

2017 IEEE International Conference on Cloud Engineering (IC2E 2017)

**Vancouver, British Columbia, Canada
4-7 April 2017**



**IEEE Catalog Number: CFP1783U-POD
ISBN: 978-1-5090-5818-1**

**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:	CFP1783U-POD
ISBN (Print-On-Demand):	978-1-5090-5818-1
ISBN (Online):	978-1-5090-5817-4

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 International Conference on Cloud Engineering

IC2E 2017

Table of Contents

Message from the IC2E 2017 General Chairs.....	ix
Message from the IC2E 2017 Program Chairs.....	x
IC2E 2017 Organizing Committee.....	xii
IC2E 2017 Program Committee.....	xiv
Message from the CLaw 2017 Chairs.....	xvi
CLaw 2017 Program Committee.....	xvii
Message from the WoC 2017 Chairs.....	xviii
WoC 2017 Program Committee.....	xix
Message from the IC2E 2017 Doctoral Symposium Chair.....	xx
Keynote Abstracts.....	xxi
Tutorial Abstracts.....	xxiv
Sponsors.....	xxxi

Doctoral Symposium Papers

Student Session 1

Introducing SECURESTREAMS: Scalable Middleware for Reactive and Secure Data Stream Processing	1
<i>Aurelien Havet, Valerio Schiavoni, Pascal Felber, and Romain Rouvoy</i>	
Paving the Way for Energy Efficient Cloud Data Centers: A Type-Aware Virtual Machine Placement Strategy	5
<i>Auday Al-Dulaimy, Ahmed Zekri, Wassim Itani, and Rached Zantout</i>	

Student Session 2

Engineering Self-Adaptive Applications on Cloud with Software Defined Networks	9
<i>Nasim Beigi-Mohammadi and Marin Litoiu</i>	
Algorithmic Enhancements to Big Data Computing Frameworks for Medical Image Processing	13
<i>Shunxing Bao, Bennett Landman, and Aniruddha Gokhale</i>	

IC2E 2017 Conference Papers

Session: Resource Management (Full Research Papers)

iCSI: A Cloud Garbage VM Collector for Addressing Inactive VMs with Machine Learning	17
<i>In Kee Kim, Sai Zeng, Christopher Young, Jinho Hwang, and Marty Humphrey</i>	
Dark Shadows: User-Level Guest/Host Linux Process Shadowing	29
<i>Peter Dinda and Akhil Guliani</i>	
BalCon: A Distributed Elastic SDN Control via Efficient Switch Migration	40
<i>Marco Cello, Yang Xu, Anwar Walid, Gordon Wilfong, H. Jonathan Chao, and Mario Marchese</i>	

Industry Paper Session 1

Agile Composition of Compliant Data Analytics Platforms	51
<i>Michael Le, K. R. Jayaram, Yaron Weinsberg, Daniel J. Dean, and Shu Tao</i>	
An Early Functional and Performance Experiment of the MarFS Hybrid Storage EcoSystem	59
<i>Hsing-Bung (HB) Chen, Gary Grider, and David Richard Montoya</i>	
Columbus: Filesystem Tree Introspection for Software Discovery	67
<i>Shripad Nadgowda, Sastry Duri, Canturk Isci, and Vijay Mann</i>	

Short Research Paper Session 1

EXFed: Efficient Cross-Federation with Availability SLAs on Preemptible IaaS Instances	75
<i>Alexander Pucher, Rich Wolski, and Chandra Krintz</i>	
QoS-Aware Virtual Machine Consolidation in Cloud Datacenter	81
<i>Mohammad Alaul Haque Monil and Allen D. Malony</i>	
Impact of Multiple Video Representations in Live Streaming: A Cost, Bandwidth, and QoE Analysis	88
<i>Kashif Bilal and Aiman Erbad</i>	

Session: Cloud Scheduling (Full Research Papers)

GENPACK: A Generational Scheduler for Cloud Data Centers	95
<i>Aurelien Havet, Valerio Schiavoni, Pascal Felber, Maxime Colmant, Romain Rouvoy, and Christof Fetzer</i>	
CloudGC: Recycling Idle Virtual Machines in the Cloud	105
<i>Bo Zhang, Yahya Al Dhuraibi, Romain Rouvoy, Fawaz Paraiso, and Lionel Seinturier</i>	
CoMICon: A Co-Operative Management System for Docker Container Images	116
<i>Senthil Nathan, Rahul Ghosh, Tridib Mukherjee, and Krishnaprasad Narayanan</i>	

Session: Infrastructure (Full Research Papers)

Cloud Engineering Principles and Technology Enablers for Medical Image Processing-as-a-Service	127
<i>Shunxing Bao, Andrew J. Plassard, Bennett A. Landman, and Aniruddha Gokhale</i>	
Revising OpenStack to Operate Fog/Edge Computing Infrastructures	138
<i>Adrien Lebre, Jonathan Pastor, Anthony Simonet, and Frédéric Desprez</i>	
Meeting Latency Target in Transient Burst: A Case on Spark Streaming	149
<i>Robert Birke, Mathias Björkqvist, Evangelia Kalyvianaki, and Lydia Y. Chen</i>	

Industry Paper Session 2

Mitigating Resource Contention and Heterogeneity in Public Clouds for Scientific Modeling Services	159
<i>Shrdeep Pallickara, Olaf David, Mazdak Arabi, and Ken Rojas</i>	
One Time Trapdoor Based Searchable Encryption	167
<i>Kulvaibhav Kaushik and Vijayaraghavan Varadharajan</i>	
QUEST: Search-Driven Management of Cloud-Scale Data Centers	175
<i>Atreyee Maiti, Rahul Singh, Ramesh Chandra, and Himanshu Shukla</i>	

Short Research Paper Session 2

Benchmarking Key-Value Stores via Trace Replay	183
<i>Edwin F. Boza, Cesar San-Lucas, Cristina L. Abad, and Jose A. Viteri</i>	
Impact of the Vendor Lock-in Problem on Testing as a Service (TaaS)	190
<i>Ricardo Ramos de Oliveira, Rafael Messias Martins, and Adenildo da Silva Simao</i>	
PHP2Uni: Building Unikernels Using Scripting Language Transpilation	197
<i>Thomas Pasquier, David Eyers, and Jean Bacon</i>	

Invited Paper Session 1

Session: Security (Full Research Papers)

Performance Impact of DDoS Attacks on Three Virtual Machine Hypervisors	204
<i>Pezhman Sheinidashtegol and Michael Galloway</i>	
Trustworthy Services Built on Event-Based Probing for Layered Defense	215
<i>Read Sprabery, Zachary J. Estrada, Zbigniew Kalbarczyk, Ravishankar Iyer, Rakesh B. Bobba, and Roy Campbell</i>	
VirtusCap: Capability-Based Access Control for Unikernels	226
<i>Ioannis Sfyarakis and Thomas Groß</i>	

Short Research Paper Session 3

Image-Centric Social Discovery Using Neural Network under Anonymity Constraint	238
<i>Kazi Wasif Ahmed, Mohammad Zahidul Hasan, and Noman Mohammed</i>	
SwiftAnalytics: Optimizing Object Storage for Big Data Analytics	245
<i>Lukas Rupprecht, Rui Zhang, Bill Owen, Peter Pietzuch, and Dean Hildebrand</i>	
Practical Data Compliance for Cloud Storage	252
<i>Martin Henze, Roman Matzutt, Jens Hiller, Erik Mühmer, Jan Henrik Ziegeldorf, Johannes van der Giet, and Klaus Wehrle</i>	

IC2E 2017 Workshop Papers

IEEE Third International Workshop on Container Technologies and Container Clouds (WoC 2017)

Integrating MPI with Docker for HPC	259
<i>Maximilien de Baysier and Renato Cerqueira</i>	
Comparing Scaling Methods for Linux Containers	266
<i>Shripad Nadgowda, Sahil Suneja, and Ali Kanso</i>	
DockerFinder: Multi-attribute Search of Docker Images	273
<i>Antonio Brogi, Davide Neri, and Jacopo Soldani</i>	
Enabling Docker Containers for High-Performance and Many-Task Computing	279
<i>Abdulrahman Azab</i>	

Third International IEEE Workshop on Legal and Technical Issues in Cloud Computing and the Internet of Things (CLaw 2017)

Internet of Things Ecosystems: Unpacking Legal Relationships and Liabilities	286
<i>Christopher Millard, W. Kuan Hon, and Jatinder Singh</i>	
Eyes of Things	292
<i>Noelia Vallez, Jose L. Espinosa-Aranda, Jose M. Rico-Saavedra, Javier Parra-Patino, Oscar Deniz, Alain Pagani, Stephan Krauss, Ruben Reiser, Didier Stricker, David Moloney, Alireza Dehghani, Aubrey Dunne, Dexmont Pena, Martin Waeny, Pedro Santos, Matteo Sorci, Tim Llewellynn, Christian Fedorczak, Thierry Larmoire, Elodie Roche, Marco Herbst, Andre Seirafi, and Kasra Seirafi</i>	
In Search for the Value of Connectivity: Accountable Citizens Fostering Accountable Governance via Connectivity: The Case of Environmental Health Policies	298
<i>Anna Berti Suman</i>	
Towards the Classification of Confidentiality Capabilities in Trustworthy Service Level Agreements	304
<i>Yudhistira Nugraha and Andrew Martin</i>	

Author Index	311
---------------------------	-----