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## CCT Colloquium Series

**A next generation supercomputer based on an innovative massively parallel system architecture****Valentina Salapura, IBM T.J. Watson Research Center**Johnston Hall 338  
October 26, 2007 - 02:00 pm**Abstract:**

Innovative system architecture must become the engine for performance growth as device speed increases from CMOS scaling offer diminishing returns. We will discuss our holistic approach to optimize the entire hardware and software stack for the Blue Gene supercomputer family. Blue Gene was designed from the ground up with a focus on power/performance efficiency and reliability. The largest Blue Gene/L configuration consists of 64 racks with a total of 65536 dual-processor nodes for a peak performance of 360TFLOPS, and is number one on Top 500 list since November 2004. Blue Gene/P was announced in June 2007 and in a full configuration, its performance will exceed 1 Petaflop. To achieve good application performance, we exploit parallelism at multiple levels: at the process-level, thread-level, data-level, and instruction-level. To increase performance of each single compute node over the previous generation of systems, we turned to a quad-processor node incorporating symmetric multiprocessing in BlueGene/P. To ensure high efficiency of each quad-processor node, we architected a novel snoop filter to reduce the impact of coherence traffic. As the result of a deliberate design for scalability approach, Blue Gene supercomputers offer unprecedented scalability and performance to a wide range of scientific applications. Although peak numbers are often used to in comparing systems, the real merit is the value delivered to its user community. A broad range of scientific applications on Blue Gene supercomputers have allowed to advance scientific discovery, which is the ultimate measure of success of the Blue Gene system family.

**Speaker's Bio:**

Dr. Valentina Salapura has been a technical leader for the Blue Gene program since its inception at the IBM T.J. Watson Research Center. She has contributed to the architecture and implementation of several generations of Blue Gene Systems focusing on multiprocessor interconnect and synchronization and multithreaded, multicore architecture design and evaluation. Most recently, she has been unit lead for several units of BlueGene/P, as well as a leader of the chip and system bringup effort. Before joining IBM Research at the IBM T.J. Watson Research Center in 2000, Dr. Salapura was Assistant Professor with the Dept. of Computer Engineering at Technische Universität Wien in Vienna, Austria. Dr. Salapura is recipient of the 2006 ACM Gordon Bell Prize for Special Achievements for the BlueGene/L supercomputer and Quantum Chromodynamics. Dr. Salapura has received several corporate awards for her technical contributions, and several top licensing patent awards, and together with the IBM BlueGene team was recognized with the 2004 Team of the Year Award by EE Times. Dr. Salapura is the author of over 60 papers on processor architecture and high-performance computing, and holds many patents in this area. Dr. Salapura is a Senior Member of IEEE. <http://www.research.ibm.com/people/s/salapura>

