

# IBM Turns on the Water for Energy-Efficient Supercomputer

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IBM today introduced a new supercomputer powered by one of the world's fastest microprocessors and cooled by an innovative water system.

The new Power 575 supercomputer, equipped with IBM's latest POWER6 microprocessor, uses water-chilled copper plates located above each microprocessor to remove heat from the electronics.

Requiring 80 percent fewer air conditioning units, the water-cooled Power 575 can reduce typical energy consumption used to cool the data center by 40 percent. IBM scientists estimate that water can be up to 4,000-times more effective in cooling computer systems than air.

With 448 processor cores per rack, the new Power 575 offers more than five times the performance of its predecessor, and thanks to advanced water cooling and POWER6 efficiencies, is three times more energy efficient per rack. Nicknamed "Hydro-Cluster" the system supports very large clusters - hundreds of nodes -- and enables extreme performance in dense packaging. A single rack features 14 2U nodes, each with 32, 4.7-Ghz cores of POWER6, a stunning 3.5 TB of memory, and yet is more energy efficient than traditional air-cooled designs. At 600 GFlops per node, the Power 575 is three times more energy-efficient in GFlops per kilowatt than the POWER5® generation of air-cooled processors.

"We were looking for an energy-efficient supercomputer design, but nevertheless with a high single-processor performance. The new IBM

Power 575 with water cooling enables us to scale up our performance, while staying within the given energy envelope in our environment," said Dr. Hermann Lederer, head of Application Support at Garching Computing Center (RZG), Max Planck Institute for Plasma Physics in Garching, Germany. "The new computer will enable Max Planck researchers to tackle new challenging scientific problems and solve single compute tasks five to 20 times faster than is possible on the current system, which was Germany's fastest supercomputer in 2002."

"The Power 575, like all POWER-based supercomputers, is designed for the most computationally intensive problems in energy, engineering, aerospace, and weather modeling," said Dave Jursik, VP of supercomputing sales for IBM. "IBM continually stretches the boundaries of high-end supercomputing and energy efficiency to meet the expanding requirements of science and technological progress."

The National Center for Atmospheric Research in Boulder, Colo., is scheduled to upgrade to the POWER6 version of the Power 575 later this year.

"Ever faster computers are vital to our research on hurricane formation and climate change," said Al Kellie from the National Center for Atmospheric Research. "We're especially pleased to see that with the new Power 575, IBM has been able to drastically increase performance while remaining very energy efficient."

"IBM POWER systems have proven to be reliable workhorses for us," said Walter Zwiefelhofer, Head of Operations at the European Centre for Medium-Range Weather Forecasts, Reading, England. The Centre is an international organization supported by 30 nations. "The computational might of the new Power 575 and its successors will allow us to create more detailed models, resulting in more accurate forecasts and improved early warnings of severe weather events."

## The ‘Zero-Emission Data Center’

Looking to the future, IBM scientists at the company's Zurich Research Laboratory recently presented a pioneering concept of a “zero-emission” data center at CeBIT 2008. A new kind of water-cooling system embedded on a chip is the basis for this exciting innovation that captures the water at its hottest and pipes it off the chip for reuse in heating a building or for hot water.

The IBM Research team is working on the next steps: getting the water even closer to the chip -- not with a copper plate, but actually inside the chip. Then, once captured there, the water can be routed out of the computer and pumped into the heating system for re-use.

The Power 575 supports both AIX -- the IBM UNIX operating system -- and Linux, and will be generally available in May.

Source: IBM

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