2023 USENIX Annual Technical Conference July 10–12, 2023 Boston, MA, USA

Monday, July 10

Security and Privacy
Bifrost: Analysis and Optimization of Network I/O Tax in Confidential Virtual Machines
SecretFlow-SPU: A Performant and User-Friendly Framework for Privacy-Preserving Machine Learning
Portunus: Re-imagining Access Control in Distributed Systems
Searching Graphs
GLogS: Interactive Graph Pattern Matching Query At Large Scale
Cyclosa: Redundancy-Free Graph Pattern Mining via Set Dataflow
SOWalker: An I/O-Optimized Out-of-Core Graph Processing System for Second-Order Random Walks
Deduplication
Light-Dedup: A Light-weight Inline Deduplication Framework for Non-Volatile Memory File Systems
TiDedup: A New Distributed Deduplication Architecture for Ceph

LoopDelta: Embedding Locality-aware Opportunistic Delta Compression in Inline Deduplication for Highly Efficient Data Reduction
Yucheng Zhang, School of Mathematics and Computer Sciences, Nanchang University and Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology; Hong Jiang, Department of Computer Science and Engineering, University of Texas at Arlington; Dan Feng, Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology; Nan Jiang, School of Information Engineering, East China Jiaotong University; Taorong Qiu and Wei Huang, School of Mathematics and Computer Sciences, Nanchang University
Structuring Graphs
TC-GNN: Bridging Sparse GNN Computation and Dense Tensor Cores on GPUs
Legion: Automatically Pushing the Envelope of Multi-GPU System for Billion-Scale GNN Training
Bridging the Gap between Relational OLTP and Graph-based OLAP
Placement and Fault Tolerance
Comosum: An Extensible, Reconfigurable, and Fault-Tolerant IoT Platform for Digital Agriculture
Oakestra: A Lightweight Hierarchical Orchestration Framework for Edge Computing
Explore Data Placement Algorithm for Balanced Recovery Load Distribution
Updating Code
Luci: Loader-based Dynamic Software Updates for Off-the-shelf Shared Objects
MELF: Multivariant Executables for a Heterogeneous World
Apron: Authenticated and Progressive System Image Renovation
zpoline: a system call hook mechanism based on binary rewriting.

Tuesday, July 11

Serverless
Sponge: Fast Reactive Scaling for Stream Processing with Serverless Frameworks
On-demand Container Loading in AWS Lambda. 315 Marc Brooker, Mike Danilov, Chris Greenwood, and Phil Piwonka, Amazon Web Services
Decentralized and Stateful Serverless Computing on the Internet Computer Blockchain
Troubleshooting and Measurement
Pinolo: Detecting Logical Bugs in Database Management Systems with Approximate Query Synthesis
AutoARTS: Taxonomy, Insights and Tools for Root Cause Labelling of Incidents in Microsoft Azure
Avoiding the Ordering Trap in Systems Performance Measurement
Cloud and Microservices
AWARE: Automate Workload Autoscaling with Reinforcement Learning in Production Cloud Systems 387. Haoran Qiu and Weichao Mao, <i>University of Illinois at Urbana-Champaign;</i> Chen Wang, Hubertus Franke, and Alaa Youssef, <i>IBM Research;</i> Zbigniew T. Kalbarczyk, Tamer Başar, and Ravishankar K. Iyer, <i>University of Illinois at Urbana-Champaign</i>
Nodens: Enabling Resource Efficient and Fast QoS Recovery of Dynamic Microservice Applications in Datacenters403 Jiuchen Shi, Hang Zhang, Zhixin Tong, Quan Chen, Kaihua Fu, and Minyi Guo, <i>Department of Computer Science and Engineering, Shanghai Jiao Tong University</i>
Lifting the veil on Meta's microservice architecture: Analyses of topology and request workflows
Distributed Storage
Tectonic-Shift: A Composite Storage Fabric for Large-Scale ML Training
Calcspar: A Contract-Aware LSM Store for Cloud Storage with Low Latency Spikes
Adaptive Online Cache Capacity Optimization via Lightweight Working Set Size Estimation at Scale

ardware and Software for Security and Performance
AGE: Software-based Attestation for GPU Execution
onfidential Computing within an AI Accelerator
rbitor: A Numerically Accurate Hardware Emulation Tool for DNN Accelerators
etworking
BBR: Optimize Retransmissions of BBR Flows on the Internet
ridging the Gap between QoE and QoS in Congestion Control: A Large-scale Mobile Web Service Perspective
trReach: Write-back Caching in Programmable Switches
lemory-Related Hardware and Software
KL-ANNS: Software-Hardware Collaborative Memory Disaggregation and Computation for Billion-Scale oppoximate Nearest Neighbor Search
wercoming the Memory Wall with CXL-Enabled SSDs
YX: Exploiting SmartNIC Capability to Reduce Datacenter Memory Tax
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Deploying User-space TCP at Cloud Scale with Luna. 673 Lingjun Zhu, Yifan Shen, Erci Xu, Bo Shi, Ting Fu, Shu Ma, Shuguang Chen, Zhongyu Wang, Haonan Wu, Xingyu Liao, Zhendan Yang, Zhongqing Chen, Wei Lin, Yijun Hou, Rong Liu, Chao Shi, Jiaji Zhu, and Jiesheng Wu, <i>Alibaba Group</i>	3
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RubbleDB: CPU-Efficient Replication with NVMe-oF. 689 Haoyu Li, Sheng Jiang, and Chen Chen, Columbia University; Ashwini Raina, Princeton University; Xingyu Zhu, Changxu Luo, and Asaf Cidon, Columbia University)
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Security: Attacks	
Prefix Siphoning: Exploiting LSM-Tree Range Filters For Information Disclosure	•
EPF: Evil Packet Filter	5
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Virtual Machines	
Translation Pass-Through for Near-Native Paging Performance in VMs	3
Efficient Memory Overcommitment for I/O Passthrough Enabled VMs via Fine-grained Page Meta-data	
Management)
LPNS: Scalable and Latency-Predictable Local Storage Virtualization for Unpredictable NVMe SSDs in Clouds 785 Bo Peng, Cheng Guo, Jianguo Yao, and Haibing Guan, Shanghai Jiao Tong University	5
Persistent Memory	
P ² Cache: Exploring Tiered Memory for In-Kernel File Systems Caching	l
Revisiting Secondary Indexing in LSM-based Storage Systems with Persistent Memory	7
Zhuque: Failure is Not an Option, it's an Exception	3

Offloading and Scheduling
EnvPipe: Performance-preserving DNN Training Framework for Saving Energy
Decentralized Application-Level Adaptive Scheduling for Multi-Instance DNNs on Open Mobile Devices
UnFaaSener: Latency and Cost Aware Offloading of Functions from Serverless Platforms
Kernel and Concurrency
LLFREE: Scalable and Optionally-Persistent Page-Frame Allocation
SINGULARFS: A Billion-Scale Distributed File System Using a Single Metadata Server
The Hitchhiker's Guide to Operating Systems
Optimizing ML
Accelerating Distributed MoE Training and Inference with Lina
SMARTMOE: Efficiently Training Sparsely-Activated Models through Combining Offline and Online Parallelization961 Mingshu Zhai, Jiaao He, Zixuan Ma, Zan Zong, Runqing Zhang, and Jidong Zhai, <i>Tsinghua University</i>
MSRL: Distributed Reinforcement Learning with Dataflow Fragments
GPU
Beware of Fragmentation: Scheduling GPU-Sharing Workloads with Fragmentation Gradient Descent
Towards Iterative Relational Algebra on the GPU
VectorVisor: A Binary Translation Scheme for Throughput-Oriented GPU Acceleration