2024 IEEE 31st International Conference on High Performance Computing, Data, and Analytics (HiPC 2024)

Bangalore, India 18-21 December 2024



IEEE Catalog Number: CFP24176-POD ISBN:

979-8-3315-0910-1

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:
 CFP24176-POD

 ISBN (Print-On-Demand):
 979-8-3315-0910-1

 ISBN (Online):
 979-8-3315-0909-5

ISSN: 1094-7256

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 31th International Conference on High Performance Computing, Data, and Analytics (HiPC) HiPC 2024

Table of Contents

2024 Message from the General Co-chairs	ix
2024 Message from the Program Chairs	
HiPC 2024 Organization	xv
HiPC 2024 Steering Committee	xviii
HiPC 2024 Technical Program Committee	xix
Technical Session 1	
Allocation Strategies for Disaggregated Memory in HPC Systems	1
HPC Application Parameter Autotuning on Edge Devices: A Bandit Learning Abrar Hossain (The University of Toledo), Abdel-Hameed A. Badawy (New Mexico State University), Mohammad Atiqul Islam (The University of Texas at Arlington), Tapasya Patki (Center for Applied Scientific Computing, Lawrence Livermore National Laboratory), and Kishwar Ahmed (The University of Toledo)	; Approach12
Effective and Efficient Offloading Designs for One-Sided Communication to S Benjamin Michalowicz (The Ohio State University, USA), Kaushik Kandadi Suresh (The Ohio State University, USA), Hari Subramoni (The Ohio State University, USA), Mustafa Abduljabbar (The Ohio State University, USA), Dhabaleswar K. Panda (The Ohio State University, USA), and Stephen Poole (Los Alamos National Laboratory)	5martNICs23
Retrospection on the Performance Analysis Tools for Large-Scale HPC Prograzhibo Xuan (Beihang University, China), Xin You (Beihang University, China), Hailong Yang (Beihang University, China), Mingzhen Li (State Key Lab of Processors, Institute of Computing Technology, Chinese Academy, China), Zhongzhi Luan (Beihang University, China), Yi Liu (Beihang University, China), and Depei Qian (Beihang University, China)	ams 34

BigThrill: MPI-Based Data Processing Engine
Technical Session 2
Scaling Large Language Model Training on Frontier with Low-Bandwidth Partitioning
Transformer-Based Self-Supervised Imputation and Attention GANs Oversampling for Medical Data Processing
Aryan Kumar Singh (National Institute of Technology Silchar, India), Arpit Saikia (National Institute of Technology Silchar, India), Pranita Baro (National Institute of Technology Silchar, India), and Malaya Dutta Borah (National Institute of Technology Silchar, India)
Exploring Algorithmic Design Choices for Low Latency CNN Deployment
CAR-LLM: Cloud Accelerator Recommender for Large Language Models
HyperSack: Distributed Hyperparameter Optimization for Deep Learning Using Resource-Aware Scheduling on Heterogeneous GPU Systems
Technical Session 3
GDBOD: Density-Based Outlier Detection Exploiting Efficient Tree Traversals on the GPU

Design and Implementation of Kernel-Based MPI Reduction Operations for Intel GPUs	. 122
Multi-Space Tree with Incremental Construction for GPU-Accelerated Range Queries	. 132
A More Scalable Sparse Dynamic Data Exchange	. 143
Using BlueField-3 SmartNICs to Offload Vector Operations in Krylov Subspace Methods	. 155
Technical Session 4	
From Bits to Qubits: Challenges in Classical-Quantum Integration	. 166
Circuit Partitioning and Full Circuit Execution: A Comparative Study of GPU-Based Quantum Circuit Simulation	. 177
Kartikey Sarode (San Francisco State University, USA)	
	. 188
Bo Zhang (University of Utah, USA), Philip E. Davis (University of Utah, USA), Zhao Zhang (Rutgers University, USA), Keita Teranishi (Oak Ridge National Laboratory, USA), and Manish Parashar (University of Utah, USA)	
Mini-Combust — An Open-Source Unstructured FGM Combustion Mini-App for Co-Designing Aero-Engines at Extreme Scale. Samuel Curtis (University of Warwick), Harry Waugh (University of Bristol), Tom Deakin (University of Bristol), and Gihan R. Mudalige (University of Warwick)	. 199
Training Photonic Mach Zehnder Meshes for Neural Network Acceleration	. 210

Technical Session 5

ML-Based Modeling to Predict I/O Performance on Different Storage Sub-Systems	. 221
Simulation of Large-Scale HPC Storage Systems: Challenges and Methodologies	232
Graph Sampling Quality Prediction for Algorithm Recommendation Seyedehhaleh Seyeddizaji (University of Klagenfurt, Austria), Reza Farahani (University of Klagenfurt, Austria), Joze Martin Rozanec (Jozef Stefan Institute, Slovenia), Dragi Kimovski (University of Klagenfurt, Austria), Ahmet Soylu (Kristiania University College, Norway), and Radu Aurel Prodan (University of Klagenfurt, Austria)	243
Efficient Resource-Constrained Federated Learning Clustering with Local Data Compression on the Edge-to-Cloud Continuum	255
When Less is More: Achieving Faster Convergence in Distributed Edge Machine Learning	266
Leveraging LLVM OpenMP GPU Offload Optimizations for Kokkos Applications	277
Author Indox	280