The 22nd IEEE International Symposium on Cluster, Cloud and Internet Computing

Taormina (Messina), Italy
16-19 May 2022

Advanced Program

Version published on May 5th, 2022

Tuesday, 17 May 2022

8:45 - 9:00
Plenary Room: **Opening**

9:00 - 10:00
Plenary Room: **Keynote Speaker: Rajiv Ranjan**
The Osmotic Computing Approach: Integrating Internet of Things and Distributed Learning
Chair: Omer Rana, Cardiff University, UK

10:00-10:15 Break

10:15 - 11:15
Plenary Room: **Programming models and runtime systems**
Chair: Taisuke Boku, Univ. of Tsukuba, Japan

Accelerating Scientific Workflows on HPC Platforms with In Situ Processing
Tu Mai Anh Do, Loïc Pottier, Orcun Yildiz, Karan Vahi, Patrycja Krawczuk, Tom Peterka and Ewa Deelman

Deverlay: Container snapshots for Virtual Machines
Orestis Lagkas Nikolos, Georgios Goumas and Nectarios Koziris

Room A: **Storage and I/O systems**
Chair: Jay Lofstead, Sandia National Laboratories, USA

Accelerating Deep Learning Training through Transparent Storage Tiering
Marco Dantas, Diogo Leitão, Peter Cui, Ricardo Macedo, Xinlian Liu, Weijia Xu and João Paulo

VeloxDFS: Coordinated Access to Distributed Datasets with Adaptive Partitioning
Sunghwan Ahn, Hyeongjun Park, Vicente A. Bolea Sanchez, Deukyeon Hwang, Wonbae Kim, Alan Sussman and Beomseok Nam

Room B: **Future Internet and Computing Systems**
Chair: Maciej Malawski, AGH University of the Science and Technology, Poland

Splice: An Automated Framework for Cost- and Performance-Aware Blending of Cloud Services
Myungjun Son, Shruti Mohanty, Jashwant Raj Gunasekaran, Aman Jain, Mahmut Kandemir, George Kesidis and Bhuvan Urgaonkar

Divide (CPU Load) and Conquer: Semi-Flexible Cloud Resource Allocation
Bartłomiej Przybylski, Paweł Żuk and Krzysztof Rzadca

Room C: **Security, privacy, trust and resilience**
Chair: Stefan Schulte, Hamburg University of Technology, Germany

A Scalable Covert Communication Service For Coworkers
Xingkong Ma, Weinan Zhai, Shaoyong Li, Xueshu Hong and Bo Liu

Train Me to Fight: An On-Device Personalized Machine-Learning-Based Malware Detection
Amirmohammad Pasdar, Young Choon Lee, Tongliang Liu and Seok-hee Hong

11:15 - 11:45 Coffee Break

11:45 - 13:15
Plenary Room: **Artificial intelligence, Machine Learning and Deep Learning**
Chair: Radu Prodan, University of Klagenfurt, Austria

Adaptive Multi-Feature Fusion Visual Target Tracking Based on Siamese Neural Network with Cross-Attention Mechanism
Qian Zhou, Haoran Xia, Hongzheng Yan, Ming Yang and Shidong Chen

BFRT: Blockchained Federated Learning for Real-time Traffic Flow Prediction
Collin Meese, Hang Chen, Wanxin Li, Syed Ali Asif, Mark Nejad and Chien-Chung Shen

A Generalized Model for Crowd Violence Detection Focusing on Human Contour and Dynamic Features
Zhenche Xia, Zhenhua Tan, Danke Wu, Jingyu Ning and Bin Zhang

Room A: **Storage and I/O systems**
Chair: João Paulo, INESC TEC, Portugal

Assembling Portable In-Situ Workflow from Heterogeneous Components using Data Reorganization
Bo Zhang, Pradeep Subedi, Philip E. Davis, Francesco Rizzi, Keita Teranishi and Manish Parashar

SCANNS: Towards Scalable and Concurrent DatA iNdexing and searchiNg in high-end computing systemS
Alexandru Iulian Orhean, Anna Giannakou, Lavanya Ramakrishnan, Kyle Chard and Ioan Raicu

HDF5 Cache VOL: Efficient and Scalable Parallel I/O through Caching Data on Node-local Storage
Huihuo Zheng, Venkatram Vishwanath, Quincey Koziol, Houjun Tang, John Ravi, John Mainzer and Suren Byna

Room B: **Future Internet and Computing Systems**
Chair: Raffaele Montella, University of Naples Parthenope, Italy

Pushing Serverless to the Edge with WebAssembly Runtimes
Philipp Gackstatter, Pantelis Frangoudis and Schahram Dustdar

Managing Access Control in Large-Scale Multi-Party IoT Systems
Pavana Pradeep Kumar, Krishna Kant and Amitangshu Pal

Edgelet Computing: Pushing Query Processing and Liability at the Extreme Edge of the Network
Ludovic Javet, Nicolas Anciaux, Luc Bouganim and Philippe Pucheral

Room C: **Security, privacy, trust and resilience**
Chair: Antonio Celesti, University of Messina, Italy

SPRITE : A Scalable Privacy-Preserving and Verifiable Collaborative Learning for Industrial IoT
Jayasree Sengupta, Sushmita Ruj and Sipra Das Bit

ELSA: a Keyword-based Searchable Encryption for Cloud-edge assisted Industrial Internet of Things
Jawhara Aljabri, Anna Lito Michala and Jeremy Singer

SGX-Bundler: speeding up enclave transitions forIO-intensive applications
Jakob Svenningsson, Nicolae Paladi and Arash Vahidi

13:15 - 15:00 Lunch

15:00 - 16:00
Plenary Room: **Keynote Speaker: Ilkay Altintas**
Composable Systems for AI-Integrated Scientific Computing
Chair: Maria Fazio, University of Messina, Italy

16:00 - 16:30 Coffee Break

16:30 - 18:00
Plenary Room: **Artificial intelligence, Machine Learning and Deep Learning**
Chair: Brian Van Essen, Lawrence Livermore National Laboratory, USA

Towards Low-Overhead Resilience for Data Parallel Deep Learning
Bogdan Nicolae, Tanner Hobson, Orcun Yildiz, Tom Peterka and Dmitry Morozov

Failure Identification from Unstable Log Data using Deep Learning
Jasmin Bogatinovski, Sasho Nedelkoski, Li Wu, Jorge Cardoso and Odej Kao

The Personalized and Multi-Objective Optimized Model on Bundle Recommendation
Liu Xinyu, Nan Wang, Liu Yong and Li Xiaokun

Room A: **Storage and I/O systems**
Chair: Yogesh Simmhan, Indian Institute of Science, India

VCSR: Mutable CSR Graph Format Using Vertex-Centric Packed Memory Array
Dong Dai, Abdullah Al Raqibul Islam and Dazhao Chen

Skyhook: Towards an Arrow-Native Storage System
Jayjeet Chakraborty, Ivo Jimenez, Sebastiaan Alvarez Rodriguez, Alexandru Uta, Jeff LeFevre and Carlos Maltzahn

Room B: **Future Internet and Computing Systems**
Chair: Marco Lapegna, Universita degli Studi di Napoli, Italy

Tiny Autoscalers for Tiny Workloads: Dynamic CPU Allocation for Serverless Functions
Yuxuan Zhao and Alexandru Uta

KneeScale: Efficient Resource Scaling for Serverless Computing at the Edge
Xue Li, Peng Kang, Jordan Molone, Wei Wang and Palden Lama

Energy-Aware Resource Scheduling for Serverless Edge Computing
Mohammad Sadegh Aslanpour, Adel N. Toosi, Muhammad Aamir Cheema and Raj Gaire

Room C: **Security, privacy, trust and resilience**
Chair: Omer Rana, Cardiff University, UK

Protecting sensitive data in the cloud-to-edge continuum: The FogProtect approach
Dhouha Ayed, Paul-Andrei Dragan, Edith Felix, Zoltan Adam Mann, Eliot Salant, Robert Seidl, Anestis Sidiropoulos, Steve Taylor and Ricardo Vitorino

Restricting Times of Data Access Using TrustZone in Cloud Storage
Zhengwei Ren, Xin Li, Shiwei Xu and Yan Tong

MeDA: Using Blockchain for Patient-Controlled Medical Data Auditing in Institutions
Fanbo Nie, Beiji Zou, Ling Xiao, Tao Zhang and Chengzhang Zhu

Wednesday, 18 May 2022

9:00 - 10:00
Plenary Room: **Keynote Speaker: Frank Leymann**
Quantum Software: Help from the Cloud
Chair: Massimo Villari, University of Messina, Italy

10:00-10:15 Break

10:15 - 11:15
Plenary Room: **Distributed middleware and network architectures**
Chair: Robert Henschel, Indiana University, USA

Decentralized Allocation of Geo-distributed Edge Resources using Smart Contracts
Jinlai Xu, Balaji Palanisamy, Qingyang Wang, Heiko Ludwig and Sandeep Gopisetty

Optimized Resource Allocation on Virtualized Non-Uniform I/O Architectures
Tu Dinh Ngoc, Boris Teabe, Daniel Hagimont and Georges Da Costa

Room A: **Sustainable and green computing**
Chair: Laurent Lefevre, INRIA, France

Automating CPU Dynamic Thermal Control for High Performance Computing
Ghazanfar Ali, Lowell Wofford, Christopher Turner and Yong Chen

Impact of loosely coupled data dissemination policies for resource challenged environments
Issam Raïs, Loic Guegan and Otto Anshus

Room B: **Scientific and industrial applications**
Chair: Manish Parashar, University of Utah, USA

Efficient Collision-Free MTTKRP Algorithm for Multi-core CPUs with Less Memory Usage
Yusuke Nagasaka and Naoto Fukumoto

Accelerating Spatial Autocorrelation Computation with Parallelization, Vectorization and Memory Access Optimization
Anmol Paudel and Satish Puri

Room C: **ICFEC conference**

11:15 - 11:45 Coffee Break

11:45 - 13:15
Plenary Room: **Artificial intelligence, Machine Learning and Deep Learning**
Chair: Bethany Lusch, Argone National Lab, USA

SPA: An Efficient Adversarial Attack on Spiking Neural Networks Using Spike Probabilistic
Xuanwei Lin, Chen Dong, Ximeng Liu and Yuanyuan Zhang

Scanflow-K8s: Agent-based Framework for Autonomic Management and Supervision of ML Workflows in Kubernetes Clusters
Peini Liu, Gusseppe Bravo-Rocca, Jordi Guitart, Ajay Dholakia, David Ellison, Jeffrey Falkanger and Miroslav Hodak

Parallelizing Graph Neural Networks via Matrix Compaction for Edge-Conditioned Networks
Shehtab Zaman, Tim Moon, Tom Benson, Sam Ade Jacobs, Kenneth Chiu and Brian Van Essen

Room A: **Storage and I/O systems**
Chair: Heonyoung Yeom, Seoul National University, Korea

An SIMD-Accelerated Metadata Management Scheme for Persistent Memory File Systems
Zejie Hu, Jarvan Law, Zhiguang Chen and Nong Xiao

Egeon: Software-Defined Data Protection for Object Storage
Marc Sánchez-Artigas and Raul Saiz-Laudo

Stimulus: Accelerate Data Management for Scientific AI applications in HPC
Hariharan Devarajan, Anthony Kougkas, Huihuo Zheng, Venkatram Vishwanath and Xian-He Sun

Room B: **Scientific and industrial applications**
Chair: Ilkay Altintas, SDSC/UCSD, USA

Scalable federated machine learning with FEDn
Morgan Ekmefjord, Addi Ait-Mlouk, Sadi Alawadi, Mattias Åkesson, Prashant Singh, Ola Spjuth, Salman Toor and Andreas Hellander

A Federated Learning Framework for IoT : Application to Industry 4.0
Hamza Safri, Mohamed Mehdi Kandi, Youssef Miloudi, Christophe Bortolaso, Denis Trystram and Frederic Desprez

A Serverless Engine for High Energy Physics Distributed Analysis
Jacek Kuśnierz, Vincenzo Eduardo Padulano, Maciej Malawski, Kamil Burkiewicz, Enric Tejedor, Pedro Alonso-Jordá, Michael Pitt and Valentina Avati

Room C: **ICFEC conference**

13:15 - 15:00 Lunch

15:00 - 16:00
Plenary Room: **Keynote Speaker: Manish Parashar**
Harnessing the Computing Continuum for Urgent Science
Chair: Radu Prodan, University of Klagenfurt, Austria

16:00 - 16:30 Coffee Break

16:30 - 18:00
Plenary Room: **Future Internet and Computing Systems**
Chair: Maria Fazio, University of Messina, Italy

A Distributed Vehicle-assisted Computation Offloading Scheme based on DRL in Vehicular Networks
Jiayue Wang, Hongbo Zhao, Haoqiang Liu, Liwei Geng and Zebin Sun

A Qualitative Evaluation of Service Mesh-based Traffic Management for Mobile Edge Cloud
Aleksandra Obeso Duque, Cristian Klein, Jinhua Feng, Xuejun Cai, Björn Skubic and Erik Elmroth

On Realizing Efficient Deep Learning Using Serverless Computing
Kevin Assogba, Moiz Arif, M. Mustafa Rafique and Dimitrios S. Nikolopoulos

Room A: **Performance modeling, scheduling, and analysis**
Chair: Giuliano Laccetti, Universita degli Studi di Napoli, Italy

Coeus: Clustering (A)like Patterns for Practical Machine Intelligent Hybrid Memory Management
Thaleia Dimitra Doudali and Ada Gavrilovska

Evaluating Performance Interference on a Key-Value Store with Storiks
Adriano Lange, Tiago Kepe, Marcos Sunyé and Eduardo Almeida

Improving Server Re-Consolidation for Datacenters via Resource Exchange and Load Adjustment
Kaiyue Duan, Yusen Li, Gang Wang and Xiaoguang Liu

Room B: **Scientific and industrial applications**
Chair: Kenneth Chiu, Binghamton University, USA

Time Series Data Management Optimized for Smart City Policy Decision
Mario Colosi, Francesco Martella, Giovanni Parrino, Antonio Celesti, Maria Fazio and Massimo Villari

RAPTOR: Ravenous Throughput Computing
Matteo Turilli, Andre Merzky and Shantenu Jha

Exploring Spatial Indexing for Accelerated Feature Retrieval in HPC
Margaret Lawson, William Gropp and Jay Lofstead

Room C: **ICFEC conference**

Thursday, 19 May 2022

9:00 - 11:00
Plenary Room: **EU event**
Chair: Amrita Prasad, Martel Innovate, Switzerland

Room A: **Performance modeling, scheduling, and analysis**
Chair: Antonino Galletta, University of Messina, Italy

A Multi-Agent Deep Reinforcement Learning Approach for Computation Offloading in 5G Mobile Edge Computing
Zhaoyu Gan, Rongheng Lin and Hua Zou

Generic and Robust Performance Diagnosis via Causal Inference for OLTP Database systems
Xianglin Lu, Zhe Xie, Zeyan Li, Mingjie Li, Xiaohui Nie, Nengwen Zhao, Qingyang Yu, Shenglin Zhang, Kaixin Sui, Lin Zhu and Dan Pei

ELITE: Near-Optimal Heuristics for Coflow Scheduling
Afaf Arfaoui, El-Azouzi Rachid, Francesco De Pellegrini, Cédric Richier and Jeremie Leguay

First Experiences in Performance Benchmarking with the New SPEChpc 2021 Suites

Holger Brunst, Sunita Chandrasekaran, Florina Ciorba, Nick Hagerty, Robert Henschel, Guido Juckeland, Junjie Li, Veronica G. Melesse Vergara, Sandra Wienke and Miguel Zavala

Room B: **Distributed middleware and network architectures**
Chair: Ashiq Anjum, University of Leicester, UK

Exploring the Impact of Virtualization on the Usability of the Deep Learning Applications
Davood Ghatrehsamani and Mohsen Amini Salehi

Alleviating Resource Requirements for Spatial Deep Learning Workloads
Saptashwa Mitra, Menuka Warushavithana, Mazdak Arabi, Jay Breidt, Sangmi Pallickara and Shrideep Pallickara

Adaptive Routing in InfiniBand Hardware
Jose Rocher González, Ernst Gunnar Gran, Sven-Arne Reinemo, Tor Skeie, Jesus Escudero-Sahuquillo, Pedro Javier Garcia and Francisco J. Quiles

Resilient Execution of Data-triggered Applications on Edge, Fog and Cloud Resources
Prateeksha Varshney, Shriram Ramesh, Shayal Chhabra and Yogesh Simmhan

Room C: **ICFEC conference**

11:00 - 11:30 Coffee Break

11:30 - 13:00
Plenary Room: **EU event**
Chair: Dumitru Roman, SINTEF, Norway

Room A: **Performance modeling, scheduling, and analysis**
Chair: Luiz DeRose, Oracle, USA

RAISE: Efficient GPU Resource Management viaHybrid Scheduling
Yue Weng, Tianao Ge, Xi Zhang, Xianwei Zhang and Yutong Lu

SCHEDTUNE: A Heterogeneity-aware GPU Scheduler for Deep Learning
Hadeel Albahar, Shruti Dongari, Yanlin Du, Nannan Zhao, Arnab K. Paul and Ali R. Butt

QSketch: GPU-Aware Probabilistic Sketch Data Structures
Huanyi Qin, Kenneth Chiu, Zongpai Zhang, Bo Yan and Madhusudhan Govindaraju

Room B: **Distributed middleware and network architectures**
Chair: Lorenzo Carnevale, University of Messina, Italy

pSFC: Fine-grained Composition of Service Function Chains in the Programmable Data Plane
Xiaoquan Zhang, Lin Cui and Fung Po Tso

CASY: a CPU Cache Allocation System for FaaS Platform
Armel Jeatsa, Boris Teabe and Daniel Hagimont

Hummingbird: Leveraging Heterogeneous System Architecture for deploying dynamic NFV chains
Avinash Chaurasia, Bhaskaran Raman, Praveen Kumar Gupta, Omkar Prabhu, Shashank P and Anshuj Garg

Room C: **ICFEC conference**

13:00 - 15:00 Lunch

15:00 - 16:00
Plenary Room: **Keynote Speaker: Luiz DeRose**
The New Era of High-End Computing: Data Drien, Real Time, in the Cloud
Chair: Dhabaleswar (DK) Panda, Ohio State University, USA

16:00 - 16:30 Coffee Break

16:30 - 18:00
Plenary Room: **EU event**
Chair: Dumitru Roman, SINTEF, Norway

Room A: **Performance modeling, scheduling, and analysis**
Chair: Ali Butt, Virginia Tech, USA

Towards an In-Depth Analysis of Multifidelity High Performance Computing Systems
Fnu Shilpika, Bethany Lusch, Murali Emani, Filippo Simini, Venkatram Vishwanath, Michael Papka and Kwan-Liu Ma

On Task Assignment and Scheduling for Distributed Job Execution
Yitong Guan and Xueyan Tang

One core dedicated to MPI nonblocking communication progression? A model to assess whether it is worth it.
Alexandre Denis, Julien Jaeger, Emmanuel Jeannot and Florian Reynier

Room B: **Artificial intelligence, Machine Learning and Deep Learning**
Chair: Dhabaleswar (DK) Panda, Ohio State University, USA

SDST-Accelerating GEMM-based Convolution through Smart Data Stream Transformation

Chunhua Xiao and Chen Shi

Using Multi-resolution Data to Accelerate Neural Network Training in Scientific Applications
Kewei Wang, Sunwoo Lee, Jan Balewski, Alex Sim, Peter Nugent, Ankit Agrawal, Alok Choudhary, Kesheng Wu and Wei-Keng Liao

Accelerating Neural Network Training with Processing-in-Memory GPU
Xiang Fei, Jianhui Han, Youhui Zhang, Jianqiang Huang and Weimin Zheng