

# **2020 IEEE/ACM 11th Workshop on Latest Advances in Scalable Algorithms for Large-Scale Systems (Scala 2020)**

**Atlanta, Georgia, USA  
13 November 2020**



**IEEE Catalog Number: CFP20A63-POD  
ISBN: 978-1-6654-2271-0**

**Copyright © 2020 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:	CFP20A63-POD
ISBN (Print-On-Demand):	978-1-6654-2271-0
ISBN (Online):	978-1-6654-2270-3

**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](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

CURRAN ASSOCIATES INC.  
**proceedings**  
.com

# 2020 IEEE/ACM 11th Workshop on Latest Advances in Scalable Algorithms for Large-Scale Systems (Scala) **Scala 2020**

## Table of Contents

Message from the Workshop Chairs .v.....  
Workshop Organization .vi.....

### Session 1

An Integer Arithmetic-Based Sparse Linear Solver Using a GMRES Method and Iterative Refinement .1.....  
*Takeshi Iwashita (Hokkaido University, Japan), Kengo Suzuki (Hokkaido University, Japan), and Takeshi Fukaya (Hokkaido University, Japan)*

### Session 2

Two-Stage Asynchronous Iterative Solvers for Multi-GPU Clusters .9.....  
*Pratik Nayak (Karlsruhe Institute of Technology, Germany), Terry Cojean (Karlsruhe Institute of Technology, Germany), and Hartwig Anzt (Karlsruhe Institute of Technology, Germany)*

Revisiting Exponential Integrator Methods for HPC with a Mini-Application .19.....  
*James Douglas Shanks (AWE plc), Wei Liu (AWE plc), and Richard Smedley-Stevenson (AWE plc)*

A Survey of Singular Value Decomposition Methods for Distributed Tall/Skinny Data .27.....  
*Drew Schmidt (Oak Ridge National Laboratory)*

### Session 3

Replacing Pivoting in Distributed Gaussian Elimination with Randomized Techniques .35.....  
*Neil Lindquist (University of Tennessee, USA), Piotr Luszczyk (University of Tennessee, USA), and Jack Dongarra (University of Tennessee, USA; Oak Ridge National Laboratory, USA; University of Manchester, UK)*

Basic Linear Algebra Operations on TensorCore GPU .44.....  
*Shaoshuai Zhang (University of Houston, USA), Vivek Karihaloo (University of Houston, USA), and Panruo Wu (University of Houston, USA)*

High-Order Finite Element Method using Standard and Device-Level Batch GEMM on GPUs .53....  
*Natalie Beams (University of Tennessee, USA), Ahmad Abdelfattah (University of Tennessee, USA), Stanimire Tomov (University of Tennessee, USA), Jack Dongarra (University of Tennessee, USA), Tzanio Kolev (Lawrence Livermore National Laboratory, USA), and Yohann Dudouit (Lawrence Livermore National Laboratory, USA)*

## Session 4

A Fast Scalable Iterative Implicit Solver with Green's Function-Based Neural Networks .61.....  
*Tsuyoshi Ichimura (The University of Tokyo, Japan), Kohei Fujita (The University of Tokyo, Japan), Muneo Hori (Japan Agency for Marine-Earth Science and Technology, Japan), Lalith Maddegadara (The University of Tokyo, Japan), Naonori Ueda (RIKEN, Japan), and Yuma Kikuchi (The University of Tokyo, Japan)*

Implementation and Numerical Techniques for One Eflop/s HPL-AI Benchmark on Fugaku .69.....  
*Shuhei Kudo (Center for Computational Science, RIKEN), Keigo Nitadori (Center for Computational Science, RIKEN), Takuya Ina (Center for Computational Science, RIKEN), and Toshiyuki Imamura (Center for Computational Science, RIKEN)*

Performance Analysis of a Quantum Monte Carlo Application on Multiple Hardware Architectures Using the HPX Runtime .77.....  
*Weile Wei (Louisiana State University), Arghya Chatterjee (Oak Ridge National Laboratory), Kevin Huck (University of Oregon), Oscar Hernandez (Oak Ridge National Laboratory), and Hartmut Kaiser (Louisiana State University)*

**Author Index 85** .....