2021 40th International Symposium on Reliable Distributed Systems (SRDS 2021)

Virtual Conference 20 – 23 September 2021



IEEE Catalog Number: CFP21059-POD **ISBN:**

978-1-6654-3820-9

Copyright © 2021 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:	
ISBN (Print-On-Demand):	
ISBN (Online):	
ISSN:	

CFP21059-POD 978-1-6654-3820-9 978-1-6654-3819-3 1060-9857

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



2021 40th International Symposium on Reliable Distributed Systems (SRDS) **SRDS 2021**

Table of Contents

Message from the General Chair x
Message from the Program Chairs .xi
Organizing Committee xii
Technical Program Committee xiii
External Reviewers xv

Best Paper Award

Making Reads in BFT State Machine Replication Fast, Linearizable, and Live .1..... Christian Berger (University of Passau, Germany), Hans P. Reiser (University of Passau, Germany), and Alysson Bessani (Universidade de Lisboa, Portugal)

Best Paper Award Finalists

Node-Level Indicators of Soft Faults in Wireless Sensor Networks 13..... Dominik Widhalm (University of Applied Sciences Technikum Wien, Austria), Karl M. Goeschka (University of Applied Sciences Technikum Wien, Austria), and Wolfgang Kastner (TU Wien, Austria)

The Design, Architecture and Performance of the Tendermint Blockchain Network .23..... Daniel Cason (Università della Svizzera italiana, Switzerland), Enrique Fynn (Università della Svizzera italiana, Switzerland), Nenad Milosevic (Università della Svizzera italiana, Switzerland), Zarko Milosevic (Informal Systems, Canada), Ethan Buchman (Informal Systems, Canada), and Fernando Pedone (Università della Svizzera italiana, Switzerland)

Adding Fairness to Order: Preventing Front-Running Attacks in BFT Protocols using TEEs .34..... Chrysoula Stathakopoulou (IBM Research Europe - Zurich), Signe Rüsch (TU Braunschweig), Marcus Brandenburger (IBM Research Europe -Zurich), and Marko Vukolic (Protocol Labs)

Fault Tolerance I

- Chaos Duck: A Tool for Automatic IoT Software Fault-Tolerance Analysis .46..... Igor Zavalyshyn (ICTEAM, UCLouvain, Belgium), Thomas Given-Wilson (ICTEAM, UCLouvain, Belgium), Axel Legay (ICTEAM, UCLouvain, Belgium), Ramin Sadre (ICTEAM, UCLouvain, Belgium), and Etienne Riviere (ICTEAM, UCLouvain, Belgium)
- Active Replication for Latency-Sensitive Stream Processing in Apache Flink .56..... Guillaume Rosinosky (ICTEAM, Belgium), Florian Schmidt (TU Dresden, Germany), Oleh Bodunov (TU Dresden, Germany), Christof Fetzer (TU Dresden, Germany), André Martin (TU Dresden, Germany), and Etienne Rivière (ICTEAM, Belgium)
- Parameterized Distributed Synthesis of Fault-Tolerance using Counter Abstraction .67..... Hadi Moloodi (University of Tehran), Fathiyeh Faghih (University of Tehran), and Borzoo Bonakdarpour (Michigan State University)

Fault Tolerance II

Threat Adaptive Byzantine Fault Tolerant State-Machine Replication .78
Douglas Simões Silva (University of Luxembourg), Rafal Graĉzyk
(University of Luxembourg), Jérémie Decouchant (Delft University of
Technology), Marcus Völp (University of Luxembourg), and Paulo
Esteves-Verissimo (King Abdullah University of Science and Technology)
Failure Recovery from Persistent Memory in Paxos-Based State Machine Replication .88
Jan Kończak (Poznan University of Technology, Poland) and Paweł T.

Wojciechowski (Poznan University of Technology, Poland)

Enabling Low-Redundancy Proactive Fault Tolerance for Stream Machine Learning via Erasure Coding .99.

Zhinan Cheng (The Chinese University of Hong Kong), Lu Tang (The Chinese University of Hong Kong), Qun Huang (Peking University), and Patrick P. C. Lee (The Chinese University of Hong Kong)

Blockchain

Characterizing the Impact of Network Delay on Bitcoin Mining .109
Tong Cao (ŠnT - University of Luxembourg), Jérémie Decouchant (TU
Delft), Jiangshan Yu (Monash University), and Paulo Esteves-Verissimo
(King Abdullah University of Science and Technology)
How to Trust Strongarcy Composition of Buzanting Quarum Systems 120

Orestis Alpos (University of Bern, Switzerland), Christian Cachin (University of Bern, Switzerland), and Luca Zanolini (University of Bern, Switzerland) Vassago: Efficient and Authenticated Provenance Query on Multiple Blockchains .132......
Rui Han (Huazhong University of Science and Technology, China), Jiang
Xiao (Huazhong University of Science and Technology, China), Xiaohai
Dai (Huazhong University of Science and Technology, China), Shijie
Zhang (Huazhong University of Science and Technology, China), Yi Sun
(University of Chinese Academy of Sciences, China), Baochun Li
(University of Toronto, Canada), and Hai Jin (Huazhong University of Science and Technology, China)

Security & Privacy I

Security & Privacy II

Scrooge Attack: Undervolting ARM Processors for Profit .187
Christian Göttel (Université de Neuchâtel, Switzerland), Konstantinos
Parasyris (Lawrence Livermore National Laboratory), Osman Unsal
(Barcelona Supercomputing Center), Pascal Felber (Université de
Neuchâtel, Switzerland), Marcelo Pasin (Université de Neuchâtel,
Switzerland), and Valerio Schiavoni (Université de Neuchâtel,
Switzerland)
2PPS – Publish/Subscribe with Provable Privacy .198
Sarah Abdelwahab Gaballah (TU Darmstadt), Christoph Coijanovic
(Karlsruhe Institute of Technology), Thorsten Strufe (Karlsruhe
Institute of Technology), and Max Mühlhäuser (TU Darmstadt)

A (Comprehensive Measurement-Based Investigation of DNS Hijacking .210
	Rebekah Houser (University of Delaware), Shuai Hao (Old Dominion
	University), Zhou Li (University of California, Irvine), Daiping Liu
	(Palo Alto Networks), Chase Cotton (University of Delaware), and
	Haining Wang (Virginia Tech)

Distributed Systems, Services, and Storage

What Distributed Systems Say: A Study of Seven Spark Application Logs .222 Sina Gholamian (University of Waterloo, Canada) and Paul A. S. Ward (University of Waterloo, Canada)
GeoPaxos+: Practical Geographical State Machine Replication .233 Paulo Coelho (Federal University of Uberlândia, Brazil) and Fernando Pedone (USI, Switzerland)
 Automated Intelligent Healing in Cloud-Scale Data Centers .244 Rui Li (Alibaba Group, China), Zhinan Cheng (The Chinese University of Hong Kong, China), Patrick P. C. Lee (The Chinese University of Hong Kong, China), Pinghui Wang (Xi'an Jiaotong University, China), Yi Qiang (Alibaba Group, China), Lin Lan (Xi'an Jiaotong University, China), Cheng He (Alibaba Group, China), Jinlong Lu (Alibaba Group, China), Mian Wang (Alibaba Group, China), and Xinquan Ding (Alibaba Group, China)
MinervaFS: A user-Space File System for Generalised Deduplication .254 Lars Nielsen (Aarhus University, Denmark), Dorian Burihabwa (University of Neuchâtel, Switzerland), Valerio Schiavoni (University of Neuchâtel, Switzerland), Pascal Felber (University of Neuchâtel, Switzerland), and Daniel E. Lucani (Aarhus University, Denmark)

Distributed Algorithms

Machine Learning and Beyond

Protecting Reward Function of Reinforcement Learning via Minimal and Non-Catastrophic Adversarial Trajectory .299 Tong Chen (Beijing Jiaotong University, China), Yingxiao Xiang (Beijing Jiaotong University, China), Yike Li (Beijing Jiaotong University, China), Yunzhe Tian (Beijing Jiaotong University, China), Endong Tong (Beijing Jiaotong University, China), Wenjia Niu (Beijing Jiaotong University, China), Jiqiang Liu (Beijing Jiaotong University, China), Gang Li (Deakin University, Australia), and Qi Alfred Chen (University of California, USA)
WAFFLE: Watermarking in Federated Learning .310. Buse G. A. Tekgul (Aalto University, Finland), Yuxi Xia (Aalto University, Finland), Samuel Marchal (F-Secure Corporation, Finland), and N. Asokan (University of Waterloo, Canada)
Detecting Malicious Gradients from Asynchronous SGD on Variational Autoencoder .321 Zhipin Gu (National University of Defense Technology, China), Yuexiang Yang (National University of Defense Technology, China), and Heyuan Shi (Tsinghua University, China)
DragonFly: Drone-Assisted High-Rise Monitoring for Fire Safety 331 Fangqi Liu (University of California, USA), Tzu-Yi Fan (National Tsing Hua University, Taiwan), Casey Grant (DSRAE, USA), Cheng-Hsin Hsu (National Tsing Hua University, Taiwan), and Nalini Venkatasubramanian (University of California, USA)

Ph.D. Forum

Sharding Techniques in the Era of Blockchain .343 Chunyu Mao (University of Waterloo, Canada) and Wojciech Golab (University of Waterloo, Canada)
Adaptive Erasure Coded Data Maintenance for Consensus in Distributed Networks .345 Yulei Jia (Tianjin University of Technology, China), Guangping Xu (Tianjin University of Technology, China), Chi Wan Sung (City University of Hong Kong, China), and Salwa Mostafa (City University of Hong Kong, China)
Runtime Verification for Blockchains .347 Ritam Ganguly (Michigan State University, USA)
Runtime Verification for Distributed Cyber-Physical Systems .349 Anik Momtaz (Michigan State University, USA)

Author Index 351