VMware Helps Xiamen University
Cope with Challenges of Digital Campus Building

厦門大學
XIAMEN UNIVERSITY

Sector:

Education

Region:

Xiamen, China

Main challenges:

Xiamen University Malaysia Campus needs to build a flexible, efficient, and scalable virtual system architecture based on its development characteristics. XMU needs to transform from the traditional storage architecture to the software-defined storage architecture vSAN to adapt to the current development.

Solution:

VMware vSAN and the virtualization solution of VMware are used to create a VM cluster to extend the network scale of the new campus. After the results are validated, the main campus adopts the tailored VMware vSAN solution to promote its campus informatization.

Established in 1921, Xiamen University (XMU) is a national key university directly affiliated to the Ministry of Education of the People's Republic of China. XMU has long been listed among China's leading universities in the national "211 Project" and "985 Project". XMU covers a total area of over 9,000 mu, and a building area of over 2.1 million square meters. With a graduate school, 6 academic divisions consisting of 28 schools and colleges, and 14 research institutes consisting of over 200 research bodies, XMU boasts a total enrollment of nearly 40,000 full-time students.

In July 2014, Xiamen University Malaysia Campus started its construction as the first overseas branch campus established by a Chinese university. In February 2016, Xiamen University Malaysia Campus held the commencement ceremony for the first enrollment of students. With 13 majors, Xiamen University Malaysia Campus boasts a total enrollment of over 2,800 full-time students and a total of 216 faculty members. Hailed as a pearl of the One Belt, One Road strategy, Xiamen University Malaysia Campus represents a new milestone in the higher education cooperation between China and Malaysia.

With the rapid development of Mobile Internet, colleges and universities face the following four knotty problems of campus informatization: how to provide teachers and students with full coverage of stable and efficient campus network, how to build an information-based system with improved flexibility and easier access to boost new services and the teaching and research industry, how to ensure campus information security, and how to vigorously support the information management of branch campuses. While addressing the preceding problems, XMU needs to deal with challenges arising from the differences between the main campus and the branch campus.

Challenge of the branch campus during inception: The basic system architecture must adapt to the campus development pace

Xiamen University Malaysia Campus has a small scale at the beginning of inception, while the campus's future development scale is difficult to predict. The campus requires a flexible and scalable basic system architecture that satisfies strict requirements of cost and budget. The system architecture must meet all the requirements of campus informatization, with the ability to scale up flexibly and quickly as the campus scale expands to vigorously support the branch campus' teaching and services.

New challenge of the main campus: urgent need for a stable, reliable, and easy-to-maintain system architecture which is adaptable to development

As a prestigious university with a large number of full-time teachers and students and a sophisticated teaching and scientific research system, XMU is highly dependent on information-based systems for daily teaching, office business handling, and management, and is in need of robust network support for the audiovisual education, email system, scientific research system, all-in-one campus card system, and asset management. The traditional basic architecture is complex to deploy with high O&M costs, and no longer adaptable to the current development of XMU.

XMU is in urgent need of a stable, reliable, and easy-to-maintain new architecture to address the knotty problems of campus informatization, deal with the changes arising from campus expansion, and update the campus' information network systems to boost the development of scientific research and teaching.

VMware is a global leading vendor of desktop-to-data center virtualization solutions, helping customers of different scales in the world to reduce costs and operation fees, ensure service continuity, improve security, and start green operation. After meticulous survey, XMU decided to give up the traditional architecture (FC storage) and, after validation, chose VMware's vSAN and virtualization solution for Xiamen University Malaysia Campus.

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The solution has a software-centered system structure to integrate computing, storage, network, and virtualization resources into the same hardware device, featuring a range of technologies such as computing, network connection, storage and server virtualization and a series of functions such as backup software, snapshot, duplicate data deletion, and online data compression. The solution can aggregate multiple single-function devices based on a network to implement seamless and horizontal modular extension and build a unified resource pool for the information center which is reliable, flexible, scalable, and low-cost.

After more than one year of validation, the solution is highly recognized by XMU for its excellent performance in the Xiamen University Malaysia Campus, and thus XMU decided to gradually change the original storage architecture to the software-center vSAN architecture in the main campus. vSAN and the virtualization solution effectively help XMU cope with the challenges of campus informatization while developing at a stable pace with diverse benefits.

VMware products and services

VMware vSAN

Branch campus:

4x Node

（Dell server, 1xCPU/Node;8T）

4x Node

（Dell server, 2xCPU/Node;16TB）

Main campus:

33 nodes in total, with each node featuring 2CPU/20T

Trial operation time:

March 2016 for Xiamen University Malaysia Campus

January 2017 for XMU

1、Flexible scalability, helping the branch campus to grow

As the first overseas branch campus established by a prestigious Chinese university, Xiamen University Malaysia Campus is independently operated by outstanding XMU under the support of Chinese and Malaysian governments. Though the initial scale is limited, the branch campus has a bright future. VMware vSAN and the virtualization solution are flexible and quick to scale up, highly suitable for the branch campus development.

The solution adopts the traditional x86 server architecture for horizontal scaling, where nodes can be added with flexibility to adapt to service development. The branch campus adopted 4x Node (Dell server, 1xCPU/Node; 8T) initially, which has doubled in scale as the campus grows. Based on this virtual architecture, Xiamen University Malaysia Campus introduced about 70 virtual machines (VMs) to run servers such as DHCP, DNS and network authentication servers, and systems such as the all-in-one campus card system and the financial system. The solution is flexibly scalable to adapt to the future school development.

2、Stability and reliability, ensuring comprehensive information security

The branch campus has encountered power failures many times due to limited local conditions. Even under the circumstances of unstable infrastructure and power supply, vSAN has been operating stably with quick restoration and no data loss. The cluster only takes 15 minutes to start and processes service access immediately after the network is connected. The speed nearly doubles that of the traditional storage architecture. vSAN ensures data security with minimum local IT intervention. This reduces the basic architecture cost and simplifies the disaster recovery (DR) operation and management at remote DR sites.

3、Wide applications, playing an important role in multiple fields

At XMU, the vSAN cluster has 33 physical machines consisting of about 600 VMs, 70% of which run on vSAN to carry campus informatization applications based on the virtual architecture, such as the network authentication system, log system, all-in-one campus card system, email system, OA, educational administration, human affairs, student work, assets, and website group.

The following describes the important role of VMware vSAN with regard to the email system, information security, and medical service as examples.

● **Email system**

The email system of XMU has nearly 100,000 users, with an average daily IOPS of about 1,000–2,000 and a single cluster peak value close to 70,000 IOPS, handling over 3 million emails every day. VMware vSAN processes services in order and effectively distinguishes spams and virus-infected emails.

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VMware vSAN integrated solution is secure, stable, and reliable. The solution plays an important role in the campus informatization of Xiamen University Malaysia Campus and drives the basic system architecture construction at the main campus of Xiamen University. VMware vSAN is an effective and cost-efficient software-defined storage solution.

——**He Weiping**
Senior engineer
Information and Network Center of Xiamen University

●Information security

XMU has about 100,000 network users passing through 6G network egresses. XMU is legally required to collect and maintain logs related to all the devices with network access. The average daily log volume of each service is 200 GB to 300 GB. With the powerful performance of VMware, vSAN ensures smooth service implementation on a daily basis and provides robust data assurance.

●Medical service

Xiang'an Hospital is a grade A tertiary general hospital affiliated to XMU. Initially, the hospital has 1,000 beds, and plans to increase to 3,000 beds, expected to put into use in July 2018. The hospital has a vSAN architecture operating about 100 VMs, of which about 40 are heavy-load database VMs and 60 are medium- and light-load VMs. vSAN and Stretch Cluster are combined to implement a cross-data center active-active architecture, effectively ensuring hospital operation.

4、Simple and low-cost O&M, helping the university save labor and investment

VMware's vSAN provides simple, cost-efficient, and highly available solutions to manage remote offices and branches with minimum local IT intervention, greatly benefiting branch campus informatization.

vSAN is easy to install and deploy and is highly compatible with architectures of different brands such as Dell, Huawei, and Lenovo. In O&M, the management personnel can select the license for each VM or CPU from vSAN with improved flexibility to obtain higher values.

vSAN uses the cost-efficient standard x86 servers without having to operate FC switches or perform complex storage operations, achieving faster and more efficient system delivery. This not only reduces the workloads of the O&M management personnel but also drives down costs for the university. Compared with traditional storage, vSAN reduces costs by 30% and improves the virtual platform delivery and change efficiency by over 90%, highly praised by the school's management personnel.

Looking forward

In the future, XMU will continue cooperation with VMware. As the branch campus continues the growth momentum and the affiliated hospital extends the scale after put into operation, XMU will increase VMs and extend the network storage size with flexibility to adapt to service changes. As the main campus poses increasing demand for basic systems to support multiple services, XMU will further build and optimize the campus network architecture to safeguard its development.