### INNOVATION HALL OF FAME





David A. Bader (Ph.D. '96, electrical and computer engineering) is a distinguished professor, founder of the Department of Data Science, and inaugural director of the Institute for Data Science at New Jersey Institute of Technology. He previously served as founding professor and chair of the School of Computational Science and Engineering, College of Computing, at the Georgia Institute of Technology.

Bader is a leading expert in solving global grand challenges in science, engineering, computing, and data science. His interests are at the intersection of high-performance computing and real-world applications, including cybersecurity, massive-scale analytics, and computational genomics.

Before the early 2000s, only elite technical organizations and governments used high-performance computing due to the cost of systems that required proprietary processor architectures, software, and programmers. Bader designed the first high-performance supercomputer based on commodity parts, reducing expenses by an order of magnitude. From a prototype he built in 1998 using commodity off-the-shelf parts and a high-speed low-latency interconnection network, Bader led the design of the first Linux Supercomputer RoadRunner for open use by the national science and engineering community via the National Science Foundation's (NSF) National Technology Grid. His computer was first used in April 1999.

Bader then led the technical design team of the NSF Alliance's LosLobos system, the first-ever Linux production system built by IBM. IBM turned Bader's design into the industry's first pre-assembled and configured Linux server clusters for business. By 2018, all of the top 500 supercomputers in the world traced back to Bader's technical contributions and leadership. Further, Bader and his team pioneered the general-purpose use of accelerators such as

> the IBM Cell Broadband Engine Processor and the NVIDIA Graphics Processing Unit (GPU). In 2022, Hyperion Research's HPC Qview tracking of servers and the broader HPC ecosystem estimated the total economic value of Linux supercomputing pioneered by Bader over the 25 years prior to be more than \$100 trillion.

> Bader is also widely known for his long-standing research efforts on novel parallel graph algorithms that use highperformance implementations. He has produced multiple firsts, including the evaluation of parallel single-source shortest path algorithms on large and real-world graphs, scalable parallel betweenness centrality calculation, scalable parallel community detection algorithm (winner of the 10th Center for Discrete Mathematics and Theoretical Computer Science Implementation Challenge), streaming community maintenance algorithm, and many of the best-performing graph algorithms for GPUs. He has applied streaming graph analysis to detect insider threats in real

corporate networks. The STINGER streaming graph package (winner of the Institute of Electrical and Electronics Engineers' [IEEE] HPEC Best Paper) is the first of its kind.

Bader is a Fellow of IEEE, the Association of Computing Machinery, the Society for Industrial and Applied Mathematics, and the American Association for the Advancement of Science. He is a recipient of the IEEE Sidney Fernbach Award. He has served as a lead scientist in several DARPA programs including High Productivity Computing Systems with IBM, Ubiquitous High Performance Computing with NVIDIA, Anomaly Detection at Multiple Scales, Power Efficiency Revolution For Embedded Computing Technologies, Hierarchical Identify Verify Exploit, and Software-Defined Hardware. Bader directed the Sony-Toshiba-IBM Center of Competence for the Cell B.E. Processor, the chip used in the Sony PlayStation 3 and, with his co-designed software, accelerated the world's first supercomputer to break the petaflops barrier. He also directed an NVIDIA GPU Center of Excellence.

# Announcing the Induction of **Dr. David Bader**

Into the 🏶 Innovation Hall of Fame

November 9, 2022

A. JAMES CLARK SCHOOL OF ENGINEERING University of Maryland, College Park

## **INNOVATION HALL OF FAME**



#### Program

NOVEMBER 9, 2022 5:00 PM JEONG H. KIM ENGINEERING BUILDING RECEPTION TO FOLLOW

#### PARTICIPANTS

Samuel Graham, Jr. DEAN AND NARIMAN FARVARDIN PROFESSOR, A. JAMES CLARK SCHOOL OF ENGINEERING

Scott M. Berman REPRESENTING THE BERMAN FAMILY

Nathan Bluzer CHAIR, INNOVATION HALL OF FAME SELECTION COMMITTEE



THE LAUNCH OF ROADRUNNER MAKES THE NEWS. "MACHINE ONE OF 100 SPEEDIEST IN WORLD," WITH DAVID BADER PICTURED AT ROADRUNNER'S CONSOLE.



In 1985 Stanford Berman ('50) conceptualized the Innovation Hall of Fame to recognize great engineering and inspire young engineers. Thanks to his vision and philanthropic generosity, the A. James Clark School of Engineering honors Berman's legacy at its annual Innovation Hall of Fame induction ceremony. From the Universal Product Code to satellite radio, SMS text messaging to the implantable insulin pump, the Innovation Hall of Fame represents the unique ability of engineers to transform fearless ideas into new innovations that benefit millions of lives across the globe.

THE CLARK SCHOOL IS ETERNALLY GRATEFUL TO THE LATE STANFORD BERMAN AND HIS FAMILY.



INSIDE A ROADRUNNER CABINET WITH EACH NODE ATTACHED TO THREE NETWORKS: MYRINET (RIBBON CABLE), FAST ETHERNET (CAT5), AND DIAGNOSTIC (RS232 SERIAL PORT).