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The Green500 List - June 2010

With the latest release of The Green500 List, accelerator-based supercomputers now occupy the top eight slots of the Green500, where the 'fuel efficiency' (or energy efficiency) of supercomputers is defined as 'millions of floating-point operations per second' (MFLOPS) divided by 'watts' (W) or MFLOPS/W. Accelerators refer to the use of dedicated hardware to perform computations faster than a traditional processor, also known as a central processing unit (CPU).

Green500 co-founder Wu Feng, associate professor of computer science and electrical & computer engineering at the College of Engineering at Virginia Tech explained the significance of the 'fuel efficiency' of these accelerator-based supercomputers. "The accelerator-based supercomputers on The Green500 List produce an average efficiency of 554 MFLOPS/W whereas the other measured supercomputers on the list produce an average efficiency of 181 MFLOPS/W. That makes the accelerator-based supercomputers on the Green500 more than three times more energy efficient than their non-accelerated counterparts on the list" Feng said.

The accelerator-based supercomputers come in two flavors: one is based on the custom PowerXCell 8i processor from IBM; and the second is based on the commodity graphics processing unit (GPU) from one of two companies, either Advanced Micro Devices' (AMD) ATI technology or from NVIDIA. As in the previous edition of the list from November 2009, the former flavor tops the Green500 with three IBM quantum chromodynamics parallel computing on the cell (QPACE) machines, all tying for first place and all located in Germany at the University of Wuppertal, University of Regensburg, and JÄ¼Research Center, respectively. The low-power QPACE clusters use the IBM PowerXCell 8i processor, an enhancement of the Cell Broadband Engine originally developed by Sony, Toshiba, and IBM for Sony's PlayStation 3, as well as a network of programmable units called field programmable gate arrays or FPGAs.

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Listed below are the The Green500's Top 10 most energy-efficient supercomputers in the world as of June 2010.

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