

2023 IEEE 16th International Conference on Cloud Computing (CLOUD 2023)

**Chicago, Illinois, USA
2-8 July 2023**



**IEEE Catalog Number: CFP23CLO-POD
ISBN: 979-8-3503-0482-4**

**Copyright © 2023 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:	CFP23CLO-POD
ISBN (Print-On-Demand):	979-8-3503-0482-4
ISBN (Online):	979-8-3503-0481-7
ISSN:	2159-6182

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

2023 IEEE 16th International Conference on Cloud Computing (CLOUD) **CLOUD 2023**

Table of Contents

Steering Committee Chair Message	xv
Congress General Chairs Message	xvi
Congress Program Chairs Message	xvii
TCSVC Chair Message	xviii
CLOUD 2023 Chairs Message	xix
CLOUD 2023 Committees	xx

CLOUD Conference Papers

Cloud & AI - I (CLD_CON1)

xCloudServing: Automated ML Serving Across Clouds	1
<i>Malgorzata Lazuka (IBM Research - Europe; ETH Zurich, Switzerland), Andreea Anghel (IBM Research - Europe, Switzerland), Parikshit Ram (IBM Research, USA), Haralampos Pozidis (IBM Research - Europe, Switzerland), and Thomas Parnell (IBM Research - Europe, Switzerland)</i>	
Deep Reinforcement Learning in Cloud Elasticity through Offline Learning and Return Based Scaling	13
<i>Miltiadis Chrysopoulos (CSLAB NTUA, Greece), Ioannis Konstantinou (University of Thessaly, Greece), and Nectarios Koziris (CSLAB NTUA, Greece)</i>	
Demystifying Deep Learning in Predictive Monitoring for Cloud-Native SLOs	24
<i>Andrea Morichetta (Distributed Systems Group, TU Wien, Austria), Victor Casamayor Pujol (Distributed Systems Group, TU Wien, Austria), Stefan Nastic (Distributed Systems Group, TU Wien, Austria), Thomas Pusztai (Distributed Systems Group, TU Wien, Austria), Philipp Raith (Distributed Systems Group, TU Wien, Austria), Schahram Dustdar (Distributed Systems Group, TU Wien, Austria), Deepak Vij (Futurewei Technologies, Inc., USA), Ying Xiong (Futurewei Technologies, Inc., USA), and Zhaobo Zhang (Futurewei Technologies, Inc., USA)</i>	

Cloud Management and Operations - I (CLD_CON2)

Fine-Grained Heterogeneous Execution Framework with Energy Aware Scheduling	35
<i>Gourav Rattihalli (Hewlett Packard Labs, USA), Ninad Hogade (Hewlett Packard Labs, USA), Aditya Dhakal (Hewlett Packard Labs, USA), Eitan Frachtenberg (Hewlett Packard Labs, USA), Rolando Pablo Hong Enriquez (Hewlett Packard Labs, USA), Pedro Bruel (Hewlett Packard Labs, USA), Alok Mishra (Hewlett Packard Labs, USA), and Dejan Milojicic (Hewlett Packard Labs, USA)</i>	
Storm-RTS: Stream Processing with Stable Performance for Multi-cloud and Cloud-Edge	45
<i>Hai Duc Nguyen (University of Chicago) and Andrew A. Chien (University of Chicago and Argonne National Laboratory)</i>	
Blaze: A High-Performance, Scalable, and Efficient Data Transfer Framework with Configurable and Extensible Features	58
<i>Suresh Marru (Indiana University, USA), Brian Freitag (NASA Marshall Space Flight Center, USA), Dimuthu Wannipurage (Indiana University, USA), Uday Kumar Bommala (University of Alabama in Huntsville, USA), Patrick Pradier (GAEL Systems, France), Christophe Demange (GAEL Systems, France), Nishan Pantha (University of Alabama in Huntsville, USA), Tathagata Mukherjee (University of Alabama in Huntsville, USA), Betlem Rosich (European Space Agency, Italy), Eric Monjoux (European Space Agency, Italy), and Rahul Ramachandran (NASA Marshall Space Flight Center, USA)</i>	
Kepler: A Framework to Calculate the Energy Consumption of Containerized Applications	69
<i>Marcelo Amaral (IBM Research, Japan), Huamin Chen (Red Hat, USA), Tatsuhiro Chiba (IBM Research, Japan), Rina Nakazawa (IBM Research, Japan), Sunyanan Choochootkaew (IBM Research, Japan), Eun Kyung Lee (IBM Research, USA), and Tamar Eilam (IBM Research, USA)</i>	

Cloud Security - I (CLD_CON3)

Argus: Rapid Wildfire Tracking Using Satellite Data Collections	72
<i>Saptashwa Mitra (Colorado State University, USA), Paahuni Khandelwal (Colorado State University, USA), Shrideep Pallickara (Colorado State University, USA), and Sangmi Lee Pallickara (Colorado State University, USA)</i>	
The Case for the Anonymization of Offloaded Computation	84
<i>Md Washik Al Azad (University of Notre Dame), Shifat Sarwar (University of Nebraska at Omaha), Sifat Ut Taki (University of Notre Dame), and Spyridon Mastorakis (University of Notre Dame)</i>	
Wawel: Architecture for Scalable Attestation of Heterogeneous Virtual Execution Environments	96
<i>Wojciech Ozga (IBM Research Europe - Zurich), Patricia Sagmeister (IBM Research Europe - Zurich), Tamás Visegrády (IBM Research Europe - Zurich; Metaco Labs), and Silvio Dragone (IBM Research Europe - Zurich)</i>	

Cloud & AI - II (CLD_CON4)

IRIS: Interference and Resource Aware Predictive Orchestration for ML Inference Serving	108
<i>Aggelos Ferikoglou (National Technical University of Athens, Greece), Panos Chrysomiris (National Technical University of Athens, Greece), Achilleas Tzenetopoulos (National Technical University of Athens, Greece), Manolis Katsaragakis (National Technical University of Athens, Greece), Dimosthenis Masouros (National Technical University of Athens, Greece), and Dimitrios Soudris (National Technical University of Athens, Greece)</i>	
GNOSIS: Proactive Image Placement Using Graph Neural Networks & Deep Reinforcement Learning	120
<i>Theodoros Theodoropoulos (Harokopio University of Athens, Greece), Antonios Makris (Harokopio University of Athens, Greece), Evangelos Psomakelis (Harokopio University of Athens, Greece), Emanuele Carlini (Institute of Information Science and Technologies, National Research Council (CNR), Italy), Matteo Mordacchini (Institute of Information Science and Technologies, National Research Council (CNR), Italy), Patrizio Dazzi (University of Pisa, Italy), and Konstantinos Tserpes (Harokopio University of Athens, Greece)</i>	
A Framework for Characterizing Very Large Cloud Workload Traces with Unsupervised Learning.....	129
<i>Basem Suleiman (The University of New South Wales; The University of Sydney, Australia), Mohammed Mustafa Fulwala (The University of Sydney, Australia), and Albert Zomaya (The University of Sydney, Australia)</i>	
Keep It Simple: Fault Tolerance Evaluation of Federated Learning with Unreliable Clients	141
<i>Victoria Huang (National Institute of Water and Atmospheric Research, New Zealand), Shaleeza Sohail (University of Newcastle, Australia), Michael Mayo (University of Waikato, New Zealand), Tania Lorida Botran (Roblox, United States), Mark Rodrigues (University of Waikato, New Zealand), Chris Anderson (University of Waikato, New Zealand), and Melanie Ooi (University of Waikato, New Zealand)</i>	

Cloud & AI - III (CLD_CON5)

EN-Beats: A Novel Ensemble Learning-Based Method for Multiple Resource Predictions in Cloud	144
<i>Ming Chen (The University of Melbourne, Australia), Maria Rodriguez Read (The University of Melbourne, Australia), Patricia Arroba (Universidad Politécnica de Madrid, Spain), and Rajkumar Buyya (The University of Melbourne, Australia)</i>	
Learning Representations on Logs for AIOps	155
<i>Pranjal Gupta (IBM Research, India), Harshit Kumar (IBM Research, India), Debanjana Kar (IBM Research, India), Karan Bhukar (IBM Research, India), Pooja Aggarwal (IBM Research, India), and Prateeti Mohapatra (IBM Research, India)</i>	
Hawk: DevOps-Driven Transparency and Accountability in Cloud Native Systems	167
<i>Elias Grünwald (Technische Universität Berlin), Jannis Kiesel (Technische Universität Berlin), Siar-Remzi Akbayin (Technische Universität Berlin), and Frank Pallas (Technische Universität Berlin)</i>	

Selective Preemption of Distributed Deep Learning Training	175
<i>Younghun Go (Korea University), Changyong Shin (Korea University), Jeunghwan Lee (Korea University), Yeonho Yoo (Korea University), Gyeongsik Yang (Korea University), and Chuck Yoo (Korea University)</i>	

Cloud & AI - IV (CLD_CON6)

μ P: A Development Framework for Predicting Performance of Microservices by Design	178
<i>Giulio Garbi (IMT School for Advanced Studies, Italy), Emilio Incerto (IMT School for Advanced Studies, Italy), and Mirco Tribastone (IMT School for Advanced Studies, Italy)</i>	
HydraGen: A Microservice Benchmark Generator	189
<i>Mohammad Reza Saleh Sedghpour (Umeå University, Sweden), Aleksandra Obeso Duque (Umeå University; Ericsson Research, Sweden), Xuejun Cai (Ericsson Research, Sweden), Björn Skubic (Ericsson Research, Sweden), Erik Elmroth (Umeå University, Sweden), Cristian Klein (Umeå University, Sweden), and Johan Tordsson (Umeå University, Sweden)</i>	
Detecting and Resolving Coupling-Related Infrastructure as Code Based Architecture Smells in Microservice Deployments	201
<i>Evangelos Ntentos (University of Vienna, Austria), Uwe Zdun (University of Vienna, Austria), Ghareeb Falazi (University of Stuttgart, Germany), Uwe Breitenbücher (University of Stuttgart, Germany), and Frank Leymann (University of Stuttgart, Germany)</i>	

Cloud Management and Operations - II (CLD_CON7)

A Carbon-Aware Workload Dispatcher in Cloud Computing Systems	212
<i>Tayebeh Bahreini (IBM T.J. Watson Research Center), Asser Tantawi (IBM T.J. Watson Research Center), and Alaa Youssef (IBM T.J. Watson Research Center)</i>	
Declarative and Linear Programming Approaches to Service Placement, Reconciled	219
<i>Jacopo Massa (University of Pisa, Italy), Stefano Forti (University of Pisa, Italy), Patrizio Dazzi (University of Pisa, Italy), and Antonio Brogi (University of Pisa, Italy)</i>	
An Auto-Scaling Framework for Predictable Open Source FaaS Function Chains	229
<i>David Balla (Budapest University of Technology and Economics, Hungary), Markosz Maliosz (Budapest University of Technology and Economics, Hungary), and Csaba Simon (Budapest University of Technology and Economics, Hungary)</i>	

Cloud Management and Operations - III (CLD_CON8)

Object as a Service (OaaS): Enabling Object Abstraction in Serverless Clouds	238
<i>Pawissanutt Lertpongrujikorn (University of Louisiana at Lafayette) and Mohsen Amini Salehi (University of Louisiana at Lafayette)</i>	

Zero-Cost In-Depth Enforcement of Network Policies for Low-Latency Cloud-Native Systems	249
<i>Gerald Budigiri (imec-DistriNet, KU Leuven, Belgium), Christoph Baumann (Ericsson Security Research, Sweden), Eddy Truyen (imec-DistriNet, KU Leuven, Belgium), Jan Tobias Mühlberg (Université libre de Bruxelles, Belgium), and Wouter Joosen (imec-DistriNet, KU Leuven, Belgium)</i>	
Application and Infrastructure-Aware Orchestration in the Cloud-to-Edge Continuum	262
<i>Angelo Marchese (University of Catania, Italy) and Orazio Tomarchio (University of Catania, Italy)</i>	
Composability of Cloud Accelerators in Virtual World Simulations	272
<i>Dionysios Diamantopoulos (IBM Research Europe, Switzerland), Burkhard Ringlein (IBM Research Europe, Switzerland), Beat Weiss (IBM Research Europe, Switzerland), Mark Lantz (IBM Research Europe, Switzerland), and François Abel (IBM Research Europe, Switzerland)</i>	

Cloud Security - II (CLD_CON9)

Free the Turtles: Removing Nested Virtualization for Performance and Confidentiality in the Cloud	275
<i>Mengmei Ye (IBM Research), Angelo Ruocco (IBM Research), Daniele Buono (IBM Research), James Bottomley (IBM Research), and Hubertus Franke (IBM Research)</i>	
Making Your Program Oblivious: a Comparative Study for Side-Channel-Safe Confidential Computing	282
<i>A K M Mubashwir Alam (Marquette University, USA) and Keke Chen (Marquette University, USA)</i>	
InsightsSumm - Summarization of ITops Incidents through In-Context Prompt Engineering	290
<i>Suranjana Samanta (IBM Research, India), Oishik Chatterjee (IBM Research, India), Neil Boyette (IBM Software, USA), Guangya Liu (IBM Software, USA), and Prateeti Mohapatra (IBM Research, India)</i>	
Towards Confidential Computing: A Secure Cloud Architecture for Big Data Analytics and AI	293
<i>Naweiluo Zhou (Leibniz Supercomputing Centre (LRZ), Germany), Florent Dufour (Leibniz Supercomputing Centre (LRZ), Germany), Vinzent Bode (Leibniz Supercomputing Centre (LRZ), Germany), Peter Zinterhof (Leibniz Supercomputing Centre (LRZ), Germany), Nicolay J Hammer (Leibniz Supercomputing Centre (LRZ), Germany), and Dieter Kranzlmüller (Leibniz Supercomputing Centre (LRZ), Germany)</i>	
On the Value of Sequence-Based System Call Filtering for Container Security	296
<i>Somin Song (Kyungpook National University, Republic of Korea), Sahil Suneja (IBM TJ Watson Research Center, USA), Michael V. Le (IBM TJ Watson Research Center, USA), and Byungchul Tak (Kyungpook National University, Republic of Korea)</i>	

Cloud & AI - V (CLD_CON10)

FedGen: Generalizable Federated Learning for Sequential Data	308
<i>Praveen Venkateswaran (IBM Research), Vatche Isahagian (IBM Research), Vinod Muthusamy (IBM Research), and Nalini Venkatasubramanian (UC Irvine)</i>	
GraVAC: Adaptive Compression for Communication-Efficient Distributed DL Training	319
<i>Sahil Tyagi (Indiana University Bloomington, USA) and Martin Swamy (Indiana University Bloomington, USA)</i>	
Performance Characterization of Multi-container Deployment Schemes for Online Learning Inference	330
<i>Peini Liu (Universitat Politècnica de Catalunya, Spain), Jordi Guitart (Universitat Politècnica de Catalunya, Spain), and Amir Taherkordi (University of Oslo; NTNU, Norway)</i>	
Economics of Spot Instance Service: A Two-Stage Dynamic Game Approach	341
<i>Hyojung Lee (Cloud Research Team, Samsung SDS), Lam Vu (Samsung SDSV), and Minsung Jang (Cloud Research Team, Samsung SDS)</i>	

Infrastructure - I (CLD_CON11)

AdaCache: A Disaggregated Cache System with Adaptive Block Size for Cloud Block Storage	348
<i>Qirui Yang (Samsung), Runyu Jin (Arizona State University), Ni Fan (Samsung), Devasena Inupakutika (Samsung), Bridget Davis (Samsung), and Ming Zhao (Arizona State University)</i>	
Elevating Performance of LSM-Tree-Based Key-Value Stores with Gradient Data Hierarchy	360
<i>Hui Sun (Anhui University, China), Jinfeng Xu (Anhui University, China), and Xiao Qin (Auburn University, USA)</i>	
Virtual Network Function Migration Considering Load Balance and SFC Delay in Cloud Datacenter	370
<i>Yi Yue (China Unicom Research Institute, China), Xiongyan Tang (China Unicom Research Institute, China), Wencong Yang (China Unicom Research Institute, China), Zhiyan Zhang (China Unicom Research Institute, China), and Xuebei Zhang (China Unicom Research Institute, China)</i>	
AutoOPT: Data Generation and Optimization for Digital Twin Network (DTN)	376
<i>Mei Li (China Mobile Research Institute, China), Cheng Zhou (China Mobile Research Institute, China), Lu Lu (China Mobile Research Institute, China), Yan Zhang (University of Oslo, Norway), and Tao Sun (China Mobile Research Institute, China)</i>	

Infrastructure - II (CLD_CON12)

Enabling Scalability in the Cloud for Scientific Workflows: An Earth Science Use Case	383
<i>Paula Olaya (University of Tennessee, USA), Jakob Luettgau (University of Tennessee, USA), Camila Roa (University of Tennessee, USA), Ricardo Llamas (University of Delaware, USA), Rodrigo Vargas (University of Delaware, USA), Sophia Wen (IBM Research, USA), I-Hsin Chung (IBM Research, USA), Seetharami Seelam (IBM Research, USA), Yoonho Park (IBM Research, USA), Jay Lofstead (Sandia National Laboratories, USA), and Michela Taufer (University of Tennessee, USA)</i>	

NVMe-Driven Lazy Cache Coherence for Immutable Data with NVMe over Fabrics	394
<i>Tuan Anh Nguyen (Sungkyunkwan University), Hyeongjun Jeon (Sungkyunkwan University), Daegy Han (Sungkyunkwan University), Duck-Ho Bae (Samsung Electronics), Young Jin Yu (Samsung Electronics), Kyeungpyo Kim (GlueSys), Sungsoon Park (GlueSys), Jinkyu Jeong (Yonsei University), and Beomseok Nam (Sungkyunkwan University)</i>	
Performance Analysis of Apache OpenWhisk Across the Edge-Cloud Continuum	401
<i>Areej Alabbas (Cardiff University, United Kingdom; Imam Abdulrahman Bin Faisal University, Saudi Arabia), Ashish Kaushal (Indian Institute of Technology Ropar, India), Osama Almurshed (Cardiff University, United Kingdom), Omer Rana (Cardiff University, United Kingdom), Nitin Auluck (Indian Institute of Technology Ropar, India), and Charith Perera (Cardiff University, United Kingdom)</i>	
Effective Management of Time Series Data	408
<i>Cristiano E. Caon (Addepar, Inc., USA), Jie Li (Texas Tech University, USA), and Yong Chen (Texas Tech University, USA)</i>	
Design-Time Analysis of Time-Critical and Fault-Tolerance Constraints in Cloud Services	415
<i>Remo Andreoli (Sant'Anna School of Advanced Studies, Italy), Harald Gustafsson (Ericsson Research, Sweden), Luca Abeni (Sant'Anna School of Advanced Studies, Italy), Raquel Mini (Ericsson Research, Sweden), and Tommaso Cucinotta (Sant'Anna School of Advanced Studies, Italy)</i>	

Cloud Economics (CLD_CON13)

DEMOTS: A Decentralized Task Scheduling Algorithm for Micro-Clouds with Dynamic Power-Budgets	418
<i>Tharindu B. Hewage (The University of Melbourne, Australia), Shashikant Ilager (Vienna University of Technology (TU Wien), Austria), Maria A. Rodriguez (The University of Melbourne, Australia), Patricia Arroba (Universidad Politécnic de Madrid, Spain), and Rajkumar Buyya (The University of Melbourne, Australia)</i>	
Cost-Aware Multifaceted Reconfiguration of Service and Cloud-Based Dynamic Routing Applications	428
<i>Amirali Amiri (University of Vienna, Austria) and Uwe Zdun (University of Vienna, Austria)</i>	
Time-Dependent Pricing and Scheduling for Cloud Object Storage Service Providers	439
<i>Kyungtae Lee (Inha University) and Yeongjin Kim (Inha University)</i>	
A Novel Cost-Aware Data Placement Strategy for Edge-Cloud Collaborative Smart Systems	450
<i>Yifei Zhang (Anhui University, China), Jia Xu (Anhui University, China), Xiao Liu (Deakin University, Australia), Wuzhen Pan (Anhui University, China), and Xuejun Li (Anhui University, China)</i>	
Application of Auction Theory in Cloud Computing and Renewable Energy	457
<i>Hari Sowrirajan (Stanford University, USA) and George Wang (Stanford University, USA)</i>	

Cloud Management and Operations - IV (CLD_CON14)

MicroBlend: An Automated Service-Blending Framework for Microservice-Based Cloud Applications	460
<i>Myungjun Son (The Pennsylvania State University, USA), Shruti Mohanty (The Pennsylvania State University, USA), Jashwant Raj Gunasekaran (Adobe Research, USA), and Mahmut Kandemir (The Pennsylvania State University, USA)</i>	
QoS-Aware Deployment of Service Compositions in 5G-Empowered Edge-Cloud Continuum	471
<i>Marco Anisetti (Università degli Studi di Milano, Italy), Filippo Berto (Università degli Studi di Milano, Italy), and Ruslan Bondaruc (Università degli Studi di Milano, Italy)</i>	
Workload Failure Prediction for Data Centers	479
<i>Jie Li (Texas Tech University, USA), Rui Wang (Texas Tech University, USA), Ghazanfar Ali (Texas Tech University, USA), Tommy Dang (Texas Tech University, USA), Alan Sill (Texas Tech University, USA), and Yong Chen (Texas Tech University, USA)</i>	
Efficient Resource Scheduling for Distributed Infrastructures Using Negotiation Capabilities	486
<i>Junjie Chu (Uppsala University, Sweden), Prashant Singh (Uppsala University, Sweden), and Salman Toor (Uppsala University, Sweden)</i>	

Cloud as a Service (CLD_CON15)

Hybrid Serverless Platform for Service Function Chains	493
<i>Sheshadri K R (Indian Institute of Science, India) and J Lakshmi (Indian Institute of Science, India)</i>	
A Microservice-Based SaaS Deployment in a Data Center Considering Computational Server and Network Energy Consumption	505
<i>Amal Alzahrani (Queensland University of Technology, Australia) and Maolin Tang (Queensland University of Technology, Australia)</i>	
A Structured Literature Review Approach to Define Serverless Computing and Function as a Service	516
<i>Johannes Manner (Otto-Friedrich-University, Germany)</i>	
Scoop: A Scalable Object-Oriented Serverless Platform	523
<i>Narges Shahidi (Pennsylvania State University, USA), Jashwant Raj Gunasekaran (Adobe Research), Mahmut Taylan Kandemir (Pennsylvania State University, USA), and Bhuvan Uргаonkar (Pennsylvania State University, USA)</i>	
FaaSCTDO: Collaborative Task-Data Orchestration for Serverless Workflows	526
<i>Neng Yang (Beijing University of Posts and Telecommunications, China), Haitao Zhang (Beijing University of Posts and Telecommunications, China), and Yepeng Zhang (Beijing University of Posts and Telecommunications, China)</i>	

Cloud Security - III (CLD_CON16)

Integrating Homomorphic Encryption and Trusted Execution Technology for Autonomous and Confidential Model Refining in Cloud	529
<i>Pinglan Liu (Iowa State University, USA) and Wensheng Zhang (Iowa State University, USA)</i>	
Reliable and Accurate Fault Detection with GPGPUs and LLVM	540
<i>Yuichi Ozaki (Kyushu Institute of Technology), Sousuke Kanamoto (Kyushu Institute of Technology), Hiroaki Yamamoto (Kyushu Institute of Technology), and Kenichi Kourai (Kyushu Institute of Technology)</i>	
GuaranTEE: Introducing Control-Flow Attestation for Trusted Execution Environments	547
<i>Mathias Morbitzer (Fraunhofer AISEC), Benedikt Kopf (Fraunhofer AISEC), and Philipp Zieris (Fraunhofer AISEC)</i>	
Secure Lattice-Based Ciphertext-Policy Attribute-Based Encryption from Module-LWE For Cloud Storage	554
<i>Gudipati Sravya (NIT Warangal; IDRBT, Hyderabad, India), Pasupuleti Syam Kumar (IDRBT, Hyderabad, India), and R. Padmavathy (NIT Warangal, India)</i>	
Enabling Efficient Multidimensional Encrypted Data Aggregation for Fog-Cloud-Based Smart Grid	557
<i>Hang Shi (Harbin Institute of Technology, China), Jie Zhao (Harbin Institute of Technology, China), Chonglin Gu (Harbin Institute of Technology, China), Mingyue Wang (Harbin Institute of Technology, China), and Hejiao Huang (Harbin Institute of Technology, China)</i>	

Infrastructure - III (CLD_CON17)

A Case for Performance- and Cost-Aware Multi-Cloud Overlays	560
<i>Bahador Yeganeh (Snap, Inc.; University of Oregon), Ramakrishnan Durairajan (University of Oregon), Reza Rejaie (University of Oregon), and Walter Willinger (NIKSUN, Inc.)</i>	
MoKE: Modular Key-Value Emulator for Realistic Studies on Emerging Storage Devices	567
<i>Manoj Pravaakar Saha (Florida International University, USA), Danlin Jia (Northeastern University, USA), Janki Bhimani (Florida International University, USA), and Ningfang Mi (Northeastern University, USA)</i>	
GDTS: GAN-Based Distributed Tabular Synthesizer	570
<i>Zilong Zhao (TU Delft, Netherlands), Robert Birke (University of Turin, Italy), and Lydia Y. Chen (TU Delft, Netherlands)</i>	
Darly: Deep Reinforcement Learning for QoS-Aware Scheduling Under Resource Heterogeneity Optimizing Serverless Video Analytics	577
<i>Dimitrios Giagkos (National Technical University of Athens), Achilles Tzenetopoulos (National Technical University of Athens), Dimosthenis Masouros (National Technical University of Athens), Dimitrios Soudris (National Technical University of Athens), and Sotirios Xydis (National Technical University of Athens)</i>	

Author Index 581