

2015 IEEE 7th International Conference on Cloud Computing Technology and Science (CloudCom 2015)

**Vancouver, British Columbia, Canada
30 November – 3 December 2015**



**IEEE Catalog Number: CFP15CLU-POD
ISBN: 978-1-4673-9561-8**

**Copyright © 2015 by the Institute of Electrical and Electronic Engineers, Inc
All Rights Reserved**

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

******This publication is a representation of what appears in the IEEE Digital Libraries. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP15CLU-POD
ISBN (Print-On-Demand):	978-1-4673-9561-8
ISBN (Online):	978-1-4673-9560-1

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com

2015 IEEE 7th International Conference on Cloud Computing Technology and Science

CloudCom 2015

Table of Contents

Message from the General Co-Chairs.....	xiii
Message from the Program Chairs.....	xiv
Message from the Cloud Computing Association.....	xv
Message from the Enterprise Security Workshop Chairs.....	xvi
Message from the Data Teaching Workshop Chairs.....	xviii
Message from the DSVCC Workshop Chairs.....	xx
Message from the QAC 2015 Workshop Chairs.....	xxii
Committee Lists.....	xxiv
Program Committee Members.....	xxvi
Reviewers.....	xxxiii
Sponsors.....	xxxiv
Keynotes.....	xxxv
Tutorials.....	xlii
Panel Abstracts.....	xlv

Session 1A: Big Data and HPC

SmartFetch: Efficient Support for Selective Queries	1
<i>Manuel Ferreira, João Paiva, Manuel Bravo, and Luís Rodrigues</i>	
Record-Aware Two-Level Compression for Big Textual Data Analysis Acceleration	9
<i>Dapeng Dong and John Herbert</i>	
Adaptive Cloud Resource Allocation for Analysing Many Video Streams	17
<i>Wenyi Chen, Yung-Hsiang Lu, and Thomas J. Hacker</i>	
HPCCloud: A Cloud/Web-Based Simulation Environment	25
<i>Patrick O’Leary, Mark Christon, Sébastien Jourdain, Chris Harris, Markus Berndt, and Andrew Bauer</i>	

Session 1B: Security and Privacy I

VISO: Characterizing Malicious Behaviors of Virtual Machines with Unsupervised Clustering	34
<i>Yen-Han Li, Yeu-Ruey Tzeng, and Fang Yu</i>	
Friend or Foe? Detecting and Isolating Malicious Nodes in Mobile Edge Computing Platforms	42
<i>Abderrahmen Mtibaa, Khaled Harras, and Hussein Alnuweiri</i>	
Security-as-a-Service for Microservices-Based Cloud Applications	50
<i>Yuqiong Sun, Susanta Nanda, and Trent Jaeger</i>	
Security Compliance Auditing of Identity and Access Management in the Cloud: Application to OpenStack	58
<i>Suryadipta Majumdar, Taous Madi, Yushun Wang, Yosr Jarraya, Makan Pourzandi, Lingyu Wang, and Mourad Debbabi</i>	

Session 1C: Architecture I (Resource Management)

Gemini: An Adaptive Performance-Fairness Scheduler for Data-Intensive Cluster Computing	66
<i>Zhaojie Niu, Shanjiang Tang, and Bingsheng He</i>	
Fast and QoS-Aware Heterogeneous Data Center Scheduling Using Locality Sensitive Hashing	74
<i>Mohammad Shahedul Islam, Matt Gibson, and Abdullah Muzahid</i>	
Prediction-Based Admission Control for IaaS Clouds with Multiple Service Classes	82
<i>Marcus Carvalho, Daniel Menascé, and Francisco Brasileiro</i>	
Traffic-Aware Resource Controller for IaaS Clouds	91
<i>Koichi Onoue and Naoki Matsuoka</i>	

Session 2A: Services and Applications I (Performance Evaluation)

Let Latency Guide You: Towards Characterization of Cloud Application Performance	99
<i>Hamed Saljooghinejad, Felix Cuadrado, and Steve Uhlig</i>	
An Evaluation Model for Selecting Cloud Services from Commercially Available Cloud Providers	107
<i>Shyam S. Wagle, Mateusz Guzek, Pascal Bouvry, and Raymond Bisdorff</i>	
An Empirical Study for Evaluating the Performance of <i>jclouds</i>	115
<i>Marcelo Alexandre da Cruz Ismael, Cesar Alberto da Silva, Gabriel Costa Silva, and Reginaldo Ré</i>	
A Classifier for the Latency-CPU Behaviors of Serving Jobs in Distributed Environments	123
<i>Christophe Restif, Natalia Ponomareva, and Krzysztof Ostrowski</i>	

Session 2B: Cloud Computing and IoT

Governing Elastic IoT Cloud Systems under Uncertainty	131
<i>Stefan Nastic, Georgiana Copil, Hong-Linh Truong, and Schahram Dustdar</i>	
Green Energy Aware Avatar Migration Strategy in Green Cloudlet Networks	139
<i>Xiang Sun, Nirwan Ansari, and Qiang Fan</i>	
D-CLOC: A Delay Tolerant Cloud Formation Using Context-Aware Mobile Crowdsourcing	147
<i>Shahid Al Noor and Ragib Hasan</i>	
Energy Efficiency as an Orchestration Service for Mobile Internet of Things	155
<i>Peramanathan Sathyamoorthy, Edith C.-H. Ngai, Xiping Hu, and Victor C. M. Leung</i>	

Session 2C: Short Papers I

Scheduling Data-Driven Workflows in Multi-cloud Environment	163
<i>Nafise Sooezi, Saeid Abrishami, and Majid Lotfian</i>	
Dynamic Pricing Scheme: Towards Cloud Revenue Maximization	168
<i>Fadi Alzhouri and Anjali Agarwal</i>	
A Middleware-Centric Optimization Approach for the Automated Provisioning of Services in the Cloud	174
<i>Karolina Vukojevic-Haupt, Santiago Gómez Sáez, Florian Haupt, Dimka Karastoyanova, and Frank Leymann</i>	
Value and Energy Optimizing Dynamic Resource Allocation in Many-Core HPC Systems	180
<i>Amit Kumar Singh, Piotr Dziurzanski, and Leandro Soares Indrusiak</i>	
The Ignite Distributed Collaborative Scientific Visualization System	186
<i>Sushil Bhojwani, Matthew Hemmings, Daniel Ingalls, Jens Lincke, Robert Krahn, David Lary, Patrick McGeer, Glenn Ricart, Marko Roeder, Yvonne Coady, and Ulrike Stege</i>	
Prototyping Decomposed Cloud Software: A Case Study on 3D Skeletal Game Engine	192
<i>Minchen Li, Wei Cai, Ke Wang, Ji Hong, and Victor C. M. Leung</i>	

Session 3A: Media, Social Media, and Gaming Applications

Gaussian Mixture Model Based Interest Prediction In Social Networks	196
<i>Dongyun An, Xianghan Zheng, Chunming Rong, Tahar Kechadi, and ChongCheng Chen</i>	
Integration of an Assisted P2P Live Streaming Service in Community Network Clouds	202
<i>Mennan Selimi, Nuno Apolónia, Ferran Olid, Felix Freitag, Leandro Navarro, Agustí Moll, Roger Pueyo, and Luís Veiga</i>	
Minimizing Resource Cost for Camera Stream Scheduling in Video Data Center	210
<i>Yihong Gao, Huadong Ma, Haitao Zhang, Xianda Yang, and Ning Cao</i>	
DCRA: Decentralized Cognitive Resource Allocation Model for Game as a Service	218
<i>Nabil M. Al-Rousan, Wei Cai, Hong Ji, and Victor C. M. Leung</i>	

Session 3B: Architecture II (Virtualization and Synchronization)

Diagnosing Virtualization Overhead for Multi-threaded Computation on Multicore Platforms	226
<i>Xiaoning Ding and Jianchen Shan</i>	
vINT: Hardware-Assisted Virtual Interrupt Remapping for SMP VM with Scheduling Awareness	234
<i>Jian Li, Ruhui Ma, HaiBing Guan, and David S. L. Wei</i>	
APPLE: Addressing Lock Holder Preemption Problem with High Efficiency	242
<i>Jianchen Shan, Xiaoning Ding, and Narain Gehani</i>	
IncludeOS: A Minimal, Resource Efficient Unikernel for Cloud Services	250
<i>Alfred Bratterud, Alf-Andre Walla, Hårek Haugerud, Paal E. Engelstad, and Kyrre Begnum</i>	

Session 4A: Architecture III (Energy Management and Fault Tolerance)

A Dual Delay Timer Strategy for Optimizing Server Farm Energy	258
<i>Fan Yao, Jingxin Wu, Guru Venkataramani, and Suresh Subramaniam</i>	
Crowdware: A Framework for GPU-Based Public-Resource Computing with Energy-Aware Incentive Mechanism	266
<i>Zhongli Dong, Young Choon Lee, and Albert Y. Zomaya</i>	
A QoS-Aware Data Reconstruction Strategy for a Data Fault-Tolerant Storage System	274
<i>Hsin-Wen Wei, Tseng-Yi Chen, Shuo-Han Chen, Nai-Yuan Jhang, Li-Zheng Liang, Chih-Ching Kuo, Tsan-sheng Hsu, and Wei-Kuan Shih</i>	
Conflict-Free Partially Replicated Data Types	282
<i>Iwan Briquemont, Manuel Bravo, Zhongmiao Li, and Peter Van Roy</i>	

Session 4B: Architecture V (Pricing-Based Schemes)

On a Feedback Control-Based Mechanism of Bidding for Cloud Spot Service	290
<i>Zheng Li, Maria Kihl, and Anders Robertsson</i>	
A Privacy and Price-Aware Inter-Cloud System	298
<i>Yuanfang Chi, Wei Cai, Zhen Hong, Henry C. B. Chan, and Victor C. M. Leung</i>	
Providing Fairer Resource Allocation for Multi-tenant Cloud-Based Systems	306
<i>Jia Ru, John Grundy, Yun Yang, Jacky Keung, and Li Hao</i>	
WAIO: Improving Virtual Machine Live Storage Migration for the Cloud by Workload-Aware IO Outsourcing	314
<i>Yaodong Yang, Hong Jiang, Bo Mao, Lei Tian, Yuekun Yang, and Junjie Qian</i>	

Session 5A: Services and Applications III (Cloud Computing Operations Management)

Operation Changes Recommendation Method Using Histories of Operation Changes in Cloud Computing Environment	322
<i>Shinya Kitajima, Shinji Kikuchi, and Yasuhide Matsumotoy</i>	
Service-Level Agreement Durability for Web Service Response Time	331
<i>Hiranya Jayathilaka, Chandra Krintz, and Rich Wolski</i>	
Evolutionary Algorithm with AHP Decision-Making Method for Cloud Workflow Service Composition	339
<i>Miao Zhang and Li Liu</i>	
An Autonomous Data Structure for Brute Force Calculations in the Cloud	347
<i>Silvia Grampone, Witold Litwin, and Thomas Schwarz S.J.</i>	

Session 5B: Security and Privacy II

Harbormaster: Policy Enforcement for Containers	355
<i>Mingwei Zhang, Daniel Marino, and Petros Efstathopoulos</i>	
Assessing Data Breach Risk in Cloud Systems	363
<i>Yogachandran Rahulamathavan, Muttukrishnan Rajarajan, Omer F. Rana, Malik S. Awan, Pete Burnap, and Sajal K. Das</i>	
ARCHISTAR: Towards Secure and Robust Cloud Based Data Sharing	371
<i>Thomas Loruenser, Andreas Happe, and Daniel Slamanig</i>	
StoreSim: Optimizing Information Leakage in Multicloud Storage Services	379
<i>Hao Zhuang, Rameez Rahman, Pan Hui, and Karl Aberer</i>	

Session 6A: Architecture IV (Resource Management)

Continuous Datacenter Consolidation	387
<i>Petter Svärd, Wubin Li, Eddie Wadbro, Johan Tordsson, and Erik Elmroth</i>	
Enhancing Real-Time Applications by Means of Multi-tier Cloud Federations	397
<i>Vamis Xhagjika, Leandro Navarro, and Vladimir Vlassov</i>	
Effective Load Balancing Mechanism for Heterogeneous Range Queriable Cloud Storage	405
<i>Xun Shao, Masahiro Jibiki, Yuuichi Teranishi, and Nozomu Nishinaga</i>	
Semi-Open Trace Based Simulation for Reliable Evaluation of Job Throughput and User Productivity	413
<i>Netanel Zakay and Dror G. Feitelson</i>	

Session 6B: Short Papers II

Data Velocity Scaling via Dynamic Monitoring Frequency on Ultrascale Infrastructures	422
<i>Toni Mastelić and Ivona Brandić</i>	
FSAD: Flow Similarity Analysis for Anomaly Detection in Cloud Applications	426
<i>Senbo Fu, Hyong Kim, and Rui Prior</i>	

Virtualized FPGA Accelerators for Efficient Cloud Computing	430
<i>Suhaib A Fahmy, Kizheppatt Vipin, and Shanker Shreejith</i>	
Energy Efficient Virtual Machine Consolidation under Uncertain Input Parameters for Green Data Centers	436
<i>Enrica Zola and Andreas J. Kasser</i>	
Renewable Energy-Aware Inter-Datacenter Virtual Machine Migration over Elastic Optical Networks	440
<i>Liang Zhang, Tao Han, and Nirwan Ansari</i>	
Server-Side Efficient Parity Generation for Cluster-Wide RAID System	444
<i>Hiroki Ohtsuji and Osamu Tatebe</i>	
QoS-Aware Service Composition in Mobile Cloud Networks	448
<i>Ismaeel Al Ridhawi and Yousif Al Ridhawi</i>	

Poster/Demo Papers

Pricing Models for Sensor-Cloud	454
<i>Chunsheng Zhu, Victor C. M. Leung, Edith C.-H. Ngai, Laurence T. Yang, Lei Shu, and Xiuhua Li</i>	
An SDN App for Hadoop Clusters	458
<i>Chi-Yi Lin and Jhen-Yu Liao</i>	
Octopus: Hybrid Big Data Integration Engine	462
<i>Yanjie Chen, Chenyang Xu, Weixiong Rao, Hong Min, and Gong Su</i>	
Clouds of Things Need Information Flow Control with Hardware Roots of Trust	467
<i>Thomas F. J.-M. Pasquier, Jatinder Singh, and Jean Bacon</i>	
Planning Mobile Cloud Infrastructures Using Stochastic Petri Nets and Graphic Processing Units	471
<i>Francisco Airtton Silva, Matheus Rodrigues, Paulo Maciel, Sokol Kosta, and Alessandro Mei</i>	
A Novel Cloud-Based Crowd Sensing Approach to Context-Aware Music Mood-Mapping for Drivers	475
<i>Arun Sai Krishnan, Xiping Hu, Jun-qi Deng, Renfei Wang, Min Liang, Chunsheng Zhu, Victor C. M. Leung, and Yu-Kwong Kwok</i>	
Towards a Methodology for Trade-off Analysis in a Multi-cloud Environment Considering Monitored QoS Metrics and Economic Performance Assessment Results	479
<i>Claudia-Melania Chituc</i>	
Energy Efficient Resource Allocation over Cloud-RAN Based Heterogeneous Network	483
<i>Heli Zhang, Hong Ji, Xi Li, Ke Wang, and Weidong Wang</i>	

PhD Consortium Papers

Design and Implementation of a Distributed Mobility Management Entity on OpenStack	487
<i>Gopika Premsankar, Kimmo Ahokas, and Sakari Luukkainen</i>	
Towards Integration of Wireless Sensor Networks and Cloud Computing	491
<i>Chunsheng Zhu, Xi Li, Hong Ji, and Victor C. M. Leung</i>	

A Cloud-Based Workflow Approach for Optimizing Molecular Docking Simulations of Fully-Flexible Receptor Models and Multiple Ligands	495
<i>Renata De Paris, Duncan A. D. Ruiz, and Osmar Norberto de Souza</i>	
A Productive Cloud Computing Platform Research for Big Data Analytics	499
<i>Yuzhong Yan, Chao Chen, and Lei Huang</i>	

The Second International Workshop on Enterprise Security

Passing the Buck: Outsourcing Incident Response Management	503
<i>Alfredo Ramiro Reyes Zúñiga and Martin Gilje Jaatun</i>	
Validating Technology Acceptance Model (TAM) during IT Adoption in Organizations	509
<i>Osdan Jokonya</i>	
The Importance of Proper Measurement for a Cloud Security Assurance Model	517
<i>Bob Duncan and Mark Whittington</i>	
Information Security in the Cloud: Should We be Using a Different Approach?	523
<i>Bob Duncan and Mark Whittington</i>	
Security and Privacy in Cloud Computing via Obfuscation and Diversification: A Survey	529
<i>Shohreh Hosseinzadeh, Sami Hyrynsalmi, Mauro Conti, and Ville Leppänen</i>	
Cloud Storage Forensic: hubiC as a Case-Study	536
<i>Ben Blakeley, Chris Cooney, Ali Dehghantanha, and Rob Aspin</i>	
Risk Management Using Big Real Time Data	542
<i>Jie Cheng, Chunming Rong, Huijuan Ye, and Xianghan Zheng</i>	
Cryptanalysis and Enhancement of a Password-Based Authentication Scheme	548
<i>Mohamed H. Eldefrawy and Jalal F. Al-Muhtadi</i>	
An Efficient Framework and Access Control Scheme for Cloud Health Care	552
<i>Saravana kumar N., Rajya Lakshmi G.V., and Annappa B.</i>	
Risk Analysis of Business Intelligence in Cloud Computing	558
<i>Raed Alsufyani and Victor Chang</i>	
A Case Study on Data Protection and Security Decisions in Cloud HPC	564
<i>Morgan Eldred, Alice Good, and Carl Adams</i>	

Data Teaching Workshop

Teaching Domain-Driven Data Science: Public-Private Co-creation of Market-Driven Certificate	569
<i>Andrea Manieri, Francesco Saverio Nucci, Mauro Femminella, and Gianluca Reali</i>	
Experience with Problem-Based Learning in a Hybrid Classroom	575
<i>Tomasz Wiktorski, Thomas Hacker, Raymond A. Hansen, and Gregory Rodgers</i>	
Data Science and Online Education	582
<i>Geoffrey Fox, Sidd Maini, Howard Rosenbaum, and David Wild</i>	

Data Science Professional Uncovered: How the EDISON Project will Contribute to a Widely Accepted Profile for Data Scientists	588
<i>Andrea Manieri, Steve Brewer, Ruben Riestra, Yuri Demchenko, Matthias Hemmje, Tomasz Wiktorski, Tiziana Ferrari, and Jeremy Frey</i>	

Teaching Programming on Cloud: A Perspective Beyond Programming	594
<i>Yan Liu</i>	

The First IEEE Workshop on Delay-Sensitive Video Computing in the Cloud (DSVCC)

GPU-Accelerated Key Frame Analysis for Face Detection in Video	600
<i>Xuan Qi and Chen Liu</i>	

An Open Source Cloud Gaming Testbed Using DirectShow	606
<i>Hamed Ahmadi, Mahmoud Reza Hashemi, and Shervin Shirmohammadi</i>	

First International Workshop on Quality of Service Assurance in the Cloud (QAC 2015)

Minimizing Latency of Real-Time Container Cloud for Software Radio Access Networks	611
<i>Chen-Nien Mao, Mu-Han Huang, Satyajit Padhy, Shu-Ting Wang, Wu-Chun Chung, Yeh-Ching Chung, and Cheng-Hsin Hsu</i>	

Simulating High Availability Scenarios in Cloud Data Centers: A Closer Look	617
<i>Mohamed Abu Sharkh, Abdallah Shami, Peter Öhlén, Abdelkader Ouda, and Ali Kanso</i>	

A Dynamic Bandwidth Prediction and Provisioning Scheme in Cloud Networks	623
<i>Abiola Adegboyega</i>	

A Formal Approach for QoS Assurance in the Cloud	629
<i>Parisa Heidari, Hanifa Boucheneb, and Abdallah Shami</i>	

Temperature Distribution Prediction in Data Centers for Decreasing Power Consumption by Machine Learning	635
<i>Yuya Tarutani, Kazuyuki Hashimoto, Go Hasegawa, Yutaka Nakamura, Takumi Tamura, Kazuhiro Matsuda, and Morito Matsuoka</i>	

Author Index	643
---------------------------	-----