<tr>
<td></td>
<td>Telecommunications, China</td>
</tr>
<tr>
<td>Antonio Maña Gomez</td>
<td>University of Malaga, Spain</td>
</tr>
<tr>
<td>Ian Marshall</td>
<td>Lancaster University, UK</td>
</tr>
<tr>
<td>Hong Mei</td>
<td>Peking University, China</td>
</tr>
<tr>
<td>Hein Meling</td>
<td>University of Stavanger, Norway</td>
</tr>
<tr>
<td>Kai Xiang Miao</td>
<td>Intel China Research Center, China</td>
</tr>
<tr>
<td>José A. Montenegro</td>
<td>Universidad de Málaga, Spain</td>
</tr>
<tr>
<td>David Moreland</td>
<td>CSIRO, Australia</td>
</tr>
<tr>
<td>Gero Mühl</td>
<td>Technical University of Berlin, Germany</td>
</tr>
<tr>
<td>Tadahiko Murata</td>
<td>Kansai University, Japan</td>
</tr>
<tr>
<td>Simin Nadjm-Tehrani</td>
<td>Linköping University, Sweden</td>
</tr>
<tr>
<td>Dimitris Nikolopoulos</td>
<td>Virginia Tech, USA</td>
</tr>
<tr>
<td>Josef Noll</td>
<td>UniK, Norway</td>
</tr>
<tr>
<td>Oleksandr Otenko</td>
<td>Oracle, UK</td>
</tr>
<tr>
<td>Maria S. Perez-Hernandez</td>
<td>Universidad Politécnica de Madrid, Spain</td>
</tr>
<tr>
<td>Radu Prodan</td>
<td>University of Innsbruck, Austria</td>
</tr>
<tr>
<td>Depei Qian</td>
<td>BeiHang University, China</td>
</tr>
<tr>
<td>Huai'feng Qin</td>
<td>Platform Computing, China</td>
</tr>
<tr>
<td>Julian L. Rrushi</td>
<td>Oak Ridge National Laboratory, USA</td>
</tr>
<tr>
<td>Ali Shahrabi</td>
<td>Glasgow Caledonian University, UK</td>
</tr>
<tr>
<td>Kuei-Ping Shih</td>
<td>Tamkang University, Taiwan, China</td>
</tr>
</tbody>
</table>
Timothy K. Shih  NTUE, Taiwan, China
Qinbao Song   Xian Jiao Tong University, China
Willy Susilo  University of Wollongong, Australia
Jie Tang     Tsinghua University, China
Yong Tang    South China Normal University, China
Feiyue Wang  Chinese Academy of Sciences, China
Guojun Wang  Central South University, China
Junfeng Wang Sichuan University, China
Peng Wang    Chengdu University of Information Technology, China
Qing Wang    Chinese Academy of Sciences, China
Yi Wang      Google China Research Lab, China
Von Welch    University of Illinois, USA
Gilbert Wondracek  TU Vienna, Austria
Song Wu      Huazhong University of Science and Technology, China
Xinran Wu    Intel Research China, China
Jinhua Xiong Institute of Computing Technology, CAS, China
Dongyan Xu   Purdue University, USA
Zhiyong Xu   Suffolk University, USA
Lu Yan       University of Hertfordshire, UK
Shoubao Yang USTC, China
Geng Yang    Nanjing University of Post & Telecommunications, China
Chao-Tung Yang Tunghai University, Taiwan, China
Hongyu Yao   Yoyo System, China
Jon (Jong-Hoon) Youn University of Nebraska at Omaha, USA
Feng Yu      Southeast University, China
Huashan Yu   Peking University, China
Nenghai Yu   University of Science and Technology of China, China
Zhiwen Yu    Northwestern Polytechnical University, China
Sherali Zeadally University of the District of Columbia, USA
Cheng Zeng   Wuhan University, China
Li Zha       Institute of Computing Technology, CAS, China
Feng Zhang   Sun Yat-sen University, China
Li Zhang     BeiHang University, China
Tingting Zhang Mid Sweden University, Sweden
Zonghua Zhang NICT, Japan
Wenyin Zhao  KingQue Cor., China
Weimin Zheng Tsinghua University, China
Zhibin Zheng HUAWEI, China
Sheng Zhong  
Wenhui Zhou  
Jinzy Zhu  
Peidong Zhu  
Deqing Zou  
Knut Øvsthus

SUNY Buffalo, USA  
China Mobile Research Institute, China  
IBM Software Group Services, China  
National University of Defense Technology, China  
Huazhong University of Science and Technology, China  
Bergen University College, Norway

**External Reviewers**

Azab, Abdulrahman  
Cao, Zhidong  
Chang, Lei  
Chen, Jidong  
Chen, Xi  
Chen, Xu  
Chen, Yu  
Deng, Fang  
Ding, Zhijun  
Garg, Nandan  
Hao, Lu  
He, Chengwan  
He, Keqiong  
Huang, Bo  
Huang, Jiung-yao  
Huang, Xiaomeng  
Ibrahim, Shadi  
Jeng, Yu-Lin  
Liu, Haiwen  
Liu, Jeff  
Liu, Jin  
Long, Qin  
Luo, Xiangfeng  
Muñoz, Antonio  
Nyre, Åsmund Ahlmann  
Ostermann, Simon  
Peng, Rong  
Rekleitis, Evangelos  
Schneider, Joerg  
Schoenherr, Jan H.  
Shi, Feng  
Shi, Xuanhua

Slagell, Adam  
Sonmez, Ozan  
Sun, Xiaoping  
Sun, Yibo  
Tang, Lei  
Ting, Chuan-Kang  
Voorsluys, William  
Wang, Chi  
Wang, Lei  
Wang, Rui  
Wang, Xingang  
Wang, Zhu  
Wu, Ling  
Wu, Qian  
Xiao, Chunxian  
Xiao, Junchao  
Xiaolong, Zheng  
Yang, Bo  
Yang, Qiusong  
Yang, Ziye  
Yigitbasi, Nezih  
Zaman, Sharrukh  
Zhai, Haoliang  
Zhang, Chi  
Zhang, Junsheng  
Zhao, Zhuofeng  
Zheng, Zibin  
Zhou, Aoying  
Zhou, Guofu  
Zhou, Shuigeng  
Zhydkov, Dmytro
Table of Contents

1. Invited Papers

The Many Colors and Shapes of Cloud ............................. 1  
   *James T. Yeh*

Biomedical Case Studies in Data Intensive Computing ............. 2  
   *Geoffrey Fox, Xiaohong Qiu, Scott Beason, Jong Choi,  
   Jaliya Ekanayake, Thilina Gunarathne, Mina Rho, Haixu Tang,  
   Neil Devadasan, and Gilbert Liu*

An Industrial Cloud: Integrated Operations in Oil and Gas in the  
Norwegian Continental Shelf ...................................... 19  
   *Chunning Rong*

Cloudbus Toolkit for Market-Oriented Cloud Computing .......... 24  
   *Rajkumar Buyya, Suraj Pandey, and Christian Vecchiola*

2. Full Papers

Self-healing and Hybrid Diagnosis in Cloud Computing .......... 45  
   *Yuanshun Dai, Yanping Xiang, and Gewei Zhang*

Snow Leopard Cloud: A Multi-national Education Training and  
Experimentation Cloud and Its Security Challenges .............. 57  
   *Erdal Cayirci, Chunning Rong, Wim Huiskamp, and Cor Verkoelen*

Trust Model to Enhance Security and Interoperability of Cloud  
Environment .......................................................... 69  
   *Wenjuan Li and Lingdi Ping*

Dynamic Malicious Code Detection Based on Binary Translator .... 80  
   *Zhe Fang, Minglu Li, Chuliang Weng, and Yuan Luo*

A Privacy Manager for Cloud Computing ........................... 90  
   *Siani Pearson, Yun Shen, and Miranda Mowbray*

Privacy in a Semantic Cloud: What’s Trust Got to Do with It? .... 107  
   *Åsmund Ahlmann Nyre and Martin Gilje Jaatun*

Data Protection-Aware Design for Cloud Services .................. 119  
   *Sadie Creese, Paul Hopkins, Siani Pearson, and Yun Shen*

Accountability as a Way Forward for Privacy Protection in the  
Cloud ........................................................................... 131  
   *Siani Pearson and Andrew Charlesworth*
Towards an Approach of Semantic Access Control for Cloud Computing.................. 145
Luokai Hu, Shi Ying, Xiangyang Jia, and Kai Zhao

Identity-Based Authentication for Cloud Computing................................. 157
Hongwei Li, Yuanshun Dai, Ling Tian, and Haomiao Yang

Liang Yan, Chunming Rong, and Gansen Zhao

Availability Analysis of a Scalable Intrusion Tolerant Architecture with Two Detection Modes ......................................................... 178
Toshikazu Uemura, Tadashi Dohi, and Naoto Kaio

Data Center Consolidation: A Step towards Infrastructure Clouds ............. 190
Markus Winter

Decentralized Service Allocation in a Broker Overlay Based Grid.............. 200
Abdulrahman Azab and Hein Meling

DisTec: Towards a Distributed System for Telecom Computing................. 212
Shengqi Yang, Bai Wang, Haizhou Zhao, Yuan Gao, and Bin Wu

Cloud Computing Boosts Business Intelligence of Telecommunication Industry ................................................................. 224
Meng Xu, Dan Gao, Chao Deng, Zhiguo Luo, and Shaoling Sun

Xiaoxin Wu, Wei Wang, Ben Lin, and Kai Miao

SLA-Driven Adaptive Resource Management for Web Applications on a Heterogeneous Compute Cloud............................... 243
Waheed Iqbal, Matthew Dailey, and David Carrera

Cost of Virtual Machine Live Migration in Clouds: A Performance Evaluation ................................................................. 254
William Voorsluys, James Broberg, Srikumar Venugopal, and Rajkumar Buyya

Cloud-Oriented Virtual Machine Management with MLN .................... 266
Kyrre Begnum, Nii Apleh Larrey, and Lu Xing

A Systematic Process for Developing High Quality SaaS Cloud Services.................. 278
Hyun Jung La and Soo Dong Kim

Cloud Computing Service Composition and Search Based on Semantic......................... 290
Cheng Zeng, Xiao Guo, Weijie Ou, and Dong Han
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deploying Mobile Computation in Cloud Service</td>
<td>301</td>
</tr>
<tr>
<td>Xuhui Li, Hao Zhang, and Yongfa Zhang</td>
<td></td>
</tr>
<tr>
<td>A Novel Method for Mining SaaS Software Tag via Community Detection</td>
<td>312</td>
</tr>
<tr>
<td>in Software Services Network</td>
<td></td>
</tr>
<tr>
<td>Li Qin, Bing Li, Wei-Feng Pan, and Tao Peng</td>
<td></td>
</tr>
<tr>
<td>Retrieving and Indexing Spatial Data in the Cloud Computing Environment</td>
<td>322</td>
</tr>
<tr>
<td>Yonggang Wang, Sheng Wang, and Daliang Zhou</td>
<td></td>
</tr>
<tr>
<td>Search Engine Prototype System Based on Cloud Computing</td>
<td>332</td>
</tr>
<tr>
<td>Jinyu Han, Min Hu, and Hongwei Sun</td>
<td></td>
</tr>
<tr>
<td>Distributed Structured Database System HugeTable</td>
<td>338</td>
</tr>
<tr>
<td>Ji Qi, Ling Qian, and Zhiguo Luo</td>
<td></td>
</tr>
<tr>
<td>Cloud Computing: A Statistics Aspect of Users</td>
<td>347</td>
</tr>
<tr>
<td>Gansen Zhao, Jiale Liu, Yong Tang, Wei Sun, Feng Zhang, Xiaoqing Ye,</td>
<td></td>
</tr>
<tr>
<td>Na Tang</td>
<td></td>
</tr>
<tr>
<td>An Efficient Cloud Computing-Based Architecture for Freight System</td>
<td>359</td>
</tr>
<tr>
<td>Application in China Railway</td>
<td></td>
</tr>
<tr>
<td>Baopeng Zhang, Ning Zhang, Honghui Li, Feng Liu, and Kai Miao</td>
<td></td>
</tr>
<tr>
<td>Web Server Farm in the Cloud: Performance Evaluation and Dynamic</td>
<td>369</td>
</tr>
<tr>
<td>Architecture</td>
<td></td>
</tr>
<tr>
<td>Huan Liu and Sewook Wee</td>
<td></td>
</tr>
<tr>
<td>SPECI, a Simulation Tool Exploring Cloud-Scale Data Centres</td>
<td>381</td>
</tr>
<tr>
<td>Ilango Sriram</td>
<td></td>
</tr>
<tr>
<td>CloudWF: A Computational Workflow System for Clouds Based on Hadoop</td>
<td>393</td>
</tr>
<tr>
<td>Chen Zhang and Hans De Sterck</td>
<td></td>
</tr>
<tr>
<td>A Novel Multipath Load Balancing Algorithm in Fat-Tree Data Center</td>
<td>405</td>
</tr>
<tr>
<td>Laiquan Han, Jinkuan Wang, and Cuirong Wang</td>
<td></td>
</tr>
<tr>
<td>Scheduling Active Services in Clustered JBI Environment</td>
<td>413</td>
</tr>
<tr>
<td>Xiangyang Jia, Shi Ying, Luokai Hu, and Chunlin Chen</td>
<td></td>
</tr>
<tr>
<td>Task Parallel Scheduling over Multi-core System</td>
<td>423</td>
</tr>
<tr>
<td>Bo Wang</td>
<td></td>
</tr>
<tr>
<td>Cost-Minimizing Scheduling of Workflows on a Cloud of Memory Managed</td>
<td>435</td>
</tr>
<tr>
<td>Multicore Machines</td>
<td></td>
</tr>
<tr>
<td>Nicolas G. Grounds, John K. Antonio, and Jeff Muehring</td>
<td></td>
</tr>
</tbody>
</table>
Table of Contents

Green Cloud on the Horizon ................................................. 451
   Mufajjul Ali

Industrial Cloud: Toward Inter-enterprise Integration .................. 460
   Tomasz Wiktor Wlodarczyk, Chunming Rong, and
   Kari Anne Haaland Thorsen

Community Cloud Computing ............................................. 472
   Alexandros Marinos and Gerard Briscoe

A Semantic Grid Oriented to E-Tourism ................................. 485
   Xiao Ming Zhang

Irregular Community Discovery for Social CRM in Cloud Computing ... 497
   Jin Liu, Fei Liu, Jing Zhou, and Cheng Wan He

A Contextual Information Acquisition Approach Based on Semantics
and Mashup Technology .................................................. 510
   Yangfan He, Lu Li, Keqing He, and Xiuhong Chen

Evaluating MapReduce on Virtual Machines: The Hadoop Case ....... 519
   Shadi Ibrahim, Hai Jin, Lu Lu, Li Qi, Song Wu, and Xuanhua Shi

APFA: Asynchronous Parallel Finite Automaton for Deep Packet
Inspection in Cloud Computing ........................................ 529
   Yang Li, Zheng Li, Nenghai Yu, and Ke Ma

3. Short Papers

Secure Document Service for Cloud Computing ........................ 541
   Jin-Song Xu, Ru-Cheng Huang, Wan-Ming Huang, and Geng Yang

Privacy of Value-Added Context-Aware Service Cloud ................ 547
   Xin Huang, Yin He, Yifan Hou, Lisi Li, Lan Sun, Sina Zhang,
   Yang Jiang, and Tingting Zhang

A Simple Technique for Securing Data at Rest Stored in a Computing
Cloud ............................................................................. 553
   Jeff Sedayao, Steven Su, Xiaohao Ma, Minghao Jiang, and Kai Miao

Access Control of Cloud Service Based on UCON ...................... 559
   Chen Danwei, Huang Xiuli, and Ren Xunyi

Replica Replacement Strategy Evaluation Based on Grid Locality ..... 565
   Lihua Ai and Siwei Luo

Performance Evaluation of Cloud Service Considering Fault Recovery ... 571
   Bo Yang, Feng Tan, Yuan-Shun Dai, and Suchang Guo
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>BlueSky Cloud Framework: An E-Learning Framework Embracing</td>
<td>577</td>
</tr>
<tr>
<td>Bo Dong, Qinghua Zheng, Mu Qiao, Jian Shu, and Jie Yang</td>
<td></td>
</tr>
<tr>
<td>Cloud Infrastructure &amp; Applications – CloudIA</td>
<td>583</td>
</tr>
<tr>
<td>Anthony Sulistio, Christoph Reich, and Frank Doelitzscher</td>
<td></td>
</tr>
<tr>
<td>One Program Model for Cloud Computing</td>
<td>589</td>
</tr>
<tr>
<td>Guofu Zhou and Guoliang He</td>
<td></td>
</tr>
<tr>
<td>Enterprise Cloud Architecture for Chinese Ministry of Railway</td>
<td>595</td>
</tr>
<tr>
<td>Xumei Shan and Hefeng Liu</td>
<td></td>
</tr>
<tr>
<td>Research on Cloud Computing Based on Deep Analysis to Typical</td>
<td>601</td>
</tr>
<tr>
<td>Platforms</td>
<td></td>
</tr>
<tr>
<td>Tianze Xia, Zheng Li, and Nenghai Yu</td>
<td></td>
</tr>
<tr>
<td>Automatic Construction of SP Problem-Solving Resource Space</td>
<td>609</td>
</tr>
<tr>
<td>Jin Liu, Fei Liu, Xue Chen, and Junfeng Wang</td>
<td></td>
</tr>
<tr>
<td>An Idea of Special Cloud Computing in Forest Pests’ Control</td>
<td>615</td>
</tr>
<tr>
<td>Shaocan Jiang, Luming Fang, and Xiaoying Huang</td>
<td></td>
</tr>
<tr>
<td>IBM Cloud Computing Powering a Smarter Planet</td>
<td>621</td>
</tr>
<tr>
<td>Jinzy Zhu, Xing Fang, Zhe Guo, Meng Hua Niu, Fan Cao, Shuang Yue, and Qin Yu Liu</td>
<td></td>
</tr>
<tr>
<td>Cloud Computing: An Overview</td>
<td>626</td>
</tr>
<tr>
<td>Ling Qian, Zhiguo Luo, Yujian Du, and Leitao Guo</td>
<td></td>
</tr>
<tr>
<td>Integrating Cloud-Computing-Specific Model into Aircraft Design</td>
<td>632</td>
</tr>
<tr>
<td>Tian Zhimin, Lin Qi, and Yang Guangwen</td>
<td></td>
</tr>
<tr>
<td>Towards a Theory of Universally Composable Cloud Computing</td>
<td>638</td>
</tr>
<tr>
<td>Huafei Zhu</td>
<td></td>
</tr>
<tr>
<td>A Service-Oriented Qos-Assured and Multi-Agent Cloud Computing</td>
<td>644</td>
</tr>
<tr>
<td>Architecture</td>
<td></td>
</tr>
<tr>
<td>Bu-Qing Cao, Bing Li, and Qi-Ming Xia</td>
<td></td>
</tr>
<tr>
<td>Price-Oriented Trading Optimization for Grid Resource</td>
<td>650</td>
</tr>
<tr>
<td>Hao Li, Guo Tang, Wei Guo, Changyan Sun, and Shaowen Yao</td>
<td></td>
</tr>
<tr>
<td>A Requirements Recommendation Method Based on Service Description</td>
<td>656</td>
</tr>
<tr>
<td>Da Ning and Rong Peng</td>
<td></td>
</tr>
<tr>
<td>Extending YML to Be a Middleware for Scientific Cloud Computing</td>
<td>662</td>
</tr>
<tr>
<td>Ling Shang, Serge G. Petiton, Nahid Emad, Xiaolin Yang, and Zhijian Wang</td>
<td></td>
</tr>
<tr>
<td>Title</td>
<td>Page</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Power-Aware Management in Cloud Data Centers</td>
<td>668</td>
</tr>
<tr>
<td><em>Milan Milenkovic, Enrique Castro-Leon, and James R. Blakley</em></td>
<td></td>
</tr>
<tr>
<td>Parallel $K$-Means Clustering Based on MapReduce</td>
<td>674</td>
</tr>
<tr>
<td><em>Weizhong Zhao, Huifang Ma, and Qing He</em></td>
<td></td>
</tr>
<tr>
<td>Storage and Retrieval of Large RDF Graph Using Hadoop and MapReduce</td>
<td>680</td>
</tr>
<tr>
<td><em>Mohammad Farhan Husain, Pankil Doshi, Latifur Khan, and Bhavani Thuraisingham</em></td>
<td></td>
</tr>
<tr>
<td>Distributed Scheduling Extension on Hadoop</td>
<td>687</td>
</tr>
<tr>
<td><em>Zeng Dadan, Wang Xieqin, and Jiang Ningkang</em></td>
<td></td>
</tr>
<tr>
<td>A Data Distribution Aware Task Scheduling Strategy for MapReduce System</td>
<td>694</td>
</tr>
<tr>
<td><em>Leitao Guo, Hongwei Sun, and Zhiguo Luo</em></td>
<td></td>
</tr>
<tr>
<td>Cloud Computing Based Internet Data Center</td>
<td>700</td>
</tr>
<tr>
<td><em>Jianping Zheng, Yue Sun, and Wenhui Zhou</em></td>
<td></td>
</tr>
<tr>
<td><strong>Author Index</strong></td>
<td>705</td>
</tr>
</tbody>
</table>