SOSCIP
SOUTHERN ONTARIO SMART
COMPUTING INNOVATION PLATFORM

Southern Ontario Smart Computing Innovation Platform (SOSCIP)

Boosting long-term economic development with cutting-edge collaborative research

Overview

The need
Many innovative business ideas require high-performance computing or advanced data analytics to get them off the ground; SOSCIP aims to ensure Ontario's small- and medium-sized enterprises can access these capabilities.

The solution
With IBM as lead industrial partner and solution provider, SOSCIP runs four research computing platforms supporting regional businesses, including Canada's fastest supercomputer, a 4-rack IBM® Blue Gene®/Q system and the first research-dedicated cloud analytics platform in Canada.

The benefit
First-of-its-kind research-dedicated cloud analytics platform enables businesses and academics to collaborate on ground-breaking complex data analytics, accelerating research progress and creating new jobs in the province.

In a world where leading researchers and companies are highly mobile and actively seeking out the best environment to develop their new ideas, SOSCIP wanted to develop an attractive ecosystem that would help to keep research talent and startups in Ontario.

The goal was to connect leading academic institutions with small- and medium-sized enterprises (SMEs) to provide a competitive edge by accelerating research. SOSCIP and its partners wanted to develop intellectual property such as patents, and support the commercialization of research results through collaborative projects.

Allen Lalonde, Sr. Executive, IBM Canada Research and Development Centre, says: "We aim to give SMEs access to advanced computing and analytics resources through collaborative research projects. This will enhance their productivity and competitiveness, and foster the development of new technologies, products and services. Ultimately, the goal is to boost and sustain economic activity in Ontario and create new jobs in knowledge-intensive industries. In doing so, we are also equipping the next generation of knowledge workers with critical skills, experience and insight, thereby providing highly qualified personnel to the regional workforce."

SOSCIP's partnership with IBM Canada has been instrumental to the consortium's success. "Our collaborative research model and partnership with IBM allows small and medium-sized companies to utilize computing technologies that wouldn't otherwise be accessible and to benefit from the vast research expertise at our academic institutions and within IBM Global Research," says Elissa Strome, Executive Director, SOSCIP, University of Toronto.

Solution components

Software
- IBM® Cognos® Business Intelligence
- IBM InfoSphere® BigInsights™
- IBM InfoSphere Streams
- IBM SPSS® Analytical Decision Management
- IBM SPSS Modeler
- IBM SPSS Statistics

Hardware
- IBM Blue Gene®/Q
- IBM Power Systems™

Elissa Strome, Executive Director at SOSCIP, adds: "This is a long-term program—we know that innovation is pivotal for economic growth. Bringing researchers together with companies is known to have a positive impact on the economy. At SOSCIP, we want to leverage our world-class researchers and research infrastructure to increase the global competitive edge of local companies, and create an even stronger and more sustainable economy in Ontario."

Technology helping scientists deliver results

As the SOSCIP consortium was forming, the organization sought a lead industrial partner to establish the computing technologies and collaborative research and development model upon which the consortium was founded. Strome comments, "Based on their technology solutions, their strong culture of research and innovation, their commitment to collaboration and commercialization and their investment in R&D facilities in the province of Ontario, IBM was the clear choice for lead industrial partner in the consortium."

The consortium has deployed four advanced computing platforms to support ground-breaking research, all based on IBM solutions.

The first platform, designed to handle large-scale distributed applications that require massive parallel processing power, is Canada's fastest supercomputer, based on IBM Blue Gene/Q technology. The second platform, for agile computing, uses a combination of IBM POWER8® processor-based servers and Field-Programmable Gate Arrays to support applications including real-time data stream processing, machine learning and physical systems simulation. Thirdly, the Large Memory System platform offers a virtual symmetric multiprocessing environment running IBM analytics software for data-intensive projects involving in-memory databases, key-value storage and large computations.

The fourth platform deployed by SOSCIP is Canada's first research-dedicated cloud analytics platform, uniquely providing access to a broad suite of IBM analytics solutions—including IBM InfoSphere® Streams, Hadoop-based IBM InfoSphere BigInsights™, IBM Cognos® and IBM SPSS®—that can be combined with other software to create customized virtual research environments. This cloud analytics platform is designed for complex data analysis, streaming and managing large data volumes, and data-mining applications.

Lalonde comments: "The cloud analytics platform is helping accelerate research in a number of important areas, for example, in healthcare, where brain science, drug discovery and real-time health analytics and clinical decision-making require enormous processing power."

> *"SOSCIP has helped over 40 small and medium-sized companies become more productive and competitive."*

— Elissa Strome, Executive Director, SOSCIP, University of Toronto

Strome adds, "We support joint commercial-academic research teams working on optimizing energy distribution, smarter urban infrastructure, water conservation and medicine, among many other topics. What typically unites the research is that it is societally important for the future, and that it takes advantage of IBM computing and analytics technology as a key enabler."

The combination of different platforms at SOSCIP enables research teams to choose the most appropriate environment for different requirements. For example, to work with complex hydrology or climate change models, teams may run their model first on the Blue Gene/Q supercomputer, and then conduct further analysis on the cloud analytics platform to gain new insights and test their research hypotheses.

Smarter outcomes

The main Canadian academic high-performance computing network is not normally open to SMEs; SOSCIP crosses academic and industry boundaries to enable collaboration that is already producing new services and jobs. One example is Dr. Carolyn McGregor's Artemis Project, which uses IBM InfoSphere Streams to process and analyze live streams of hundreds of gigabytes per hour of physiological data from medical devices that are monitoring prematurely born infants in hospitals. This technology enables real-time analysis of data on each infant's approximately 2,000 breaths and 7,000 heartbeats per hour. The resulting cloud analytics platform, which helps researchers develop algorithms that can predict medical complications and ensure timely intervention, is now being commercialized through a new company, Synchronicity in Motion.

Dr. David Rudolph of the Department of Earth and Environment Sciences of the University of Waterloo is analyzing data from thousands of hydrological sensors in the Grand River Watershed, an important water resource for the heavily populated southern Ontario area. The solution is dynamic, using intelligent sensors that communicate with each other to maximize their data-gathering potential. For example, a sensor that detects heavy rainfall will alert nearby sensors to increase the frequency of their sampling so that the most possible detail about the rainfall incident can be captured. The team queries and visualizes the very large sets of data output by the sensors, revealing valuable intelligence on the dynamics of the watershed and its response to changing land-use practices and other environmental modifications.

"Backed by IBM high-performance computing and analytics technologies, we are boosting livability, workability and sustainability, and helping to create an ecosystem of successful businesses around these topics."

— Elissa Strome, Executive Director, SOSCIP, University of Toronto

Elsewhere, Dr. Patrick Martin of Queen's University has used the SOSCIP cloud analytics platform to create a flexible and intuitive Analytics as a Service (AaaS) offering. The AaaS makes it easy for academic and business organizations to share big data and conduct complex analytics, greatly reducing development and deployment times by masking the underlying complexity from end-users.

As SOSCIP moves forward with the support of CAD20 million in additional funding from FedDev Ontario—backed by a new CAD65 million investment by IBM Canada—it will further extend its services to SMEs and help them access big data analytics on the cloud. Forty new projects will be launched over the next three years, with particular emphasis on advanced manufacturing, cybersecurity, digital media and mining and a focus on engaging medium-sized companies.

In SOSCIP's January 2015 Economic Impact Statement, the organization forecasts that potential revenue generation from the early collaborative research projects will exceed CAD66 million over the next five years, and CAD1.8 billion over ten years. An initial evaluation conducted on just eight SOSCIP healthcare projects suggests opportunities to generate new revenues in excess of CAD100 million over the next ten years, and potential savings or other benefits to the Canadian healthcare system of almost CAD2 billion over the same period.

Boosting skills development and Ontario's economy

In addition to promoting the personal development of post-doctoral researchers from its constituent academic partners, the SOSCIP consortium is helping to transfer knowledge from academia to industry. Lalonde says: "We have been very successful in bringing researchers and our high-performance computing resources together with industry partners—without our support, small companies would often not even realize how much they can benefit from new analytics capabilities.

"About 75 percent of all SOSCIP projects involve SMEs. We provide significant competitive advantages for member companies, enabling them to benefit from world-class research expertise and the latest knowledge in the relevant fields. In just the first two years of operations, we created about 280 new jobs – nearly twice as many as we originally expected."

Strome concludes: "Today, SOSCIP is collaborating with the public and private sectors in successfully conducting leading-edge research to solve critical social, technical and economic challenges across more than 50 projects. Our efforts represent a major investment in the future economic prosperity of Ontario, producing highly-skilled knowledge workers and ensuring that great business ideas can be nurtured and commercialized right here in the province. Backed by IBM high-performance computing and analytics technologies, we are boosting livability, workability and sustainability, and helping to create an ecosystem of successful businesses around these topics."

About SOSCIP

Southern Ontario Smart Computing Innovation Platform (SOSCIP) is a research and development consortium that pairs academic and industry researchers with advanced computing tools to fuel innovation leadership in Canada within the areas of agile computing, health, water, energy, cities, mining, advanced manufacturing, digital media and cybersecurity. SOSCIP members include Carleton University, Laurier University, McMaster University, the University of Ontario Institute of Technology, the University of Ottawa, Queen's University, Ryerson University, the University of Toronto, the University of Waterloo, Western University, York University, Ontario Centres of Excellence and the IBM Canada Research and Development Centre. The Federal Government of Canada, the Province of Ontario and IBM Canada have invested more than CAD210 million (USD167 million) to create this unique innovation cluster.

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