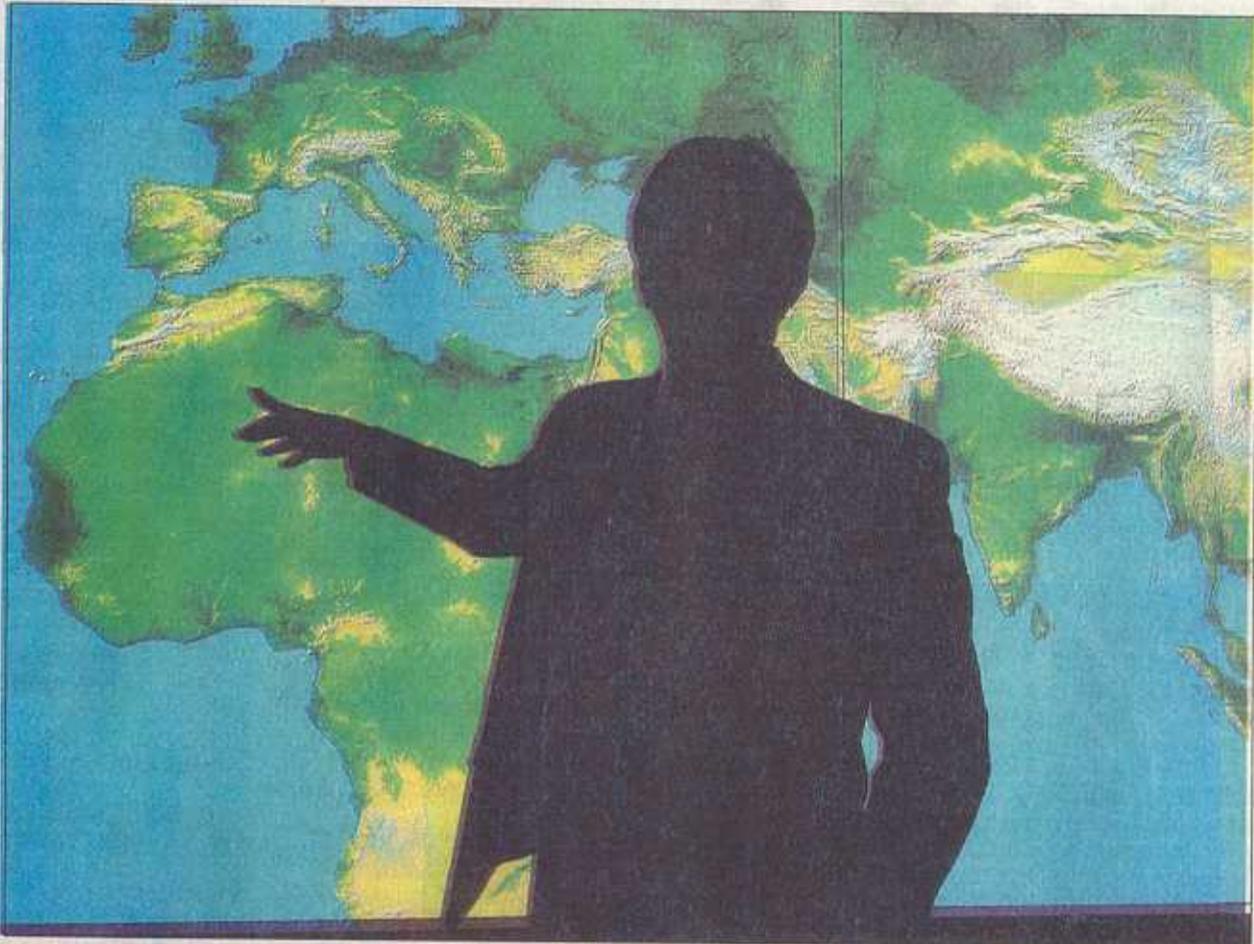


ORNL supercomputer will rapidly push science to new levels



PHOTOS BY MICHAEL PATRICK/NEWS SENTINEL

Oak Ridge National Laboratory's computer chief, Thomas Zacharia, is silhouetted against a wall-size screen in the Science Exploratorium. The screen visually represents the data produced by one of the lab's supercomputers so that researchers can better analyze results of climate-changing modeling and other research projects.

Bragging rights

BY FRANK MUNGER
AND RICHARD POWELSON

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Buoyed by a "historic win" in a national competition, Oak Ridge National Laboratory officials Wednesday vowed to deliver the world's fastest computer by early 2006 and turbo-charge the U.S. capabilities for scientific research.

"It's a great day for Oak Ridge and for science," Thomas Zacharia, ORNL's computer chief and architect of the winning proposal, said with a big smile.

"Anytime you have an opportunity to have the world's best at anything, that's great," Zacharia said as he showed off the lab's computer center. "But more important is to bring about a fundamental change in how science is done and how computers are viewed."

The U.S. Department of Energy selected ORNL to lead the U.S. efforts in high-end computing and help develop the best supercomputers for scientific research. The Oak Ridge lab's winning proposal included a long list of labs and universities as partners.

Energy Secretary Spencer Abraham made the announcement Wednesday at the nonpartisan, non-profit Council on Competitiveness in Washington. He said ORNL was selected to head the computing project after an expert panel reviewed four proposals.

"We are planning to build the fastest computer in the world open



Thomas Zacharia was visibly pleased Wednesday about the announcement that the U.S. Energy Department will build the world's fastest civilian computer at ORNL in Oak Ridge. Behind him is the Cray supercomputer now used at the Center for Computational Sciences at ORNL.

to all users," Abraham said.

The federal government will invest about \$25 million in the project this year, with an expectation of \$200 million over the next five years if Congress approves the funding plan. ORNL would receive much of that money but distribute it among the research partners, including Argonne National Laboratory in Illinois and Pacific Northwest National Lab in Washington state.

U.S. Rep. Zach Wamp, R-Tenn., who represents the Oak Ridge district, attended Wednesday's announcement and praised the DOE plan to build computing capabilities.

"From biotechnology, bringing us new medicines, to fusion energy, reducing our dependence on foreign

DID YOU KNOW?

Famous First Facts states that the first supercomputer was the Control Data 6600, designed by a team under Seymour R. Cray at Control Data Corp. in Chippewa Falls, Minn., in 1963. The military purchased it to simulate nuclear explosions and break Soviet codes.

Cray went on to found Cray Research in 1972. In 2000, Cray Research merged with Tera Computer Co. to form Cray Inc., according to www.cray.com. Cray Inc. is collaborating on ORNL's proposed supercomputer.

JAMES GILL
News Sentinel librarian

See **COMPUTER** on A11

'S ima in C

Additional pho
U.S. troops forc
sex acts on Iraq

BY PAULINE JE
Associated P

WASHINGTON — The prisoners by U.S. troops beyond the photos of Americans, shaken last Wednesday after viewing pictures and video that depicted forced sex, brutality and snarling at cowed prisoners.

Some members of the public they feared that making public would inflame outrage and endanger still in Iraq. The priv of more than 1,600 prisoners in a secret room of the U.S. one day after Islamic announced they had l American in Iraq to a at the Abu Ghraib pri

"I don't know how people got into our ar orado Republican Nighthorse Campbell what he called a fracti ages.

"I saw cruel, sadistic Rep. Jane Harman, I said some of the im male prisoners maste said she saw a man h against a wall as tho himself unconscious.

Others said they s corpses, military dog cowering prisoners, v manded to expose the sex acts, including fo

U.S. s insurg

BY HAMZA HEN
Associated Pre

KARBALA, Iraq — U.S. copters and jets attac loyal to a radical Shiite holy city Wednesday part of a mosque used and setting seven ho Twenty-two militants

The cleric, Muqtada his followers to resist a their struggle to the V in his first news conf the standoff began r month ago.

Six coalition sol wounded, U.S. Brig. Ge mitt said in Baghdad. soldiers returned to d

Iraqi leaders in anot Najaf, discussed how t resolve the confrontati al-Sadr and the U.S.-le which is seeking to arre the murder of a rival c

COMPUTER

from A1

oil, to climate modeling, helping to clean the air we breathe, this investment will pay for itself many times over and bring greater prosperity to America," Wamp said.

ORNL is working with Cray Corp. to develop architecture for a supercomputer that would surpass Japan's Earth Simulator as the world's fastest machine. The Japanese computer has a capability of about 40 trillion calculations per second or 40 teraflops.

But Zacharia said the computing initiative is about much more than world-record speed in calculations.

"This project was never about building the fastest computer in the world. That was just a necessary condition," he said. "What it's really about is computing that will advance science — from climate to fusion energy to nanoscience and the life sciences. It is about fundamental new discoveries."

The Oak Ridge laboratory invested about \$70 million in a new computer complex over the past couple of years, providing the infrastructure and support facilities for high-end computing. The lab has also been adding more computer scientists and mathematicians to staff the research center.

"That was a risk, but it helped put us in a very competitive position," ORNL Director Jeff Wadsworth said.

Asked what ORNL would have done if it had lost the national competition, Wadsworth said, "I don't know. We only had a plan for success."

Zacharia said the lab would upgrade its existing Cray X1 supercomputer in the next few weeks and should improve its capabilities to 20 teraflops by December. Simultaneously, the lab will acquire another Cray machine of another design — known as Red Storm — and upgrade it to about 20 teraflops in early 2005.

At that time, including the use of other supercomputers by IBM

WORLD'S FASTEST COMPUTERS*

1. Earth Simulator Center; Japan, 2002
2. Los Alamos National Laboratory; United States, 2002
3. Virginia Tech; United States, 2003
4. NCSA; United States, 2003
5. Pacific Northwest National Laboratory; United States, 2003
6. Los Alamos National Laboratory; United States, 2003
7. Lawrence Livermore National Laboratory; United States, 2002
8. Lawrence Livermore National Laboratory; United States, 2000
9. NERSC/LBNL; United States, 2002
10. Lawrence Livermore National Laboratory; United States, 2003

*As of November 2003

Source: Top500.org

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Thomas Zacharia,

ORNL's computer chief and architect of the winning proposal

and Silicon Graphics Inc., the Oak Ridge lab will have a combined capability of about 50 teraflops or 50 trillion calculations per second.

Meanwhile, a new-generation

machine, the Cray X2, will come on line in the second quarter of 2006, and it is expected to be a 100-teraflop machine with unprecedented capabilities. At that time, ORNL would have an in-house computing capability of 150 teraflops, which should rival any institution in the world as a place to do research with supercomputers.

Zacharia said the plan is to develop a hybrid machine that will incorporate the architectures of X2 and Red Storm — currently under development at Sandia National Laboratories in New Mexico — and combine their strengths and capabilities.

"Our proposal is for us to upgrade the machines to total capacity by 300 teraflops by 2007," he said.

Cray plans to staff its own Center of Excellence at ORNL, bringing top computer designers and experts to Oak Ridge and coordinating some of its research activities from that base.

While Cray has the "pole position" because of the X1 and other current development, Zacharia emphasized that ORNL would entertain proposals from all of the top computer vendors. The lab and its research partners would like to test and evaluate the best supercomputers, regardless of their make or design, he said.

It's probable that ORNL will have a petaflop machine — capable of 1,000 trillion calculations per second — by the end of this decade, Zacharia said.

U.S. Sen. Bill Frist, R-Tenn., said the program will make the United States more competitive globally and creates jobs and economic growth in Tennessee.

"High-end computing is one of the critical science fields in which our nation needs to be the world's leader," said U.S. Sen. Lamar Alexander, R-Tenn.

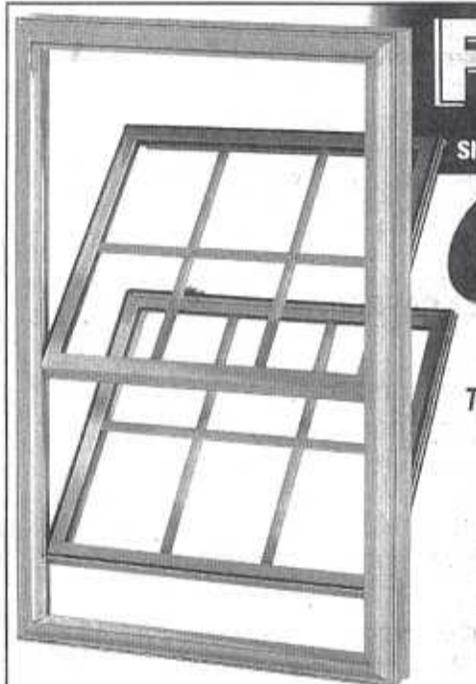
Zacharia said ORNL would use the additional funding to hire more computer experts and boost the staff at the Oak Ridge Center for Computational Science. He said it's probable that the project will also allow other research divisions at ORNL to expand their staff to take advan-

tage of the computing capabilities.

The new Oak Ridge complex includes a vast computer room for its high-end supercomputers, as well as separate facilities that house the external networking hardware and systems for the lab's in-house business computers.

The theater-like Science Explorerium allows computer scientists and researchers to visualize the results of massive data-crunching on the supercomputers. There, on a wall-size screen with backlit projections, scientists can view models of global climate change and get an expanded look at computer simulations.

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