Los Alamos supercomputer remains fastest in world

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New TOP500 list is announced IBM/LANL Roadrunner hybrid supercomputer still #1

LOS ALAMOS, New Mexico, November 18, 2008 —The latest list of the TOP500 computers in the world has been announced at the SC08 supercomputing conference in Austin, Texas, and continued to place the Roadrunner supercomputer at Los Alamos National Laboratory as fastest in the world running the LINPACK benchmark—the industry standard for measuring sustained performance.

Roadrunner is currently housed at the Nicholas Metropolis Center for Modeling and Simulation at Los Alamos where it reached a sustained 1.105 petaflop/s on November 2, 2008.

“Petaflop/s” is computer jargon—peta signifying the number 1 followed by 15 zeros (sometimes called a quadrillion) and flop/s meaning “double-precision floating point operations per second.”

“The full Roadrunner system is now fully installed at Los Alamos and has entered its acceptance phase and is operating at or above designed performance,” said Andrew White, Roadrunner project director. “We are looking forward to the integration phase where we use the machine to do some fascinating calculations in the unclassified realm, to see what it can really do.”

The unique hybrid architecture of Roadrunner was developed by IBM in partnership with Los Alamos and the National Nuclear Security Administration. Roadrunner uses commercially available hardware, including aspects of commercial game console technologies. Because of its off-the-shelf components, the $121 million computer costs significantly less than a one-of-a-kind machine.

The Roadrunner system was built by IBM in Poughkeepsie, New York, and became the first computer to break the petaflop/s barrier running LINPACK in May 2008. At that time the system also ran three scientific codes to verify its performance. Among those codes was “PetaVision” a model of the human visual system—mimicking more than 1 billion visual neurons and trillions of synapses. Neurons are nerve cells that process information in the brain. Neurons communicate with each other using synaptic connections, analogous to what transistors are in modern computer chips. Synapses store memories and play a vital role in learning.

Los Alamos scientists used PetaVision to reach a new computing performance record of 1.144 petaflop/s. The achievement throws open the door to eventually achieving human-like cognitive performance in electronic computers. PetaVision requires only single precision arithmetic, whereas the official LINPACK code used to officially verify Roadrunner’s speed uses double precision. System enhancements to Roadrunner have boosted the computer’s speed since its initial listing in the TOP500 last June.

The secret to Roadrunner’s record-breaking performance is its hybrid design. The full system consists of AMD Opteron™ dual-core processors and PowerXCell 8i™ Cell processors, a special IBM-developed variant of the Cell processor used in the Sony PlayStation®3. The node-attached Cell accelerators are what make Roadrunner different from typical clusters.

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