Case study
Korea Meteorological Administration

» Building an advanced weather system to improve public communication required introduction of large-scale storage to handle changes to numerical prediction models and improved prediction accuracy «

Lee Kyung-Heoun, Super Computer Management Division Director of National Weather Computer Center.

The customer

Country: Republic of Korea
Industry: Public
Founded: August, 1948
Website: www.kma.go.kr

The challenge

The National Meteorological Computer Center is building a more objective and scientific numerical weather prediction system matched to rapid changes in the environment. This will enhance the value of weather information and make the Repulic of Korea a world-leading advanced weather prediction country. Exapnsion of current tasks and the resulting R&D taking place on the supercomputer has raised the predictions for data storage from the Terabyte to Petabyte levels. In order to progress the study for change and development of the numerical weather prediction system a project "Enhancement of meteorological super computer storage" to handle the related volume has recently been promoted.

The solution

The National Weather Supercomputer Center adopted a Fujitsu ETERNUS DX8000 series storage solution for its storage enhancement project. This was due to the excellent evaluation of its reliability, stability of storage management, future storage expansion capability and efficiency of performance versus cost. Fujitsu's long experience in supercomputers, including its history of operation of pre and post storage devices on the previous supercomputer unit 2, installed in 2004, was also an important factor.

The customer

The National Weather Supercomputer Center built by Korea's Meteorological Administration in March, 2010 is a fully equipped large-scale facility optimized for supercomputer operation. It works day and night for a more accurate and advanced weather prediction service, introducing and operating the Meteorological supercomputer unit 3 and Unified Model. This is the United Kingdom's numerical weather prediction model, and calculates using Chollian satellite information.

The challenge

With the growth in human activity increased risk of weather disasters, caused by unusual weather phenomena, and the spread of weather services, which make use of weather databases, have focused a greater need on accuracy and utilization of weather predictions. The National Meteorological Supercomputer Center is therefore attempting to build a more objective and scientific numerical weather prediction system. This will enhance the value of weather information and thereby advance the country in weather forecasting.

For this purpose, the center accelerated the development of a weather prediction service specific to the geography of the Republic of Korea, i.e. a "Korea-specific numerical weather prediction model". This would enable use of the model across a wide number of disciplinessuch as disaster prevention, energy and logistics (to improve national competitiveness), and more specifically for analysis of weather conditions and climate change.

As the numerical weather prediction model continues to improve

In addition there was a need for a high-performance storage system to free existing bottlenecks to performance. Included in this would be: production and transmission/reception of materials under the high-speed communications environment, the collection of a range of observed information data reduction in run times for numerical weather prediction models, and the support of weather information for developing countries. These had all become imminent.

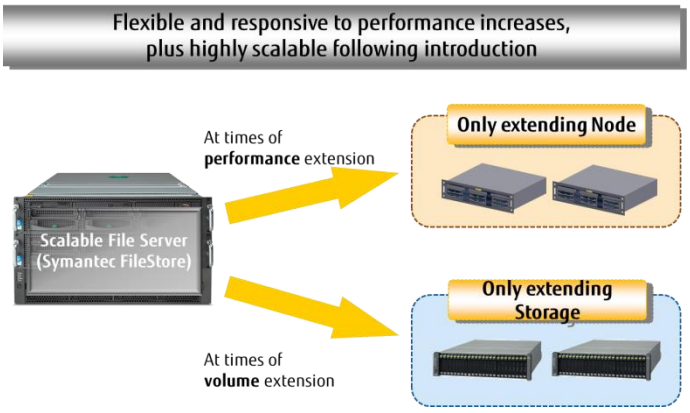
The solution

The National Weather Supercomputer Center recognized the need for large computational resources and, large-scale, high-performance storage devices in order to handle rapid growth in supercomputer data. This included rapid growth in significance of observed materials and the huge volume of such data gleaned from satellites and radar, used to perform high-resolution numerical prediction models. It thereby started the first petabyte class storage implementation project ever introduced by a domestic public agency in the Republic of Korea.

Fujitsu Korea Ltd. (FKL) has had a long association with the Korea Meteorological Administration, since the project that built the first supercomputer test device in 1995. As a result, this relationship currently retains the best technology and long experience in building IT infrastructure for utilizing optimized supercomputers in Korea.

FKL analyzed the requirements of the Korea Meteorological Administration. Based on its understanding of the National Weather Supercomputer Center's major projects and history of its manufacturing performance FKL decided that NAS-based products would be the most suitable. They would be capable of handling both the data used for business partnerships and the output produced by R&D use of the supercomputers. In addition they were most suitable because of their durability and stability for regular 24-hour operation. Taking into consideration easy management and expansion, FKL proposed an ETERNUS DX8000 series, peta-class scale storage product.

In its evaluation the National Weather Supercomputer Center gave ETERNUS DX8400 high scores for its operational stability•efficiency, extensibility•utilization of storage resources, high energy efficiency with Eco-mode, and its good price performance, and finally select it.



The benefit Flexible Scale-out

The ETERUS DX8000 series introduced by the National Weather Super computer Center is 'a Super Green' product. This designation is only granted to products that passed Fujitsu's own stringent environmental standards while retaining high reliability and performance. Now, It is safely being used as a reinforcing device for the National Weather Computer Center's Supercomputer unit 3 in storing R&D data related to Korea Meteorological Administration's current tasks and its numerical prediction models and satellite image data.

The National Weather Computer Center has now prepared a foundation for transmission/reception of weather data in various volumes, stable operation of storage matched to data access frequency and importance, plus future storage extension through the introduction of ETERUS DX8000.

The benefit

- Support for stable/permanant storage of current tasks and R&D results through the extension to Petabyte storage volumes
- Assured support for long continuous tasks through storage stability suitable to transmission/reception of weather data at various volumes
- Reduced maintenance costs and managment workloads through operational stability and easy expansion

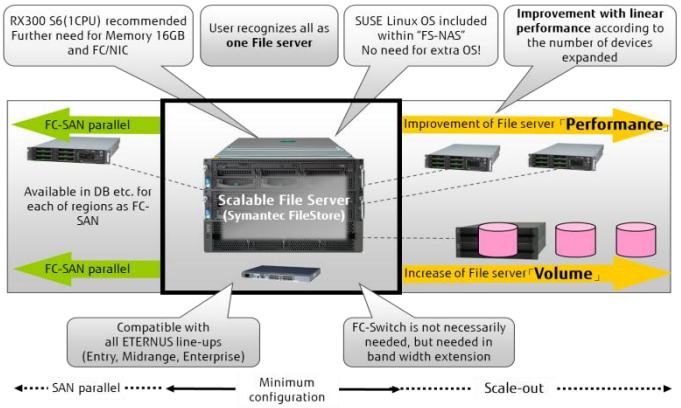
Products and services

A Scalable File Server Solution based on :

- Fujitsu ETERNUS DX8400 Storage Systems
- Fujitsu PRIMERGY RX300 Servers
- Symantec FileStore

The ETERUS DX8000 Series can easily move a logical volume to another RAID group even in the middle of task operation through RAID Migration. It also supports easy change to the most suitable RAID level to meet changing requirements. It also adroitly protects and supports data operationsusing a variety of features, which fit the cooperative job tasks given by the National Weather Supercomputer Center, including collection and transfer of volumes of weather data every day.

FKL proposed the implementation of a Scale-out NAS scheme for the storage, in order to prepare a foundation capable of extending flexibly of performance and data volumes by the National Weather Supercomputer Center. This is expected to continuously expand its storage requirements into the future. As a result the center is now able to promote an excellent and simple storage extention project just by expanding NAS nodes at times of storage performance extension and only overall storage at times of volume extension.



Fujitsu Scalable File Server Configuration image

In addition, providing an extension in various fields and utilization capable of using storage resources at maximum level allows an easy extention of disk, cache and host interface, and therefore rapid response can be done even for the necessary volume and access host extension.

National Weather Computer Center is very pleased with the stability aspect in the actual uses of Fujitsu's ETERUS DX8400 products, and accelerates the current tasks and R&D for more accurate weather prediction through the stable storage operation.

Conclusion

Korea Meteorological administration is promoting an institutional framework for enhancing the value of weather information and the spread of public consensus. This has resulted in enhancement in support of R&D to obtain the practical techniques necessary to improve key industries, and the service extensions to providetailored high-quality weather information.

The National Weather Computer Center plans to implement more accurate and stable weather prediction services through future Korean focused numerical prediction model development and IT infrastructure extension as a spearhead of the national weather tasks performed by the Korea Meteorological Administration. In particular, it expects to enhance its ability to analyze weather and more actively correspond to timely changing weather phenomena through continuous performance improvement of its supercomputer system and expandable storage.

About Fujitsu

Fujitsu is the leading Japanese information and communication technology (ICT) company offering a full range of technology products, solutions and services. Over 170,000 Fujitsu people support customers in more than 100 countries. We use our experience and the power of ICT to shape the future of society with our customers. Fujitsu Limited (TSE:6702) reported consolidated revenues of 4.5 trillion yen (US$55 billion) for the fiscal year ended March 31, 2011. For more information, please see http://www.fujitsu.com

The interview

Q1. Please tell me about the background to the introduction of petabyte class storage?

A1. It's for stably storing and maintaining a large amount of numerical prediction model productions and observation materials produced by meteorological supercomputer unit 3. This was fully introduced in the second half of 2010. The trend is such that a proportion of large-scale observation materials such as satellite and radar materials used in operating the supercomputer is greatly increasing. We recognized that a large amount of supercomputer computational resources and large-scale high-performance storage devices, to perform high-resolution numerical prediction models, was essential basic infrastructure.

Q2. Why did you select Fujitsu Korea Ltd.'s product?

A2. This time we selected Fujitsu's ETERNUS Series based on experience of operating such storage devices forthe pre- and post-process system of the supercomputer introduced as super computer unit 2 in 2004. Based on our operating experience, we know the stability, of Fujitsu's storage devices, is very excellent. The Completed installation of a Fujitsu ETERNUS DX8400 system late last year has also being operating stably without failure.

Q3. Future IT project plans?

A3. We plan to build 10PB-scale storage devices to operate the supercomputer this year. The reason why such large-scale storage device is to be introduced is that out put from current task's is expected to produce from 600TB per year in 2010 to more than 1PB scale a year in 2011~2015. In addition, adding the current task's output and the production output of developers we are expecting about 1.5~2PB. We will therefore build a high-performance storage device with no bottleneck phenomena in material production, transmission and reception, using high-speed communication environments of more than InifiniBand or at least 10GE.

In collaboration with

Contact
FUJITSU Korea Limited
Address: Susong Tower Bldg.,83-1, Susong-dong, Jongno-gu, Seoul, 110-774, Korea
Phone: 02-3787-6000
Website: www.fujitsu.com/kr
2012-02 Seoul Korea