Client: Scalar Decisions

Project: Case study: Perimeter Institute case study

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# Perimeter Institute Unlocks the Power of HPC to Solve the Mysteries of the Universe

**Perimeter delivers a world-class computing experience to its researchers with help from Scalar**

Perimeter Institute in Waterloo, Ontario, is a major centre for theoretical physics research, attracting a diverse international community of more than 150 resident researchers and 1,000 visiting scientists per year. Its mission is to advance our understanding of the universe at the most fundamental level.

## Customer Challenge

More scientists are utilizing high-performance computing (HPC) in their research programs as they test models to validate their theories. And, this research is becoming more data-intensive, drawing on a growing body of data from more sources. For Perimeter to continue unlocking the mysteries of the universe, they needed to move beyond their aging HPC environment that was too small, too slow, and not meeting the needs of their researchers. They wanted to take advantage of recent advances in HPC computing to keep and attract top researchers.

While big HPC systems are becoming common in research universities and other institutions with big budgets, Perimeter's relatively small size and funding required them to find the most power at the best price that would be reliable and manageable for their small IT group.

Perimeter's old HPC system required a lot of manual work for management and administration. And they struggled to manage storage resources, something they hadn't anticipated in the original design. Ben Davies, Perimeter's Director of Information Technology, says, "It's one thing to calculate and parse data at very high rates in a fast set of servers but if you can’t store that data quickly enough then you slow down the whole computing process."

Perimeter started their HPC upgrade journey by contacting OEM vendors but found the options too complex to sort out. "Buying HPC systems is easier today because the hardware has become commoditized," Davies explains. "But it's also harder because there's a lot more choice and because of the complexities of the trade-offs to be made in the investment decisions."

Davies says that much of the complexity stems from potentially tying hundreds of servers together over two different types of networks to get the required level of control, particularly in the storage architecture. "All these things have to be balanced in terms of how they're connected, operating, and optimized," he says.

## Our Approach

Faced with more complexity than it could apply resources to, Perimeter decided to seek outside help with experience in the current HPC product landscape and the expertise to design and implement a system to meet their power and budget needs.

To fill the expertise gap, Perimeter engaged Scalar to provide guidance on a hardware, software, and networking solution. "When we found Scalar, we quickly realized they had far more experience in navigating this very complex landscape," Davies says. "And they could bring a lot of value to us in helping select the technology and – just as importantly – design and implement the system. What looks on the surface to be a simple hardware acquisition is actually a very complex set of interrelated design questions."

So Scalar's mission was clear: Help Perimeter navigate the complex world of fast storage, upgrade power, include system management tools to streamline administration, recommend all of the hardware, software, and tools needed to create a system, and implement and test the system to Perimeter's requirements.

## Solution

Scalar helped Perimeter identify the right vendors and right products to meet Perimeter's objectives, and then configured the system around specific use cases. Davies says, "Scalar has a deep understanding and a great depth of experience in this area – research and academia. They demonstrated various products and services that might be relevant to us now or in the future which really opened our eyes to some utilities, techniques, and services that we should be looking at downstream."

For hardware, the team selected Dell EMC as the best solution for computing power, storage, and networking.

To manage the hardware, operating system, HPC software, and users, the team selected Bright Cluster Manager for HPC from Bright Computing, which automates much of the administration and management tasks.

Davies says, "Scalar helped us work through these decisions in a way that the OEM vendors were not able to. They brought invaluable practical experience from wide range of similar implementations. They provided essential context from real world experience to help us make smart choices. They helped us find the right architecture and the right storage technology at the right price, and that was very important. Scalar was very helpful was in showing us new and improved software tools that really streamlined management of the equipment. The area where Scalar provided the highest level of value is helping us come out with a design that was exceptionally useful and met all of our various needs."

## Results

- A new HPC system with the power to handle the client's load, data, and storage needs
- Streamlined system administration

## Profile

Perimeter Institute for Theoretical Physics

Industry: Research

Headquarters: Waterloo, ON

Website: http://www.perimeterinstitute.ca

## Objective

Perimeter Institute required an HPC system that:

- Is flexible enough to accommodate the varied computational requirements of its researchers
- Is manageable and maintainable by its small IT staff
- Meets the client's budget requirements

## Highlights

- Upgrade computing and storage power
- Help client navigate HPC complexities

- Select system management tools to streamline administration
- Recommend all of the hardware and software

## Technology Used

- Dell EMC for computing, storage, and networking
- Bright Cluster Manager for HPC from Bright Computing for system administration

## What We Did for This Client

- Strategic guidance on technology decisions
- Complete design, testing and implementation of a new HPC system