



Ghent University powers advanced research with HPE energy-efficient supercomputers

HPE Apollo 6000 System speeds research for high-performance computing

Objective

Provide a stable and state-of-the-art high-performance computing environment able to support world-class research.

Approach

Deploy a HPE high-performance server cluster that enables researchers to conduct innovative, high-quality research

IT Matters

- Streamlines IT operations and manages OPEX with a 216-node supercomputer cluster in a dense and energy-efficient implementation
- Efficiently manages IT resources and proactively monitors server operations by leveraging network monitoring tools
- Ensures high reliability via proactive scans and periodic healthchecks on connected servers

Business Matters

- Controls costs and optimizes efficiency for the university community while maximizing energy efficiency
- Delivers high-performance computing that accelerates research and enables increased creativity and innovation
- Increases Ghent University's ability to attract leading researchers and publish world-class, multi-disciplinary academic research



“The power of the HPE Apollo 6000 System strengthens scientific research for Ghent University and allows our researchers to quickly test new hypotheses and explore areas like bioinformatics, weather prediction, fluid dynamics, nanotechnology, physics, computational chemistry, and linguistics. The ability to swiftly process massive amounts of data enables innovative analysis that opens up new worlds of research and exploration.”

Ghent University in Belgium has deployed a Tier 2 supercomputer infrastructure based on the HPE Apollo 6000 System. It is now used by the university community for advanced research in diverse fields such as bioinformatics, engineering, physics, chemistry, and linguistics and is allowing the university to increase its visibility by publishing additional world-class, multi-disciplinary academic research..

– Ewald Pauwels, Scientific Coordinator
for High-Performance Computing,
Ghent University

Since the beginning of the century, both the Flemish government and the Flemish universities in Belgium have taken bold initiatives to build up a supercomputer infrastructure to support high-performance research. A consortium of universities from the Flemish region of Belgium banded together to share the cost of deploying a Tier 1 supercomputer to support their research efforts. They selected Hewlett Packard Enterprise (HPE) servers, and a Tier 1 system was installed at Ghent University in Belgium in 2012.

The Flemish Tier 1 supercomputer opened at Ghent University in October 2012, and is operated by Ghent University and shared by all Flemish universities and by industry and public research institutions. The Tier 1 supercomputer facility consists of a 528-node cluster of HPE ProLiant SL230s Gen8 Servers, and it also includes HPE ProLiant DL380e Gen8 Servers.

With over 41,000 students and 9,000 employees, Ghent University is one of the largest universities in Belgium, and it sought additional high-performance computing power to support its own researchers and therefore extended its Tier 2 supercomputing cluster to strengthen the university's research capabilities. After a careful evaluation, Ghent University selected the HPE Apollo 6000 System and is now able to conduct even more sophisticated computational research than previously possible.

"We needed an additional high-performance, highly reliable supercomputing platform that could further stretch the boundaries of research and allow our researchers to accelerate their research and crunch the numbers on exponentially larger model sizes with dramatically faster response times," says Ewald Pauwels, scientific coordinator for high-performance computing for Ghent University. "We were pleased with the reliability and performance of the shared, regional Tier 1 supercomputer deployment. We selected the HPE Apollo 6000 System and deployed a high-performance Tier 2 supercomputer cluster that is efficient to manage and is delivering the performance needed for state-of-the-art academic research by the Ghent University academic community."

Implementing high-performance computing

Supercomputers play an important role in academic research and are used for a wide range of computationally intensive tasks in various disciplines, including bioinformatics, weather forecasting, climate research, molecular modeling, mechanical engineering, statistics, linguistics, and physical simulations. High-performance computing allows researchers to combine advanced computing power, scalable network infrastructure, an adaptive software environment, and production reliability to push the boundaries of academic research.

"Universities can improve themselves by implementing high-performance computing," explains Pauwels. "Supercomputing allows researchers to go to new levels of experimentation. Whether a chemist is analyzing the stability of chemical interactions or a mathematician is trying to prove a theory, powerful computing infrastructure accelerates and improves the quality of research. And high-performance computing is not just for hard sciences like technology, engineering, life sciences, and math; it is also being used effectively by sociology and literary researchers to expand our collective knowledge base and improve the quality of research published by major universities."

Ghent University sought to expand supercomputing resources for its researchers, and evaluated options for a new supercomputing cluster. The University selected the Apollo 6000 System, primarily because of reliability, scalability, and capital and operating cost advantages. "HPE offered a superior architecture, and allowed us to deploy 200-plus nodes in a dense and energy-efficient implementation that is easy to manage," says Pauwels.

The Apollo 6000 System delivers industry-leading performance in less space with the flexibility to tailor the system to precisely meet workload requirements. This rack-level solution allows Ghent University to address the growing demand for high-performance computing while controlling costs and optimizing operational efficiency. It allows Ghent University to optimize performance at the rack level, and the HPE Apollo family is designed to deliver efficient rack-scale compute, storage, networking, power, and cooling solutions for high-performance computing workloads.

The Apollo 6000 System was deployed with ProLiant XL230a Gen9 Servers and runs Red Hat Enterprise Linux 7. Twenty Apollo 6000 System chassis were deployed with 10 nodes per chassis in a scaled-out chassis configuration. In addition, 16 ProLiant DL380e Gen9 Servers were each fitted with half a TB of memory and a tiered HD/SSD storage solution in order to boost Big Data research. The installation was smooth, and the new computing cluster went online in April 2015. The academic community immediately began reaping the rewards of the expanded high-performance computing environment.

“The increased computing power is allowing researchers to run more complex calculations and obtain results much faster,” states Pauwels. “For example, our supercomputer is being used to build better climate models that calculate weather patterns for increasingly larger regions, and to develop new materials with exciting properties. Biochemists also use it to examine the properties of enzymes or study the evolution of biological systems. It’s also being used to develop linguistic models to determine whether chat room feeds can be

interpreted to detect suicidal thoughts, and by legal scholars to analyze the behavior of burglars on a geographic basis.”

He continues, “Our own supercomputer infrastructure onsite is enabling big science in which members of the academic community move beyond their own safety zones and conduct innovative research that challenges existing views and potentially leads to new levels of understanding that improve society. It also dramatically improves research productivity. For example, one of Ghent University’s medical researchers was previously analyzing magnetic resonance imaging (MRI) scans periodically using legacy infrastructure, but this was very time-consuming. With the aid of our supercomputer, this researcher was able to perform the analyses overnight, and pushed beyond previous boundaries by processing much larger sample sizes on the more powerful computing capabilities now available.”

Ensuring server reliability

Ghent University relies on HPE Proactive Care Service to support this supercomputer deployment. Flexible and cost-effective, Proactive Care Service combines support with smart technology to help prevent problems, keep IT reliable and stable, and boost operational performance. HPE experts take a hands-on, personalized approach with proactive reports that include analysis, consultation and recommendations, and reporting to prevent issues and quickly resolve problems. This results in an enhanced call experience that includes start-to-finish case management.

Customer at a glance

HPE Hardware

- Apollo 6000 System
- HPE ProLiant XL230a Gen9 Compute Server
- HPE ProLiant DL380e Gen8 Server
- HPE ProLiant DL380 Gen9 Server
- HPE ProLiant SL230s Gen8 Servers

HPE Technology Services

- HPE Proactive Care Service

According to Ghent University technical team member Wouter Depypere, “Having a dedicated hardware engineer in country who knows the environment and the university helps us proactively support our supercomputer infrastructure.”

The servers are connected to HPE and leverage 24x7 monitoring, pre-failure alerts, rapid diagnosis, automatic call logging, and parts dispatch to help avoid outages. Ghent University receives proactive scans and a periodic healthcheck on the connected devices with tailored maintenance recommendations from HPE as part of Proactive Care Service.

HPE Insight Online, available as part of the HPE warranty agreement, enables the university and technical team to monitor the servers from anywhere, at any time, from any device. “Proactive Care Service and the Insight Online dashboard help us maintain and operate our systems,” states Depypere.

Increasing advanced research

Supercomputers enable the world’s leading scientists to find answers to some of the most difficult challenges of our time. But while the human imagination is limitless, the massive

space and energy requirements of traditional supercomputers, combined with the fall off in semiconductor scaling, are slowing the pace of innovation. HPE is breaking through traditional supercomputing barriers by rethinking cooling to enable high-density, energy-efficient supercomputing solutions.

Ghent University is providing its research community with access to high-performance computing capabilities that are increasing the university’s ability to attract leading researchers and publish world-class, multi-disciplinary academic research. “Faster and more powerful and reliable computing means an improved research environment,” says Pauwels. “The Apollo 6000 System is allowing Ghent University to efficiently deliver the computing resources that researchers need to investigate their fields and publish breakthrough research that advances our knowledge.”

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