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Improving Virtual Desktop Infrastructure Performance with Intel® Solid-State Drives

Shandong University of Science and Technology utilizes the EVENDATA* cloud computing solution, integrated with Intel ® Solid-State Drive DC S3500 Series, improving the storage performance of its data center while reducing total cost of ownership

山东科技大学
SHANDONG UNIVERSITY OF SCIENCE AND TECHNOLOGY

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"The EVENDATA eCLOUD* solution, which integrates Intel® Solid-State Drive (Intel® SSD) DC S3500 Series, meets SDUST's need for data-reading performance, scalability, and storage expansion to ensure that our virtual desktops and other applications run smoothly on our current data center setup. With its excellent data-reading performance, Intel SSD DC S3500 Series effectively responds to the high I/O impact that results from using the virtual desktop infrastructure for teaching, as well as significantly reducing SDUST's data center management cost by 50 percent."

Cui Ran,
Network Center Director,
SDUST

Founded in 1951, Shandong University of Science and Technology (SDUST) is a key university located in Shandong Province, China, which currently has over 39,700 full-time students. By building a unified data center and adopting a virtual machine solution, SDUST uses virtual desktops to carry out teaching and research missions. However, as various teaching domains become more dependent on information technology, and more users utilize virtual desktops, SDUST's IT framework–composed of traditional mechanical hard disks with limited performance–could no longer keep up with the demands of running applications under a virtual desktop environment.

Challenges

- **Shorten boot time of virtual desktops.** Improve user experience by reducing the time it takes for virtual desktops to start, especially when most desktops are started simultaneously.

- **Boost data center storage performance.** Enhance data access performance of the data center's storage system, and eliminate delays in running virtual desktop applications with frequent read/write operations.

- **Better storage utilization.** Available storage capacity in the existing infrastructure could not be fully utilized, which drove up hardware and maintenance costs.

Solution

- **Deploy the EVENDATA eCLOUD* cloud computing solution integrated with Intel® Solid-State Drive (Intel® SSD) DC S3500 Series.** Adopt a cloud VMware-based cloud solution to improve storage utilization and utilize Intel SSD DC S3500 Series to improve system performance and remove the read/write bottleneck.

Impact

- **Improved user experience.** Previously 45 seconds, start time for the virtual desktops is now 20 seconds, reducing boot time by over 50 percent.

- **Improve storage utilization.** SDUST cut down on the number of drives being used to store data by over 50 percent, while meeting data center I/O performance requirements.

SDUST used to adopt a traditional virtual machine deployment solution in its data center, maintaining several virtual desktops on mutually independent physical servers. Explains Cui Ran, Network Center director at SDUST, "Under this architecture, as the storage of data keeps growing and producing new storage needs, the university has to update all existing servers. We needed to purchase hard disks with higher capacity for replacement and expansion even if there is still storage space left in some servers due to the mutual independence of each server. The costs of the hardware itself and of system maintenance were very high."

SDUST was also dealing with the problem of slow boot time for virtual desktops, especially when a large number of users boot the virtual machines concurrently. At present, it takes more than 45 seconds to boot a single virtual desktop. However, technicians in the university noticed that the usage rates of the server processors

and network were not that high, which means the servers still had enough computing capacity to support more virtual desktops. They found out that the slow boot time of the virtual desktops was due to the read/write bottleneck with the traditional mechanical hard disks. Software performance also suffered. Advanced users such as those using software development tools were impacted more severely. The poor performance of the virtual desktops had seriously affected the teaching efficiency and learning experience..

Aiming to address these challenges, SDUST needed a new solution that will deal with storage performance, storage expansion, and the daily boot storm.

Boosting Virtual Desktop Infrastructure Performance with Cloud Computing

SDUST chose the EVENDATA eCLOUD solution to address its virtual desktop infrastructure (VDI) challenges, after comparing several solutions. The EVENDATA eCLOUD

Deploying the EVENDATA eCLOUD* solution integrated with Intel® SSD DC S3500 Series helps SDUST significantly improve virtual desktop performance
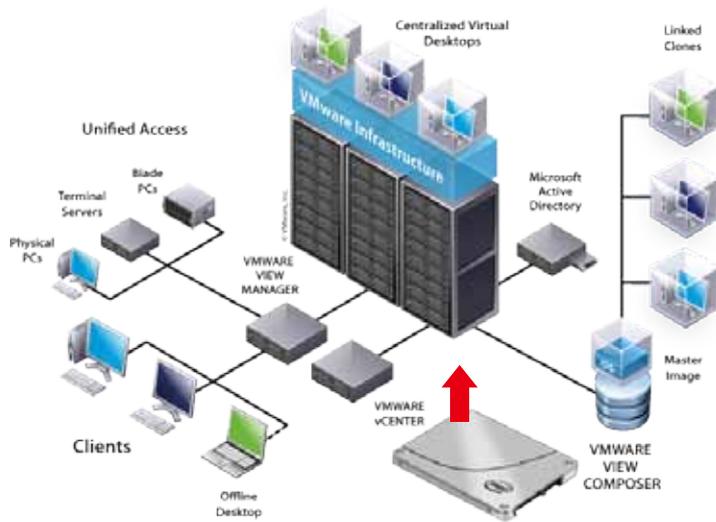
SDUST's virtual desktop infrastructure deployed with the EVENDATA eCLOUD* solution using Intel® SSD DC S3500 Series as cache

solution incorporates Intel SSD DC S3500 Series for high-performance I/O requirements.

Four servers equipped with eight 480 GB Intel SSD DC S3500 Series and 24 TB of hard drive storage were deployed to handle over 50 applications including, among others, fixed-assets management system, campus forum, email system, and deep analysis of network flow.

Improving Storage Expandability

By adopting the EVENDATA eCLOUD solution with Intel SSD DC S3500 Series, SDUST was able to transform the previous scale-up storage architecture of its data center into a scale-out storage architecture. Through a virtual storage solution, storage of previously mutually independent physical servers was connected to form a large-scale storage pool that can be used by shared machines.

"By adopting a virtual storage solution, our data center can now make effective use of existing resources. When the system needs to be expanded, we can easily expand the storage capacity and improve storage performance by adding normal servers into the infrastructure. This solution allows us to scale efficiently as needed," says Ran.

Reducing Boot Time While Improving Data Read/Write Performance

SDUST also took a tiered approach to its data storage. To enhance virtual desktop performance and reduce boot time, operating systems and frequently accessed data were stored on the Intel SSD in the eCLOUD solution. Infrequently accessed data were stored in traditional hard drives to reduce total storage cost.

During the test, 400 virtual desktops were able to start efficiently in just 13 minutes, or at least 30 virtual machines every minute. "When using traditional mechanical hard disks, the starting time usually took over 30 minutes, which means only 13 virtual desktops can be started every minute. With the new solution, boot time was only 20 seconds for each virtual machine, a reduction of more than 50 percent" notes Ran.

Intel SDD not only reduces boot time but also improves software performance. "For example, when visiting the website in our course selection system, students can now make queries and search for courses in less than one-third the time. This has effectively relieved the high concurrency pressure in the university's course selection system,"

explains Ran.

Enhancing Overall Data Center Performance

Deploying the eCLOUD solution integrated with Intel SSD DC S3500 Series also allowed more virtual machines in the data center to be deployed on each physical server, which not only boosted I/O performance but also provided more virtual desktop services to users.

In the future, SDUST and EVENDATA aim to optimize the new solution by cooperating with Intel to further improve the use ratio and performance of Intel SSD by applying technologies such as automated tiered storage, and deploying more advanced Intel SSD solutions into other applications.

Find a solution that's right for your organization. Contact your Intel representative, visit Intel's Business Success Stories for IT Managers (**www.intel.com/itcasestudies**) or explore the Intel.com IT Center (**www.intel.com/itcenter**).