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Enhancing Research

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From air quality forecasting to medical informatics, UNLV’s National Supercomputing Center for Energy and the Environment (NSCEE) provides users from 24 states and three countries with the most advanced high-performance computing system in Nevada.

More than 200 scientific projects related to global atmospheric modeling and fossil energy research have been supported by the NSCEE since the center was established in 1989.

Initially, the center was designed to study nuclear waste isolation, disposal, and transmutation in conjunction with the Department of Energy’s work associated with the Yucca Mountain Nuclear Repository project, located approximately 100 miles northwest of Las Vegas. In 1989, the U.S. Congress appropriated $10 million for the purchase and development of the supercomputing facility to be operated exclusively by UNLV.

The NSCEE has since grown to partner with 14 affiliates and now addresses a much wider range of national scientific challenges.

The NSCEE occupies approximately 5,000 square feet on the third floor of the Thomas T. Beam Engineering Complex. The center’s central computing system is an SGI® Onyx® 3800 visualization system with InfiniteReality® graphics supported by more than 200 terabytes of storage.

This system, with high-band-width CC-NUMA architecture, combines supercomputing and visualization technologies to support 3-D graphics and video streaming in real time, according to Joseph Lombardo, the center’s director.

“Our program capabilities currently span the entire sequence of turning raw data into practical knowledge that ultimately makes the discovery and evaluation process easier for researchers, scientists, and government entities,” Lombardo says.

An example of just one of several major research projects under way at the NSCEE is the Air Quality Forecasting Research Initiative. UNLV faculty and students work in collaboration with the Department of Energy, the Environmental Protection Agency, and the National Oceanic
E-Records Technology
UNLV helps develop sophisticated electronic records management system

New statutory and regulatory directives are leading federal agencies to recognize a tremendous need for integrated electronic records management and archiving systems capable of maintaining huge amounts of data. In a unique public-private partnership, UNLV and Quest Technology are working to create just such a system for the U.S. Department of Energy (DOE).

With an initial grant in 2000 of $1.4 million from the DOE and other federal appropriations provided with the support of U.S. Sen. Harry Reid, university researchers are working to develop an electronic records system that will provide a highly efficient method for processing massive amounts of medical information.

The project will help the DOE manage information in areas such as occupational medicine, industrial hygiene, and radiation exposure.

Under the guidance of Dr. Stephen Rice, associate vice president of research and economic development at UNLV, two research teams, composed of several faculty members and both undergraduate and graduate students, are actively focused on this project.

The first team, led by UNLV computer science professor Dr. Angelo Yfantis, is working to automate the recognition of forms and hand-written information. The second team, led by School of Computer Science Director Dr. Hal Berghel, is developing cyber-security techniques. The innovations produced by these teams will then be integrated with software designed and developed by Quest Technology to create the new “enterprise records system.”

Once existing DOE information is processed using the e-records technology, it will then be centrally housed at the UNLV National Supercomputing Center for Energy and the Environment.

According to Rice, this highly technical but user-friendly approach to medical records management allows for easy access of information while enhancing the timely and secure exchange of critical data between individuals and organizations.

“The implications of this project are highly significant,” Rice notes. “In the event of an epidemic outbreak, for example, crucial medical information can be made instantly available to health care and government officials throughout the world in just a matter of minutes.”

The project is the largest externally sponsored research effort currently under way at UNLV; it has garnered approximately $23.4 million in funding during the last five years. Rice notes that it serves as an example of how higher education, industry, and government are working together to find solutions to some of today’s most challenging human-service issues.