ISC 2020 Research Papers

PLEASE NOTE: The Call for Research Papers is closed!

The ISC research paper sessions provide world-class opportunities for engineers and scientists in academia, industry and government to present and discuss issues, trends and results that will shape the future of high performance computing (HPC), Networking, Storage and AI/Machine Learning.

Attendance will require a Conference Pass.
*ISC will grant a 100% discount on the conference day pass to paper presenter on day of presentation.

Chair - Saday Sadayappan

Saday Sadayappan, University of Utah and Pacific Northwest National Laboratory
Brad Chamberlain, CRAY
Guido Juckeland, Helmholtz-Zentrum Dresden-Rossendorf
Hatem Ltaief, KAUST
From all Research Papers submitted to the conference, the ISC 2020 Research Papers Committee, which is headed by Prof. Saday Sadayappan, University of Utah and Pacific Northwest National Laboratory, USA, with Brad Chamberlain, CRAY, USA, as Deputy Chair, has selected the following Research Papers for presentation at ISC High Performance 2020:

**Monday, June 22**

**Research Paper Award Session**

- Hans Meuer Award Finalist 1: *Load-balancing Parallel Relational Algebra*
- Hans Meuer Award Finalist 2: *Time Series Mining at Petascale Performance*
- GCS Award Winning Paper: tba

**Research Paper Session - Machine Learning / Big Data**

- **HyPar-Flow**: Exploiting MPI and Keras for Scalable Hybrid-Parallel DNN Training with TensorFlow
- **Opportunities for Cost Savings with In-transit Visualization**
- **Semi-automatic Assessment of I/O Behavior by Inspecting the Individual Client-Node Timelines — An Explorative Study on 10^6 obs**
- **Predicting Job Power Consumption Based on RJMS Submission Data in HPC Systems**

**Tuesday, June 23**

**Research Paper Session - Accelerators**

- **Using High-Level Synthesis to Implement the Matrix-Vector Product on FPGA**
- **FASTHash**: FPGA-based High Throughput Parallel Hash Table
- **Enabling Execution of a Legacy CFD Mini Application on Accelerators Using OpenMP**

**Research Paper Session - Architecture**

- **SHARP Streaming-Aggregation Hardware Design and Evaluation**
- **Embedding Algorithms for Quantum Annealers with Chimera and Pegasus Connection Topologies**
- **Communication-Aware Hardware-Assisted MPI Overlap Engine**

**Research Paper Session - Programming / Scheduling for Hybrid Memory Systems**

- **Pattern-Aware Staging for Hybrid Memory Systems**
- **Desynchronization and Wave Pattern Formation in MPI-Parallel and Hybrid Memory-Bound Programs**
- **Footprint-Aware Power Capping for Hybrid Memory Based Systems**

**Research Paper Session - Parallel Programming Models**

- **Shared-Memory Parallel Probabilistic GraphicalModeling Optimization: Comparison of Threads, OpenMP, and Data-Parallel Primitives**
- **Simplifying Communication Overlap in OpenSHMEM Through Integrated User-Level Thread**
Scheduling

Wednesday, June 24

Research Paper Session - Performance

- Understanding HPC Benchmark Performance on Intel Broadwell and Cascade Lake Processors
- Offsite Autotuning Approach - Performance Model Driven Autotuning Applied to Parallel Explicit ODE Methods
- Timemory: Modular Performance Analysis for HPC

Research Paper Session - Linear Algebra

- DGEMM using Tensor Cores, and Its Accurate and Reproducible Versions
- Sparse Linear Algebra on AMD and NVIDIA GPUs -- The Race is on
- Solving Acoustic Boundary Integral Equations Using High Performance Tile Low-Rank LU Factorization

Research Paper Session - Fault-Tolerance / Resilience

- TeaMPI—Replication-based Resilience without the (Performance) Pain
- Evaluating the Performance of Global- Restart Recovery For MPI Fault Tolerance

Research Paper Session - Scalable Applications

- Scaling Genomics Data Processing with Memory-Driven Computing to Accelerate Computational Biology
- Running a Pre-Exascale, Geographically Distributed, Multi-Cloud Scientific Simulation

ISC 2020 Call for Research Papers

PLEASE NOTE: The Call for Research Papers is closed!

Submitted research paper proposals will be reviewed by the ISC 2020 Research Papers Committee, which is headed by Prof. Saday Sadayappan, University of Utah and Pacific Northwest National Laboratory, USA, with Brad Chamberlain, CRAY, USA, as Deputy Chair.

The ISC organizers as well as the German Gauss Center for Supercomputing will again sponsor the call for research papers with two awards for outstanding research papers: the Hans Meuer Award and the GCS Award. Each accepted paper will be considered for the awards. The Hans Meuer Award and the GCS Award winner will receive a cash prize of 5,000 Euros each.

Important Dates
Areas of Interest

The Research Papers Committee encourages the submission of high-quality papers reporting original work in theoretical, experimental, and industrial research and development. The ISC submission process will be divided into eight tracks this year.

Architectures, Networks & Infrastructure
- Future design concepts of HPC systems
- Multi-core & many-core systems
- Heterogeneous systems
- Other paradigms (including data flow computing, FPGAs, etc.)
- Network technology
- Domain-specific architectures
- Memory technologies
- Trends in the HPC chip market
- Exascale computing

HPC Applications
- Highly scalable applications
- Convergence of simulations & big data
- Scalability on future architectures
- Workflow management
- Coupled simulations
- Industrial simulations
- Implementations on GPUs & other accelerators

Programming Models & Systems Software
- Parallel programming paradigms
- Tools and libraries for performance & productivity

Data, Storage & Visualization
- From big data to smart data
- Memory systems for HPC & big data
- File systems & tape libraries
- Data-intensive applications
- Databases
- Visual analytics
- In-situ analytics

HPC Algorithms
- Innovative algorithms, discrete or continuous
- Algorithmic-based fault tolerance
- Communication-reducing & synchronization-reducing algorithms
- Time-space trade-offs in algorithms
- Energy-efficient algorithms

Artificial Intelligence & Machine Learning
- Neural networks & HPC
- Machine learning & HPC
- AI & machine learning-oriented hardware
- Devising benchmarks for
• Job management
• Monitoring & administration tools
• Productivity improvement
• Power & energy management & scheduling
• Resilience

Performance Modeling & Measurement

• Performance models
• Performance prediction & engineering
• Performance measurement
• Power consumption
• Energy measurement & modelling

Emerging Technologies

• Quantum computing architecture
• Software for quantum computing
• Quantum algorithms
• Quantum annealing

Note: Submissions on other innovative aspects of high performance computing are also welcome. You will be asked to pick a primary and a secondary track from the eight above for your submission.

Submission & Review Process

Submission (The Call for Research Papers is closed!)

Only accepted style: LNCS style (Springer's website)

• Single column format
• Maximum 18 pages (including figures and references)
• LaTeX document class OR Word template
• Suitable for anonymous review
• Incorrectly formatted papers will be excluded

It's allowed to put papers on ArXiv before submitting to ISC.

• Minimum 4 reviewers
• Double-blind peer-review (see ISC High Performance Double-Blind Review Guidelines)
• Criteria: novelty, fundamental insights and potential for long-term contribution

Rebuttal phase (January 22-25, 2020)
- Chance to respond to reviewer comments
- Clarify misunderstandings
- Written format
- Authors receive instructions via email

**Final decision (February 05, 2020)**

- Consideration of reviews and rebuttals
- Discussion at research paper committee meeting
- Notification of authors

**Terms & Conditions**

- By submitting a paper, you agree to present the paper at ISC 2020 in Frankfurt, Germany.
- The research paper sessions will be held from Monday, June 22 through Wednesday, June 24, 2020. Attendance will require a Conference Pass. Paper presenters need to be registered ISC 2020 participants.
- The ISC organizers will grant a **100% discount on the conference day pass** to one presenter per paper for the day of their presentation.
- Travel, accommodation, registration fees and other such costs will not be covered by the ISC organizers.

**PUBLICATIONS & SLIDES**

The publication of the papers is managed by Proceedings Chair **Guido Juckeland**, Helmholtz-Zentrum Dresden-Rossendorf with **Hatem Ltaief**, KAUST, as Proceedings Deputy Chair.

**OPEN ACCESS PUBLICATION**

All accepted research papers will be published in the *Springer's Lecture Notes in Computer Science (LNCS) series* in **Gold Open Access**.

Gold OA makes the final version of a research paper **freely and permanently accessible for everyone**, immediately after publication. Paper submissions are required to be within 18 pages in LNCS style. For the camera-ready version, authors are automatically granted one extra page to incorporate reviewer comments.
Volumes published as part of the LNCS series are made available to the following indexing services: Conference Proceedings Citation Index (CPCI), part of Clarivate Analytics’ Web of Science, EI Engineering Index (Compendex and Inspec databases), ACM Digital Library, DBLP, Google Scholar, IO-Port, MathSciNet, Scopus, Zentralblatt MATH.

PRESENTATION SLIDES FOR ATTENDEES

The ISC organizers will make the presentation slides available online a week after the event, provided as PDF files. ISC 2020 attendees will receive an e-mail with the access link.

ISC 2020 Research Papers Committee

- **Saday Sadayappan**, University of Utah and Pacific Northwest National Laboratory, United States of America (Chair)
- **Bradford L. Chamberlain**, Cray, a Hewlett Packard Enterprise company, United States of America (Deputy Chair)

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- Ron Brightwell, Sandia National Laboratories, United States of America
- Nectarios Koziris, National Technical University of Athens, Greece
- Arthur Maccabe, Oak Ridge National Laboratory, United States of America
- Satoshi Matsuoka, Riken Center for Computational Science, Tokyo Institute of Technology, Japan
- John Shalf, Lawrence Berkeley National Laboratory, United States of America
- Tor Skeie, Simula Research Laboratory, Norway
- Guangming Tan, Institute of Computing Technology (ICT), China, China
- Carsten Trinitis, Technical University of Munich, Germany

Artificial Intelligence and Machine Learning

- Bingsheng He, National University of Singapore, Singapore (Chair)
- Woongki Baek, UNIST, South Korea
- Thomas Brettin, Argonne National Laboratory, United States of America
- Xiaowen Chu, Hong Kong Baptist University, Hong Kong
• Judy Fox, Indiana University, United States of America
• Mohammad Ghasemzadeh, Apple, United States of America
• David Gregg, Trinity College Dublin, Ireland
• Xiaosong Ma, Qatar Computing Research Institute, Qatar
• Dimitrios Nikolopoulos, Queen's University Belfast, United Kingdom
• Martin Schultz, Forschungszentrum Jülich, Germany
• Ana Lucia Varbanescu, University of Amsterdam, Netherlands
• Yu Wang, Tsinghua University, China
• Zeyi Wen, The University of Western Australia, Australia

Data, Storage & Visualization

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• Preei Malakar, Indian Institute of Technology Kanpur, India
• Suzanne McIntosh, New York University, United States of America
• Kathryn Mohror, Lawrence Livermore National Laboratory, United States of America
• Talita Perciano, Lawrence Berkeley National Laboratory, United States of America
• Venkatram Vishwanath, Argonne National Laboratory, United States of America

Emerging Technologies

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• Mathias Soeken, EPFL Lausanne, Switzerland
• Robert Wille, Johannes Kepler University Linz, Austria

HPC Algorithms
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• Sascha Hunold, TU Wien, Austria

• Ananth Kalyanaraman, Washington State University, United States of America

• Kamer Kaya, Sabancı University, Turkey, Turkey

• Hatem Ltaief, KAUST, Saudi Arabia

• Veronika Sonigo, University of Franche-Comté, FEMTO-ST institute, France

• Didem Unat, Koç University, Turkey

• Ana Lucia Varbanescu, University of Amsterdam, Netherlands

HPC Applications

• Dirk Pleiter, Forschungszentrum Juelich, Germany (Chair)

• Edouard Audit, CEA, France

• Xing Cai, Simula Research Laboratory, Norway

• Carlo Cavazzoni, CINECA, Italy

• Anne C. Elster, University of Texas; Norwegian University of Science and Technology, (NTNU), Norway

• Erwin Laure, KTH, Sweden

• Erik Lindahl, SciLifeLab, Sweden

• Hatem Ltaief, KAUST, Saudi Arabia

• A. Cristiano I. Malossi, IBM Research - Zurich, Switzerland

• Gabriel Noaje, NVIDIA, Singapore

• Dirk Pleiter, Forschungszentrum Juelich, Germany

• Filippo Spiga, Arm, United Kingdom

• Tjerk Straatsma, ORNL, United States of America

Performance Modeling & Measurement
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Sudheer Chunduri, Argonne Leadership Computing Facility, United States of America

I-Hsin Chung, IBM Research, United States of America

Florina Ciorba, University of Basel, Switzerland

Georg Hager, University of Erlangen-Nuremberg, Erlangen Regional Computing Center, Germany

Daniel Holmes, EPCC, The University of Edinburgh, United Kingdom

Guillaume Mercier, Bordeaux INP, France

Bernd Mohr, Juelich Supercomputing Centre, Germany

Miwako Tsuji, RIKEN, Japan

Michele Weiland, EPCC - The University of Edinburgh, United Kingdom

Jidong Zhai, Tsinghua University, China

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Abhinav Bhatele, University of Maryland, United States of America

Ron Brightwell, Sandia National Laboratories, United States of America

Angeles Gonzalez Navarro, Universidad de Malaga, Spain

Clemens Grelck, University of Amsterdam, Netherlands

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Naoya Maruyama, Lawrence Livermore National Laboratory, United States of America

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Sven-Bodo Scholz, Radboud University, Netherlands

Martin Schulz, Technical University of Munich, Chair of Computer Architecture and Parallel Systems, Germany

Xuanhua Shi, Huazhong University of Science and Technology, China

Daisuke Takahashi, University of Tsukuba, Japan
• Christian Terboven, RWTH Aachen University, Germany

• Chenxi Wang, UCLA, United States of America

• Qing Yi, University of Colorado at Colorado Springs, United States of America

• Jidong Zhai, Tsinghua University, China