Success Brief

High Performance Computing

Intel® Xeon® processor L5420

Research

Supercomputing platform for academic and industrial research

Going Green with High Performance Computing in Umeå

Intel® technology powers energy-efficient platform to drive breakthroughs in international research

Based in north east Sweden, Umeå University comprises six university colleges and 22 research centres. As part of this dedication to serving the international academic community, the university supports a high-performance computing centre, known as HPC2N. The centre is a consortium of universities and research centres across northern Sweden. It is open to scientists in any discipline, who are granted time and capacity on the system and is used for everything from fluid dynamics to weather modeling and space physics simulations.

"Energy efficiency was critical for us, and now through Intel® technology we're among the leaders on the Green500 list."

Professor Bo Kågström,
Director of HPC2N,
Umeå University

- **Tough requirements:** Umeå University needed a powerful high performance computing (HPC) platform to enable access for more researchers at a time, and to support multiple, increasingly complex calculations. The new HPC platform had to be highly energy efficient in order to meet strict budgets.
- **Faster time to research:** HPC2N deployed 672 IBM Blade Center* HS21 XM architecture servers, powered by low-voltage Intel® Xeon® processors L5420 with a total of 5,376 cores at just 12.5 watts per core. Intel® VTune™ Performance Analyzer optimises the new platform, running both Unix and Windows operating systems so more researchers can get to work faster.
- **Energy efficient:** The new system, named Akka, ranks as the 16th most energy efficient HPC platform in the world[1], and has the performance and scalability to enable growth and diversification as research needs evolve.
- **Outstanding performance:** Intel Xeon processors L5420 improve application performance compared with previous-generation processors, reaching over 85% efficiency in HP benchmarking

The old HPC2N platform was nearing the end of its life, slowing down calculation time and limiting the amount of research that could be carried out. The university therefore sourced funding for a new HPC platform and was searching for the best solution. Key requirements were energy efficiency to save electricity costs, scalability to allow more users and performance to ensure researchers could finish their projects on time.

The university had a long-standing relationship with IBM, having used its technology widely in the past. Hearing about Umeå's requirements, IBM suggested a solution that incorporated its own hardware with Intel® Xeon® processor technology and Microsoft software. By incorporating Microsoft, the solution enabled the use of Windows operating system as well as Unix, which is more traditional in HPC environments. The director of HPC2N, Bo Kågström, says: "We found the proposal from IBM very compelling, and saw that Intel® technology would help us build a really reliable platform. We also liked the option of using two different operating systems as it enabled us to open the facility to a wider range of users. It was the opportunity to take advantage of superior technology and collaboration from three leaders in the IT market that convinced us to choose this platform."

[1] http://www.green500.org/lists/2008/06/ranks1-100.php

Umeå University builds a highly scalable HPC platform to enable complex research in an increasing variety of disciplines

Umeå University purchased 672 IBM Blade Center* HS21 XM architecture servers, powered by low-voltage Intel® Xeon® processors L5420. A total of 5,376 cores were deployed, at 12.5 watts per core. It also implemented Intel® VTune™ Performance Analyzer software to optimise the new architecture and ensure maximum efficiency. Intel technicians gave Kågström's team training in how to use the software to spot bottlenecks and rectify them before they impact performance.

The new HPC platform has brought significant benefits to the university. The power-efficient Intel Xeon processor L5420 delivers a peak performance of 53.8 Teraflops (46 Teraflops sustained performance). This equals a fifty-fold improvement over the previous platform and the university calculates the platform to be up to 3,000 times more powerful than a typical dual core laptop computer.

This huge performance improvement combined with the relatively small increase in energy and cooling spending means the university calculates the new platform to be 40% more energy efficient than its previous model. It has also been recognised independently by the Green500 List as the 16th most energy efficient HPC platform in the world[2]. "As an academic institution we're always concerned with budgets, so the great savings we're making with this new platform are a really strong advantage of going green," says Kågström.

Spotlight: Umeå University

Umeå University was founded in 1965 and is Sweden's fifth oldest university. It attracts approximately 29,000 students and over 4,100 staff from around the world. The university has a strong reputation as a centre of scientific and other research, and hosts HPC2N which is part of the Swedish national metacentre SNIC. Key areas of focus for study at the centre and the university in general include various aspects of biology and medicine, northern studies, gender studies, as well as mathematics, scientific and parallel computing.

The enhanced performance of the platform also means that even the most complex algorithms and calculations can be completed within their specified time frame and more accurately. This ensures that any scientists using the HPC facilities are able to get the results they need in a timely manner, and more scientific advancements can be made. The scalability of the system also enables a larger number of researchers to access the system at any one time.

Finally, by enabling the use of two different operating systems for the first time, the university is able to make the facilities available to a wider variety of researchers, many of whom have not been able to use HPC resources before. "We're expecting to see the types of research conducted on the platform diversify further," concludes Kågström. "Some disciplines, such as the social sciences, tend to use Windows rather than Unix, which precludes them from being able to use HPC solutions. This is therefore a great opportunity for them to make use of these tools and make some valuable discoveries."

In the future, the University is keen to engage Intel's support in its R&D projects focusing on improving IT efficiency. "We'd like to leverage the benefits of multi-core Intel® processor technology on a wider scale in order to enhance our research facilities moving forward," concludes Kågström. "This will underpin our vision of widening the availability of our HPC2N centre to a wider spread of scientists both geographically and by discipline."

Find a business solution that is right for your company. Contact your Intel representative or visit the Reference Room at:
http://www.intel.com/references

[2] http://www.green500.org/lists/2008/06/ranks1-100.php

0808/JNW/RLC/XX/PDF 320439-001-EN