

2017 IEEE International Conference on Cloud Computing Technology and Science (CloudCom 2017)

**Hong Kong
11 – 14 December 2017**



**IEEE Catalog Number: CFP17CLU-POD
ISBN: 978-1-5386-0693-3**

**Copyright © 2017 by the Institute of Electrical and Electronics 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 is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP17CLU-POD
ISBN (Print-On-Demand):	978-1-5386-0693-3
ISBN (Online):	978-1-5386-0692-6

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

2017 IEEE 9th International Conference on Cloud Computing Technology and Science

CloudCom 2017

Table of Contents

Message from the General Chairs.....	xi
Message from the Program Chairs.....	xii
Message from the Cloud Computing Association – CloudCom.org	xiii
Organizing Committee.....	xiv
Technical Program Committee.....	xv
Conference Sponsors and Organizer.....	xxii
Keynotes	xxiii
Blockchain Forum.....	xxix
Panel.....	xxx
Tutorials.....	xxxv
Message from the Data Teaching Workshop 2017	
Organizers	xxxix
Data Teaching Workshop 2017 Organizing Committee.....	xli
Message from the NetCloud 2017 Organizers.....	xlii
NetCloud 2017 Organizing Committee.....	xliv
Message from the FutureCloud 2017 Organizers.....	xlv
FutureCloud 2017 Organizing Committee.....	xlvii

Part I: IEEE CloudCom 2017 Main Conference

Session 1A: IoT and Mobile on Cloud

Balancing Cloud and Mobile Terminal: An Empirical Study on Decomposed Cloud Gaming	1
<i>Wei Cai, Chaojie Zhu, Yuanfang Chi, and Victor C.M. Leung</i>	
Kea: A Computation Offloading System for Smartphone Sensor Data	9
<i>Roshan Bharath Das, Nicolae Vladimir Bozdog, Marc X. Makkes, and Henri Bal</i>	

MAMoC: Multisite Adaptive Offloading Framework for Mobile Cloud Applications	17
<i>Dawand Sulaiman and Adam Barker</i>	

PATH2iot: A Holistic, Distributed Stream Processing System	25
<i>Peter Michalák and Paul Watson</i>	

Session 1B: Distributed Cloud / Cloud Brokering / Edge and Fog Computing (I)

Self-Regulated Multi-criteria Decision Analysis: An Autonomous Brokerage-Based Approach for Service Provider Ranking in the Cloud	33
<i>Muhammad Umer Wasim, Abdallah A. Z. A. Ibrahim, Pascal Bouvry, and Tadas Limba</i>	

On Uncoordinated Service Placement in Edge-Clouds	41
<i>Onur Ascigil, Truong Khoa Phan, Argyrios G. Tasiopoulos, Vasilis Surlas, Ioannis Psaras, and George Pavlou</i>	

Traffic-Aware Virtual Machine Placement in Cloudlet Mesh with Adaptive Bandwidth	49
<i>Kangkang Li and Jarek Nabrzyski</i>	

Session 1C: Cloud Architecture - Best Paper Candidates

Re-designing Cloud Platforms for Massive Scale Using a P2P Architecture	57
<i>João Monteiro Soares, Fetahi Wuhib, Vinay Yadhav, Xin Han, and Robin Joseph</i>	

VM-Aware Adaptive Storage Cache Prefetching	65
<i>Keiichi Matsuzawa and Takahiro Shinagawa</i>	

A Tale of Two Systems: Using Containers to Deploy HPC Applications on Supercomputers and Clouds	74
<i>Andrew J. Younge, Kevin Pedretti, Ryan E. Grant, and Ron Brightwell</i>	

Session 2A: Architecture and Virtualization (I)

VICE Registry: An Image Registry for Virtual Collaborative Environments	82
<i>Christopher B. Hauser and Jörg Domaschka</i>	

Virtual Network Function Placement: Towards Minimizing Network Latency and Lead Time	90
<i>Daewoong Cho, Javid Taheri, Albert Y. Zomaya, and Lizhe Wang</i>	

Online Phase Detection and Characterization of Cloud Applications	98
<i>Arnamooy Bhattacharyya, Stelios Sotiriadis, and Cristiana Amza</i>	

Session 2B: Cloud Services and Applications (I)

PCAD: Cloud Performance Anomaly Detection with Data Packet Counts	106
<i>Ke Wang and Hyong S. Kim</i>	

RESTful Web Services on Standalone Disaggregated FPGAs	N/A
<i>Raphael Polig, Jagath Weerasinghe, and Christoph Hagleitner</i>	

Benchmarking Cloud-Based SCADA System	122
<i>Mao Yi, Harald Mueller, Liu Yu, and Jiang Chuan</i>	

Session 2C: Distributed Cloud Computing - Best Paper Candidates

Decentralized Search for Shortest Path Approximation in Large-Scale Complex Networks	130
<i>Zheng Lu, Yunhe Feng, and Qing Cao</i>	
Supporting Internet-of-Things Analytics in a Fog Computing Platform	138
<i>Hua-Jun Hong, Pei-Hsuan Tsai, An-Chieh Cheng, Md Yusuf Sarwar Uddin, Nalini Venkatasubramanian, and Cheng-Hsin Hsu</i>	
Ellis: Dynamically Scaling Distributed Dataflows to Meet Runtime Targets	146
<i>Lauritz Thamsen, Ilya Verbitskiy, Jossekin Beilharz, Thomas Renner, Andreas Polze, and Odej Kao</i>	

Session 3A: Architecture and Virtualization (II)

SPDK: A Development Kit to Build High Performance Storage Applications	154
<i>Ziye Yang, James R. Harris, Benjamin Walker, Daniel Verkamp, Changpeng Liu, Cunyin Chang, Gang Cao, Jonathan Stern, Vishal Verma, and Luse E. Paul</i>	
A Preliminary Review of Enterprise Serverless Cloud Computing (Function-as-a-Service) Platforms	162
<i>Theo Lynn, Pierangelo Rosati, Arnaud Lejeune, and Vincent Emeakaro</i>	
Resource Cages: A New Abstraction of the Hypervisor for Performance Isolation Considering IDS Offloading	170
<i>Kenichi Kourai, Sungho Arai, Kousuke Nakamura, Seigo Okazaki, and Shigeru Chiba</i>	

Session 3B: Cloud Services and Applications (II)

A Framework and Task Allocation Analysis for Infrastructure Independent Energy-Efficient Scheduling in Cloud Data Centers	178
<i>Bernhard Primas, Peter Garraghan, David McKee, Jon Summers, and Jie Xu</i>	
On the Performance and Cost of Cloud-Assisted Multi-path Bulk Data Transfer	186
<i>Kyuho Jeong, Renato Figueiredo, and Kohei Ichikawa</i>	
Quantifying the Financial Value of Cloud Investments: A Systematic Literature Review	194
<i>Pierangelo Rosati, Grace Fox, David Kenny, and Theo Lynn</i>	

Session 4A: Architecture and Virtualization (III)

TAG: Traffic-Aware Global Live Migration to Enhance User Experience of Cloud Applications	202
<i>Saurav Nanda and Thomas J Hacker</i>	
A Novel Game Map Preloading and Resource Provisioning Scheme in Cooperative Cloud Networks	210
<i>Ziqiao Lin, Zehua Wang, Wei Cai, and Victor C.M. Leung</i>	

Session 4B: Short Papers/Posters/Demos

An Alternate Load Distribution Scheme in DHTs	218
<i>Pulkit Goel, Kumar Rishabh, and Vasudeva Varma</i>	
On Edge Cloud Service Provision with Distributed Home Servers	223
<i>Amin M. Khan and Felix Freitag</i>	
An Approach for Reducing the Traffic within Cloud Environments Based on Customized Linux Kernel	227
<i>Yi-Wen Chen and Hung-Min Sun</i>	
Foggy: A Platform for Workload Orchestration in a Fog Computing Environment	231
<i>Daniele Santoro, Daniel Zozin, Daniele Pizzolli, Francesco De Pellegrini, and Silvio Cretti</i>	
A Multi-component Branch Predictor Design for Low Resource Budget Processors	N/A
<i>Moumita Das, Ansuman Banerjee, Bei Yu, and Bhaskar Sardar</i>	

Session 5A: Architecture and Virtualization (IV)

On the Efficiency Gains of Using Disaggregated Hardware to Build Warehouse-Scale Clusters	239
<i>Giovanni Farias, Francisco Brasileiro, Raquel Lopes, Marcus Carvalho, Fábio Morais, and Daniel Turull</i>	
Payless Monitoring Service for Tenants in Cloud with Traffic and Energy-Aware Function Deployment	247
<i>Alireza Shameli-Sendi, Habib Louafi, and Mohamed Cheriet</i>	

Session 5B: Cloud Services and Applications (III)

Continuous Location Validation of Cloud Service Components	255
<i>Philipp Stephanow, Mohammad Moein, and Christian Banse</i>	
Identifying Persistent and Recurrent QoE Anomalies for DASH Streaming in the Cloud	263
<i>Chen Wang, Hyong Kim, and Ricardo Morla</i>	
Using DSML for Handling Multi-tenant Evolution in Cloud Applications	272
<i>Assylbek Jumagaliyev, Jon Whittle, and Yehia Elkhatib</i>	

Session 6A: Big Data

iBig Hybrid Architecture for Energy IoT: When the Power of Indexing Meets Big Data Processing!	280
<i>Housseem Chihoub and Christine Collet</i>	
Predicting Resource Requirement and Runtime of Graphlab Jobs	N/A
<i>Srikant Padala and Janakiram Dharanipragada</i>	

Session 6B: Distributed Cloud / Cloud Brokering / Edge and Fog Computing (II)

Virtual Cloud Service System for Building Effective Inter-Cloud Applications	296
<i>Atsuko Takefusa, Shigetoshi Yokoyama, Yoshinobu Masatani, Tomoya Tanjo, Kazushige Saga, Masaru Nagaku, and Kento Aida</i>	
DiFFuSE, a Distributed Framework for Cloud-Based Epidemic Simulations: A Case Study in Modelling the Spread of Bovine Viral Diarrhea Virus	304
<i>Linh Manh Pham, Nikos Parlavantzas, Christine Morin, Sandie Arnoux, Luyuan Qi, Philippe Gontier, and Pauline Ezanno</i>	

Session 7A: Security and Privacy

DynSGX: A Privacy Preserving Toolset for Dynamically Loading Functions into Intel(R) SGX Enclaves	314
<i>Rodolfo Silva, Pedro Barbosa, and Andrey Brito</i>	
BMCArmor: A Hardware Protection Scheme for Bare-Metal Clouds	322
<i>Takaaki Fukai, Satoru Takekoshi, Kohei Azuma, Takahiro Shinagawa, and Kazuhiko Kato</i>	

PhD Consortium

From Cloud Computing to Fog Computing: Unleash the Power of Edge and End Devices	331
<i>Hua-Jun Hong</i>	

Part II: IEEE CloudCom 2017 Co-Located Workshops

The Seventh Workshop on Network Infrastructure Services as Part of Cloud Computing (NetCloud 2017)

PA-Flow: Gradual Packet Aggregation at Virtual Network I/O for Efficient Service Chaining	335
<i>Yuki Taguchi, Ryota Kawashima, Hiroki Nakayama, Tsunemasa Hayashi, and Hiroshi Matsuo</i>	
Deadline-Aware Coflow Scheduling in a DAG	341
<i>Junchao Wang, Huan Zhou, Yang Hu, Cees de Laat, and Zhiming Zhao</i>	
CYCLONE: The Multi-cloud Middleware Stack for Application Deployment and Management	347
<i>Mathias Slawik, Christophe Blanchet, Yuri Demchenko, Fatih Turkmen, Alexy Ilyushkin, Cees de Laat, and Charles Loomis</i>	
C2: General Purpose Cloud Platform with NFV Life-Cycle Management	353
<i>Vitaly Antonenko, Ruslan Smeliansky, Alexander Ermilov, Artem Plakunov, Nadezhda Pinaeva, and Andrey Romanov</i>	

2017 Data Teaching Workshop — The Forth Workshop on Curricula and Teaching Methods in Cloud Computing, Big Data, and Data Science

Navigating Diverse Data Science Learning: Critical Reflections Towards Future Practice	357
<i>Yehia Elkhatib</i>	
Customisable Data Science Educational Environment: From Competences Management and Curriculum Design to Virtual Labs On-Demand	363
<i>Yuri Demchenko, Adam Belloum, Cees de Laat, Charles Loomis, Tomasz Wiktorski, and Erwin Spekschoor</i>	
Model Curricula for Data Science EDISON Data Science Framework	369
<i>Tomasz Wiktorski, Yuri Demchenko, and Adam Belloum</i>	

International Workshop on the Future of Cloud Computing and Cloud Services (FutureCloud 2017)

Accountability Requirements for the Cloud	375
<i>Martin Gilje Jaatun, Inger Anne Tøndel, Nils Brede Moe, Daniela Soares Cruzes, Karin Bernsmed, and Børge Haugset</i>	
HayACK: Exploiting Characteristically Diverse Paths to Achieve Quick ACKing in MPTCP	383
<i>Yusuke Morikoshi, Hirotake Abe, and Kazuhiko Kato</i>	
Designing Overlay Networks for Decentralized Clouds	391
<i>Genc Tato, Marin Bertier, and Cédric Tedeschi</i>	
Optimal Control of Storage Regeneration with Repair Codes	397
<i>Francesco De Pellegrini, Rachid El Azouzi, Alonso Silva, and Olfa Hassani</i>	
Author Index	404