**Case Introduction in One Sentence**

Lenovo customized a software, hardware and service integrated “Big Data Practice Teaching and Research Platform” solution for Zhejiang University of Finance and Economics.

**Case Overview**

The “Big Data Practice Teaching and Research Platform” solution provided by Lenovo includes the overall layout and planning of both front and back ends, and realizes the combination of online teaching, practical training operations, and scientific research. In addition, Lenovo also arranged experts from the Data Intelligence Division to conduct training for teachers.

**Customer’s problem and Lenovo’s solution**

- As a new subject, “Data Science and Big Data Technology” is not yet mature in terms of curriculum, practical environment, teacher training and teaching resources. The absence of real business requirements, data, and software and hardware environments are the key demands of the client.
- Based on LeapHD, Lenovo provides a “Big Data Practice Teaching and Research Platform” solution which consists of 8 SR590 servers and 2 NE1032 switches. Lenovo also cooperate with PECC to provide modules including high-definition video courses, experimental tasks, practical training operations etc.
- The platform provides big data ecological tools and development environment based on Hadoop, and can monitor the utilization rate and related information of CPU, memory, hard disk of the cluster in real time.

**Value for Customer**

The platform simplifies the teacher’s management process and solves the problem of not having a complete experimental environment for students to build and simulate in traditional teaching. Students do not need to build a Hadoop environment before each use, which greatly improves the ease of use of the platform. Teachers can also use the platform to carry out big data scientific research and other work to improve their own big data and teaching capabilities.
**Case Introduction in One Sentence**

Lenovo assisted Shenhua Railway Transportation Co., Ltd. in building a big data center for “vehicle technical condition” based on private cloud.

**Case Overview**

Through the construction of a cloud management platform, Shenhua Railway Transportation has built an information system, improved basic data and collection methods, and established a data sharing mechanism to enable it to extract indicator data on the technical condition of vehicles and realize the transition from passive maintenance to active maintenance.

**Customer’s problem and Lenovo’s solution**

- The maintenance system of railway freight cars in China is mainly based on preventive regular maintenance. However, the service life and reliability of vehicle parts have been greatly improved, and due to different efficiency, the actual technical condition of each freight cars is different. The implementation of unified maintenance standards has been causing over-maintenance. Shenhua Group looks forward to building a platform for overall planning, to realize accurate repair and batch replacement of parts.

- Lenovo built a portal management platform and a cloud management platform for the client. The bottom layer uses a hyper-converged solution that supports heterogeneous capacity expansion; and a parallel storage architecture, which is easy to expand and flexible in configuration.

**Value for Customer**

Through the construction of a big data center for “vehicle technical condition”, Shenhua Railway Transportation realizes comprehensive management of vehicle parts life cycle data, vehicle maintenance history records, and operating mileage information, and forms feedback guidance on the remaining life prediction threshold of parts, thereby realizing accurate repair of faults and batch replacement of parts.
**Case Introduction in One Sentence**

Lenovo adopts new Internet concepts and cloud computing architecture to assist the development of SIASUN’s informatization construction.

**Case Overview**

SIASUN is affiliated to the Chinese Academy of Sciences and is a high-tech listed company with robotics as its core. Lenovo uses Internet-related technologies such as virtualization, distributed and hyper-convergence to unify the existing production environment of SIASUN, protect confidential documents, realize convenient management.

**Customer's problem and Lenovo's solution**

- Traditional graphics workstations have scattered data and cannot guarantee the security of design data; the management of the three-tier infrastructure is complicated; the lack of backup equipment brings great risks to data security.
- Lenovo’s solution includes HX3520-G hyper-converged cluster with M10 graphics cards and NVIDIA’s vPC license to achieve lightweight 3D desktop virtualization applications.
- The distributed architecture and linear expansion without node restriction ensure that the 3D virtual desktop in the later stage can be expanded to build a larger-scale cluster according to business operation conditions.

**Value for Customer**

- Compared with the traditional desktop virtualization method, Lenovo’s hyper-converged solution reduce investment by 35%, reduce equipment space in the data center by 50%, and reduce overall operation and maintenance cost by 50%.
- Through the Lenovo solution, users can realize remote access through various methods such as notebooks and pads; and can carry about 500 3D desktop virtualization applications.
**Case Introduction in One Sentence**

Lenovo provides Hubei Initiate with on demand SD-WAN services through "service-led" transformation.

**Case Overview**

Hubei Initiate is a MSP. During the coronavirus epidemic, the bandwidth demand of the hospital data center it serves is unstable, and planning of network resources is difficult to implement. Taking into account the needs of users in the future, Hubei Initiate uses the SD-WAN service of Lenovo to replace the traditional dedicated line to connect the hospital’s data center network with its network operation center to obtain fast and sustainable network services and dynamic adjustment of bandwidth, while reducing costs and increasing profits.

**Customer's problem and Lenovo's solution**

- The client is hoping to provide bandwidth services that can meet the actual usage of users. However, the use of dedicated line connection requires planning of network resources in advance, which is prone to problems such as insufficient network resources or redundant waste. Dedicated line does not support cross-operator access, and its high price results in low profitability of the client.
- Lenovo’s flexible SD-WAN solution is provided to customers in the form of on-demand and monthly payment services. The client’s IT administrator can deliver functions such as vFW and vWOC to the network interface device, with no need to purchase hardware.

**Value for Customer**

Through Lenovo’s SD-WAN solution, Hubei Initiate completed the SD-WAN deployment within a week compared to the deployment time of a few weeks to months for traditional dedicated line. And on-demand monthly payment will greatly reduce the pressure on customers’ cash flow. Through SD-WAN, customers are expected to save 30%-50% of TCO.
**Case Introduction in One Sentence**

Z-Bank achieves a high level of business continuity through the three-year planning and construction of the “two places and three centers” strategy.

**Case Overview**

Based on the standard model of “two places and three centers” and the recent technological development, Lenovo provides a disaster recovery consulting service to Z-Bank, including disaster recovery top-level design, disaster recovery/active-active data center design, disaster recovery center construction; and a full range of services such as construction supervision and drill guidance, which provide a solid foundation for Z-Bank’s long-term development strategy.

**Customer’s problem and Lenovo’s solution**

- Z-Bank as an emerging private bank, Internet finance business is the company’s main operating model. As the main transaction channel, once the platform fails, most financial businesses will not be able to carry out; in extreme cases, may also causes customer loss. Therefore, compared with traditional banks, Internet banks have higher requirements for business continuity.
- Lenovo solution includes a intracity disaster recovery/active-active data center, and a remote disaster recovery data center. The active-active datacenter can reduce the daily pressure on the production center; in the event of a disaster, it can also be switched for disaster recovery and emergency to maintain business continuity.
- Z-Bank plans to complete the construction of a remote disaster recovery center and hybrid cloud from 2021 to 2023 with the assistance of Lenovo.

**Value for Customer**

The intracity disaster recovery/active-active data center built by Lenovo can ensure the business continuity of Z-bank’s core businesses is higher than the regulatory requirements, with RPO=0 and RTO<1 minute.
**Case Introduction in One Sentence**

Lenovo upgraded the core ERP system of XTC. This is also the first project of DM all-flash + MCC in China.

**Case Overview**

Lenovo uses Lenovo NetApp’s MCC storage active-active solution to ensure the full redundancy of the storage layer and solve the single-point hidden danger of XTC. SR950 also effectively supports the client’s ERP system performance requirements.

**Customer’s problem and Lenovo’s solution**

- Insufficient database performance: in month end closing, processor and storage load often close to their peak performance.
- Single-point problem has occurred during operation.
- Multi-vendor coordination. Therefore, the focus of the transformation of this project plan is to implement an overall fully redundant architecture to achieve backup and disaster recovery; the design goal is to support the business load in the next 5 years.
- XTC has adopted the Lenovo all-flash MCC solution which is designed to achieve high storage availability based on best practices. At the same time, it is equipped with SR950 to run SQLServer database, and uses WSFC to achieve high application availability.

**Value for Customer**

- This is the first DM all-flash MCC project implemented in China.
- The solution architecture adopts a fully redundant architecture and deploys disaster-tolerant storage, which not only has high availability, but also improves the impact resistance of the system.
- The overall plan is delivered by Lenovo, and there is absolutely no cross-vendor communication problem regardless of maintenance or after-sales.
Case Introduction in One Sentence

Lenovo helps Xtep build a “business data life cycle” real-time display platform based on BW on HANA.

Case Overview

Xtep cooperated again with Lenovo to upgrade the existing BW on HANA platform, which not only solves the problem of insufficient capacity, but also provides higher performance, availability and redundancy capabilities, and lay a solid foundation for business innovation of the company.

Customer's problem and Lenovo's solution

• Xtep has chosen Lenovo/IBM x3950 X5 to deploy its BW on HANA platform as early as 2013. With the rapid development of the business, the server capacity can no longer meet its current business needs. As a core analysis platform, this platform has a large impact on business interruption; and its processing capacity has encountered performance bottlenecks, which cannot meet the requirements for real-time analysis and presentation of a large number of reports.

• Lenovo’s solution uses the SR950 all-flash HANA certified all-in-one machine. Lenovo’s original PS service has ensured a high-standard delivery quality of the project; and a smooth transition of the platform.

Value for Customer

In the upgrade of the Xtep BW on HANA platform, Lenovo has increased the theoretical computing capacity of the overall platform by 8.5 times; increased the system capacity from 1TB to 9TB; and increased actual loaded data volume by nearly 4 times. This has greatly improved the Xtep BW on HANA platform data processing capacity, and realize full life cycle management of the business.
Case Introduction in One Sentence

Lenovo helped Zhejiang Meteorological Service complete the system integration of its private cloud platform, laying a good foundation for the realization of digital meteorology in the future.

Case Overview

The long-term strategic goal of the client is to realize digital meteorology, including the construction of private cloud, external private cloud and supercomputer cloud platform. In this project, Lenovo has integrated the three clusters of the original private cloud platform into one cluster to achieve unified system management and improve performance and timeliness.

Customer’s problem and Lenovo’s solution

- The private cloud platform carries massive radar data issued by the CIMISS v2.0 system of the National Meteorology Bureau. The original platform consisted of three clusters, with more than 50 blade servers and hundreds of virtual machines; and carries the services of information center, service center, climate center and weather station. The original data center has a large number of equipment and brands and needs to rely on outsourcing due the complexity of operation and maintenance; maintenance cost of the old equipment is also high; data sharing platform has reached performance bottlenecks.
- Lenovo integrates three clusters into one through SR860 and FLEX servers, and virtualization, realizing resource sharing and unified management. DM5000H unified storage is used as a shared storage and data sharing NAS platform to meet the performance problems of the province’s meteorological data sharing.
- Meet the meteorological requirements for high performance and timeliness, and ensure system stability and data security.
- The new private cloud platform realizes unified management of the system, simplifies operation and maintenance, and provides 24x7 after-sales service from on-site engineers.

Value for Customer

- Meet the meteorological requirements for high performance and timeliness, and ensure system stability and data security.
- The new private cloud platform realizes unified management of the system, simplifies operation and maintenance, and provides 24x7 after-sales service from on-site engineers.

Case Picture
### Brief Intro: Wuxi Lead Intelligent Equipment Co., Ltd. Smart Factory

**Case Introduction in One Sentence**

Lenovo and LEAD have reached a three-year strategic cooperation to build a smart factory, focusing on infrastructure, big data, IoT and AI platforms, algorithms and the Lenovo’s smart factory best practices.

**Case Overview**

Lenovo and LEAD have launched strategic cooperation in areas such as top-level planning and design, data center construction, big data control and security. Relying on Lenovo’s own advanced digital transformation experience and comprehensive technical advantages, in the first phase of the project, Lenovo provides a one-stop solution from consulting, planning to landing for the LEAD data center construction.

**Customer’s problem and Lenovo’s solution**

- The rapid increase in the number of equipment, and the original hardware deployment model has further aggravated the complexity of the infrastructure, making it difficult to manage, update and maintain equipment. The enrichment of data types and increase in file size require uninterrupted online storage.
- The first phase of the project plan includes the construction of ERP, PDM, GPU, network disk system, and application computing platform, as well as network and storage resource design. Among them, the application system computing platform adopts a software-defined architecture, and through the unified maintenance and management interface of the ThinkCloud Manager platform, the overall physical hardware and virtual resource equipment are maintained and supervised.

**Value for Customer**

Lenovo’s “Dual-State” IT platform construction concept meets the needs of the new infrastructure platform required by the smart factory of LEAD. In the future, AI, big data, 5G, blockchain, cloud computing, high-performance computing, Innovative products and solutions in the fields of edge computing, Internet of Things, and smart manufacturing will eventually be built into the smart factory.

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**Case Picture**

[Image of a factory floor with equipment and workers]
The virtualization platform built by Lenovo ensures the stability, reliability, and scalability of Aiways’ file sharing platform.

The Shangrao plant of Aiways needs a new data center to carry production line related business. Lenovo has built a traditional virtualization architecture for the client from the perspective of reliability, using DM storage and backup systems.

- The requirements of Aiways include: 1. The data center carries the production line business and must guarantee the stability and reliability of the overall system; 2. The customer is in the development stage, and the architecture needs to be flexible and expandable; 3. The architecture must include integrity data backup and disaster recovery functions; 4. Since the main IT staff of the customer is based in Shanghai, a convenient management system is needed.

- Lenovo’s solution uses VMware to build a virtualization platform and file sharing platform for Aiways. The bottom layer uses 12 SR650 as the virtualization server; and 2 DM5000H and 2 B6505 fiber switches to realize synchronous replication.

- Lenovo has made full use of the SnapMirror and SnapVault functions of DM storage to provide efficient backup and disaster recovery solutions. The overall solution simplifies management and saves costs for the client.

- The DM series can provide SAN and NAS storage functions at the same time, with high flexibility for on-demand expansion, which is very in line with the business requirements of the customer during the development period. It not only meets the current performance, but also can seamlessly upgrade and expand the capacity in the future.
## Case Introduction in One Sentence

Lenovo DM unified storage provides a high-performance file sharing platform for DEARCC.

## Case Overview

Lenovo uses the advantages of DM storage to provide a file sharing platform solution with high performance-price ratio and flexible expansion capability for DEARCC. Through the implementation of modular server room, Lenovo ensured that the customer’s project goes online quickly and on time.

## Customer's problem and Lenovo's solution

- The demands for DEARCC are composed of: 1. The customer’s Shanghai R&D center has rapid data growth. There is an urgent need for a stable and reliable file sharing storage that can provide high-speed IOPS while ensuring data security; 2. The customer’s new factory does not have a server room to install the equipment. Building a normal server room will delay the launch of the customer’s project.
- Lenovo’s solution: the construction of the LDC1000 modular computer room, and a customized file sharing system. DM7000H is used to provide a high-performance file sharing platform for the R&D center of DEARCC; DPA2400 backup integrated machine combined with DM7000H's own snapshot function can provide local data backup for the platform, which ensures data security.

## Value for Customer

- DM7000H's 4TB NVMe secondary cache and SSD Cache technology improve storage performance and greatly improve the work efficiency of the R&D center;
- The DPA backup machine combined with the DM7000H snapshot function provides a cost-effective backup solution that simplifies IT management.
- Permanent online service capabilities, flexible horizontal expansion, while ensuring seamless storage upgrades and data migration in the future.
**Case Introduction in One Sentence**

Lenovo assisted East China Normal University in building an HPC platform with high-density, high-performance, low-cost, and both CPU and GPU computing capability.

**Case Overview**

The HPC platform built by Lenovo for East China Normal University, has 559Tflops of CPU double-precision floating-point computing capabilities, and 224Tflops of GPU double-precision floating-point computing capabilities, effectively supports the computational efficiency and accuracy of the scientific research in various disciplines.

**Customer's problem and Lenovo's solution**

- East China Normal University needs to build a platform for high-performance computing that is open to scientific research throughout the school. This platform is used for scientific experiments, data collection and analysis in mathematics, physics, chemistry and etc. to improve computing efficiency and accuracy. The client requires the platform to have a mature HPC dispatch management system, and to ensure the platform's high stability and scalability.

- Lenovo solution: 208 SD530 with Intel Xeon Gold 6230 CPU; 16 SD530 V100 GPU nodes; Omni-path 100Gb high-speed computing network; DE6000H. Lenovo also provides the customer with 5 years of system services.

**Value for Customer**

- Lenovo provides customers with high-density, high-performance, low-cost, cost-effective supercomputing solutions that take into account traditional CPU computing and GPU computing.

- Lenovo's end-to-end solutions provide customers with consulting, coordination, procurement, delivery and project implementation services.
**Brief Intro: Southwestern University of Finance and Economics HPC**

**Case Introduction in One Sentence**
Lenovo provides a stable, efficient, mature and secure HPC cluster and DM storage solutions for Southwestern University of Finance and Economics.

**Case Overview**
Lenovo built a HPC cluster for the International Trade Comprehensive Experimental Training Center of the university. The cluster’s requirements for storage performance, reliability and scalability are met through DM storage. DM storage supports both SAN and NAS, so that ordinary Clients can also access the data in the cluster directly.

**Customer's problem and Lenovo's solution**
- 1. Frequent storage IO are required during the HPC cluster computing process; 2. The scale of the HPC cluster will continue to grow in the planning. The storage should have extremely high scalability; 3. In addition to the HPC, the storage system should also allow other Clients to quickly and directly access the computing data through NAS.
- The HPC cluster provided by Lenovo includes 16 SR630 computing nodes, 4 SR650 login, management and IO nodes, 1 DM7000H parallel storage system, 1 G8272 Gigabit switch and 1 Lico cluster scheduling software.

**Value for Customer**
- DM7000H storage has high performance, high reliability and high scalability. RAID-DP can achieve the highest performance under the same hard disk capacity efficiency as RAID 6; the expansion scale of 12 controllers in SAN mode can meet the development of the cluster for several years; its 256G cache and 4T NVME cache can fully satisfy the high performance requirements of HPC.
**Case Overview**

HEEB needs to build a big data platform. The existing data center equipment are old, which not only affects the normal development of customer business, but also cannot support the new big data in terms of performance. Lenovo provided a complete infrastructure construction services for the customer’s new big data platforms.

**Customer’s problem and Lenovo’s solution**

- The customer’s original system has been used for a long time, which has potential safety problems, operation and maintenance costs are high, and constant failures require shutdown for maintenance, affecting the normal development of business; as the storage system ages, the proportion of hard disk damage is increasing. Data security cannot be guaranteed. The old system is no longer able to carry the peak business and the demands of the new platform.
- Lenovo’s solution includes 17 SR650 servers, 1 SR670 server, 1 DM7000H high-end storage, 1 DE6000H high-capacity storage, 4 G8272 switches and 1 B6505.

**Value for Customer**

- Unified storage solves the storage problems of data formats and helps the customer save ¥ 500,000 additional storage costs.
- The unified management interface helps the customer simplify operation and maintenance management and reduce the operation and maintenance costs of 2 people by ¥ 400,000 per year.
Brief Intro: Wuhan Asia General Hospital Cloud Hospital Model

Case Introduction in One Sentence
Building a cloud hospital model for smarter healthcare at scale through the construction of IAAS layer cloud infrastructure provided by Lenovo

Case Overview
Wuhan Asia General Hospital is the third largest cardiovascular specialist hospital in China. The Hospital needs adopt a Cloud Hospital Model that covers medical, diagnosis and treatment, office automation, medical records, medical imaging, building management etc.. Lenovo provides the hospital with an asset-light IT business model by providing rental services. The construction and subsequent operation and maintenance of the server room are provided by Lenovo as a service.

Customer's problem and Lenovo's solution
• server rooms are built as a cloud platform; core business should be hot backup in dual-machine mode, application layer and storage layer are virtualized; realized remote disaster recovery, backup data can be quickly and completely restored.
• The active-active data center IAAS solution provided by Lenovo has more than 50 servers in two data centers; 1 active-active storage; 4 SAN centralized storage; 2 distributed storage; and 1 backup and recovery system to deploy PACS, HIS and other applications. Multiple advanced technologies such as server HA, Oracle RAC, server virtualization, storage active-active, storage virtualization gateway, backup disaster recovery, data center active-active are used to ensure business continuity.

Value for Customer
• Realize the migration and deployment of the hospital business system on Cloud, becoming the first Cloud Hospital in Central China;
• Based on the recognition of Lenovo’s product solutions and services, the hospital chose in the subsequent SAP HANA and hyper-convergence projects.
### Case Introduction in One Sentence

Aihua Group has greatly simplified the procurement cycle, deployment cycle, management difficulty, and operation and maintenance difficulty of the SAP Business Suite on HANA system, with Lenovo private cloud + LEC solution.

### Case Overview

As a large manufacturing enterprise, Aihua Group needs to respond to production data in a timely manner. Therefore, it needs to newly install SAP Business Suite on HANA that includes core business systems. Due to the unclear planning of the IT infrastructure for the new business and the short business launch cycle, the customer has chosen the private cloud + LEC overall solution.

### Customer’s problem and Lenovo’s solution

- Aihua Group’s new SAP Business Suite on HANA needs to build a new development and testing system and production system, which need to be completed in 2 months from consultation to launch.
- CRM, MES, ERP and other HANA production systems adopt the Lenovo HANA all-in-one dual-machine cluster; the SAP front-end application adopts the server + storage virtualization solution. Due to the urgent time period for the development and testing system, LEC solution was adopted (a contract for 3 years) to provide Aihua Group with PAAS+ HANA services.

### Value for Customer

- The private cloud + LEC solution greatly reduces the customer’s SAP business-related expenses and deployment cycles; reduces the investment and management and operating costs of self-built systems.
- With the overall delivery of PAAS+, customers do not need to worry about equipment management and operation and maintenance. Lenovo regularly provides customers with open operation and maintenance management reports.
**Case Introduction in One Sentence**

The Lenovo VDI solution has changed the traditional PC office mode of China Railway Construction Heavy Industry, reducing management difficulty and maintenance costs, while improving the security of R&D design data.

**Case Overview**

The VDI solution provided by Lenovo has improved the security of China Railway Construction Heavy Industry’s core R&D and design data, while simplifying the management of large-scale applications such as three-dimensional design, improving terminal management and service levels.

**Customer's problem and Lenovo's solution**

- The traditional office mode requires the installation of software and client-sides on each PC/workstation. Management difficulty and maintenance costs increase with the number of R&D and office personnel. Important data is scattered on each PC/graphic workstation, facing security and management issues.
- The VDI solution provided by Lenovo includes 800 desktops. The solution uses nearly 20 SR650 servers, 1 DM7000H storage, 1 DM3000H disaster recovery storage, 600 Lenovo T30 thin terminals and Citrix desktop virtualization software to form a high-performance VDI solution.

**Value for Customer**

- While saving hardware costs, the solution also improves the data safety, and greatly reduces the management and maintenance workload of desktop terminals. It also provides integrated support and resource scheduling for the docking of the HPC platform of simulation calculation for subsequent R&D design.
- Established a Fortune 500 high-end enterprise customer story for Lenovo’s subsequent expansion of the enterprise VDI project.
**Case Introduction in One Sentence**

Lenovo's DM7000H unified storage greatly simplifies the IT infrastructure design of the Guangdong Provincial Department of Human Resources and Social Security, ensuring file sharing and performance requirements in the presence of numerous external systems.

**Case Overview**

This is the Guangdong Urban-Rural Social Security Integration and Migrant Worker Training Project, which is financed by the World Bank. Lenovo provided the HRSSD with the basic equipment to support the project, including 42 SR650s and DM7000H for a total of amount of $800K.

**Customer's problem and Lenovo's solution**

- Large number of external systems need to be connected to the platform, and documents need to be approved by multiple roles with different permissions from different departments. A simple and easy-to-use file sharing platform is required to provide powerful management functions, I/O performance, and large-capacity expandable storage space.
- Lenovo provides 42 SR650 servers and a DM7000H unified storage. The NAS access protocol provided by the DM series storage can maximize the manageability of data access. On top of this, it also provides a SAN port to meet the needs of block storage in the future.

**Value for Customer**

- This is the largest case of Lenovo's South China DM series storage in the government industry, as well as the largest case in the social security industry. It is also a full configuration DM7000H implementation case, accumulating rich experience for subsequent implementation.
- DM7000H can provide customers with higher-than-expected performance.
**Case Introduction in One Sentence**

Lenovo uses Netapp ONTAP Select software defined storage, in conjunction with the main storage DM5000H, to help Shida Shenghua achieve disaster recovery needs cost-effectively.

**Case Overview**

In order to improve management and operation efficiency, the customer uses three Lenovo SR650s to form a new virtualized cluster to meet the computing resource requirements of systems other than critical business databases. Through DM5000H and NetApp ONTAP Select, data replication and protection functions are realized within the customer's budget.

**Customer's problem and Lenovo's solution**

- The customer need to build a new virtualization platform to migrate important applications including ERP. The customer attaches great importance to data security. Maximum data security needs to be achieved under limited budgets.
- Lenovo uses 3 SR860s to form a virtualized cluster; main storage uses DM5000H, through the built-in data protection function of the storage, it can effectively prevent ransomware, data damage, etc. For disaster recovery, Lenovo uses NetApp ONTAP select to implement software-defined storage. Data replication and protection are realized at a low cost by reusing existing storage space.

**Value for Customer**

- Not only met the computing and storage requirements of the business system, but also realized the data protection expectations of disaster recovery within a limited budget, exceeding customer expectations.
- Through software-defined storage, the old storage of the customer is utilized to achieve data replication with the newly purchased storage.
Liaohe Oilfield of CNPC HPC Cluster

Case Introduction in One Sentence
The HPC cluster deployed by Lenovo composed of 224 Flex X240 M5 units, enables Liaohe Oilfield to process 2,000 square meters of seismic data annually, expected to increase annual revenue of Liaohe Oilfield by 10 million.

Case Overview
The customer was mainly using the 211 computing nodes implemented in 2011. The gradual expansion of the oilfield business puts higher demands on seismic data. The 224 Flex X240 M5 HPC cluster deployed by Lenovo enables customers to complete an annual oil exploration and processing task of 2,000 square kilometers, increase production capacity of the oilfield.

Customer's problem and Lenovo's solution
- In total, the company must process around 55 TB of data each year. To accommodate this massive increase in workload, Liaohe Oilfield Company needed to expand its HPC platform to enhance compute and storage performance.
- The solution adopts the Lenovo Flex System Chassis. Populated with 224 Lenovo Flex System x240 M5 nodes powered by Intel Xeon CPUs and NVIDIA GPUs, the cluster includes 27 Lenovo System x3650 M5 servers for application hosting and job-scheduling processes. The solution is connected via a distributed 100Gb/40Gb network architecture based on seven Mellanox SH2200 Switch Modules and two Lenovo RackSwitch G7052 Ethernet switches.

Value for Customer
- 2,500 km² seismic data analyzed per year
- $10 million increase in international sales

Case Picture
Case Introduction in One Sentence
The hyper-convergence platform composed of 24 Lenovo HX nodes meets the demand for agile cloud IaaS/PaaS resources of Country Garden's diversified business.

Case Overview
In order to promote a diversified business layout based on real estate, agriculture, and robotics, Country Garden faces challenges in the flexibility, scalability, security and cost-effectiveness of its IT infrastructure. Lenovo's hyper-convergence solution solves the urgent demand for computing resources in Country Garden's business system, and through an integrated management platform, IT personnel can significantly reduce maintenance workload and improving efficiency.

Customer's problem and Lenovo's solution
• The original traditional architecture of Country Garden cannot achieve linear expansion, results in long deployment period for new business systems; SAN/NAS storage has poor scalability and cannot support the performance requirements of new businesses; lack of application systems high-availability protection.
• Lenovo deployed 24 HX hyper-converged nodes and 6 SR950 HANA nodes for Country Garden, which are used to carry SAP applications and HANA's HR, financial and warehousing systems.

Value for Customer
• Compared with traditional architecture, Lenovo’s hyper-convergence solution reduces investment by 35%, reduces the equipment space in the data center by 50%, and reduces overall operation and maintenance cost by 50%.
• This project is a benchmark project of Lenovo's hyper-converged platform in the real estate industry.
**Brief Intro: Shenyang Pharmaceutical University Hyper-Convergence Solution**

**Case Introduction in One Sentence**
Through HX hyper-convergence solution, Lenovo has solved the historical problems of the original traditional 3-tier architecture of Shenyang Pharmaceutical University.

**Case Overview**
Shenyang Pharmaceutical University currently has 2 campuses: Shenyang campus and Benxi campus. In the past, the Shenyang data center adopted a traditional 3-tier IT infrastructure, and most of the equipment was provided by different vendors, which made it difficult to accurately locate hardware failures and quickly repair them. Therefore, when the customer built a new data center in the Benxi campus, it chose the hyper-convergence solution provided by Lenovo.

**Customer's problem and Lenovo's solution**
- 1. low server utilization rate; 2. low availability. If continues to adopt 3-tier IT architecture, storage and application servers are single points which may affect business continuity. 3 the cost of expansion is high. 4. some servers have passed the warranty period, budget for maintenance and repair has increased year by year.
- According to the needs of Shenyang Pharmaceutical University, Lenovo selected 3 HX5520s to form a hyper-convergence cluster, with DPA and NE1032.

**Value for Customer**
Lenovo’s hyper-convergence solution has laid a good foundation for the server virtualization construction of Shenyang Pharmaceutical University, greatly reducing maintenance costs and improving production efficiency.
Compared with the use of traditional architecture, Lenovo’s hyper-convergence solution has reduced investment by 35%, reduced equipment space in the data center by 50%, and reduced overall operation and maintenance cost by 50%.
**Brief Intro: Shanghai Gongli Hospital Hyper-Convergence Cluster**

**Case Introduction in One Sentence**
Lenovo’s HX hyper-convergence solution helps Shanghai Gongli Hospital to achieve business continuity.

**Case Overview**
Shanghai Gongli Hospital is a public general hospital founded in 1943, serving 3 million residents in the surrounding area. The hospital plans to complete level 6 electronic medical records and level 4 interconnection in the next 5 years. Achieving this goal requires the overall upgrading of business systems and hardware systems.

**Customer’s problem and Lenovo’s solution**
- As the customer needs to operate 7×24 hours a year without interruption, any shutdown for more than 15 minutes will cause medical accidents, the hospital relies on the highly available IT infrastructure. This poses a great challenge to the business interruption time in the process of business system and data migration.
- Lenovo deployed 2 hyper-converged clusters for the PACS system of Shanghai Gongli Hospital, each equipped with three HX5520, and configured Nutanix Advanced Replication License to achieve disaster recovery. DX1100U is used for data backup storage, which can be seamlessly compatible with the main storage in the future, simplifying data backup.

**Value for Customer**
- Lenovo HX nodes are compatible with customers’ original HyperV platform, and hence business systems won’t be interrupted during migration.
- Realize data and business disaster tolerance with active-active data center to meet the customer’s requirements for business continuity.
- This infrastructure upgrade has laid a good foundation for Gongli Hospital to achieve the goals of its 5-year plan.
Enjoy International Tourism Resort uses Lenovo ThinkSystem solutions to ensure an exceptional experience for every guest.

In the region of Henan, China, Enjoy International Tourism Resort is well known for its four Enjoy.Land amusement parks and two theme hotels. By adopting Lenovo ThinkSystem solutions to support its core business systems including ticketing, reservation, hotel and office management, Enjoy International Tourism Resort can ensure that it provides each guest with an extraordinary experience.

The group relied on disparate server and storage systems to run more than 300 information terminals and business subsystems. The back-end storage load often came under strain during peak hours and system access speed was slow. Without a DR infrastructure in place, any unexpected downtime had the potential for severe business disruption and data loss, costing millions in lost revenue.

Lenovo’s solution adopts SR950 servers, which are connected to DM5000H unified storage, and uses Veeam Backup & Replication software and DM3000H to synchronously backup the business data of the group.

Today, the company hosts all its core businesses on the Lenovo platform. An extremely high performance, availability and reliability platform ensure the smooth operation of Enjoy International Tourism Resort.

The active-active cluster deployment method with asynchronous data replication enables the company to dynamically failover to a spare disaster recovery site 60 kilometers away when the primary data center fails, realizing high data availability in the three centers in the two locations.
QR Pharmaceutical is a national high-tech pharmaceutical enterprise. The group has 8 or 9 branches, data is scattered in various factories, which causes untimely data sharing and ineffective data utilization rate, resulting in a waste of human and financial resources. It is necessary to build a unified information platform for the headquarters and strengthen data processing capabilities.

• QR Pharmaceutical’s branches have different requirements for servers, resulting in a wide variety of storage and server models and manufacturers. As the IT department has limited personnel, the selection of brands needs to be unified and simplified. Except for production business systems which have compliance requirements that must run on bare metal architecture, others such as OA, Email, CRM, etc. can run on a virtualized platform;
• The plan includes 3 HX3310 and 4 HX5000, 2 G7028 switches, and installation and implementation services provided by Lenovo’s engineers.
• Lay a good foundation for the customer’s data lake and realize the centralized management, distribution and utilization of the data of various branches and departments.
• According to customer feedback, Lenovo’s hyper-convergence solutions meet user requirements in terms of data security, such as redundancy, performance, business stability, and data integrity.

QR Pharmaceutical uses Lenovo’s hyper-convergence solution to create a private cloud for its office systems, which greatly reduces operation and maintenance costs.
**Brief Intro: Huguan People's Hospital VX Hyper-Convergence Solution**

**Case Introduction in One Sentence**

Huguan People's Hospital builds a private cloud infrastructure based on Lenovo VX hyper-convergence solution.

**Case Overview**

Huguan People’s Hospital is currently the county’s largest and strongest comprehensive second-class hospital integrating medical treatment, scientific research, teaching, preventive health care and rehabilitation. The long-term strategic goal of the hospital is to upgrade to a third-class hospital. This requires an overall upgrade of the hospital’s information systems and IT infrastructure.

**Customer's problem and Lenovo's solution**

- The customer needs to upgrade its PACS and HIS system, log audit and electronic medical records level etc. The original IT infrastructure of the hospital is old. For the long-term development of the hospital, an overall solution with strong performance, high reliability and scalability is required to meet the needs of businesses in the next 3-5 years.
- Lenovo provided 3 ThinkAgile VX3320 for the Huguan People’s Hospital, the solution is paired with 2 NE1032, and mainly operates the electronic bill management system required by the policy.

**Value for Customer**

- The customer is very satisfied with the solution, laying a good foundation for the overall upgrade of the subsequent infrastructure;
- Huguan People’s Hospital is the first to use the hyper-convergence architecture in the second-class hospitals in Shanxi Province.
### Case Introduction in One Sentence

GuoGuang Electric uses Lenovo’s virtualization solution to replace the traditional standalone architecture to reduce operation and maintenance requirements.

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### Case Overview

GuoGuang Electric is currently one of the most systematic, professional and large-scale speaker and speaker design and production company in the world. The covid-19 epidemic has spawned demand of speakers for video conferencing and voice calls. Annual sales have grown from 4 times. Server room space is not enough for large amount of new equipment, the customer decided to adopt a virtualization solution.

### Customer's problem and Lenovo's solution

- The customer has a total of 50-60 sets of IT equipment and 2 IT hardware engineers. The problems are slow launch of new business systems, low server utilization, difficult operation and maintenance management, high software and hardware update frequency, poor data security, and poor data sharing.
- Lenovo configures 3 SR590 servers as a computing resource pool, and deployed VMware EXSI6.7 in a cluster mode, with VMware HA cluster to improve the continuity of business system operation. DM5000H storage system is configured and mapped to 3 SR590 servers through fiber links, which is used as the storage resource pool of the virtualization platform, with 2 B6505 fiber optic switches.

### Value for Customer

- The virtualization solution has solved the customer’s problems and accelerated the launch of new business systems and hence improved the customer’s competitive advantage in the industry.
- Through the construction of this virtualization solution, the space occupation rate in the data center is reduced by 50%, and the overall operation and maintenance cost is reduced by 50%.
Huazhong Agricultural University adopts the Lenovo HPC system with high I/O bandwidth to meet the computing needs of the third-generation gene sequencing.

The National Key Laboratory of Crop Genetic Improvement of the university mainly processes third-generation sequencing data with an accuracy of 99.9999%. But the disadvantage is that the amount of calculation is much larger than that of second-generation sequencing, and hence requires higher HPC computing power.

- The system should be able to support 5PB of data; and meet 300TFlops of computing power. As insufficient storage performance, will slow down the entire HPC system, the customers have high storage requirements.
- The HPC solution provided by Lenovo includes 2 SR650, 95 SN550 computing nodes, 3 SR950, 6 Mellanox switch networking, 6 switches, and 1 8PB DSS-G240 storage, 40GB bandwidth, with LiCO, RHEL, GPFS and Intel IPS.
- The system satisfies the theoretical double precision peak value of computing nodes ≥300Tflops, Linpack's measured efficiency ≥65%, and meets the 56Gb/s communication requirements.
- The GPFS parallel storage provided by Lenovo has higher bandwidth in actual application than the performance during testing.
- The LSF job scheduling system provided by Lenovo is more sophisticated in management than the customer’s previous open-source PBS job scheduling system.

Case Picture
**Brief Intro: Qilu Hospital of Shandong University Hyper-Convergence Solution**

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<thead>
<tr>
<th>Case Introduction in One Sentence</th>
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<tr>
<td>Qilu Hospital of Shandong University builds a private cloud platform based on hyper-convergence technology provided by Lenovo to support non-core business systems.</td>
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<td>Qilu Hospital of Shandong University is a tertiary A with hospital 5,000 beds, directly affiliated to Shandong University. The long-term goal of the hospital is to complete the review of level-6 electronic medical record system; and to complete the construction of active-active data center. It is necessary to upgrade and migrate the software and hardware to meet the long-term development needs of the hospital.</td>
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<td>• The existing virtualized storage in the hospital has no cross-data center protection, single point of failure may occur; the system adopts a unified storage architecture, horizontal scalability is close to the bottleneck, may affect the user experience during peak period; the independent design of each business system causes difficulty in the design of the disaster recovery system.</td>
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<td>• Lenovo uses 16 HX5520 to build an active-active virtualization platform to integrate the original silo architecture; the overall deployment is across data centers (second-tier). The platform is running core business system except for the HIS, LIS and PACS; PACS data is stored in DF storage and DM storage system.</td>
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<td>• Virtualization and storage performance are greatly increased, latency is reduced by dozens of times, and the frequency of business jams is greatly reduced; data security is enhanced with no single point of failure.</td>
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<td>• The new system conforms to the hospital’s technical architecture for the next ten years.</td>
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**Guizhou Provincial Tax Service, State Taxation Administration VDI solution**

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<td>Guizhou Provincial Tax Service, State Taxation Administration (South West Prefecture) has adopted a VDI solution to replace the traditional PC office system, which greatly reduces the burden of operation and maintenance and ensures data security.</td>
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<td>Guizhou Provincial Tax Service (South West Prefecture), is directly under the State Council in charge of taxation work. Low efficiency caused by IT infrastructure will cause problems such as congestion in the service hall. Therefore, the customer’s goal is to improve the quality of service by consolidating IT infrastructure.</td>
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<td>• The goal set by the customer is to reduce the burden and cost of operation and maintenance; to provide office staff with convenient IT services. The customer currently has 200 PCs and 2 operation and maintenance staff, who are under great pressure. Users need to switch between internal and external network, in the past, 2 PCs and 2 monitors need to be deployed for each user, causing complex operation and maintenance, and serious data security risks.</td>
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<tr>
<td>• Lenovo customized a VDI solution for the customer, deploying 3 SR860 servers with the installation of VMware horizon software, 100 V300 G3 terminals, 50 monitors, 50 KVM switches and 3 switches on the back end.</td>
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<td>• Operation and maintenance cost savings, electricity bills, and increase in service life have reduced the overall TCO of users by 30%;</td>
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<td>• Data security issues have been solved; the convenience brought by terminals far exceeds that of PC desktops, which has optimized office performance.</td>
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