2024 IEEE 17th International Conference on Cloud Computing (CLOUD 2024)

Shenzhen, China 7-13 July 2024



IEEE Catalog Number: CFP24CLO-POD **ISBN:**

979-8-3503-6854-3

Copyright © 2024 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:	CFP24CLO-POD
ISBN (Print-On-Demand):	979-8-3503-6854-3
ISBN (Online):	979-8-3503-6853-6
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



2024 IEEE 17th International Conference on Cloud Computing (CLOUD) CLOUD 2024

Table of Contents

Congress Steering Committee Chair Message	xii
Congress General Chair Message	xiii
Congress Program Chairs Message	xv
TCSVC Chair Message	xvi
CLOUD 2024 Chairs Message	xvii
CLOUD 2024 Committees	xviii
CLOUD 2024 Reviewers	xxii

CLOUD 1: Cloud and AI I

Fed2PKD: Bridging Model Diversity in Federated Learning via Two-Pronged Knowledge Distillation Zaipeng Xie (Hohai University), Han Xu (Hohai University), Xing Gao (Hohai University), Junchen Jiang (Hohai University), and Ruiqian Han (The Leng Kong Luingraity of Science and Technology (Currentery))	1
Resource Efficient Bayesian Optimization	12
Improving Federated Learning through Low-Entropy Client Sampling Based on Learned High-Level Features	20

CLOUD 2: Cloud-based Applications

Intent-Driven Multi-engine Observability Dataflows for Heterogeneous Geo-Distributed Clouds	. 30
Pankaj Thorat (IBM Research India)	
ArcaDB: A Disaggregated Query Engine for Heterogenous Computational Environments	42
Kristalys Ruiz-Rohena (University of Puerto Rico, USA) and Manuel	
Rodriguez-Martinez (University of Puerto Rico, USA)	

TraceMesh: Scalable and Streaming Sampling for Distributed Traces	54
Zhuangbin Chen (Sun Yat-sen University, China), Zhihan Jiang (The	
Chinese University of Hong Kong, China), Yuxin Su (Sun Yat-sen	
University, China), Michael R. Lyu (The Chinese University of Hong	
Kong, China), and Zibin Zheng (Sun Yat-sen University, China)	
Predictive Placement of Geo-distributed Blockchain Nodes for Performance Guarantee	66
Junseok Lee (Korea University, Korea), Yeonho Yoo (Korea University,	

<i>.</i>	0.
Korea), Chuck Yoo (Korea University, Korea), and Gyeongsik Yang	(Korea
University, Korea)	

CLOUD 3: Cloud Service Delivery I

Dynamic Workflow Scheduling in the Edge-Cloud Continuum: Optimizing Runtimes under Budget Constraints
 FastMig: Leveraging FastFreeze to Establish Robust Service Liquidity in Cloud 2.0
Telemetry-Driven Microservices Orchestration in Cloud-Edge Environments
Rethinking Application Container Networking in a Multi-cluster world

CLOUD 4: Cloud Infrastructure I

Optimizing Simultaneous Autoscaling for Serverless Cloud Computing Harold Ship (IBM Research - Israel), Evgeny Shindin (IBM Research - Israel), Chen Wang (IBM Research), Diana Arroyo (IBM Research), and Asser Tantawi (IBM Research)	105
UniNet: Accelerating the Container Network Data Plane in IaaS Clouds Yuan Ma (UIUC), Scott Smith (UIUC), Bill Dai (UIUC), Hubertus Franke (IBM Research), Bharat Sukhwani (IBM Research), Sameh Asaad (IBM Research), Jinjun Xiong (University at Buffalo), Volodymyr Kindratenko (UIUC), and Deming Chen (UIUC)	115
Availability-guarantee and Traffic Optimization Virtual Machine Placement in 5G Cloud Datacenters Wencong Yang (Zhengzhou University, School of Electrical Engineering), Shouyi Yang (Zhengzhou University, School of Electrical Engineering), Yi Yue (China Unicom Research Institute), Tian Chen (Zhengzhou University, School of Electrical Engineering), and Wanming Hao (Zhengzhou University, School of Electrical Engineering)	128

CLOUD 5: Cloud Security I

CRISP: Confidentiality, Rollback, and Integrity Storage Protection for Confidential Cloud-Native Computing
Data Splitting based Double Layer Encryption for Secure Ciphertext Deduplication in Cloud Storage
 Securing AI Inference in the Cloud: Is CPU-GPU Confidential Computing Ready?
A Secure Framework for Continuous Compliance across Heterogeneous Policy Validation Points 176 Takumi Yanagawa (IBM Research - Tokyo), Vikas Agarwal (IBM Research - India), Yuji Watanabe (IBM Research - Tokyo), Lou Degenaro (IBM Thomas J. Watson Research Center), and Anca Sailer (IBM Thomas J. Watson

Research Center)

CLOUD 6: Cloud Management & Operations I

TempoScale: A Cloud Workloads Prediction Approach Integrating Short-Term and Long-Term	
Information	183
Linfeng Wen (Shenzhen Institute of Advanced Technology, Chinese	
Academy of Sciences, China, University of Chinese Academy of Sciences,	
China), Minxian Xu (Shenzhen Institute of Advanced Technology, Chinese	
Academy of Sciences, China), Adel N. Toosi (Faculty of Information	
Technology, Monash University, Australia), and Kejiang Ye (Shenzhen	
Institute of Advanced Technology, Chinese Academy of Sciences, China)	
LGDCloudSim: A Resource Management Simulation System for Large-Scale Geographically	
Distributed Cloud Data Center Scenarios	194
Jiawen Liu (Tongji University, China), Yuehao Xu (Tongji University,	
China), Binbin Feng (Tongji University, China), and Zhijun Ding	
(Tongji University, China; The Shanghai Artificial Intelligence	
Laboratory, China)	

One System Call Hook to Rule All TEE OSes in the Cloud	205
Kailun Qin (Shanghai Jiao Tong University, China) and Dawu Gu	
(Shanghai Jiao Tong University, China)	
Optimizing Cloud Workloads: Autoscaling with Reinforcement Learning	217
Pratik Mishra (IBM Research, India), Sandeep Hans (IBM Research,	
India), Diptikalyan Saha (IBM Research, India), and Pratibha Moogi	
(IBM Research, India)	

CLOUD 7: Cloud Management & Operations II

Towards Sustainable Cloud Software Systems through Energy-Aware Code Smell Refactoring 22 Asif Imran (California State University San Marcos), Tevfik Kosar (University at Buffalo), Jaroslaw Zola (University at Buffalo), and M. Fatih Bulut (Microsoft)	3
 Genetic Algorithm with Repair Method for Deadline-Constrained IoT Workflow Scheduling in Fog-Cloud Computing	5
Analysis and Optimization for Passive One-way Delay Measurement Tax in Container Networks . 24 Jingzhao Xie (University of Electronic Science and Technology of China, China), Chongxi Ma (University of Electronic Science and Technology of China, China), Hongfang Yu (University of Electronic Science and Technology of China, China), Long Luo (University of Electronic Science and Technology of China, China), and Gang Sun (University of Electronic Science and Technology of China, China)	7
 Syscall Analysis for Resource Stress Identification for Container Network Functions	6

CLOUD 8: Cloud and AI II

SAM: Subseries Augmentation-based Meta-learning for Generalizing AIOps Models in	
Multi-cloud Migration	. 291
Xi Yang (IBM Research), Paulito Palmes (IBM Research), Saurabh Jha	
(IBM Research), Bekir Turkkan (IBM Research), Gerard Vanloo (IBM	
Research), Frank Bagehorn (IBM Software), Chandra Narayanaswami (IBM	
Research), Larisa Shwartz (IBM Consulting), Naoki Abe (IBM Research),	
Yu Deng (IBM Research), and Daby M. Sow (IBM Research)	
Harmonia: Accurate Federated Learning with All-Inclusive Dataset	. 302
Wonmi Choi (Korea University, Korea), Juyoung Ahn (Korea University,	
Korea), Yeonho Yoo (Korea University, Korea), Chuck Yoo (Korea	
University, Korea), and Gyeongsik Yang (Korea University, Korea)	

CLOUD 9: Cloud-based Applications II

SimuScale: Optimizing Parameters for Autoscaling of Serverless Edge Functions through Co-Simulation Philipp Raith (TU Wien, Austria), Stefan Nastic (TU Wien, Austria), and Schahram Dustdar (TU Wien, Austria)	305
Distributed Dataflow Across the Edge-Cloud Continuum Tyler Ekaireb (University of California, Santa Barbara), Lukas Brand (HAW Landshut), Nagarjun Avaraddy (University of California, Santa Barbara), Markus Mock (HAW Landshut), Chandra Krintz (University of California, Santa Barbara), and Rich Wolski (University of California, Santa Barbara)	316
A Technique for Secure Variant Calling on Human Genome Sequences Using SmartNICs Praveen Rao (University of Missouri, USA) and Khawar Shehzad (University of Missouri, USA)	328
Decoding Logs for Automatic Metric Identification Pranjal Gupta (IBM Research), Prateeti Mohapatra (IBM Research), Debanjana Kar (IBM Research), Seema Nagar (IBM Research), Jae-wook Ahn (IBM Research), Amit Paradkar (IBM Research), and Mudhakar Srivatsa (IBM Research)	336

CLOUD 12: Cloud Infrastructure II

SpotKV: Improving Read Throughput of KVS by I/O-aware Cache and Adaptive Cuckoo Filters 344 Yi Liu (University of California Santa Cruz, USA), Ruilin Zhou (University of California Santa Cruz, USA), Yuhang Gan (University of California Santa Cruz, USA), and Chen Qian (University of California Santa Cruz, USA)
SlackAuto: Slack-Aware Vertical Autoscaling of CPU Resources for Serverless Computing
OS4C: An Open-Source SR-IOV System for SmartNIC-based Cloud Platforms

CLOUD 10: Cloud-based Applications III

Budget Aware Performance Testing of Microservices Quinn Cooper (University of Calgary, Canada), Diwakar Krishnamurthy (University of Calgary, Canada), and Yasaman Amannejad (University of Calgary, Canada)	376
Enabling Programmable Metric Flows Aishwariya Chakraborty (IBM Research), Chander Govindarajan (IBM Research), Kavya Govindarajan (IBM Research), Priyanka Naik (IBM Research), and Seep Goel (IBM Research)	386
Efficient Application Image Management in the Compute Continuum: A Vertex Cover Approach Based on the Think-Like-a-Vertex Paradigm	399
CodeSift: An LLM-Based Reference-Less Framework for Automatic Code Validation Pooja Aggarwal (IBM Research, India), Oishik Chatterjee (IBM Research, India), Ting Dai (IBM Research, USA), Prateeti Mohapatra (IBM Research, India), Brent Paulovicks (IBM Research, USA), Brad Blancett (IBM, USA), and Arthur De Magalhaes (IBM, USA)	404

CLOUD 13: Cloud Service Delivery II

 Delay-Aware Service Caching in Edge Cloud: An Adversarial Semi-Bandits Learning-based Approach Jinpeng Li (Chongqing University, China), Yunni Xia (Chongqing University, China), Xiaoning Sun (Chongqing Normal University, China), Peng Chen (Xihua University, China), Xiaobo Li (Chongqing Animal Husbandry Techniques Extension Center, China), and Jiafeng Feng (China Huadian Corporation Guangdong Branch, China) 	411
Coordinating Compaction between LSM-tree based Key-Value Stores for Edge Federation	419
The State of FaaS: An Analysis of Public Functions-as-a-Service providers	430
GASS: GPU Automated Sharing at Scale Jiafan Zhu (Google LLC, USA), Xiao Zhang (Google LLC, USA), Konstantinos Menychtas (Google LLC, USA), Zhijing Gene Qin (Google LLC, USA), Steven Hand (Google LLC, USA), Dragos Sbirlea (Google LLC, USA), and Yuang Liu (Google LLC, USA)	439

CLOUD 11: Cloud-based Applications IV

Optimizing Context Caching using a Novel Hybrid Strategy for Dynamically Monitoring Access Probability Ashish Manchanda (Swinburne University of Technology, Australia), Prem Prakash Jayaraman (Swinburne University of Technology, Australia), Abhik Banerjee (Swinburne University of Technology, Australia), and Arkady Zaslavsky (Deakin University, Australia)	. 446
Process-based Efficient Power Level Exporter Marcelo Amaral (IBM Research - Tokyo), Huamin Chen (Red Hat - USA), Tatsuhiro Chiba (IBM Research - Tokyo), Rina Nakazawa (IBM Research - Tokyo), Sunyanan Choochotkaew (IBM Research - Tokyo), Eun Kyung Lee (IBM Research - USA), and Tamar Eilam (IBM Research - USA)	456
iContinuum: An Emulation Toolkit for Intent-Based Computing Across the Edge-to-Cloud Continuum Negin Akbari (Monash University, Australia), Adel N. Toosi (Monash University, Australia), John Grundy (Monash University, Australia), Hourieh Khalajzadeh (Deakin University, Australia), Mohammad Sadegh Aslanpour (Monash University, Australia), and Shashikant Ilager (TU Wien, Austria)	468
DRLQ: A Deep Reinforcement Learning-based Task Placement for Quantum Cloud Computing Hoa T. Nguyen (The University of Melbourne, Australia), Muhammad Usman (The University of Melbourne and CSIRO, Australia), and Rajkumar Buyya (The University of Melbourne, Australia)	475

CLOUD 14: Cloud-based Applications V

Self Adjusting Log Observability for Cloud Native Applications Divya Pathak (Indian Institute of Technology Hyderabad, India), Mudit Verma (IBM Research, India), Aishwariya Chakraborty (IBM Research, India), and Harshit Kumar (IBM Research, India)	
Carbon-Aware and Fault-Tolerant Migration of Deep Learning Workloads in the	
Geo-distributed Cloud	494
Jeonghyeon Park (Dong-A University, Korea), Daero Kim (Dong-A	
University, Korea), Jiseon Kim (Dong-A University, Korea), Jungkyu Han	
(Dong-A University, Korea), and Sejin Chun (Dong-A University, Korea)	
MediatorDNN: Contention Mitigation for Co-located DNN Inference Jobs	502
Seyed Morteza Nabavinejad (Worcester Polytechnic Institute, USA),	
Sherief Reda (Brown University, USA), and Tian Guo (Worcester	
Polytechnic Institute, USA)	
•	

Author Index	5	5	1	1	Ĺ	3
--------------	---	---	---	---	---	---