

# **2017 IEEE 37th International Conference on Distributed Computing Systems (ICDCS 2017)**

**Atlanta, Georgia, USA  
5-8 June 2017**

**Pages 1-666**



**IEEE Catalog Number: CFP17040-POD  
ISBN: 978-1-5386-1793-9**

**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:	CFP17040-POD
ISBN (Print-On-Demand):	978-1-5386-1793-9
ISBN (Online):	978-1-5386-1792-2
ISSN:	1063-6927

**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](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# **2017 IEEE 37th International Conference on Distributed Computing Systems**

## **ICDCS 2017**

### **Table of Contents**

<b>Message from the General Chairs and Program Chair</b> .....	xxviii
<b>Organizing Committee</b> .....	XXX
<b>Program Committee</b> .....	xxxi
<b>Keynotes</b> .....	xli

---

#### **Research Track**

##### **Research 1: Distributed Fault Tolerance and Dependability**

Timely, Reliable, and Cost-Effective Internet Transport Service Using Dissemination Graphs .....	1
<i>Amy Babay, Emily Wagner, Michael Dinitz, and Yair Amir</i>	
Pronto: Efficient Test Packet Generation for Dynamic Network Data Planes .....	13
<i>Yu Zhao, Huazhe Wang, Xin Lin, Tingting Yu, and Chen Qian</i>	
Agar: A Caching System for Erasure-Coded Data .....	23
<i>Raluca Halalai, Pascal Felber, Anne-Marie Kermarrec, and François Taïani</i>	
High Performance Recovery for Parallel State Machine Replication .....	34
<i>Odorico Machado Mendizabal, Fernando Luís Dotti, and Fernando Pedone</i>	
On Data Parallelism of Erasure Coding in Distributed Storage Systems .....	45
<i>Jun Li and Baochun Li</i>	
MeteorShower: Minimizing Request Latency for Majority Quorum-Based Data Consistency Algorithms in Multiple Data Centers .....	57
<i>Ying Liu, Xi Guan, Vladimir Vlassov, and Seif Haridi</i>	

##### **Research 2: Distributed Operating Systems and Middleware**

LSbM-tree: Re-Enabling Buffer Caching in Data Management for Mixed Reads and Writes .....	68
<i>Dejun Teng, Lei Guo, Rubao Lee, Feng Chen, Siyuan Ma, Yanfeng Zhang, and Xiaodong Zhang</i>	

Incremental Topology Transformation for Publish/Subscribe Systems Using Integer Programming .....	80
<i>Pooya Salehi, Kaiwen Zhang, and Hans-Arno Jacobsen</i>	
milliScope: A Fine-Grained Monitoring Framework for Performance Debugging of n-Tier Web Services .....	92
<i>Chien-An Lai, Josh Kimball, Tao Zhu, Qingyang Wang, and Calton Pu</i>	
Stark: Optimizing In-Memory Computing for Dynamic Dataset Collections .....	103
<i>Shen Li, Md Tanvir Amin, Raghu Ganti, Mudhakar Srivatsa, Shanhao Hu, Yiran Zhao, and Tarek Abdelzaher</i>	
CRESON: Callable and Replicated Shared Objects over NoSQL .....	115
<i>Pierre Sutra, Etienne Rivière, Cristian Cotes, Marc Sánchez Artigas, Pedro Garcia Lopez, Emmanuel Bernard, William Burns, and Galder Zamarreño</i>	
Virtualized Network Coding Functions on the Internet .....	129
<i>Linquan Zhang, Shangqi Lai, Chuan Wu, Zongpeng Li, and Chuanxiong Guo</i>	

### **Research 3: Security and Privacy in Distributed Systems I**

Consensus Robustness and Transaction De-Anonymization in the Ripple Currency Exchange System .....	140
<i>Adriano Di Luzio, Alessandro Mei, and Julinda Stefa</i>	
Learning Privacy Habits of PDS Owners .....	151
<i>Bikash Chandra Singh, Barbara Carminati, and Elena Ferrari</i>	
City-Hunter: Hunting Smartphones in Urban Areas .....	162
<i>Xuefeng Liu, Jiaqi Wen, Shaojie Tang, Jiannong Cao, and Jiaxing Shen</i>	
When Seeing Isn't Believing: On Feasibility and Detectability of Scapegoating in Network Tomography .....	172
<i>Shangqing Zhao, Zhuo Lu, and Cliff Wang</i>	
You Can Hear But You Cannot Steal: Defending Against Voice Impersonation Attacks on Smartphones .....	183
<i>Si Chen, Kui Ren, Sixu Piao, Cong Wang, Qian Wang, Jian Weng, Lu Su, and Aziz Mohaisen</i>	
Flow Reconnaissance via Timing Attacks on SDN Switches .....	196
<i>Sheng Liu, Michael K. Reiter, and Vyas Sekar</i>	

### **Research 4: Cloud Computing and Data Center Systems**

A Study of Long-Tail Latency in n-Tier Systems: RPC vs. Asynchronous Invocations .....	207
<i>Qingyang Wang, Chien-An Lai, Yasuhiko Kanemasa, Shungeng Zhang, and Calton Pu</i>	
Rain or Shine? — Making Sense of Cloudy Reliability Data .....	218
<i>Ilyswarya Narayanan, Bikash Sharma, Di Wang, Sriram Govindan, Laura Caulfield, Anand Sivasubramaniam, Aman Kansal, Jie Liu, Badriddine Khessib, and Kushagra Vaid</i>	
Right-Sizing Geo-distributed Data Centers for Availability and Latency .....	230
<i>Ilyswarya Narayanan, Aman Kansal, and Anand Sivasubramaniam</i>	

Performance Driven Resource Sharing Markets for the Small Cloud .....	241
<i>Sung-Han Lin, Ranjan Pal, Marco Paolieri, and Leana Golubchik</i>	
Fault-Scalable Virtualized Infrastructure Management .....	252
<i>Mukil Kesavan, Ada Gavrilovska, and Karsten Schwan</i>	
DeltaCFS: Boosting Delta Sync for Cloud Storage Services by Learning from NFS .....	264
<i>Quanlu Zhang, Zhenhua Li, Zhi Yang, Shenglong Li, Shouyang Li, Yangze Guo, and Yafei Dai</i>	

## **Research 5: Edge and Fog Computing**

Cachier: Edge-Caching for Recognition Applications .....	276
<i>Utsav Drolia, Katherine Guo, Jiaqi Tan, Rajeev Gandhi, and Priya Narasimhan</i>	
Content Centric Peer Data Sharing in Pervasive Edge Computing Environments .....	287
<i>Xinong Song, Yaodong Huang, Qian Zhou, Fan Ye, Yuanyuan Yang, and Xiaoming Li</i>	
FLARE: Coordinated Rate Adaptation for HTTP Adaptive Streaming in Cellular Networks .....	298
<i>Youngbin Im, Jinyoung Han, Ji Hoon Lee, Yoon Kwon, Carlee Joe-Wong, Ted (Taekyoung) Kwon, and Sangtae Ha</i>	
Networked Drone Cameras for Sports Streaming .....	308
<i>Xiaoli Wang, Aakanksha Chowdhery, and Mung Chiang</i>	
Chronus: Consistent Data Plane Updates in Timed SDNs .....	319
<i>Jiaqi Zheng, Guihai Chen, Stefan Schmid, Haipeng Dai, and Jie Wu</i>	
Distributed Deep Neural Networks Over the Cloud, the Edge and End Devices .....	328
<i>Surat Teerapittayanon, Bradley McDanel, and H.T. Kung</i>	

## **Research 6: Distributed Green Computing and Energy Management**

Dynamic Control of Flow Completion Time for Power Efficiency of Data Center Networks .....	340
<i>Kuangyu Zheng and Xiaorui Wang</i>	
On Energy-Efficient Congestion Control for Multipath TCP .....	351
<i>Jia Zhao, Jiangchuan Liu, and Haiyang Wang</i>	
A Mechanism for Cooperative Demand-Side Management .....	361
<i>Guangchao Yuan, Chung-Wei Hang, Michael N. Huhns, and Munindar P. Singh</i>	
A Hierarchical Framework of Cloud Resource Allocation and Power Management Using Deep Reinforcement Learning .....	372
<i>Ning Liu, Zhe Li, Jielong Xu, Zhiyuan Xu, Sheng Lin, Qinru Qiu, Jian Tang, and Yanzhi Wang</i>	
SunChase: Energy-Efficient Route Planning for Solar-Powered EVs .....	383
<i>Landu Jiang, Yu Hua, Chen Ma, and Xue Liu</i>	

## **Research 7: Internet of Things, Smart Cities, and Cyber-Physical Systems**

Persistent Traffic Measurement Through Vehicle-to-Infrastructure Communications .....	394
<i>He Huang, Yu-E Sun, Shigang Chen, Hongli Xu, and Yian Zhou</i>	
TagBreathe: Monitor Breathing with Commodity RFID Systems .....	404
<i>Yuxiao Hou, Yanwen Wang, and Yuanqing Zheng</i>	
Double-Edged Sword: Incentivized Verifiable Product Path Query for RFID-Enabled Supply Chain .....	414
<i>Saiyu Qi, Yuanqing Zheng, Xiaofeng Chen, Jianfeng Ma, and Yong Qi</i>	
Towards Accurate Corruption Estimation in ZigBee Under Cross-Technology Interference .....	425
<i>Gonglong Chen, Wei Dong, Zhiwei Zhao, and Tao Gu</i>	
Unseen Activity Recognitions: A Hierarchical Active Transfer Learning Approach .....	436
<i>Mohammad Arif Ul Alam and Nirmalya Roy</i>	
RFIPad: Enabling Cost-Efficient and Device-Free In-air Handwriting Using Passive Tags .....	447
<i>Han Ding, Chen Qian, Jinsong Han, Ge Wang, Wei Xi, Kun Zhao, and Jizhong Zhao</i>	

## **Research 8: Mobile and Wireless Computing Systems I**

Robust Incentive Tree Design for Mobile Crowdsensing .....	458
<i>Xiang Zhang, Guoliang Xue, Ruozhou Yu, Dejun Yang, and Jian Tang</i>	
WearLock: Unlocking Your Phone via Acoustics Using Smartwatch .....	469
<i>Shanhe Yi, Zhengrui Qin, Nancy Carter, and Qun Li</i>	
Modeling Mobile Code Acceleration in the Cloud .....	480
<i>Huber Flores, Xiang Su, Vassilis Kostakos, Jukka Riekki, Eemil Lagerspetz, Sasu Tarkoma, Pan Hui, Yong Li, and Jukka Manner</i>	
E-Android: A New Energy Profiling Tool for Smartphones .....	492
<i>Xing Gao, Dachuan Liu, Daiping Liu, Haining Wang, and Angelos Stavrou</i>	
Local and Low-Cost White Space Detection .....	503
<i>Ahmed Saeed, Khaled A. Harras, Ellen Zegura, and Mostafa Ammar</i>	
General Analysis of Incentive Mechanisms for Peer-to-Peer Transmissions: A Quantum Game Perspective .....	517
<i>Weiman Sun and Shengling Wang</i>	

## **Research 9: Distributed Big Data Systems**

High-Performance and Resilient Key-Value Store with Online Erasure Coding for Big Data Workloads .....	527
<i>Dipti Shankar, Xiaoyi Lu, and Dhabaleswar K. Panda</i>	
Modeling and Analyzing Latency in the Memcached system .....	538
<i>Wenxue Cheng, Fengyuan Ren, Wanchun Jiang, and Tong Zhang</i>	

Speculative Slot Reservation: Enforcing Service Isolation for Dependent Data-Parallel Computations .....	549
--	-----

*Chen Chen, Wei Wang, and Bo Li*

Optimizing Shuffle in Wide-Area Data Analytics .....	560
--	-----

*Shuhao Liu, Hao Wang, and Baochun Li*

Job Scheduling without Prior Information in Big Data Processing Systems .....	572
---	-----

*Zhiming Hu, Baochun Li, Zheng Qin, and Rick Siew Mong Goh*

Distributed Load Balancing in Key-Value Networked Caches .....	583
--	-----

*Sikder Huq, Zubair Shafiq, Sukumar Ghosh, Amir Khakpour, and Harkeerat Bedi*

## **Research 10: Distributed Algorithms and Theory I**

Cognitive Context-Aware Distributed Storage Optimization in Mobile Cloud Computing: A Stable Matching Based Approach .....	594
--	-----

*Dong Han, Ye Yan, Tao Shu, Liuqing Yang, and Shuguang Cui*

Fair Caching Algorithms for Peer Data Sharing in Pervasive Edge Computing Environments .....	605
--	-----

*Yaodong Huang, Xintong Song, Fan Ye, Yuanyuan Yang, and Xiaoming Li*

Latency-Driven Cooperative Task Computing in Multi-user Fog-Radio Access Networks .....	615
---	-----

*Ai-Chun Pang, Wei-Ho Chung, Te-Chuan Chiu, and Junshan Zhang*

Approximation and Online Algorithms for NFV-Enabled Multicasting in SDNs .....	625
--	-----

*Zichuan Xu, Weifa Liang, Meitian Huang, Mike Jia, Song Guo, and Alex Galis*

Distributed Auctions for Task Assignment and Scheduling in Mobile Crowdsensing Systems .....	635
--	-----

*Zhuojun Duan, Wei Li, and Zhipeng Cai*

Effective Mobile Data Trading in Secondary Ad-hoc Market with Heterogeneous and Dynamic Environment .....	645
---	-----

*Hengky Susanto, Honggang Zhang, Shing-Yip Ho, and Benyuan Liu*

## **Research 11: Security and privacy in Distributed Systems II**

Kalis — A System for Knowledge-Driven Adaptable Intrusion Detection for the Internet of Things .....	656
--	-----

*Daniele Midi, Antonino Rullo, Anand Mudgerikar, and Elisa Bertino*

Fuzzy Extractors for Biometric Identification .....	667
---	-----

*Nan Li, Fuchun Guo, Yi Mu, Willy Susilo, and Surya Nepal*

Smartphone Privacy Leakage of Social Relationships and Demographics from Surrounding Access Points .....	678
--	-----

*Chen Wang, Chuyu Wang, Yingying Chen, Lei Xie, and Sanglu Lu*

EV-Matching: Bridging Large Visual Data and Electronic Data for Efficient Surveillance .....	689
--	-----

*Gang Li, Fan Yang, Guoxing Chen, Qiang Zhai, Xinfeng Li, Jin Teng, Junda Zhu,*

*Dong Xuan, Biao Chen, and Wei Zhao*

Adaptive Reconnaissance Attacks with Near-Optimal Parallel Batching .....	699
---	-----

*Xiang Li, J. David Smith, and My T. Thai*

Achieving Strong Privacy in Online Survey .....	710
<i>You Zhou, Yian Zhou, Shigang Chen, and Samuel S. Wu</i>	

## **Research 12: Cloud Computing and Distributed Data Analytics**

Service Overlay Forest Embedding for Software-Defined Cloud Networks .....	720
<i>Jian-Jhih Kuo, Shan-Hsiang Shen, Ming-Hong Yang, De-Nian Yang, Ming-Jer Tsai, and Wen-Tsuen Chen</i>	
Joint Optimization of Chain Placement and Request Scheduling for Network Function Virtualization .....	731
<i>Qixia Zhang, Yikai Xiao, Fangming Liu, John C.S. Lui, Jian Guo, and Tao Wang</i>	
BIG Cache Abstraction for Cache Networks .....	742
<i>Eman Ramadan, Arvind Narayanan, Zhi-Li Zhang, Runhui Li, and Gong Zhang</i>	
Distributed QR Decomposition Framework for Training Support Vector Machines .....	753
<i>Jyotikrishna Dass, V.N.S. Prithvi Sakuru, Vivek Sarin, and Rabi N. Mahapatra</i>	
Distributively Computing Random Walk Betweenness Centrality in Linear Time .....	764
<i>Qiang-Sheng Hua, Ming Ai, Hai Jin, Dongxiao Yu, and Xuanhua Shi</i>	
DeGPar: Large Scale Topic Detection Using Node-Cut Partitioning on Dense Weighted Graphs .....	775
<i>Kambiz Ghoorchian, Sarunas Girdzijauskas, and Fatemeh Rahimian</i>	

## **Research 13: Distributed Algorithms and Theory II**

Networked Stochastic Multi-armed Bandits with Combinatorial Strategies .....	786
<i>Shaojie Tang, Yaqin Zhou, Kai Han, Zhao Zhang, Jing Yuan, and Weili Wu</i>	
Computability of Perpetual Exploration in Highly Dynamic Rings .....	794
<i>Marjorie Bournat, Swan Dubois, and Franck Petit</i>	
Locally Self-Adjusting Skip Graphs .....	805
<i>Sikder Huq and Sukumar Ghosh</i>	
Online to Offline Business: Urban Taxi Dispatching with Passenger-Driver Matching Stability .....	816
<i>Huanyang Zheng and Jie Wu</i>	
An Optimization Framework for Online Ride-Sharing Markets .....	826
<i>Yongzheng Jia, Wei Xu, and Xue Liu</i>	
Fast and Accurate Tracking of Population Dynamics in RFID Systems .....	836
<i>Muhammad Shahzad and Alex X. Liu</i>	

## **Research 14: Mobile and Wireless Computing Systems II**

Robust Indoor Wireless Localization Using Sparse Recovery .....	847
<i>Wei Gong and Jiangchuan Liu</i>	
Max-Min Fair Resource Allocation in HetNets: Distributed Algorithms and Hybrid Architecture .....	857
<i>Ehsan Aryafar, Alireza Keshavarz-Haddad, Carlee Joe-Wong, and Mung Chiang</i>	

Optimization of Full-View Barrier Coverage with Rotatable Camera Sensors .....	870
<i>Xiaofeng Gao, Rui Yang, Fan Wu, Guihai Chen, and Jinguang Zhou</i>	
Communication through Symbol Silence: Towards Free Control Messages in Indoor WLANs .....	880
<i>Bing Feng, Jianqing Liu, Chi Zhang, and Yuguang Fang</i>	
Secure Connectivity of Wireless Sensor Networks Under Key Predistribution with on/off Channels .....	889
<i>Jun Zhao</i>	
iUpdater: Low Cost RSS Fingerprints Updating for Device-Free Localization .....	900
<i>Liqiong Chang, Jie Xiong, Yu Wang, Xiaojiang Chen, Junhao Hu, and Dingyi Fang</i>	

## **Research 15: Social Networks and Crowdsourcing**

Influence Maximization in a Many Cascades World .....	911
<i>Iouliana Litou, Vana Kalogeraki, and Dimitrios Gunopulos</i>	
Expertise-Aware Truth Analysis and Task Allocation in Mobile Crowdsourcing .....	922
<i>Xiaomei Zhang, Yibo Wu, Lifu Huang, Heng Ji, and Guohong Cao</i>	
MELODY: A Long-Term Dynamic Quality-Aware Incentive Mechanism for Crowdsourcing .....	933
<i>Hongwei Wang, Song Guo, Jiannong Cao, and Minyi Guo</i>	
The Strong Link Graph for Enhancing Sybil Defenses .....	944
<i>Suhendry Effendy and Roland H. C. Yap</i>	
Mechanism Design for Mobile Crowdsensing with Execution Uncertainty .....	955
<i>Zhenzhe Zheng, Zhaoxiong Yang, Fan Wu, and Guihai Chen</i>	
Towards Scalable and Dynamic Social Sensing Using A Distributed Computing Framework .....	966
<i>Daniel (Yue) Zhang, Chao Zheng, Dong Wang, Doug Thain, Xin Mu, Greg Madey, and Chao Huang</i>	

## **Industry and Experimentation Track**

### **Industry 1: Cloud Data Centers and Performance**

Phoenix: A Constraint-Aware Scheduler for Heterogeneous Datacenters .....	977
<i>Prashanth Thinakaran, Jashwant Raj Gunasekaran, Bikash Sharma, Mahmut Taylan Kandemir, and Chita R. Das</i>	
Dual Scaling VMs and Queries: Cost-Effective Latency Curtailment .....	988
<i>Juan F. Pérez, Robert Birke, Mathias Björkqvist, and Lydia Y. Chen</i>	
A Framework for Enabling Security Services Collaboration Across Multiple Domains .....	999
<i>Daniel Migault, Marcos A. Simplicio Jr., Bruno M. Barros, Makan Pourzandi, Thiago R. M. Almeida, Ewerthon R. Andrade, and Tereza C. M. B. Carvalho</i>	
Group Clustering Using Inter-Group Dissimilarities .....	1011
<i>Debessay Fesehaye, Lenin Singaraveluy, Chien-Chia Chen, Xiaobo Huang, Amitabha Banerjee, Ruijin Zhou, and Rajesh Somasundaran</i>	

Comprehensive Measurement and Analysis of the User-Perceived I/O Performance in a Production Leadership-Class Storage System .....	1022
<i>Lipeng Wan, Matthew Wolf, Feiyi Wang, Jong Youl Choi, George Ostrouchov, and Scott Klasky</i>	

## **Industry 2: Mobile Computing and Internet of Things**

On the Limits of Subsampling of Location Traces .....	1032
<i>Mudhakar Srivatsa, Raghu Ganti, and Prasant Mohapatra</i>	
SOM-TC: Self-Organizing Map for Hierarchical Trajectory Clustering .....	1042
<i>Pranita Dewan, Raghu Ganti, and Mudhakar Srivatsa</i>	
Processing Encrypted and Compressed Time Series Data .....	1053
<i>Matúš Harvan, Samuel Kimoto, Thomas Locher, Yvonne-Anne Pignolet, and Johannes Schneider</i>	
Calvin Constrained — A Framework for IoT Applications in Heterogeneous Environments .....	1063
<i>Amardeep Mehta, Rami Baddour, Fredrik Svensson, Harald Gustafsson, and Erik Elmroth</i>	

## **Applications and Experiences Track**

### **Application 1: Security, Privacy, Trust in Distributed Systems**

Privacy Preserving User-Based Recommender System .....	1074
<i>Shahriar Badsha, Xun Yi, Ibrahim Khalil, and Elisa Bertino</i>	
Privacy Preserving Optimization of Participatory Sensing in Mobile Cloud Computing .....	1084
<i>Ye Yan, Dong Han, and Tao Shu</i>	
SPHINX: A Password Store that Perfectly Hides Passwords from Itself .....	1094
<i>Maliheh Shirvanian, Stanislaw Jareckiy, Hugo Krawczyk, and Nitesh Saxena</i>	
When Smart TV Meets CRN: Privacy-Preserving Fine-Grained Spectrum Access .....	1105
<i>Chaowen Guan, Aziz Mohaisen, Zhi Sun, Lu Su, Kui Ren, and Yaling Yang</i>	
Revisiting Security Risks of Asymmetric Scalar Product Preserving Encryption and Its Variants .....	1116
<i>Weipeng Lin, Ke Wang, Zhilin Zhang, and Hong Chen</i>	
An Adversary-Centric Behavior Modeling of DDoS Attacks .....	1126
<i>An Wang, Aziz Mohaisen, and Songqing Chen</i>	

### **Application 2: Social Networks and Crowdsourcing**

Anti-Malicious Crowdsourcing Using the Zero-Determinant Strategy .....	1137
<i>Qin Hu, Shengling Wang, Liran Ma, Rongfang Bie, and Xiuzhen Cheng</i>	
JPR: Exploring Joint Partitioning and Replication for Traffic Minimization in Online Social Networks .....	1147
<i>Jingya Zhou and Jianxi Fan</i>	

Optimizing Source Selection in Social Sensing in the Presence of Influence Graphs .....	1157
<i>Huajie Shao, Shiguang Wang, Shen Li, Shuochao Yao, Yiran Zhao, Tanvir Amin,     Tarek Abdelzaher, and Lance Kaplan</i>	
Dynamic Contract Design for Heterogenous Workers in Crowdsourcing for Quality Control .....	1168
<i>Chenxi Qiu, Anna Cinzia Squicciarini, Sarah Michele Rajtmajer, and James Caverlee</i>	
Joint Request Balancing and Content Aggregation in Crowdsourced CDN .....	1178
<i>Ming Ma, Zhi Wang, Kun Yi, Jiangchuan Liu, and Lifeng Sun</i>	
Shrink: A Breast Cancer Risk Assessment Model Based on Medical Social Network .....	1189
<i>Ali Li, Rui Wang, and Lei Xu</i>	

### **Application 3: Internet of Things, Smart Cities, and Cyber-Physical Systems**

Opportunistic Energy Sharing Between Power Grid and Electric Vehicles: A Game	
Theory-Based Pricing Policy .....	1197
<i>Ankur Sarker, Zhuozhao Li, William Kolodzey, and Haiying Shen</i>	
Energy Efficient Object Detection in Camera Sensor Networks .....	1208
<i>Tuan Dao, Karim Khalil, Amit K. Roy-Chowdhury, Srikanth V. Krishnamurthy,     and Lance Kaplan</i>	
DeepOpp: Context-Aware Mobile Access to Social Media Content on Underground Metro Systems .....	1219
<i>Di Wu, Dmitri I. Arkhipov, Thomas Przepiorka, Qiang Liu, Julie A. McCann,     and Amelia C. Regan</i>	
PhaseBeat: Exploiting CSI Phase Data for Vital Sign Monitoring with Commodity WiFi Devices .....	1230
<i>Xuyu Wang, Chao Yang, and Shiwen Mao</i>	
REX: Rapid Ensemble Classification System for Landslide Detection Using Social Media .....	1240
<i>Aibek Musaev, De Wang, Jiateng Xie, and Calton Pu</i>	
Toward An Integrated Approach to Localizing Failures in Community Water Networks .....	1250
<i>Qing Han, Phu Nguyen, Ronald T. Eguchi, Kuo-Lin Hsu, and Nalini Venkatasubramanian</i>	

### **Application 4: Mobile, Wireless, and Edge Computing**

MobiQoR: Pushing the Envelope of Mobile Edge Computing Via Quality-of-Result Optimization .....	1261
<i>Yongbo Li, Yurong Chen, Tian Lan, and Guru Venkataramani</i>	
Truthful Auctions for User Data Allowance Trading in Mobile Networks .....	1271
<i>Zhongxing Ming, Mingwei Xu, Ning Wang, Bingjie Gao, and Qi Li</i>	
Online Resource Allocation for Arbitrary User Mobility in Distributed Edge Clouds .....	1281
<i>Lin Wang, Lei Jiao, Jun Li, and Max Mühlhäuser</i>	
Leveraging Target k-Coverage in Wireless Rechargeable Sensor Networks .....	1291
<i>Pengzhan Zhou, Cong Wang, and Yuanyuan Yang</i>	

Reducing Cellular Signaling Traffic for Heartbeat Messages via Energy-Efficient D2D Forwarding .....	1301
<i>Yanqi Jin, Fangming Liu, Xiaomeng Yi, and Minghua Chen</i>	
k-Protected Routing Protocol in Multi-hop Cognitive Radio Networks .....	1312
<i>Chin-Jung Liu and Li Xiao</i>	

## **Application 5: Cloud Computing and Data Center Systems**

Multi-resource Load Balancing for Virtual Network Functions .....	1322
<i>Tao Wang, Hong Xu, and Fangming Liu</i>	
Learning from Failure Across Multiple Clusters: A Trace-Driven Approach to Understanding, Predicting, and Mitigating Job Terminations .....	1333
<i>Nosayba El-Sayed, Hongyu Zhu, and Bianca Schroeder</i>	
RBAY: A Scalable and Extensible Information Plane for Federating Distributed Datacenter Resources .....	1345
<i>Xin Chen, Liting Hu, Douglas M. Blough, Michael A. Kozuch, and Matthew Wolf</i>	
Task-aware TCP in Data Center Networks .....	1356
<i>Sen Liu, Jiawei Huang, Yutao Zhou, Jianxin Wang, and Tian He</i>	
Limitations of Load Balancing Mechanisms for N-Tier Systems in the Presence of Millibottlenecks .....	1367
<i>Tao Zhu, Jack Li, Josh Kimball, Junhee Park, Chien-An Lai, Calton Pu, and Qingyang Wang</i>	
Performance Analysis of Cloud Computing Centers Serving Parallelizable Rendering Jobs Using M/M/c/r Queuing Systems .....	1378
<i>Xiulin Li, Li Pan, Jiwei Huang, Shijun Liu, Yuliang Shi, Lizhen Cui, and Calton Pu</i>	

## **Application 6: Big Data Systems and Distributed Data Management and Analytics**

Evaluation of Deep Learning Frameworks Over Different HPC Architectures .....	1389
<i>Shayan Shams, Richard Platania, Kisung Lee, and Seung-Jong Park</i>	
On Achieving Efficient Data Transfer for Graph Processing in Geo-Distributed Datacenters .....	1397
<i>Amelie Chi Zhou, Shadi Ibrahim, and Bingsheng He</i>	
GBooster: Towards Acceleration of GPU-Intensive Mobile Applications .....	1408
<i>Elliott Wen, Winston K.G. Seah, Bryan Ng, Xue Liu, Jiannong Cao, and Xuefeng Liu</i>	
Scaling k-Nearest Neighbours Queries (The Right Way) .....	1419
<i>Atoshum Cahsai, Nikos Ntarmos, Christos Anagnostopoulos, and Peter Triantafillou</i>	
Parallelizing Big De Bruijn Graph Construction on Heterogeneous Processors .....	1431
<i>Shuang Qiu and Qiong Luo</i>	
Private, Yet Practical, Multiparty Deep Learning .....	1442
<i>Xinyang Zhang, Shouling Ji, Hui Wang, and Ting Wang</i>	

## **Application 7: Distributed Middleware Systems**

Fast and Flexible Networking for Message-Oriented Middleware .....	1453
<i>Lars Kroll, Alexandru A. Ormenișan, and Jim Dowling</i>	
TailCut: Power Reduction under Quality and Latency Constraints in Distributed Search Systems .....	1465
<i>Chih-Hsun Chou, Laxmi N. Bhuyan, and Shaolei Ren</i>	
StoArranger: Enabling Efficient Usage of Cloud Storage Services on Mobile Devices .....	1476
<i>Yongshu Bai and Yifan Zhang</i>	
Characterizing Performance and Energy-Efficiency of the RAMCloud Storage System .....	1488
<i>Yacine Taleb, Shadi Ibrahim, Gabriel Antoniu, and Toni Cortes</i>	
Proactively Secure Cloud-Enabled Storage .....	1499
<i>Karim Eldefrawy, Sky Faber, and Tyler Kaczmarek</i>	
BEES: Bandwidth- and Energy- Efficient Image Sharing for Real-Time Situation Awareness .....	1510
<i>Pengfei Zuo, Yu Hua, Xue Liu, Dan Feng, Wen Xia, Shunde Cao, Jie Wu, Yuanyuan Sun, and Yuncheng Guo</i>	

## **Application 8: Distributed Systems and Optimizations**

Transparent Fault-Tolerance Using Intra-Machine Full-Software-Stack Replication on Commodity Multicore Hardware .....	1521
<i>Giuliano Losa, Antonio Barbalace, Yuzhong Wen, Ho-Ren Chuang, and Binoy Ravindran</i>	
A Preventive Auto-Parallelization Approach for Elastic Stream Processing .....	1532
<i>Roland Kotto Kombi, Nicolas Lumineau, and Philippe Lamarre</i>	
Dependable Cloud Resources with Guardian .....	1543
<i>Bara Abusalah, Derek Schatzlein, Julian James Stephen, Masoud Saeida Ardekani, and Patrick Eugster</i>	
A Communication-Aware Container Re-Distribution Approach for High Performance VNFs .....	1555
<i>Yuchao Zhang, Yusen Li, Ke Xu, Dan Wang, Minghui Li, Xuan Cao, and Qingqing Liang</i>	
Minimizing Cost in IaaS Clouds Via Scheduled Instance Reservation .....	1565
<i>Qiushi Wang, Ming Ming Tan, Xueyan Tang, and Wentong Cai</i>	
Efficient Distributed Coordination at WAN-Scale .....	1575
<i>Ailidani Ailijiang, Aleksey Charapko, Murat Demirbas, Bekir O. Turkkan, and Tevfik Kosar</i>	

## **Application 9: Distributed Systems and Applications**

Specifying a Distributed Snapshot Algorithm as a Meta-Program and Model Checking it at Meta-Level .....	1586
<i>Ha Thi Thu Doan, Kazuhiro Ogata, and François Bonnet</i>	
Self-Evolving Subscriptions for Content-Based Publish/Subscribe Systems .....	1597
<i>César Canas, Kaiwen Zhang, Bettina Kemme, Jörg Kienzle, and Hans-Arno Jacobsen</i>	

Scalable Routing for Topic-Based Publish/Subscribe Systems Under Fluctuations .....	1608
<i>Volker Turau and Gerry Siegemund</i>	
OPPay: Design and Implementation of a Payment System for Opportunistic Data Services .....	1618
<i>Fengrui Shi, Zhijin Qin, and Julie A. McCann</i>	
Optimal Resource Allocation for Multi-user Video Streaming over mmWave Networks .....	1629
<i>Zhifeng He and Shiwen Mao</i>	
A Multi-agent Parallel Approach to Analyzing Large Climate Data Sets .....	1639
<i>Jason Woodring, Matthew Sell, Munehiro Fukuda, Hazeline Asuncion, and Eric Salathe</i>	

## **Application 10: Distributed Systems and Services**

Energy Proportional Servers: Where Are We in 2016? .....	1649
<i>Congfeng Jiang, Yumei Wang, Dongyang Ou, Bing Luo, and Weisong Shi</i>	
Are HTTP/2 Servers Ready Yet? .....	1661
<i>Muhui Jiang, Xiapu Luo, TungNgai Miu, Shengtuo Hu, and Weixiong Rao</i>	
Data Integrity for Collaborative Applications over Hosted Services .....	1672
<i>Ertem Esiner and Anwitaman Datta</i>	
Virtual Machine Power Accounting with Shapley Value .....	1683
<i>Weixiang Jiang, Fangming Liu, Guoming Tang, Kui Wu, and Hai Jin</i>	
A General Purpose Testbed for Mobile Data Gathering in Wireless Sensor Networks and a Case Study .....	1694
<i>Ji Li, Cong Wang, and Yuanyuan Yang</i>	
On Directional Neighbor Discovery in mmWave Networks .....	1704
<i>Yu Wang, Shiwen Mao, and Theodore (Ted) S. Rappaport</i>	

## **Vision/Blue Sky Thinking Track**

### **Vision 1: Internet of Things, Smart Cities and Cyber-Physical Systems**

Observable-by-Design .....	1714
<i>Masaru Kitsuregawa</i>	
An Architectural Vision for a Data-Centric IoT: Rethinking Things, Trust and Clouds .....	1717
<i>Eve M. Schooler, David Zage, Jeff Sedayao, Hassnaa Moustafa, Andrew Brown, and Moreno Ambrosin</i>	
Edge Computing and IoT Based Research for Building Safe Smart Cities Resistant to Disasters .....	1729
<i>Teruo Higashino, Hirozumi Yamaguchi, Akihito Hiromori, Akira Uchiyama, and Keiichi Yasumoto</i>	
The Internet of Things and Multiagent Systems: Decentralized Intelligence in Distributed Computing .....	1738
<i>Munindar P. Singh and Amit K. Chopra</i>	

Internet of Things: From Small- to Large-Scale Orchestration .....	1748
<i>Charles Consel and Milan Kabáć</i>	

EdgeOS_H: A Home Operating System for Internet of Everything .....	1756
<i>Jie Cao, Lanyu Xu, Raef Abdallah, and Weisong Shi</i>	

## **Vision 2: Future Networking and Cyberinfrastructure**

A Vision for Zero-Hop Networking (ZeN) .....	1765
<i>Mostafa Ammar, Ellen Zegura, and Yimeng Zhao</i>	
Structured Overlay Networks for a New Generation of Internet Services .....	1771
<i>Amy Babay, Claudiu Danilov, John Lane, Michal Miskin-Amir, Daniel Obenshain, John Schultz, Jonathan Stanton, Thomas Tantillo, and Yair Amir</i>	
Ensuring Network Neutrality for Future Distributed Systems .....	1780
<i>Thiago Garrett, Schahram Dustdar, Luis C. E. Bona, and Elias P. Duarte Jr.</i>	
Uncovering the Useful Structures of Complex Networks in Socially-Rich and Dynamic Environments .....	1787
<i>Jie Wu</i>	
Future Networking Challenges: The Case of Mobile Augmented Reality .....	1796
<i>Tristan Braud, Farshid Hassani Bijarbooneh, Dimitris Chatzopoulos, and Pan Hui</i>	
Software Defined Cyberinfrastructure .....	1808
<i>Ian Foster, Ben Blaiszik, Kyle Chard, and Ryan Chard</i>	

## **Vision 3: Next Generation Cloud and Edge Services**

Computing in the Continuum: Combining Pervasive Devices and Services to Support Data-Driven Applications .....	1815
<i>Moustafa AbdelBaky, Mengsong Zou, Ali Reza Zamani, Eduard Renart, Javier Diaz-Montes, and Manish Parashar</i>	
Decision-Driven Execution: A Distributed Resource Management Paradigm for the Age of IoT .....	1825
<i>Tarek Abdelzaher, Md Tanvir A. Amin, Amotz Bar-Noy, William Dron, Ramesh Govindan, Reginald Hobbs, Shaohan Hu, Jung-Eun Kim, Jongdeog Lee, Kelvin Marcus, Shuochao Yao, and Yiran Zhao</i>	
ACTiCLOUD: Enabling the Next Generation of Cloud Applications .....	1836
<i>Georgios Goumas, Konstantinos Nikas, Ewnetu Bayuh Lakew, Christos Kotselidis, Andrew Attwood, Erik Elmroth, Michail Flouris, Nikos Foutris, John Goodacre, Davide Grohmann, Vasileios Karakostas, Panagiotis Koutsourakis, Martin Kersten, Mikel Luján, Einar Rustad, John Thomson, Luis Tomás, Atle Vesterkaer, Jim Webber, Ying Zhang, and Nectarios Koziris</i>	
JointCloud: A Cross-Cloud Cooperation Architecture for Integrated Internet Service Customization .....	1846
<i>Huaimin Wang, Peichang Shi, and Yiming Zhang</i>	
Supporting Data Analytics Applications Which Utilize Cognitive Services .....	1856
<i>Arun Iyengar</i>	

Trillion Operations Key-Value Storage Engine: Revisiting the Mission Critical Analytics Storage Software Stack .....	1865
<i>Sangeetha Seshadri, Paul Muench, and Lawrence Chiu</i>	

## **Vision 4: Security and Trust in Future Systems**

How Computer Science Risks to Lose Its Innocence, and Should Attempt to Take Responsibility .....	1873
<i>Karl Aberer</i>	
A Cognitive Policy Framework for Next-Generation Distributed Federated Systems: Concepts and Research Directions .....	1876
<i>Elisa Bertino, Seraphin Calo, Maroun Toma, Dinesh Verma, Christopher Williams, and Brian Rivera</i>	
Machine to Machine Trust in Smart Cities .....	1887
<i>Margaret L. Loper and Brian Swenson</i>	
Lateral Thinking for Trustworthy Apps .....	1890
<i>Hermann Härtig, Michael Roitzsch, Carsten Weinhold, and Adam Lackorzynski</i>	
Rumor Initiator Detection in Infected Signed Networks .....	1900
<i>Jiawei Zhang, Charu C. Aggarwal, and Philip S. Yu</i>	
Addressing Smartphone-Based Multi-factor Authentication via Hardware-Rooted Technologies .....	1910
<i>Zhongjie Ba and Kui Ren</i>	

## **Vision 5: Future Distributed Systems**

Enabling Wide Area Data Analytics with Collaborative Distributed Processing Pipelines (CDPPs) .....	1915
<i>Anja Feldmann, Manfred Hauswirth, and Volker Markl</i>	
The Millibottleneck Theory of Performance Bugs, and Its Experimental Verification .....	1919
<i>Calton Pu, Joshua Kimball, Chien-An Lai, Tao Zhu, Jack Li, Junhee Park, Qingyang Wang, Deepal Jayasinghe, Pengcheng Xiong, Simon Malkowski, Qinyi Wu, Gueyoung Jung, Younggyun Koh, and Galen Swint</i>	
Exacution: Enhancing Scientific Data Management for Exascale .....	1927
<i>Scott Klasky, Eric Suchyta, Mark Ainsworth, Qing Liu, Ben Whitney, Matthew Wolf, Jong Choi, Ian Foster, Mark Kim, Jeremy Logan, Kshitij Mehta, Todd Munson, George Ostrouchov, Manish Parashar, Norbert Podhorszki, David Pugmire, and Lipeng Wan</i>	
Hardware Acceleration Landscape for Distributed Real-Time Analytics: Virtues and Limitations .....	1938
<i>Mohammadreza Najafi, Kaiwen Zhang, Mohammad Sadoghi, and Hans-Arno Jacobsen</i>	
Coordinating Distributed Speaking Objects .....	1949
<i>Marco Lippi, Marco Mamei, Stefano Mariani, and Franco Zambonelli</i>	
Model-Driven Domain-Specific Middleware .....	1961
<i>Fabio M. Costa, Karl A. Morris, Fabio Kon, and Peter J. Clarke</i>	

## **Vision 6: Innovation in Big Data Systems**

On the Design of a Blockchain Platform for Clinical Trial and Precision Medicine .....	1972
<i>Zonyin Shae and Jeffrey J.P. Tsai</i>	
Towards Dataflow-Based Graph Accelerator .....	1981
<i>Hai Jin, Pengcheng Yao, Xiaofei Liao, Long Zheng, and Xianliang Li</i>	
Towards a RISC Framework for Efficient Contextualisation in the IoT .....	1993
<i>Dimitrios Georgakopoulos, Ali Yavari, Prem Prakash Jayaraman, and Rajiv Ranjan</i>	
The Future of the Semantic Web: Prototypes on a Global Distributed Filesystem .....	1997
<i>Michael Cochez, Dominik Hüser, and Stefan Decker</i>	
On Broad Big Data .....	2007
<i>Steffen Staab</i>	

## **Short Papers**

### **Short Paper 1: Distributed Operating Systems, Middleware, and Algorithms**

SRLB: The Power of Choices in Load Balancing with Segment Routing .....	2011
<i>Yoann Desmouceaux, Pierre Pfister, Jérôme Tollet, Mark Townsley, and Thomas Clausen</i>	
Improving Efficiency of Link Clustering on Multi-core Machines .....	2017
<i>Guanhua Yan</i>	
S3: Joint Scheduling and Source Selection for Background Traffic in Erasure-Coded Storage .....	2025
<i>Shijing Li, Tian Lan, Moo-Ryong Ra, and Rajesh Panta</i>	
On the Feasibility of Inter-Domain Routing via a Small Broker Set .....	2031
<i>Dong Lin, David Hui, Weijie Wu, Tingwei Liu, Yating Yang, Yi Wang, John C.S. Lui, Gong Zhang, and Yingtao Li</i>	
Subscription Covering for Relevance-Based Filtering in Content-Based Publish/Subscribe Systems .....	2039
<i>Kaiwen Zhang, Vinod Muthusamy, Mohammad Sadoghi, and Hans-Arno Jacobsen</i>	
Workflow Optimization in PAW .....	2045
<i>Maxim Filatov, Verena Kantere, and Iluju Kiringa</i>	
A First Look at Information Entropy-Based Data Pricing .....	2053
<i>Xijun Li, Jianguo Yao, Xue Liu, and Haibing Guan</i>	
Retrospective Lightweight Distributed Snapshots Using Loosely Synchronized Clocks .....	2061
<i>Aleksey Charapko, Ailidani Ailijiang, Murat Demirbas, and Sandeep Kulkarni</i>	
Power-Aware Population Protocols .....	2067
<i>Chuan Xu, Janna Burman, and Joffroy Beauquier</i>	
MultiPub: Latency and Cost-Aware Global-Scale Cloud Publish/Subscribe .....	2075
<i>Julien Gascon-Samson, Jörg Kienzle, and Bettina Kemme</i>	
Reachability in Binary Multithreaded Programs Is Polynomial .....	2083
<i>Alexander Malkis and Steffen Borgwardt</i>	

An Event-Level Abstraction for Achieving Efficiency and Fairness in Network Update .....	2089
<i>Ting Qu, Deke Guo, Xiaomin Zhu, Jie Wu, Xiaolei Zhou, and Zhong Liu</i>	

## **Short Paper 2: Cloud and Data Center Systems and Networks**

DCM: Dynamic Concurrency Management for Scaling n-Tier Applications in Cloud .....	2097
<i>Hui Chen, Qingyang Wang, Balaji Palanisamy, and Pengcheng Xiong</i>	
More Peak, Less Differentiation: Towards A Pricing-aware Online Control Framework for Inter-Datacenter Transfers .....	2105
<i>Wenxin Li, Xiaobo Zhou, Keqiu Li, Heng Qi, and Deke Guo</i>	
Robust Multi-tenant Server Consolidation in the Cloud for Data Analytics Workloads .....	2111
<i>Joseph Mate, Khuzaima Daudjee, and Shahin Kamali</i>	
Flow-Aware Adaptive Pacing to Mitigate TCP Incast in Data Center Networks .....	2119
<i>Shaojun Zou, Jiawei Huang, Yutao Zhou, Jianxin Wang, and Tian He</i>	
Real-Time Power Cycling in Video on Demand Data Centres Using Online Bayesian Prediction .....	2125
<i>Vicent Sanz Marco, Zheng Wang, and Barry Porter</i>	
A Distributed Access Control System for Cloud Federations .....	2131
<i>Shorouq Alansari, Federica Paci, and Vladimiro Sassone</i>	
Voyager: Complete Container State Migration .....	2137
<i>Shripad Nadgowda, Sahil Suneja, Nilton Bila, and Canturk Isci</i>	
Keddah: Capturing Hadoop Network Behaviour .....	2143
<i>Jie Deng, Gareth Tyson, Felix Cuadrado, and Steve Uhlig</i>	
A Scalable and Distributed Approach for NFV Service Chain Cost Minimization .....	2151
<i>Zijun Zhang, Zongpeng Li, Chuan Wu, and Chuanhe Huang</i>	
Elastic Paxos: A Dynamic Atomic Multicast Protocol .....	2157
<i>Samuel Benz and Fernando Pedone</i>	
Boosting The Benefits of Hybrid SDN .....	2165
<i>Wen Wang, Wenbo He, and Jinshu Su</i>	
Adopting SDN Switch Buffer: Benefits Analysis and Mechanism Design .....	2171
<i>Fuliang Li, Jiannong Cao, Xingwei Wang, Yinhu Sun, Tian Pan, and Xuefeng Liu</i>	

## **Short Paper 3: Internet of Things, Smart Cities, and Cyber-Physical Systems**

IoT SENTINEL: Automated Device-Type Identification for Security Enforcement in IoT .....	2177
<i>Markus Miettinen, Samuel Marchal, Ibbad Hafeez, N. Asokan, Ahmad-Reza Sadeghi, and Sasu Tarkoma</i>	
Efficient Z-Order Encoding Based Multi-Modal Data Compression in WSNs .....	2185
<i>Xiaofei Cao, Sanjay Madria, and Takahiro Hara</i>	
PTrack: Enhancing the Applicability of Pedestrian Tracking with Wearables .....	2193
<i>Yonghang Jiang, Zhenjiang Li, and Jianping Wang</i>	

Source Location Privacy-Aware Data Aggregation Scheduling for Wireless Sensor Networks .....	2200
<i>Jack Kirton, Matthew Bradbury, and Arshad Jhumka</i>	
Velocity Optimization of Pure Electric Vehicles with Traffic Dynamics Consideration .....	2206
<i>Liuwang Kang, Haiying Shen, and Ankur Sarker</i>	
PIANO: Proximity-Based User Authentication on Voice-Powered Internet-of-Things Devices .....	2212
<i>Neil Zhenqiang Gong, Altay Ozen, Yu Wu, Xiaoyu Cao, Richard Shin, Dawn Song, Hongxia Jin, and Xuan Bao</i>	
Category Information Collection in RFID Systems .....	2220
<i>Jia Liu, Shigang Chen, Bin Xiao, Yanyan Wang, and Lijun Chen</i>	
Scalable Role-Based Data Disclosure Control for the Internet of Things .....	2226
<i>Ali Yavari, Arezou Soltani Panah, Dimitrios Georgakopoulos, Prem Prakash Jayaraman, and Ron van Schyndel</i>	
Multi-representation Based Data Processing Architecture for IoT Applications .....	2234
<i>Vaibhav Arora, Faisal Nawab, Divyakant Agrawal, and Amr El Abbadi</i>	
Long Term Sensing via Battery Health Adaptation .....	2240
<i>Greg Jackson, Zhijin Qin, and Julie A. McCann</i>	
Detecting Time Synchronization Attacks in Cyber-Physical Systems with Machine Learning Techniques .....	2246
<i>Jingxuan Wang, Wenting Tu, Lucas C.K. Hui, S.M. Yiu, and Eric Ke Wang</i>	
Speed-Based Location Tracking in Usage-Based Automotive Insurance .....	2252
<i>Lu Zhou, Qingrong Chen, Zutian Luo, Haojin Zhu, and Cailian Chen</i>	

## **Short Paper 4: Mobile, Wireless, Edge, and Crowd Computing**

On Efficient Offloading Control in Cloud Radio Access Network with Mobile Edge Computing .....	2258
<i>Tong Li, Chathura Sarathchandra Magurawalage, Kezhi Wang, Ke Xu, Kun Yang, and Haiyang Wang</i>	
Location Privacy in Mobile Edge Clouds .....	2264
<i>Ting He, Ertugrul N. Ciftcioglu, Shiqiang Wang, and Kevin S. Chan</i>	
Approximation Designs for Cooperative Relay Deployment in Wireless Networks .....	2270
<i>Haotian Wang, Shilei Tian, Xiaofeng Gao, Lidong Wu, and Guihai Chen</i>	
Dispersing Social Content in Mobile Crowd through Opportunistic Contacts .....	2276
<i>Lei Zhang, Feng Wang, and Jiangchuan Liu</i>	
A Lightweight Recommendation Framework for Mobile User's Link Selection in Dense Network .....	2282
<i>Ji Wang, Xiaomin Zhu, Weidong Bao, and Guanlin Wu</i>	
Making Smartphone Smart on Demand for Longer Battery Life .....	2288
<i>Marco Brocanelli and Xiaorui Wang</i>	

FADEWICH: Fast Deauthentication Over the Wireless Channel .....	2294
<i>Mauro Conti, Giulio Lovisotto, Ivan Martinovic, and Gene Tsudik</i>	
Cognitive Wireless Charger: Sensing-Based Real-Time Frequency Control For Near-Field Wireless Charging .....	2302
<i>Sang-Yoon Chang, Sristi Lakshmi Sravana Kumar, and Yih-Chun Hu</i>	
Density and Mobility-Driven Evaluation of Broadcast Algorithms for MANETs .....	2308
<i>Raziel Carvajal Gómez, Inti Gonzalez-Herrera, Yérom-David Bromberg, Laurent Réveillère, and Etienne Rivière</i>	
Energy-Aware CPU Frequency Scaling for Mobile Video Streaming .....	2314
<i>Wenjie Hu and Guohong Cao</i>	
Crazy Crowd Sourcing to Mitigate Resource Scarcity .....	2322
<i>Nova Ahmed, Mahfuzur Rahman Siddiquee, Refaya Karim, Mohsina Zaman, Sayed Mahmudul Alam, and Syed Fahim Ashram</i>	
Detecting Rogue AP with the Crowd Wisdom .....	2327
<i>Tongqing Zhou, Zhiping Cai, Bin Xiao, Yueyue Chen, and Ming Xu</i>	

## **Short Paper 5: Distributed Big Data Systems and Analytics**

Towards Multilingual Automated Classification Systems .....	2333
<i>Aibek Musaev and Calton Pu</i>	
The Joint Effects of Tweet Content Similarity and Tweet Interactions for Topic Derivation .....	2338
<i>Robertus Nugroho, Weiliang Zhao, Jian Yang, Cecile Paris, and Surya Nepal</i>	
Timed-Release of Self-Emerging Data Using Distributed Hash Tables .....	2344
<i>Chao Li and Balaji Palanisamy</i>	
Caching for Pattern Matching Queries in Time Evolving Graphs: Challenges and Approaches .....	2352
<i>Muhammad Usman Nisar, Sahar Voghoei, and Lakshmith Ramaswamy</i>	
GraphA: Adaptive Partitioning for Natural Graphs .....	2358
<i>Dongsheng Li, Chengfei Zhang, Jinyan Wang, Zhaoning Zhang, and Yiming Zhang</i>	
Parallel Algorithm for Core Maintenance in Dynamic Graphs .....	2366
<i>Na Wang, Dongxiao Yu, Hai Jin, Chen Qian, Xia Xie, and Qiang-Sheng Hua</i>	
DHCRF: A Distributed Conditional Random Field Algorithm on a Heterogeneous CPU-GPU Cluster for Big Data .....	2372
<i>Wei Ai, Kenli Li, Cen Chen, Jiwu Peng, and Keqin Li</i>	
Towards New Abstractions for Implementing Quorum-Based Systems .....	2380
<i>Tormod Erevik Lea, Leander Jehl, and Hein Meling</i>	
Selective Traffic Offloading on the Fly: A Machine Learning Approach .....	2386
<i>Zaiyang Tang, Peng Li, Song Guo, Xiaofei Liao, Hai Jin, and Daqing Zhang</i>	
A Fast Heuristic Attribute Reduction Algorithm Using Spark .....	2393
<i>Mincheng Chen, Jingling Yuan, Lin Li, Dongling Liu, and Tao Li</i>	

Profiling Users by Modeling Web Transactions .....	2399
<i>Radek Tomšů, Samuel Marchal, and N. Asokan</i>	
JeCache: Just-Enough Data Caching with Just-in-Time Prefetching for Big Data	
Applications .....	2405
<i>Yifeng Luo, Jia Shi, and Shuigeng Zhou</i>	
<b>Short Paper 6: Security, Privacy, Trust, and Fault Tolerance in Distributed Systems</b>	
Proximity Awareness Approach to Enhance Propagation Delay on the Bitcoin	
Peer-to-Peer Network .....	2411
<i>Muntadher Fadhl sallal, Gareth Owenson, and Mo Adda</i>	
Catch Me If You Can: Detecting Compromised Users Through Partial Observation	
on Networks .....	2417
<i>Derek Wang, Sheng Wen, Yang Xiang, Wanlei Zhou, Jun Zhang, and Surya Nepal</i>	
Location Privacy Breach: Apps Are Watching You in Background .....	2423
<i>Dachuan Liu, Xing Gao, and Haining Wang</i>	
Android Malware Detection Using Complex-Flows .....	2430
<i>Feng Shen, Justin Del Vecchio, Aziz Mohaisen, Steven Y. Ko, and Lukasz Ziarek</i>	
Privacy Implications of DNSSEC Look-Aside Validation .....	2438
<i>Aziz Mohaisen, Zhongshu Gu, and Kui Ren</i>	
FlipNet: Modeling Covert and Persistent Attacks on Networked Resources .....	2444
<i>Sudip Saha, Anil Vullikanti, and Mahantesh Halappanavar</i>	
Understanding the Market-Level and Network-Level Behaviors of the Android Malware	
Ecosystem .....	2452
<i>Chao Yang, Jialong Zhang, and Guofei Gu</i>	
EnGarde: Mutually-Trusted Inspection of SGX Enclaves .....	2458
<i>Hai Nguyen and Vinod Ganapathy</i>	
Truthful Online Auction for Cloud Instance Subletting .....	2466
<i>Yifei Zhu, Silvery Fu, Jiangchuan Liu, and Yong Cui</i>	
On the Power of Weaker Pairwise Interaction: Fault-Tolerant Simulation of Population	
Protocols .....	2472
<i>Giuseppe Antonio Di Luna, Paola Flocchini, Taisuke Izumi, Tomoko Izumi, Nicola Santoro, and Giovanni Viglietta</i>	
Distributed Fault Tolerant Linear System Solvers Based on Erasure Coding .....	2478
<i>Xuejiao Kang, David F. Gleich, Ahmed Sameh, and Ananth Grama</i>	
Preserving Incumbent Users' Privacy in Exclusion-Zone-Based Spectrum Access	
Systems .....	2486
<i>Yanzhi Dou, He Li, Kexiong (Curtis) Zeng, Jinshan Liu, Yaling Yang, Bo Gao, and Kui Ren</i>	

## Demonstration Track

### Demo 1: Distributed Applications Cluster

LITMUS: Towards Multilingual Reporting of Landslides .....	2494
<i>Aibek Musaev, Qixuan Hou, Yang Yang, and Calton Pu</i>	
Pythia: A System for Online Topic Discovery of Social Media Posts .....	2497
<i>Iouliana Litou and Vana Kalogeraki</i>	
Data-Driven Serendipity Navigation in Urban Places .....	2501
<i>Xiaoyu Ge, Ameya Daphalapurkar, Manali Shimpi, Darpan Kohli, Konstantinos Pelechrinis, Panos K. Chrysanthis, and Demetrios Zeinalipour-Yazti</i>	
Toward an Integrated Approach to Localizing Failures in Community Water Networks (DEMO) .....	2505
<i>Qing Han, Phu Nguyen, Ronald T. Eguchi, Kuo-Lin Hsu, and Nalini Venkatasubramanian</i>	

### Demo 2: Security and Privacy Cluster

PrivateGraph: A Cloud-Centric System for Spectral Analysis of Large Encrypted Graphs .....	2507
<i>Sagar Sharma and Keke Chen</i>	
IoT Sentinel Demo: Automated Device-Type Identification for Security Enforcement in IoT .....	2511
<i>Markus Miettinen, Samuel Marchal, Ibbad Hafeez, Tommaso Frassetto, N. Asokan, Ahmad-Reza Sadeghi, and Sasu Tarkoma</i>	
Rogue Access Point Detector Using Characteristics of Channel Overlapping in 802.11n .....	2515
<i>RhongHo Jang, Jeonil Kang, Aziz Mohaisen, and DaeHun Nyang</i>	
ReverseCloak: A Reversible Multi-level Location Privacy Protection System .....	2521
<i>Chao Li, Balaji Palanisamy, Aravind Kalaivanan, and Sriram Raghunathan</i>	

### Demo 3: Clouds and Virtualization Cluster

Hopsworks: Improving User Experience and Development on Hadoop with Scalable, Strongly Consistent Metadata .....	2525
<i>Mahmoud Ismail, Ermias Gebremeskel, Theofilos Kakantousis, Gautier Berthou, and Jim Dowling</i>	
Isolation in Docker through Layer Encryption .....	2529
<i>Ioannis Giannakopoulos, Konstantinos Papazafeiropoulos, Katerina Doka, and Nectarios Koziris</i>	
Dela — Sharing Large Datasets between Hadoop Clusters .....	2533
<i>Alexandru A. Ormenisan and Jim Dowling</i>	
In Vivo Evaluation of the Secure Opportunistic Schemes Middleware Using a Delay Tolerant Social Network .....	2537
<i>Corey E. Baker, Allen Starke, Tanisha G. Hill-Jarrett, and Janise McNair</i>	

## **Demo 4: Distributed Systems and Networking Cluster**

Scaling and Load Testing Location-Based Publish and Subscribe .....	2543
<i>Bertil Chapuis and Benoit Garbinato</i>	
A Distributed Event-Centric Collaborative Workflows Development System for IoT Application .....	2547
<i>Yongyang Cheng, Shuai Zhao, Bo Cheng, Shoulu Hou, Xiulei Zhang, and Junliang Chen</i>	
Incentive Mechanism for Data-Centric Message Delivery in Delay Tolerant Networks .....	2551
<i>Himanshu Jethawa and Sanjay Madria</i>	
Performance of Cognitive Wireless Charger for Near-Field Wireless Charging .....	2555
<i>Sang-Yoon Chang, Sristi Lakshmi Sravana Kumar, and Yih-Chun Hu</i>	

## **Poster Track**

### **Poster 1: Distributed Applications Cluster**

Toward Vehicle Sensing: An Integrated Application with Sparse Video Vameras and Intelligent Taxicabs .....	2557
<i>Yang Wang, Wuji Chen, Wei Zheng He Huang, Wen Zhang, and Hengchang Liu</i>	
Segmentation of Time Series Based on Kinetic Characteristics for Storage Consumption Prediction .....	2559
<i>Beibei Miao, Yu Chen, Xuebo Jin, Bo Wang, Xianping Qu, Shimin Tao, Dong Wang, and Zhi Zang</i>	
A Multi-stage Hierarchical Window Model with Application to Real-Time Graph Analysis .....	2561
<i>Sachini Jayasekara, Shanika Karunasekera, and Aaron Harwood</i>	
Dynamic Pricing at Electric Vehicle Charging Stations for Queueing Delay Reduction .....	2565
<i>Peng Xu, Jinyang Li, Xiaoshan Sun, Wei Zheng, and Hengchang Liu</i>	
Pairwise Ranking Aggregation by Non-interactive Crowdsourcing with Budget Constraints .....	2567
<i>Changjiang Cai, Haipei Sun, Boxiang Dong, Bo Zhang, Ting Wang, and Hui (Wendy) Wang</i>	
Buffer-Based Reinforcement Learning for Adaptive Streaming .....	2569
<i>Yue Zhang and Yao Liu</i>	
The Case for Using Content-Centric Networking for Distributing High-Energy Physics Software .....	2571
<i>Mohammad Alhowaidi, Byrav Ramamurthy, Brian Bockelman, and David Swanson</i>	
LAVEA: Latency-Aware Video Analytics on Edge Computing Platform .....	2573
<i>Shanhe Yi, Zijiang Hao, Qingyang Zhang, Quan Zhang, Weisong Shi, and Qun Li</i>	
Complete Tolerance Relation Based Filling Algorithm Using Spark .....	2575
<i>Jingling Yuan, Yao Xiang, Xian Zhong, Mincheng Chen, and Tao Li</i>	

## **Poster 2: Security and Privacy Cluster**

Towards Secure Public Directory for Privacy-Preserving Data Sharing .....	2577
<i>Amin Fallahi, Xi Liu, Yuzhe Tang, Shuang Wang, and Rui Zhang</i>	
Anonymous Routing to Maximize Delivery Rates in DTNs .....	2579
<i>Kazuya Sakai, Min-Te Sun, Wei-Shinn Ku, and Jie Wu</i>	
Evaluating Connection Resilience for the Overlay Network Kademia .....	2581
<i>Henner Heck, Olga Kieselmann, and Arno Wacker</i>	
Shortfall-Based Optimal Security Provisioning for Internet of Things .....	2585
<i>Antonino Rullo, Edoardo Serra, Elisa Bertino, and Jorge Lobo</i>	
Group Differential Privacy-Preserving Disclosure of Multi-level Association Graphs .....	2587
<i>Balaji Palanisamy, Chao Li, and Prashant Krishnamurthy</i>	
Tracking Information Flow in Cyber-Physical Systems .....	2589
<i>Stefan Gries, Marc Hesenius, and Volker Gruhn</i>	
Privacy-Preserving Matchmaking in Geosocial Networks with Untrusted Servers .....	2591
<i>Qixiang Dong and Dijiang Huang</i>	
You've Been Tricked! A User Study of the Effectiveness of Typosquatting Techniques .....	2593
<i>Jeffrey Spaulding, Shambhu Upadhyaya, and Aziz Mohaisen</i>	
Real-Time Detection of Illegal File Transfers in the Cloud .....	2597
<i>Adam Bowers, Dan Lin, Anna Squicciarini, and Ali Hurson</i>	
Eyes of the Swarm: Streamers' Detection in BT .....	2601
<i>Daniel Vasconcelos Correa da Silva and Antonio Augusto de Aragao Rocha</i>	

## **Poster 3: Clouds and Virtualization Cluster**

Load Prediction for Energy-Aware Scheduling for Cloud Computing Platforms .....	2604
<i>Alexandre Dambreille, Joanna Tomaszik, Johanne Cohen, and Fabien Dufoulon</i>	
Learn-as-You-Go with Megh: Efficient Live Migration of Virtual Machines .....	2608
<i>Debabrota Basu, Xiyang Wang, Yang Hong, Haibo Chen, and Stéphane Bressan</i>	
Machine-Learning Based Performance Estimation for Distributed Parallel Applications in Virtualized Heterogeneous Clusters .....	2610
<i>Seontae Kim, Nguyen Pham, Woongki Baek, and Young-ri Choi</i>	
Incremental Elasticity for NoSQL Data Stores .....	2612
<i>Antonis Papaioannou and Kostas Magoutis</i>	
A Framework for Efficient Energy Scheduling of Spark Workloads .....	2614
<i>Stathis Maroulis, Nikos Zacheilas, and Vana Kalogeraki</i>	
Towards a Complete Virtual Data Center Embedding Algorithm Using Hybrid Strategy .....	2616
<i>M. P. Gilesh, S. D. Madhu Kumar, Lillykutty Jacob, and Umesh Bellur</i>	
Federating Consistency for Partition-Prone Networks .....	2618
<i>Benjamin Bengfort and Pete Keleher</i>	
Mitigating Nesting-Agnostic Hypervisor Policies in Derivative Clouds .....	2620
<i>Chandra Prakash, Prashanth, Purushottam Kulkarni, and Umesh Bellur</i>	

A Novel Architecture for Efficient Fog to Cloud Data Management in Smart Cities .....	2622
<i>Amir Sinaeepourfard, Jordi Garcia, Xavier Masip-Bruin, and Eva Marin-Tordera</i>	
Networklet: Concept and Deployment .....	2624
<i>Sheng Zhang, Yu Liang, Zhuzhong Qian, Mingjun Xiao, Jie Wu, Fanyu Kong, and Sanglu Lu</i>	
Optimistic Causal Consistency for Geo-Replicated Key-Value Stores .....	2626
<i>Kristina Spirovská, Diego Didona, and Willy Zwaenepoel</i>	
Automated Performance Evaluation for Multi-tier Cloud Service Systems Subject to Mixed Workloads .....	2630
<i>Xudong Zhao, Jiwei Huang, Lei Liu, Shijun Liu, Calton Pu, and Lizhen Cui</i>	
Decentralised Runtime Monitoring for Access Control Systems in Cloud Federations .....	2632
<i>Md Sadek Ferdous, Andrea Margheri, Federica Paci, Mu Yang, and Vladimiro Sassone</i>	

## **Poster 4: Distributed Systems and Networking Cluster**

DuoFS: An Attempt at Energy-Saving and Retaining Reliability of Storage Systems .....	2634
<i>Bing Jiao, Xiaomin Zhu, Xiaojun Ruan, Xiao Qin, and Shu Yin</i>	
A Proposal of an Efficient Traffic Matrix Estimation Under Packet Drops .....	2636
<i>Kohei Watabe, Toru Mano, Kimihiko Mizutani, Osamu Akashi, Kenji Nakagawa, and Takeru Inoue</i>	
Straggler Mitigation for Distributed Behavioral Simulation .....	2638
<i>Eman Bin Khunayn, Shanika Karunasekera, Hairuo Xie, and Kotagiri Ramamohanarao</i>	
Supporting Resource Control for Actor Systems in Akka .....	2642
<i>Ahmed Abdel Moamen, Dezhong Wang, and Nadeem Jamali</i>	
A Distributed Operating System Network Stack and Device Driver for Multicores .....	2646
<i>Saif Ansary, Antonio Barbalace, Ho-Ren Chuang, Thomas Lazor, and Binoy Ravindran</i>	
Cache Potentially of MONs: A Prime .....	2650
<i>Peiyan Yuan, Honghai Wu, Xiaoyan Zhao, and Zhengnan Dong</i>	
Oak: User-Targeted Web Performance .....	2654
<i>Marcel Flores, Alexander Wenzel, and Aleksandar Kuzmanovic</i>	
A Self-Organizing Distributed and In-Band SDN Control Plane .....	2656
<i>Marco Canini, Iosif Salem, Liron Schiff, Elad M. Schiller, and Stefan Schmid</i>	

## **Tutorials**

Serverless Programming (Function as a Service) .....	2658
<i>Paul Castro, Vatche Ishakian, Vinod Muthusamy, and Aleksander Slominski</i>	
Sensor Cloud: A Cloud of Sensor Networks .....	2660
<i>Sanjay K. Madria</i>	

## **Author Index**