

# SimCenter: Center of Excellence in Applied Computational Science and Engineering presents

## Computer Networking Technology Evolution for “Big” Applications and Systems

given by **Dr. Dorian Arnold**

Associate Professor, Computer Science  
Graduate Director, Computer Science and Informatics  
Emory University

October 25<sup>th</sup>, 2:00 p.m., UTC SimCenter Auditorium\*

*Public Invited*



Recent networking advances have enabled data communication at unprecedented rates. However, these same advances can be used to increase computational capacities. We present three studies that demonstrate the power of the network to accelerate computation, but also the careful considerations that must be made. Our first study looks at applications that leverage Remote Direct Memory Access (RDMA) application and shows that “Network-induced Memory Contention” (NiMC) can lead to up to 3x performance degradations at scales as small as 8K processes, even in applications previously shown to be performance-resilient to noise. We then analyze NiMC root cause and mitigation strategies. We also highlight results from two other studies involving NIC-based and switch-based in-network computing. We show that these are two additional powerful paradigms that admit new and innovative opportunities for network-based computational capabilities.

Dorian Arnold is a tenured, associate professor of Computer Science at Emory University. From 2009-2017 he was an assistant and associate professor at The University of New Mexico. He studies distributed systems, fault-tolerance, online (streaming) data analysis, and software tools for high-performance computing environments. Particularly, he is interested in the performance, scalability and reliability issues of extreme scale environments comprising many thousands or

even millions of components. He has 60+ peer-reviewed publications with 1800+ citations. His research projects have won two Top 100 R&D awards. In 2017, he was named an ACM Distinguished Speaker.

Arnold has held leadership roles at major HPC venues including chair of many technical components and steering committee member for the SC Conference and as an Associate Editor of the IEEE Transactions on Parallel and Distributed Systems. He is committed to diversity and inclusion and served as General Chair for the 2017 ACM Richard Tapia Celebration of Diversity and the 2016 CRA HPC Pipeline Workshop.

Arnold earned Ph.D. and M.S. degrees in Computer Science from the Universities of Wisconsin and Tennessee, respectively. He earned a B.S. in Math and Computer Science from Regis University (Denver, CO) and his A.S. in Physics, Chemistry and Math from St. John’s College (Belize).