CASE STUDY

SHARCNET - Distributed computing over ORION

The Challenge

As research expands in intensity and increasingly involves multiple and cross disciplines, there is growing demand for large-scale computational resources that are essential to fundamental research.

Background

The Shared Hierarchical Academic Research Computing Network (SHARCNET) harnesses the combined power of computers across south central Ontario to create one of the world's most powerful supercomputers. It was created to meet the computational needs of researchers in a diverse number of research areas and to facilitate the development of leading-edge tools for high performance computing grids. As of today, researchers at the 17 Ontario universities and colleges in the SHARCNET consortium are now able to use this massive power to support and enable their research, from modeling the movement of urban pollution, to creating more efficient electronics, to understanding the outbreaks of diseases such as SARS, and to delve deeply into questions of basic science.

ORION Makes a Difference

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.

SHARCNET is a significant addition to Ontario's basic research infrastructure and Canada's knowledge-based economy, and thanks to ORION as one of its most important enabling partners, well on its way to achieving its vision of creating a world-leading, multi-university and college interdisciplinary institute enabling forefront computational research though shared resources. SHARCNET is already transforming the way researchers access and use high-performance computing and will form the core of future collaboration and visualization facilities among the member institutions creating a virtual research infrastructure.

Results

A compelling example of the importance of SHARCNET and high performance computing is how a Queen's University researcher and his colleagues were able to help solve the riddle of cosmic black holes. SHARCNET's resources contributed to the Black Holes and Cosmic Evolution Project, led by Prof. Robert Thacker of Queen's University and a team of Ontario and US researchers, using some of Canada's top supercomputers. They successfully addressed one of the world's computational Grand Challenges to confirm that black holes have played a role in the evolution of galaxies. The research, generating a computer simulation of six billion years of cosmic history, was one of the world's largest computer-based simulations of its kind. It involved high performance computing facilities at SHARCNET and HPCVL in Ontario and WestGrid in Alberta, interconnected over Canada's advanced, ultra-high speed Canadian research networks, including ORION, Cybera, BCnet and CANARIE. The research earned the prestigious ORION Award for Discovery in 2007.

The Impact

"The SHARCNET community is growing rapidly as more researchers in more disciplines discover how the network can help them. ORION is essential infrastructure for us and we will come to rely on ORION more and more as we build an integrated set of net work services – data storage, scheduling, remote collaboration capabilities – across the consortium."

– Prof. Hugh Couchman, McMaster University, SHARCNET Scientific Director