Pacific Northwest
NATIONAL LABORATORY

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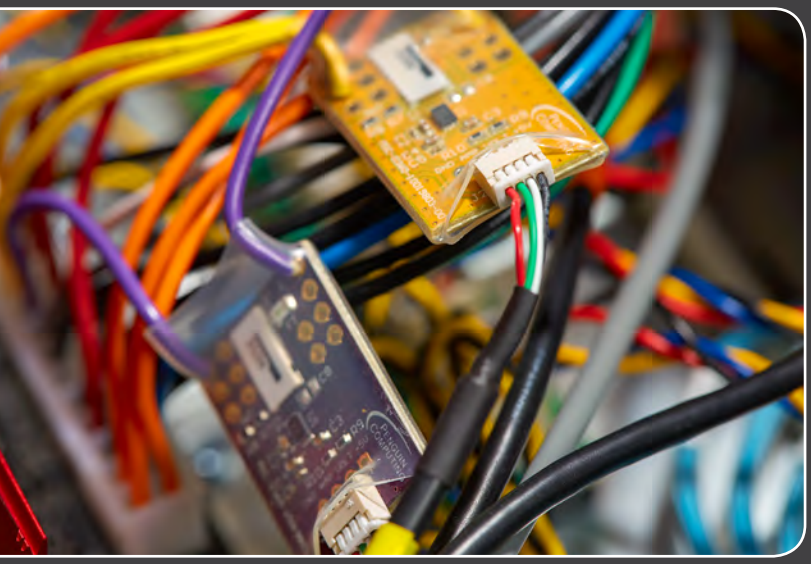
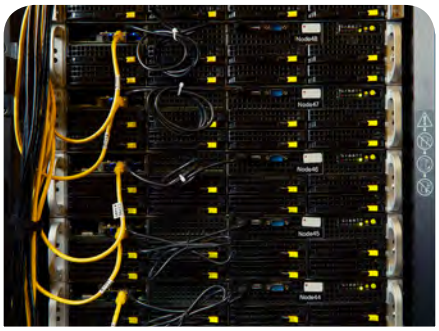
Center for Advanced Technology Evaluation



To maximize the impact of next-generation, extreme-scale supercomputers working to solve the nation's most challenging scientific problems, CENATE's integrated evaluation of early technologies will predict their potential, guide designs, and hone future technology, systems, and applications—all within a first-of-its-kind computing proving ground.

CENATE Resources



TESTBEDS - Targeting novel technologies that are key building blocks of future high-performance computing system architectures, such as processors, accelerators, memory, storage, and/or software stacks.

INSTRUMENTATION AND EVALUATION - Collecting different dimensions of performance, power, temperature, and/or resilience data to assess a system's overall capabilities and conduct workload characterization, including microbenchmarks, applications, and workflows.

PREDICTIVE ANALYSIS - Predictive tools and methods to evaluate discrete technologies with the expertise to assess the impact of their integration into complete system architectures.

U.S. DEPARTMENT OF
ENERGY

CENATE evaluates early and pre-release technologies and charts the state of the art in hardware, from developments at the component level, which may include novel devices, to turnkey advanced systems. Available component technologies and scalability platforms can be examined empirically and combined with predictive analysis methods to determine their impact on possible future large-scale system deployments at DOE's Leadership Computing Facilities and other installations.

As part of its outreach, CENATE offers collaborative access to its resources, including staff, to the HPC community.

ACCELERATORS

- **NVIDIA Pascal:** GPU architecture designed for Machine Learning workloads.
- **NVIDIA Volta:** Integrating Tensor Cores with GPU architecture targeting Deep Learning.

INSTRUMENTATION

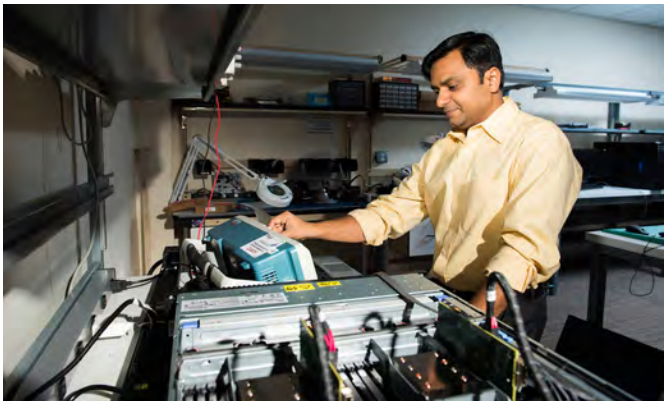
- **PowerInsight + Thermal:** Component-level power and energy instrumentation of commodity hardware.

MEMORY

- **IBM ConTutto:** Non-volatile RAM featuring spin torque transfer magnetic memory with memory controller logic, implemented in an FPGA.
- **3D Stacked Memory:** Ultra-high bandwidth dynamic RAM that uses less energy per bit.

NETWORKS

- **Data Vortex:** High-probability, congestion-free networks for fine-grained communications.
- **NVLink™:** High-bandwidth, energy-efficient interconnect for ultra-fast communication between GPUs and CPU to GPU.
- **Optical Circuit Switch:** Optical Networking technology that enables rapid system reconfiguration.



Advanced measurement capabilities allow CENATE to probe the potential impact of a diverse range of emerging hardware technologies.

SYSTEMS

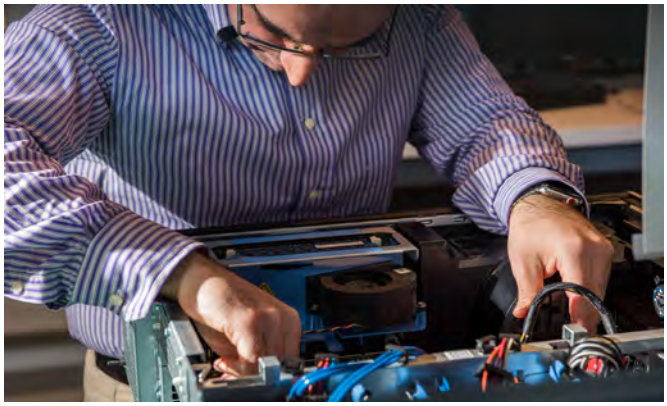
- **DGX-1 + Volta:** Eight-socket Volta with stacked memory and NVLink 2.0.
- **SeaPearl:** Scalability cluster with integrated high-fidelity thermal/power measurement.
- **BlueSky:** Computing instrument with performance/power data capture and analysis capability.

ABOUT CENATE

Launched in 2015, CENATE is a computer proving ground that employs an integrated measure–model–design evaluation pipeline of early technologies impacting future systems and applications. CENATE's research primarily focuses on workload applications of interest to the U.S. Department of Energy.

CENATE is funded by the DOE's Office of Advanced Scientific Computing Research.

https://cenate.pnnl.gov/



CENATE testbeds provide evaluation platforms for emerging technologies, such as the 3D-stacked Hybrid Memory Cube.

Contact

Kevin Barker
CENATE Director
kevin.barker@pnnl.gov
509-375-6743

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