

## *ORION making a difference...*

### *in research...*

In a high-performance computing twist on the old adage “many hands make light work,” the Shared Hierarchical Academic Research Computing Network (SHARCNET) harnesses the combined power of computers across south central Ontario via ORION to create one of the world’s most powerful super-computers. ORION provides the high-bandwidth, point-to-point connections that allow the seamless integration of SHARCNET’s distributed processors to efficiently leverage computer resources that are separated by hundreds of kilometres. Researchers at the 17 universities and colleges in the SHARCNET consortium are using this massive power to model the movement of urban pollution, create more efficient electronics, understand the outbreaks of diseases such as SARS and delve deeply into questions of basic science.

### *in education...*

The classroom walls disappeared recently for Grade 12 political science students at Middlefield Collegiate Institute in York Region. In a real-time, videoconference mock trial before a Supreme Court judge in Ottawa, the students vigorously prosecuted a drinking and driving case. The defense team was at another York Region school, while a class in Alberta served as the jury. All four sites were brought together by York University’s Advanced Broadband Enabled Learning (ABEL) program over the ORION network. It was a high-impact, real-world learning experience for the students. The mock trial was just one of the many learning and education events which led ABEL to win the prestigious Learning Partnership 2005 National Technology Innovation Award.

### *in science...*

From almost two kilometres below the ground in Sudbury, researchers at the Sudbury Neutrino Observatory (SNO) measure and investigate the fundamental elements of nature – neutrinos from the sun. This is “big science,” questions of how the world began and how it works at the most basic level, questions that have engaged scientists around the world for hundreds of years. Neutrinos are one of the smallest particles in our Universe, but studying them calls for massive data sets that range up to ten terabytes in size. Moving that data from SNO to research partners at universities across Ontario and internationally, from the U.S. to the U.K., calls for a high-bandwidth network that is robust, reliable and globally connected.

### *in the arts...*

The University of Waterloo is making use of its ORION connection to pioneer a new form of theatre. This research project involves staging live, interactive theatrical performances linking actors and sets from remote locations, using advanced networks and videoconferencing technologies. A fully interactive live performance was staged with actors in Waterloo sharing a virtual stage with actors at Bradley University in Illinois and University of Central Florida, connecting at very high speeds over ORION, CANARIE and Internet2. The latest production to take place was of Lewis Carroll’s “Alice in Wonderland.” Researchers are now working on staging more complex productions and pushing the limits of the current software, and designing devices to allow remote audiences to respond with instantaneous feedback.



## *ORION making a difference...*

### *in remote diagnostics...*

The Laboratory for Collaborative Diagnostics at the University of Toronto is making innovative and creative use of their lab's connectivity to the ORION network by developing a Collaborative Digital Microscope (CDM) for remote diagnosis. The CDM allows physicians or researchers to review a sample of blood that may contain malaria parasites under a microscope and interact in real time with a malaria expert in Toronto, who can help determine if malaria is present. Open-source collaboration software is used, enabling very high-resolution images to be transmitted over a live digital video feed of the malaria parasite, which is accompanied by an audio feed that permits a collaborative diagnosis.

### *in digital cinema...*

Ryerson University in Toronto is a founding member of CineGrid, a consortium of worldwide labs including the University of California San Diego, University of Southern California and Keio University in Japan. Ryerson's Rogers Communications Centre, which houses the university's media schools, is opening a new digital lab complete with state-of-the-art equipment and a 10 Gbps direct "lightpath" connection over CANARIE that will enable collaboration with other CineGrid participants. This will enable collaboration on projects with other students, hands-on training with next-generation equipment and practical experience with what is reputed to become the new standard medium of the industry. The digital image maintains the film format's maximum fidelity, yet real-time collaboration at the production and post-production levels requires much greater bandwidth. The ultra high bandwidth of CANARIE, ORION and other R&E networks permits filmmakers and technicians to see, hear and manipulate the same material in real time with no time lag - no matter where they are physically located in the world.

### *in data storage...*

ORION supports the work of researchers at the University Health Network (UHN) in Toronto, enabling dramatic improvements in connectivity and access to new tools and resources, and opening the doors to enhanced participation in medical research collaborations and trials. Connecting to ORION over GTAnet, UHN is a data-centric organization where researchers accumulate half a terabyte of new information each week. This amount is steadily increasing, driving up competition for bandwidth. Thus, it is easy to see why ORION is actively promoted internally to address researchers' need for large database storage.

### *in program delivery...*

A new Medical Education Building was built on the University of Windsor campus to house the Windsor-based branch of the University of Western Ontario's Schulich School of Medicine & Dentistry program. Able to accommodate up to 200 medical students, the facility boasts two 50-seat lecture rooms equipped with high-definition videoconferencing (VC) technology, and a virtual anatomy lab where the students will study and manipulate 3-D anatomical images using a computer. LARG\*net and ORION together built a dedicated VC network between the UWO, the University of Windsor, and London and Windsor teaching hospitals using a Layer 2 connection that runs on ORION between London and Windsor. The speed and reliability of ORION has enabled fully-functional high-definition VC with individual microphone setups in each of the London and Windsor teaching rooms. "Our use of ORION has made the vision of highly-interactive distributed medical education in Southern Ontario a reality," said Dr. Peter Flanagan, Director of Faculty E-Learning at Schulich School of Medicine & Dentistry.

