David Bader to Receive 2021 IEEE CS Sidney Fernbach Award

LOS ALAMITOS, Calif., 22 September 2021 – The IEEE Computer Society (IEEE CS) has named David Bader as the recipient of the 2021 Sidney Fernbach Award. Bader is a Distinguished Professor and founder of the Department of Data Science, and inaugural Director of the Institute for Data Science, at the New Jersey Institute of Technology.

Established in 1992 in memory of high-performance computing pioneer Sidney Fernbach, the Sidney Fernbach Award recognizes outstanding contributions in the application of high-performance computers using innovative approaches. Bader was cited for the development of Linux-based massively parallel production computers and for pioneering contributions to scalable discrete parallel algorithms for real-world applications.

"David has expanded the realm of supercomputing from narrow sets of technical computing to be the leading edge of mainstream computing we see today in massive cluster-based supercomputers such as Fugaku, as well as hyperscaler clouds," said Satoshi Matsuoka, director of RIKEN Center for Computational Science. "As supercomputing progresses onwards, we should further continue to observe other elements in which David has contributed to their genesis."

"Today, 100% of the Top 500 supercomputers in the world are Linux HPC systems, based on Bader's technical contributions and leadership. This is one of the most significant technical foundations of HPC," noted Steve Wallach, a guest scientist for Los Alamos National Laboratory and 2008 IEEE CS Seymour Cray Computer Engineering Award recipient.

Specifically, the Fernbach Award recognizes Bader's contributions, in the following areas:

- Demonstrated that a Linux OS-based machine can be a production supercomputer with matching performance and utility, by integrating a high-performance scalable interconnection network, system services such as scalable booting methodology, system software including free and commercial compiler suites, high-utilization job schedulers, and diagnostic monitoring.
- Developed scalable discrete algorithms for problems with irregular data structures, lack of locality, and unpredictable memory traces on Linux supercomputers.
- Started and maintained the Graph500 ranking that influenced the HPC community to look beyond LINPACK as the sole performance ranking metric.
- Attacked real-world problems such as conducting the first study of Twitter using streaming parallel graph algorithms to identify "important actors" during epidemics and disasters and applying streaming graph analysis to detect insider threats in corporate networks.

Viktor Prasanna, Charles Lee Powell Chair in Engineering and Professor of Electrical Engineering and Professor of Computer Science at the University of Southern California, summarized, "Professor Bader has developed innovative techniques to explore HPC for many challenging application areas where graph based techniques are being used. This has been an exciting research direction that requires advances in platform architecture, software systems, and parallelization. This award recognizes Professor Bader's work in building such software as well as in developing scalable techniques for graph analytics."

Bader's interests are at the intersection of high-performance computing and real-world applications, including cybersecurity, massive-scale analytics, and computational genomics. He has served as a lead scientist in several DARPA programs. He has co-authored over 300 scholarly papers and has best paper awards from ISC, IEEE HPEC, and ACM/IEEE SC. Bader is editor-in-chief of the *ACM Transactions on Parallel Computing*, and General Co-Chair of IPDPS 2021, and previously served as editor-in-chief of the *IEEE Transactions on Parallel and Distributed Systems*.

Bader is a Fellow of the IEEE, AAAS, and SIAM, and advises the White House, most recently on the National Strategic Computing Initiative (NSCI) and Future Advanced Computing Ecosystem (FACE). Other notable awards he has received include recognition in the 2021 ROI-NJ inaugural list of technology influencers, 2014 Outstanding Senior Faculty Research Award from Georgia Tech, and 2012 inaugural recipient of University of Maryland's Electrical and Computer Engineering Distinguished Alumni Award. Recently, Bader received an NVIDIA AI Lab (NVAIL) award, and a Facebook Research AI Hardware/Software Co-Design award.

The Sidney Fernbach award consists of a certificate and a $2,000 honorarium. The award will be presented to Bader at the SC21 Conference awards plenary session in St. Louis, Missouri, on Tuesday morning, 16 November 2021.

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