Academic Research

Fueling fundamental scientific discoveries

Institute for Basic Science

With an ultra-efficient high-performance computing (HPC) platform, built on Lenovo ThinkSystem servers, the Institute for Basic Science in South Korea is ready to help researchers tackle tougher questions and drive scientific progress.

Lenovo

Who is
the Institute
for Basic
Science?

The Institute for Basic Science was established in 2011, becoming the first institution in South Korea dedicated to basic science research. Focused on studying the most fundamental principles of nature, basic science is essential to creating new knowledge from which significant scientific and societal progress can be achieved.

The Institute for Basic Science specializes in long-term projects involving large groups of researchers. The institute operates 33 research centers, each dedicated to a different discipline of basic science, from mathematics and physics to chemistry and biology.

ibS Institute for
Basic Science

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The
Challenge

The Institute for Basic Science believes scientists unleash their creative potential most effectively when they conduct their research in an autonomous institution with world-class infrastructure. That's why, since its inception, the institute has been developing its research facilities and HPC infrastructure, to enable its scientists to conduct the most cutting-edge research.

With demand for HPC growing exponentially, the Institute for Basic Science found that its original approach to allocating computing resources for research was no longer fit for purpose. Previously, each research center was had to apply for the HPC resources its scientists wanted to use. This was complex and costly for the institute, and caused long lead times, which threatened to delay important investigations.

The institute aimed to evolve to an integrated and centralized approach, establishing a shared HPC center with a single computing cluster, which was available to all users and could be easily scaled out as requirements increased.

> "We had a central supercomputing cluster, but it was primarily dedicated to climate research. This meant that researchers from other disciplines had to follow a convoluted process to procure their own computing resources. We saw that there was an urgent need to expand our core HPC environment, so that all researchers could access the resources they required without delay."

Dr. Muyoung Heo
System Architect, Institute for Basic Science

An expertly engineered solution

The Institute for Basic Science tapped Lenovo to help it build this centralized HPC platform from the ground up. Unlike its existing supercomputing cluster, which was liquid-cooled and housed in a dedicated room, the only space available for the institute to construct a new HPC cluster of the size it wanted was an existing data center, where space was limited and an air-cooled environment was mandatory.

Lenovo Professional Services helped the institute design and deploy a highly efficient system that fits within the space, and is air-cooled.

Hardware
Lenovo ThinkSystem SD630 V2
Lenovo ThinkSystem SR650 V2
Lenovo ThinkSystem DE2000H

Software
Lenovo XClarity
Slurm Workload Manager

Services
Lenovo Professional Services

Optimized
data center

Dr. Muyoung Heo, System Architect at the Institute for Basic Science, says: "The Lenovo team helped us redesign our entire data center to optimize space and air cooling. They were able to pack a lot of computing power into a very dense footprint, and came up with a system that ventilates heat very efficiently."

The new HPC cluster comprises 210 Lenovo ThinkSystem SD630 V2 computing nodes, with an additional ThinkSystem SR650 V2 system acting as a central provisioning server. The Institute for Basic Science also makes use of a Lenovo ThinkSystem DE2000H hybrid array for storage. In production since January 2023, Lenovo's HPC platform supports large-scale simulations across multiple basic science fields, as well as processing and analyzing big volumes of data produced by the institute's large experimental facilities.

"" "Lenovo did an excellent job of understanding our needs and coming up with a solution that met them. We especially appreciate the extra work that went into designing such a dense system. While other vendors proposed solutions that took up almost 20 racks, Lenovo gave us more computing resources and fit everything into just three racks. That's a huge difference."

Kyuheon Shim
HPC Technical Officer, Institute for Basic Science

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Results

Researchers at the institute are now able to draw on the power of 210 HPC nodes, all contained within a single, super dense design. The system comes with lower energy consumption, less management complexity, and lower costs for the institute. It also makes upscaling easier for the institute, enabling it to meet growing demand from users.

Lenovo technology has helped the Institute for Basic Science to leap forward in terms of compute capacity and performance. The advances have been well-received by the institute's research community.

Delivers top performance for demanding workloads, including simulations and analyses

Dense cluster design minimizes power consumption and heat generation

Helps advance fundamental scientific research

Answering complex questions faster

"When designing the cluster, Lenovo put quite a lot of emphasis on networking and data I/O with our existing storage systems," says Kyuheon Shim, HPC Technical Officer at the Institute for Basic Science. "Combined with the inclusion of latest-gen CPUs, it adds up to a strong, stable performance. We've had good feedback from our users; even those performing extremely demanding data analyses are satisfied."

With a powerful HPC platform at their disposal, researchers across the Institute for Basic Science can complete more detailed analyses on larger datasets and get answers to complex questions faster. This keeps the institute at the forefront of vital research into the fundamentals of life.

"Lenovo provides excellent technology systems, and we are very happy with the performance and stability of our new cluster. But what sets Lenovo apart is their people. The Lenovo team was genuinely invested in making this project a success, and really went the extra mile to improve our HPC capabilities. Lenovo is ready to hear their customer's voice and listen to them, and that's something you don't get with just any technology provider."

Dr. Muyoung Heo
System Architect, Institute for Basic Science

Why Lenovo?

Lenovo technology was uncharted territory for the Institute for Basic Science, who had previously been using servers and storage from two competing providers. The Lenovo team, however, came up with the best value offer by far.

Lenovo's proposed HPC solution beat its competitors' benchmarks and included almost 55% more computing nodes than the institute had outlined in its request for proposals (RFP), while remaining within budget.

Dr. Muyoung recalls: "We chose Lenovo because they proposed the best solution by a long way. We wrote a very specific RFP and Lenovo not only met all of our requirements, but also went above and beyond, both in terms of performance benchmarks and overall resources."

How can scientific institutes stay ahead of the curve?

With a Lenovo high-performance computing platform, Korea's Institute for Basic Science is helping researchers drive scientific progress.

Explore Lenovo ThinkSystem solutions for HPC

Lenovo