



Providing a good, high-class education service through the implementation of an advanced e-campus environment

Significantly improved flexibility and speed – just some of the astounding benefits from Cisco “UCS”



Pusan National University has recently gained much attention through the implementation of the virtualization of its IT infrastructure, including servers. Virtualization is an essential step towards improving speed and agility across an organization, with flexibility added to an inflexible data center so as to reduce the cost. There is a particular rising interest in building a virtual environment in concert with the recent cloud computing issue. In this case study, we look at the advanced e-campus of Pusan National University that has implemented a VDI (Virtual Desktop Infrastructure) environment along with server virtualization with “Cisco UCS”.

Pusan National University, which was established in May 1946 to nurture talented young people capable of stepping up to the mantle to lead the future of Korea, has been one of the leading educational institutions in the Busan-Gyeongnam area ever since its establishment. Performing a key role in establishing a cooperative network in the southeastern metropolitan region, Pusan National University is a heavy investor in IT-informatization, transforming itself in the process into a university with a world-class capability in research.

The reason behind Pusan National University playing an initiating role in server virtualization is to provide the best service to professors and students there through improvements in terms of network speed and agility.

Pusan National University expects server virtualization to improve the efficiency of IT infrastructure on its campus and thus greatly contribute to establishing an advanced campus that make better use of IT. Further, the university has put in place a roadmap to extend virtualization from servers to cover the full IT infrastructure on the campus and, thus, move into a cloud computing environment that improves agility while reducing cost.

Facilitate effective teaching with advanced IT

Pusan National University gradually adopted virtualization to part of its service from 2009, quickly taking on board cutting-edge IT. At first, the university applied virtualization to some of its on-campus application servers with a view to check the effectiveness while reducing the cost by using existing individual servers. After 2009, Pusan National University thoroughly examined the advancement of virtualization technology and its 2 years of experience in running the virtual environment. Finally, in 2010, it



extended the virtualization to servers used for course registration. In 2011, the university established a roadmap to turn its entire IT environment into a virtual environment and, accordingly, started setting up a virtual environment as well as replacing its existing degraded servers with “Cisco UCS (Unified Computing System)”.

Cisco UCS is x86 Blade System, a strategic product presented by Cisco to target the cloud environment. Cisco UCS provides four times the memory slots of other x86 servers and thus offers more benefits in a cloud computing environment as it is capable of creating more VMs (Virtual Machines) with a reduced number of servers.

“Stand-alone equipment has increased the demand for complicated cabling when extending a network and it also causes many problems due to heating. We examined the Blade Server and finally chose Cisco UCS as it provides more benefits in a virtual environment”, said Seo Jeongcheon, Head of the Pusan National University Information and Computer Center.

It is also worth noting that it is the university unified section connects the server and storage layer alongside server virtualization. By installing Cisco Nexus Switch in a server farm, various storage systems, including SAN, NAS as well as iSCS, were able to be connected. Through this, the university unified connections between its storage and servers, improving both their maintainability and reducing the cost, as it does not require adopting a separate SAN switch.

Pusan National University also implemented VDI (Virtual Desktop Infrastructure) along with server virtualization in order to bolster network security. Relocating developer’s and on-campus service operator’s PCs to UCS allowed them to work in a VDI environment while reducing the risk of security incidents that may otherwise occur.

Improved security and reduced cost with VDI

A virtual laboratory using VDI is a typical example of Pusan National University’s advanced IT infrastructure. Any student in Pusan National University is able to access the virtual lab, which is set using VDI environment, and thus is free to practice anytime, anywhere. Currently, the virtual lab provides about 60 virtual desktops environments for its students and teaching staff to conveniently make full use of them.

With virtualization, Pusan National University has benefited from reduced cost and improved performance. In general, a university’s information and computer room deals with its greatest loads during application and course registration periods. As a great number of users access the university’s network at a specific time to submit applications or select the course they want to take, the network can become overloaded. To avoid such a situation, many universities rent extra servers during application or course registration periods. However, Pusan National University enables smooth access even when a huge number of users simultaneously access the server, for example during the course registration period, as it has improved performance and flexibility through server virtualization based on Cisco UCS. The university solves the overload problem by simply adding VMs on Cisco UCS and allocating them for course registration during this period.

“As we created a powerful system environment capable of allowing 30,000 users on to the system at one time during application and course registration periods, we don’t need to set extra infrastructure temporarily during the time, when students tend to bombard the system. We will continue to work toward enabling on-campus IT such as the course registration and virtual lab to support classes that run smoothly”, said Kim Jaegab from Pusan National University Information and Computer Center.

Another benefit from server virtualization is that Pusan National University was able to improve the ease of management. Individual server environment required more time and effort to create a new service or make modifications to several parts, including network setup, should a change need to be made. However, it is now possible to immediately meet requirements with ease and thus to manage the system through server virtualization, resulting in upgraded IT service quality.

Better management convenience, thanks to server virtualization

“A task that used to take about 30 minutes, now takes only 5 minutes and that’s thanks to our adoption of Cisco UCS. Physical error is also reduced and so is the number of times that we have to go into the server room”, said Seo Jeongcheon, Chief of Pusan National University Information and Computer Center.

This benefit resulted in an enhanced reduction cost. The university can reduce costs as it does not need to bring in new servers. In addition, the reduction in maintainability cost is estimated to be about 14 million won a year.

Pusan National University plans to extend virtual environment and eventually turn its on-campus data center into a cloud computing environment. Currently, most servers run as VM, but there are still a number of servers separately managed by some organizations in the university, including the server for professors’ offices.

Pusan National University Information and Computer Center’s plan is to integrate these servers into its virtual environment because the integration into the central data center with virtual environment implemented has benefits in terms of reducing costs while providing resources more smoothly.

“Implementing the cloud data center through the expansion of virtualization”

- Seo Jeongcheon, Chief of Pusan National University Information and Computer Center, Kim Jaegab, a member of Information and Computer Center

■ Background of introducing the server virtualization

In time for replacing the existing degraded system, we examined virtualization as a measure for reducing cost. We were well aware of the advantages and benefits of virtualization, as we changed and used some servers, including our on-campus application server, as part of a virtual environment from 2009. Based on our 2 years of experience in running the virtual environment and the development of more advanced virtualization technology, we extended the virtualization to cover the servers used for course registration in 2010, confident of the benefits we would gain from virtualization. Subsequently, we came up with a roadmap to set up the entire environment as a virtual environment and completed the virtualization project with “Cisco UCS”.

■ Rationale behind choosing Cisco UCS as HW for virtual environment

We checked several vendors' products after making a decision to converting the physical servers into a virtual environment. Our first condition was for the Blade type because we believed that the Blade type would give us more benefits in terms of cable rings or heating. Among Blade servers, we determined that Cisco UCS is optimized for the virtual environment and, thus, chose it. Plus, Cisco UCS perfectly suits our roadmap to use Milyang Campus as a DR center, since UCS has a structure that is easy to copy and transfer the VM image as is. Hence, DR environment setup is another reason behind choosing Cisco UCS.

■ Advice to other universities which are considering to accept virtualization

Virtualization results in a significant cost reduction. Pusan National University has experienced a benefit in terms of work efficiency, convenience as well as maintenance cost reduction. It would be better to prepare a master

plan for replacing servers or adopting new server by stage. By doing so, a school may set virtual environment without needing to go through a process of trial and error while also deriving a wider range of benefits.



▲ Seo Jeongcheon, Head of Pusan National University Information and Computer Center (right), Kim Jaegab, a member of Information and Computer Center (left)

■ Further plan for advancement of IT environment

We are planning to extend the virtualization of server separately managed by a certain organization while implementing the virtual network and storage duplexing. Through this, we will complete the cloud data center and consequently, implement a faster IT environment. We will also upgrade the DR system and implement a more powerful data protection environment in order to maintain service continuity and promptly restore the system where necessary.

The plan also includes duplexing storage and extending the virtual environment across the network in order to complete the cloud data center and, accordingly, implement IT environment more rapidly.

Plus, the university plans to implement a powerful data protection environment by upgrading the DR (Disaster Restoration) system. The plan is to use Milyang Campus as a DR center in order to maintain the service continuity and perform rapid restoration in case of an error occurring in the central data center on Pusan Campus,

“Smooth disaster recovery is also one of the reasons behind adopting Cisco UCS. Since UCS has a structure that is easy to copy and transfer the VM image as it is, it perfectly suits Pusan National University’s plan to utilize Milyang Campus as a DR center”, said Kim Jaegab.

Continued efforts to enhance the university

Pusan National University is a typical example of a university that supports classes that run smoothly by actively accepting the most advanced IT. It is also known that the server virtualization implemented by Pusan National University provided a benchmark against which C University in the Jeonnam region promoted virtualization.

Pusan National University has set up a faster, more convenient and more reliable network infrastructure by adopting not only server virtualization, but also gigabit networking and network duplexing, in advance of other universities. Plus, the university

is taking the lead in strengthening security as it has introduced ESM (Enterprise Security Management), again before other universities have done so.

“In order to become a university with a competitive edge in the information age, a harmonious mix of IT and resources is indispensable. The information and computer center, as a key organization of the university, will continue to work to establish various information systems, as well as to upgrade education and research infrastructure and advance the university administration”, said Seo Jeongcheon, Head of Pusan National University Information and Computer Center. Meanwhile, this interview was also conducted using a video conferencing system that connected the Cisco Korea head office located in Seoul with the Pusan National University Information and Computer Center. This advanced video conferencing system, likewise, shows Pusan National University’s outstanding IT infrastructure and how to make the best use of it. Pusan National University conducted a meeting with Cisco Korea every week while this virtualization project was carried out, helping to set up the virtual environment in a prompt fashion. Having experienced the benefit of video conferencing, the university plans to hold further video conferences in the future.