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Factors threaten technology's amazing potential

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Supercomputers are bringing humanity to the brink of amazing discoveries -- from modeling global warming to simulating the functions of proteins within the human body.

But there are serious factors threatening to limit that potential, experts at the SC2004 supercomputing convention at the David L. Lawrence Convention Center, Downtown, said Wednesday. Chief among those factors are the limited commercial use of supercomputing capacity as well as problems posed by the machines' size, energy consumption and heat generation.

J. Bee Bednar, president of 3dBee Technology Inc., a consulting firm that works for oil companies exploring for offshore oil reserves, said the cost of finding oil in deep water is increasing to \$35 million to drill a single well.

To gather and process the data necessary to avoid drilling dry holes, "there's no computer system we can't outrun, destroy or burn up" he said.

Greater computing power than exists today is necessary, but Bednar isn't confident that it will be achieved, primarily due to the heat generated by the silicon chips powering most of today's computers.

An example is Japan's top supercomputer -- named Earth Simulator because of its focus on solving problems related to the atmosphere and environment. Bednar said it doesn't just simulate global warming, but helps to cause it because of the enormous amounts of power it consumes.

"These boxes (computer farms) are ovens now. You think computer rooms are breezy today (from air cooling), just wait, it will feel like a hurricane," he said.

From the ocean floor to the big screen, the problem is the same.

Nick Bali, information technology coordinator for Sony Pictures Imageworks, which provided the computer-generated animation for recent movies like "Spider Man II" and "The Polar Express," said one of his biggest problems is finding room to house a growing number of microprocessor racks within his facility and the equipment to cool them.

At 3,000 watts, he said, the system's power supply is reaching its maximum tolerance, he said.

Gerard Koposcy, a 25-year employee at IBM Corp.'s research facility in Yorktown Heights, N.Y., and a member of the team that helped design what as of Tuesday is recognized as the world's most powerful computer -- the IBM

Blue Gene/L -- said his group has helped tackle the power and heat problem in Blue Gene by designing it as a system that provides both memory and computing on the same low-energy chip.

"We were able to achieve a factor of 20 reduction in power supply while at the same time significantly reducing the size of the machine," he said.

Nevertheless, when it is fully installed at the Lawrence Livermore National Laboratory in Livermore, Calif., next year, it will use up to 1.5 megawatts of power a day, a significant figure given that one megawatt is enough to power about 800 homes.

Stan Ahalt, executive director of the Ohio Supercomputer Center in Columbus, said supercomputing is not reaching its potential in industry. He said there are not enough programmers to write code for high-performance computing at companies that could use more computing power for enhanced product development and sophisticated marketing strategies.

"While the U.S. leads the world in hardware engineering, Europe and Japan are investing more strategically in computer science research focused on software," he said.

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