TOP500: IBM Dominates Global Supercomputing

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In what has become a closely watched event in the world of high-performance computing, the 25th edition of the TOP500 list of the world's fastest supercomputers was released today at the 20th International Supercomputing Conference (ISC2005) in Heidelberg Germany.

As predicted several years ago by the research team behind the TOP500 listing, only systems exceeding the 1 TFlop/s mark on the Linpack were qualified to enter the list this time. The system in No. 500 spot reached 1.166 TFlop/s.

IBM's Blue Gene/L tops the list with a sustained performance of 136.8 Teraflops, or trillions of floating point calculations per second.

The system developed with IBM's primary partner, the Department of Energy's National Nuclear Security Administration, is being installed at Lawrence Livermore National Laboratories in California and is planned to grow to a 360 Teraflop Blue Gene/L supercomputer when completed this summer. IBM's new Watson Blue Gene system, installed at the IBM Thomas J. Watson Research Center in New York, debuts at number two with 91.29 TF as the world's most powerful privately owned supercomputer.

"The Blue Gene architecture will run certain problems at tremendous speeds, ten times faster than previously possible. Once complete, the National Nuclear Security Administration will have available the kind of national security tool needed to rapidly analyze urgent nuclear weapons stockplie aging issues. It will support broader simulation codes to

support certification of our stockpile," said Dimitri Kusnezov, Director of the NNSA Advanced Simulation and Computing program.

"Even as we are bringing the machine to its full configuration, we are doing science critical to NNSA's mission to ensure the safety, security and reliability of the nation's nuclear weapons stockpile. This represents a great team effort led by NNSA's Advanced Simulation and Computing program," said Dona Crawford, associate director for Computation at Lawrence Livermore National Laboratory. "Working with our partners at IBM, Los Alamos and Sandia, we are simultaneously advancing scientific discovery and the high-performance computing that makes it possible. The capabilities we are now beginning to apply to our national security missions will also be applicable in other domains."

For the first time in history a single vendor, IBM, has more than 51% of the total number of systems on the list. IBM is the leading provider of both installed supercomputing systems with 259 systems as well as total aggregate supercomputing power, with a record total 976 Teraflops. IBM has 6 of the systems in the Top 10, including MareNostrum, Europe's most powerful supercomputer which is powered by IBM's POWER Microprocessor and eServer BladeCenter JS20 -- the only supercomputer based on blade server technology to ever be ranked in the global top 5. According to numbers compiled by the TOP500 List of Supercomputers, IBM is the overwhelming leader in global supercomputing with 57.9 percent of the total processing power, compared to its closest rival, HP, with a mere 13.3%. Just IBM's Blue Gene TOP500 install base is equivalent to the total number of Cray systems and about 60% of all SGI systems on the list.

"The latest list, particularly if you look at the Top 10, clearly illustrates the dynamic nature of supercomputing today. In just one year, we have seen a dramatic turnover from a ranking topped by the Earth Simulator followed by a number of clusters and two prototypes of IBM's Blue

Gene," said Erich Strohmaier, one of the founding editors of the TOP500 list and a computer scientist at Lawrence Berkeley National Laboratory. "Today, we see that Blue Gene has gained the first two positions and occupies five of the top 10 slots."

Since IBM announced the commercial availability of IBM eServer Blue Gene Solution, a commercial version of the research project, in November 2004, a record number of 16 Blue Gene Systems appear on the list. Based on IBM's Power architecture, the IBM eServer Blue Gene Solution is optimized for bandwidth, scalability and the ability to handle large amounts of data while consuming a fraction of the power and floor space required by today's fastest systems. IBM and its partners are exploring a growing list of high performance computing (HPC) applications including life sciences, financial modeling, hydrodynamics, quantum chemistry, molecular dynamics, astronomy and space research and climate modeling for eServer Blue Gene.

IBM is debuting two new Blue Gene systems on the TOP500 List: Boston University and Juelich -- each have installed IBM eServer Blue Gene systems.

Boston University has chosen IBM's Blue Gene to help tackle a host of difficult scientific problems ranging from subnuclear physics through genetics and cellular biology to the modeling of space weather and ocean systems. Boston University professors will, for example, use Blue Gene to explore quantum chromodynamics (QCD), the theory of the mysterious force that holds quarks inside nuclear particles, which is key to describing what goes on at high-energy accelerators. Other researchers will use the Blue Gene to predict space weather -- how activities on the surface of the Sun, such as solar flares, affect the Earth's radiation belt, its upper atmosphere, and the ionosphere. These effects include disruptions in communications, disturbances to power grids, and outages in global navigational systems.

Along with Lawrence Livermore National Laboratory, ASTRON, AIST, NIWS, NCAR, University of Edinburgh, San Diego Supercomputing Center, Argonne National Lab, The Ecole Polytechnique Fédérale de Lausanne (EPFL) and the IBM Deep Computing Capacity on Demand Center, these research institutions make up a growing ecosystem of early collaborators dedicated to harnessing Blue Gene's power to advance research.

"By giving our clients access to innovative, affordable and flexible supercomputing power like Blue Gene, JS20s and the Deep Computing Capacity on Demand Center, we are providing new resources to drive breakthroughs in business, science and industry," said Dave Turek, vice president, Deep Computing, IBM. "Whether we are talking about improving the accuracy of weather forecasts, designing better automobiles or improving disease research, we are seeing the advent of a new supercomputing age."

IBM develops and manufactures state-of-the-art semiconductor and interconnect technologies, including industry-leading Power Architecture microprocessors. In December of 2004, IBM and 14 companies announced the formation of Power.org, an open standards community dedicated to chips and systems that use Power Architecture technology. Power.org is a community dedicated to open hardware and collaborative innovation around the Power Architecture. The Power microprocessor is the heartbeat of devices and systems large and small, including the world's best-known electronics brands, IBM supercomputers, and the high-performance IBM eServer and TotalStorage systems.

The "TOP500 Supercomputer Sites" is compiled and published by supercomputing experts Jack Dongarra from the University of Tennessee, Erich Strohmaier and Horst Simon of NERSC/Lawrence Berkeley National Laboratory and Hans Meuer of the University of

Mannheim (Germany). The entire list can be viewed at www.top500.org

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