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Brown's supercomputer brings tasks down to earth

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PROVIDENCE — Until recently, scientists at Brown University working on a map of the Mars terrain had a long wait ahead of them each time they downloaded new satellite data.

The researchers in the Planetary Geosciences Group would send the information from NASA to a computer on campus that would transform it into images of the Red Planet. It was a relatively high-performance computer but it could still take three months to process a single package of images.

Now, that same amount of work can be done in as little as one day.

On Friday, Brown unveiled its latest high-tech research tool: a multimillion-dollar supercomputer that is more powerful than any other machine of its kind in Rhode Island and could transform the way research is done in the state.

The IBM computer will be shared by scientists at Brown and other educational institutions around Rhode Island to research so-called “grand challenges” in medicine, the environment, energy and other complex fields.

The supercomputer will allow researchers at separate venues who work in different disciplines to collaborate on projects that require the analysis of massive amounts of information. Research could range from analysis of a genome to find a pre-disposition for a disease to the study of weather data to predict climate change.

“I think it will really spur things and make things go forward very, very fast in ways we never imagined,” said Clyde Briant, vice president for research at Brown.

GOVERNOR CARCIERI, Lt. Gov. Elizabeth Roberts and Providence [Mayor David N. Cicilline](#) were at the ribbon-cutting at Brown's Center for Computation and Visualization, where the supercomputer is being housed.

The governor believes the supercomputer will advance research in the state and boost the fledgling knowledge economy. Policymakers are counting on such industries as biotechnology and medical manufacturing to help pull Rhode Island out of a deep recession.

“We need to reposition the economy of this state,” Carcieri said. “We need a different dimension to the economy.

Research and innovation will be at the core of that.”

Brown's supercomputer ranks just outside the top 500 most powerful computers in the world, according to IBM. More than half of those computers are in the United States, with most located at other academic institutions and government research agencies. The most powerful system in the country is located at the University of Tennessee. Before Brown installed its machine, the closest supercomputer to Rhode Island was in Cambridge, Mass.

Brown's machine was set up from July to September and has three staff members dedicated to its operation. It has been in use mainly on a test basis since its installation. Technicians reported Friday that scientists at Brown and the University of Rhode Island had already done work with the computer. A researcher from Germany had also been using it.

The machine looks unremarkable. It occupies a corner of a server room in the Center for Computation and Visualization and is made up of six black refrigerator-size units with 1,440 microprocessors and multiple storage systems. It does not have a keyboard or a monitor. Users can access it through Brown's network or get on using the Internet.

THE COMPUTER is the equivalent of 5,000 regular desktop machines, said Jan Hesthaven, a professor of applied mathematics and the director of the Center for Computation and Visualization. It operates at a speed of 14 teraflops, nearly 50 times faster than anything Brown had before.

The machine has 390 terabytes of storage capacity. That means if all the data the computer could hold were written on sheets of paper and those sheets were then stacked one on top of the other, the stack would reach from Providence to Hong Kong, said Hesthaven.

He describes the computer's overall power using another analogy.

“If every Rhode Islander does one computation every second, it would take 126 days to do the amount of work this machine could do in one second,” he said.

Those capabilities could allow Rhode Island researchers to explore new scientific frontiers, said Nick Bowen, vice president of technology at IBM, which is sharing in the cost of the computer. They could use it in the creation of new drugs or to explore ocean ecosystems.

“It really means scientists will be able to address problems they weren't able to before,” Bowen said.

Over the next several months, Brown and IBM will host workshops with experts to discuss how the supercomputer can be used. Dr. James F. Padbury, pediatrician-in-chief at Women & Infants Hospital, said one issue that will be studied soon is how genetics relates to premature births. It will require an analysis of data supplied by thousands of people.

“This is where medicine is going,” he said. “We couldn't go there without this resource.”

The supercomputer could also make a huge difference to the Mars mapping project.

One day, the machine could be used to help create extremely detailed three-dimensional images of land forms, a sort of virtual-reality version of Mars. John Huffman, graphic systems analyst at the Center for Computation and Visualization, said it will give scientists a better idea of what the faraway planet looks like.

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