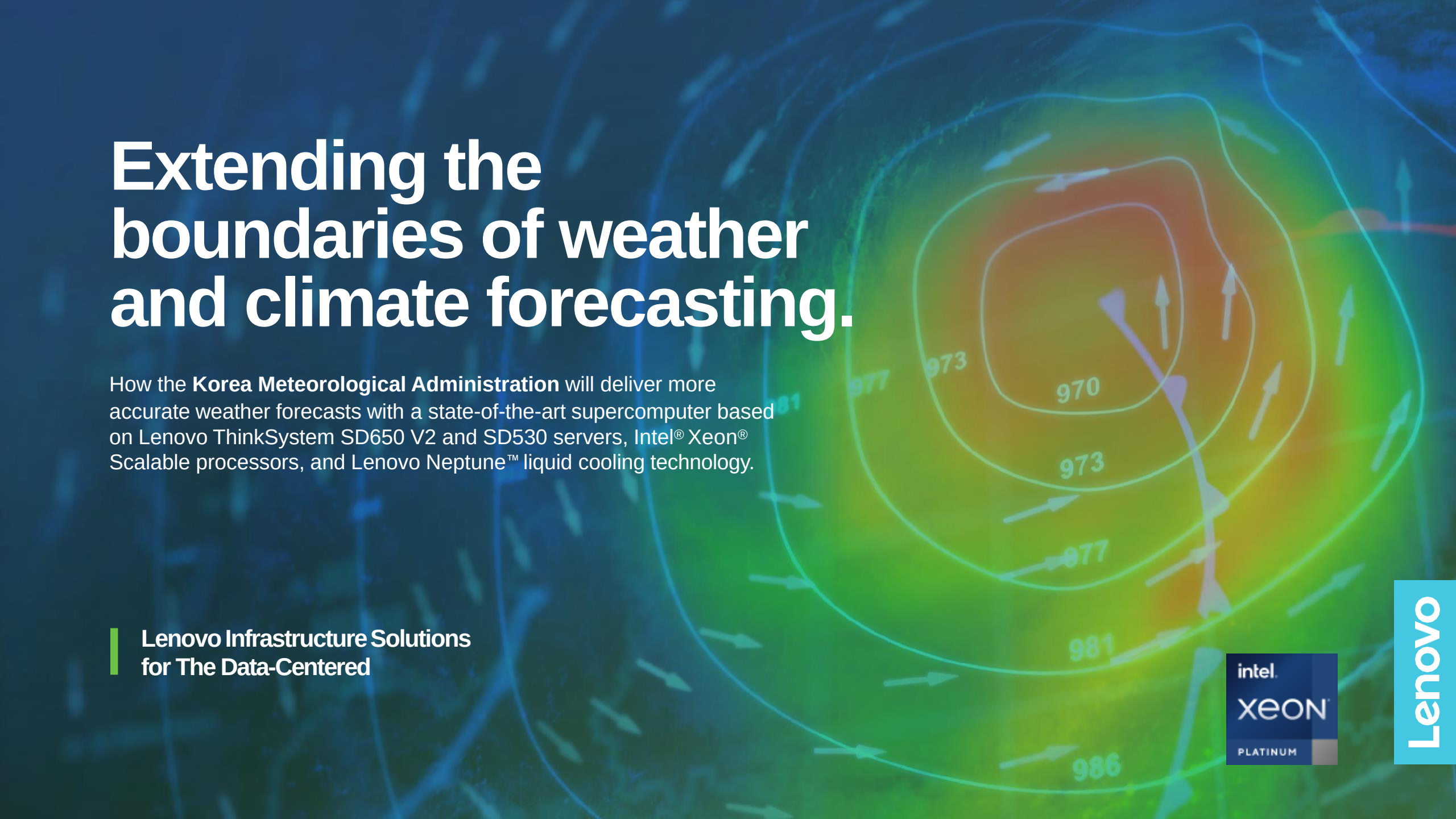
Extending the boundaries of weather and climate forecasting.

How the **Korea Meteorological Administration** will deliver more accurate weather forecasts with a state-of-the-art supercomputer based on Lenovo ThinkSystem SD650 V2 and SD530 servers, Intel® Xeon® Scalable processors, and Lenovo Neptune™ liquid cooling technology.

Lenovo Infrastructure Solutions for The Data-Centered



1

Background

Based in Seoul, the Korea Meteorological Administration (KMA) provides weather forecasting and issues warnings to citizens, businesses, and government agencies. The administration is also responsible for observing and researching climate change.

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Challenge

KMA operates the National Center for Meteorological Supercomputer (NCMS), the largest supercomputer in Korea, to support vital weather and climate forecasting. To enable faster and more accurate forecasting, and to help advance scientific research, KMA refreshes its supercomputer every five years.

“Weather and climate forecasting techniques and technologies are constantly evolving and improving, and so must our high-performance computing [HPC] resources,” explains KMA. “There have been huge strides in forecast modeling and model resolution in recent years. To harness these advances and improve the accuracy of our weather predictions, we aim to sharpen the resolution of our forecasts from 12km*12km to 8km*8km, which requires a huge increase in compute power.”

With its HPC cluster approaching end-of-life, KMA launched a tender to secure a system with next-generation compute capacity.

Why Lenovo? Powerful, energy efficient HPC technology.

Following an extensive evaluation, KMA selected Lenovo ThinkSystem SD650 V2 and SD530 servers with Intel® Xeon® Scalable processors, and Lenovo Neptune liquid cooling technology.

“The Lenovo system will help us to achieve all our technical requirements, offering the best performance and energy efficiency of all the proposals we considered,” says KMA. “The fact that the Lenovo ThinkSystem SD650 V2 servers are built on the latest 3rd Gen Intel® Xeon® Scalable processors will enable us to provide a huge amount of compute power to run CPU-intensive forecast modeling workloads.”

In fact, the 3rd Gen Intel® Xeon® Platinum 8386Q Processors featured in the Lenovo ThinkSystem SD650 V2 servers were specifically designed for KMA. With 38 cores and 76 threads per CPU, the Intel® Xeon® Platinum 8386Q Processors deliver excellent performance for forecast modeling workloads.

“Lenovo is proud to partner with KMA on its next-generation supercomputer. This partnership will deliver more capacity and greater climate insights than ever before, using state-of-the-art Neptune direct water cooling (DWC) technology at its core. We are dedicated to KMA and its success.”

Sinisa Nikolic
Director HPC and AI, Lenovo Asia Pacific

End-to-end Lenovo Intelligent Cluster.

KMA engaged Lenovo Professional Services to install the new supercomputer in two phases. A Lenovo Intelligent Cluster solution, all nodes, switches, and other components came pre-installed and pre-integrated into the racks for speed and ease of deployment.

The new supercomputer comprises two redundant 4,000-node systems named Maru and Guru, with a total of 8,064 Lenovo ThinkSystem SD650 V2 and 426 Lenovo ThinkSystem SD530 compute nodes with direct-to-node water cooling—making it the largest Lenovo HPC cluster currently in production. For high-performance data storage, KMA implemented nine Lenovo Distributed Storage Solution for IBM Spectrum Scale (DSS-G260) arrays for a total capacity of 63 pebibytes (PiB).

“We actually began the installation before either the 3rd Gen Intel® Xeon® Platinum 8386Q Processors or the Lenovo ThinkSystem SD650 V2 servers was released,” says KMA. “In spite of this, the installation went very smoothly.”

“Lenovo Professional Services took care of everything, from the physical installation to the liquid cooling to the system configuration. Their hard work made the deployment a success.”

Korea Meteorological Administration

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Results

The Lenovo system is currently undergoing extensive testing and KMA is working to adapt its applications to run on the new supercomputer. KMA put Maru and Guru into production in October 2021. While still undergoing testing, the two systems completed TOP500 runs just three months after installation—ranking 23 and 24 in the June 2021 TOP500 list of the world's fastest supercomputers respectively.[1]

When it begins service, the supercomputer will be used for an extensive range of meteorological services, including weather and climate forecasts, climate change assessments, and earthquake and marine studies.

Equipped with Intel® Xeon® Scalable processors, the Lenovo cluster will execute at a theoretical performance of 50 PetaFLOPS—eight times faster than KMA's current supercomputer. And thanks to the Lenovo Neptune liquid cooling technology, the cluster will be four times more energy efficient than its predecessor.[2]

"Our fifth supercomputer will deliver much more processing power much more efficiently," says KMA. "We expect to be able to generate more accurate forecasts at a higher resolution than was previously possible, so we can deliver better, more reliable services to citizens, businesses, and the government."

KMA Korea Meteorological Administration

- **50 PetaFLOPS Rpeak**
- **8x faster than predecessor**
- **4x more energy efficient**
- **99.9% availability**
- **Ranked 23 and 24 in the June 2021 TOP500 list**

[1] Ranked 23 (Maru) and 24 (Guru) in June 2021 TOP500 (https://www.top500.org/lists/top500/list/2021/06/).
[2] Data provided by the Korea Meteorological Administration.

“Our fifth supercomputer will deliver the enormous compute power we need to produce higher resolution weather and climate forecasts, improving the quality and precision of our predictions.”

Korea Meteorological Administration

What will you do with Lenovo HPC solutions?

The Data-Centered deliver more accurate weather forecasts with
Lenovo smarter infrastructure solutions, powered by Intel® Xeon® Scalable processors.

Explore Lenovo HPC Solutions