Keynote Talk

Designing Networking Technologies and Communication Libraries for Exascale Computing Systems: Opportunities and Challenges

Prof. Dhabaleswar K. (DK) Panda

Ohio State University, USA

Abstract: The high-end computing community is aiming to enter the exascale-level computing during the next six to eight years. Such systems will consist of millions of processors and accelerators. This presentation will first focus on the architectural aspects of such exascale computing systems and the associated programming models and runtime systems. Next, we will derive a set of features and support expected from the underlying networking technologies and communication libraries for supporting these programming models and runtime systems. Finally, we will compare and contrast these requirements with the features and support available in current generation systems and outline the opportunities and challenges for designing networking technologies and communication libraries for next generation exascale systems.

Bio: Dhabaleswar K. (DK) Panda is a Professor of Computer Science and Engineering at the Ohio State University. His research interests include parallel computer architecture, high performance networking, InfiniBand, exascale computing, programming models, GPUs and accelerators, high performance file systems and storage, virtualization and cloud computing. He has published over 300 papers in major journals and international conferences related to these research areas. Dr. Panda and his research group members have been doing extensive research on modern networking technologies including InfiniBand, High-Speed Ethernet and RDMA over Converged Enhanced Ethernet (RoCE). The MVAPICH2 (High Performance MPI over InfiniBand, iWARP and RoCE) open-source software packages, developed by his research group (http://mvapich.cse.ohio-state.edu), are currently being used by more than 1,930 organizations worldwide (in 68 countries). This software has enabled several InfiniBand clusters to get into the latest TOP500 ranking during the last decade. More than 115,000 downloads of this software have taken place from the project's website alone. This software package is also available with the software stacks of many network and server vendors, and Linux distributors. Dr. Panda’s research has been supported by funding from US National Science Foundation, US Department of Energy, and several industry including Intel, Cisco, SUN, Mellanox, QLogic, NVIDIA and NetApp. He is an IEEE Fellow and a member of ACM. More details about Prof. Panda are available at http://www.cse.ohio-state.edu/~panda.
Keynote Talk

Challenges and Opportunities for “Big Data” – A Platform Perspective

Dr. Wen-Hann Wang

Intel Corporation

Abstract: At the turn of this decade we began to witness a rapidly growing style of computing characterized by its reliance on large, fast, hard, and often dynamically growing datasets. This “Big Data” phenomenon presents immense challenges as well as opportunities to the computer industry and the research community. In this keynote I will discuss the life cycle of big data and the growing importance in predictions, smart analytics agents, and the federations of intelligent agents. I will also address platform challenges and highlight opportunities in system architecture innovations for addressing the Big Data challenges.

Bio: Dr. Wen-Hann Wang is vice president of Intel Labs and director of Circuits and System Research for Intel Corporation. Prior to his current assignment, he served as vice president of the Software and Services Group (SSG) and general manager of Software and Solutions and Product Development in China. While in SSG, he also held general management positions for the Core Software, the Managed Runtime, and the Middleware Products divisions. He was also instrumental in establishing SSG’s presence in PRC. Wang joined Intel in 1991 as an Intel® Pentium® Pro platform architect, working on the highly successful P6 product family. His platform architecture and analysis work was instrumental in the creation of the Intel® Xeon® processor product line. He served as platform infrastructure research manager of the newly formed Intel Microprocessor Research Lab (MRL) in 1995 and later became director of the Emerging Platforms Lab, delivering cutting-edge technologies and reference platforms for Intel product groups. Wang holds 15 patents and has received numerous technical awards, including the inaugural Influential Paper Award of ACM/IEEE International Symposium on Computer Architectures in 2003 and Best Paper Award of ACM SIGMETRICS Conference in 1990. Prior to joining Intel in 1991, Wang served as a research staff member at IBM T. J. Watson Research Lab. Wang has worked and studied in three continents.
Keynote Talk

Checkpointing for Extreme Scale Systems: from Loser to Champion

Dr. Franck Cappello

Co-Director of the INRIA-Illinois Joint Laboratory on PetaScale Computing

Abstract: Before 2010, a strong community belief was that checkpointing would not scale to the next generation of supercomputers, the Exascale systems. This theory is at the origin of flourishing research activities in failure prediction, algorithmic level fault tolerance and replication approaches, to cite a few. Surprisingly, the projected decline of checkpointing has also motivated one of the largest research efforts in history to improve checkpointing for HPC systems. The results of this quest to push checkpointing to its limits are striking. Not only checkpointing is not dead but also it is considered currently by many researchers as the most credible approach for fault tolerance at Exascale. This keynote will review the key research results that have changed the face of checkpointing in the last 5 years. Still, there is room for improvements and we will also discuss some of the main open problems.

Bio: Dr. Franck Cappello holds a research director position at INRIA and is visiting research professor in Computer Science at University of Illinois at Urbana Champaign. Since 2009, he is co-director with Marc Snir of the INRIA-Illinois Joint-Laboratory on PetaScale Computing (http://jointlab.ncsa.illinois.edu/) where he is also leading the Resilience/Fault Tolerance effort. He is leading the roadmapping effort on Resilience/Fault Tolerance for EESI2 (European Exascale Software Initiative) and led similar effort for IESP (International Exascale Software Project : http://www.exascale.org) and EESI1. He is the main PI of the G8 ECS (Enabling Climate Simulation at Exascale: https://wiki.engr.illinois.edu/display/G8/) project gathering researchers from USA, France, Germany, Japan, Canada and Spain with the objective of identifying scalability, performance and resilience solutions for running CESM at extreme scale.