

# **2019 IEEE/ACM Third Workshop on Deep Learning on Supercomputers (DLS 2019)**

**Denver, Colorado, USA  
17 November 2019**



**IEEE Catalog Number: CFP19W52-POD  
ISBN: 978-1-7281-6012-2**

**Copyright © 2019 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:	CFP19W52-POD
ISBN (Print-On-Demand):	978-1-7281-6012-2
ISBN (Online):	978-1-7281-6011-5

**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

# 2019 IEEE/ACM Third Workshop on Deep Learning on Supercomputers (DLS) DLS 2019

## Table of Contents

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

### Technical Papers

Highly- Scalable, Physics-Informed GANs for Learning Solutions of Stochastic PDEs .1.....  
*Liu Yang (Brown University, USA), Sean Treichler (Nvidia Corporation, USA), Thorsten Kurth (Lawrence Berkeley National Laboratory, USA), Keno Fischer (Massachusetts Institute of Technology, USA), David Barajas-Solano (Pacific Northwest National Laboratory, USA), Josh Romero (Nvidia Corporation, USA), Valentin Churavy (Massachusetts Institute of Technology, USA), Alexandre Tartakovsky (Pacific Northwest National Laboratory, USA), Michael Houston (Nvidia Corporation, USA), Mr Prabhat (Lawrence Berkeley National Laboratory, USA), and George Karniadakis (Brown University, USA)*

DeepDriveMD: Deep-Learning Driven Adaptive Molecular Simulations for Protein Folding .12.....  
*Hyungro Lee (Rutgers University, USA), Matteo Turilli (Rutgers University, USA), Shantenu Jha (Rutgers University, USA), Debsindhu Bhowmik (Oak Ridge National Laboratory, USA), Heng Ma (Argonne National Laboratory, USA), and Arvind Ramanathan (Argonne National Laboratory, USA)*

Deep Learning Accelerated Light Source Experiments .20.....  
*Zhengchun Liu (Argonne National Laboratory, USA), Tekin Bicer (Argonne National Laboratory, USA), Rajkumar Kettimuthu (Argonne National Laboratory, USA), and Ian Foster (Argonne National Laboratory, USA)*

Deep Learning for Gap Crossing Ability of Ground Vehicles .29.....  
*Benjamin Parsons (US Army Engineer Research and Development Center (ERDC), USA) and Jing-Ru Cheng (US Army Engineer Research and Development Center (ERDC), USA)*

Evolving Larger Convolutional Layer Kernel Sizes for a Settlement Detection Deep-Learner on Summit .36.....  
*Mark Coletti (Oak Ridge National Laboratory, USA), Dalton Lungu (Oak Ridge National Laboratory, USA), Jeffrey K. Bassett (George Mason University, USA), and Amy Rose (Oak Ridge National Laboratory, USA)*

Deep Facial Recognition using Tensorflow .45.....  
*Chris A. Mattmann (Jet Propulsion Laboratory and University of Southern California, USA) and Zhao Zhang (Texas Advanced Computing Center, USA)*

Scaling Distributed Training of Flood-Filling Networks on HPC Infrastructure for Brain Mapping .52.....  
*Wushi Dong (University of Chicago, USA), Murat Kececi (Argonne National Laboratory, USA), Rafael Vescovi (Argonne National Laboratory, USA), Hanyu Li (University of Chicago, USA), Corey Adams (Argonne National Laboratory, USA), Elise Jennings (Argonne National Laboratory, USA), Samuel Flender (Argonne National Laboratory, USA), Thomas Uram (Argonne National Laboratory, USA), Venkatram Vishwanath (Argonne National Laboratory, USA), Nicola Ferrier (Argonne National Laboratory, USA), Narayanan Kasthuri (Argonne National Laboratory, USA), and Peter Littlewood (University of Chicago and Argonne National Laboratory, USA)*

DC-S3GD: Delay-Compensated Stale-Synchronous SGD for Large-Scale Decentralized Neural Network Training .62.....  
*Alessandro Rigazzi (Cray Inc, Switzerland)*

Aggregating Local Storage for Scalable Deep Learning I/O .69.....  
*Zhao Zhang (Texas Advanced Computing Center, USA), Lei Huang (Texas Advanced Computing Center, USA), J. Gregory Pauloski (University of Texas at Austin, USA), and Ian Foster (University of Chicago, Argonne National Laboratory, USA)*

Scaling TensorFlow, PyTorch, and MXNet using MVAPICH2 for High-Performance Deep Learning on Frontera... 76  
*Arpan Jain (Ohio State University, USA), Ammar Ahmad Awan (Ohio State University, USA), Hari Subramoni (Ohio State University, USA), and Dhabaleswar K. Panda (Ohio State University, USA)*

Strategies to Deploy and Scale Deep Learning on the Summit Supercomputer .84.....  
*Junqi Yin (Oak Ridge National Laboratory, USA), Shubhankar Gahlot (Oak Ridge National Laboratory, USA), Nouamane Laanait (Oak Ridge National Laboratory, USA), Ketan Maheshwari (Oak Ridge National Laboratory, USA), Jack Morrison (Oak Ridge National Laboratory, USA), Sajal Dash (Virginia Tech, USA), and Mallikarjun Shankar (Oak Ridge National Laboratory, USA)*

**Author Index 95**.....