KEYNOTE SPEAKER 2

Jeffrey Vetter

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Preparing for Extreme Heterogeneity in High Performance Computing

While computing technologies have remained relatively stable for nearly two decades, new architectural features, such as heterogeneous cores, deep memory hierarchies, non-volatile memory (NVM), and near-memory processing, have emerged as possible solutions to address the concerns of energy-efficiency and cost. However, we expect this 'golden age' of architectural change to lead to extreme heterogeneity and it will have a major impact on software systems and applications. Software will need to be redesigned to exploit these new capabilities and provide some level of performance portability across these diverse architectures. In this talk, I will sample these emerging memory technologies, discuss their architectural and software implications, and describe several new approaches (e.g., domain specific languages, intelligent compilers and introspective runtime systems) to address these challenges.

Jeffrey Vetter, Ph.D., is a Distinguished Research and Development Staff Member as well as the founding group leader of the Future Technologies Group in the Computer Science and Mathematics Division at Oak Ridge National Laboratory (ORNL). In addition, he holds a joint appointment at the Electrical Engineering and Computer Science Department of the University of Tennessee-Knoxville. Vetter is a Fellow of the IEEE and a Distinguished Scientist Member of the ACM. In 2018, he was awarded the ORNL Director's Award for Outstanding Individual Accomplishment in Science and Technology. In 2010, as part of an interdisciplinary team from Georgia Tech, NYU, and ORNL, Vetter was awarded the ACM Gordon Bell Prize. In 2015, he served as the SC15 Technical Program Chair (the annual supercomputing conference with nearly 13,000 attendees). His recent books, entitled "Contemporary High Performance Computing: From Petascale toward Exascale (Vols. 1-3)," survey the international landscape of HPC. See his website for more information: https://ft.ornl.gov/~vetter/.