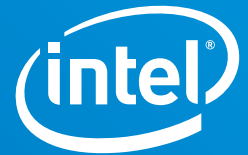


## Case Study

Intel® Optane™ SSDs  
2nd Gen Intel® Xeon® Scalable Processors  
Data Center



# Improving I/O Latency with All-Flash HCI Using Intel® Optane™ SSDs for Caching

**Seijo University uses Intel® Optane™ SSDs to balance cost and performance with low latency and consistent stability.**

## Seijo University

[www.seijo.ac.jp](http://www.seijo.ac.jp)



Seijo University is a university for humanities and social sciences. It offers four colleges (College of Economics, College of Arts and Literature, College of Law, Faculty of Social Innovation) with 11 departments and aims to nurture "self-reliance" in its students so that they can survive in the globalized world. The Media Network Center (MNC), which manages the university's overall IT infrastructure, is now deploying advanced IT technologies with the aim of letting the students experience "today's IT." In 2016, a room previously used as a traditional computer lab was refurbished and transformed into a café-style lounge to be used as a study room. Students may borrow PCs or otherwise use their own devices under BYOD (Bring Your Own Device) policies, which allow students to freely access various types of information from the university campus.

In addition to maintaining PCs and facilities, the MNC at Seijo University manages the entire on-campus IT infrastructure, including the network environments such as Internet or Wi-Fi, emails used by the students and academic staff, the library system, the server environment which runs applications used by research departments and the security appliance management environment. In 2014, Seijo University adopted VMware vSAN as a virtualization platform supporting the on-campus IT infrastructure in its migration to hyperconverged infrastructure (HCI).

## Challenges

- Improving the stability of the HCI storage foundation
- Improving performance

## Solution

- 2nd Gen Intel® Xeon® Scalable processor
- Intel® Optane™ SSDs
- VMware vSAN (VMware)

## Results

- Improved I/O latency from milliseconds to microseconds
- Improved application response
- More efficient system management

"I/O latency, which used to be milliseconds in the previous HCI environment, improved to microseconds.<sup>2</sup> It led to a huge improvement in application response for security and log management."  
– Mr. Igarashi

At first, they operated on a hybrid configuration of SSDs and HDDs, but their performance proved to be unstable and insufficient. "In 2014, VMware vSAN was still a nascent technology and I faced a lot of operational challenges. I/O workloads of management applications were heavy and when batch processing was performed in the library system, I had to cope with a demanding workload," recalls Mr. Kazuhiro Igarashi, Manager of the MNC.

## Low Latency and Consistent Stability Intel Optane SSDs Selected for the Next HCI

Five years had passed since VMware vSAN was first deployed and the university was at the point of hardware replacement, so they considered migrating to the next HCI. All-flash configurations were deployed for the next-generation platform where high-speed SSDs and NAND SSDs were combined to find the optimal balance between cost and performance. In this process, they turned to Intel® Optane™ SSDs to be used for high performance storage. Mr. Igarashi had been participating in the VMUG (VMware User Group) for some time, and had researched up-to-date technical information. He decided on Intel Optane SSDs because of their low latency and consistent stability.

"Intel Optane SSDs, which process data at the memory cell level, provide random access with lower latency and higher throughput, compared to NAND SSDs which refer to data at the page level by binding multiple memory cells.<sup>1</sup> Each storage cell has higher aerial density as it does not use transistors, enabling us to implement large-capacity memory while saving space" notes Mr. Igarashi.

For the replacement with HCI using All-Flash, instead of using hardware pre-validated with a certification solution (Ready Node), they configured their own by combining components validated for compatibility. The university started the project in September 2018, and began performing an assessment in earnest in November. In April 2019, the new system started running on the new HCI environment and in September, they completed the migration from the existing system running on the old environment.

## Improved I/O Latency from Milliseconds to Microseconds

The new HCI platform is configured with nine hosts, of which six are for workloads and three are for management. Currently, 90 to 100 virtual machines are running on nine hosts and they plan to scale virtual machines according to user requests. Seijo University adopted 2nd Gen Intel® Xeon® Scalable processor-based servers. There are six 10G network ports in total on each host, of which two are used for storage and another two are used for communication between workloads.

For the workload cluster, two 375 GB Intel® Optane™ SSD P4800X are inserted in one host to be used as cache.

By moving to the new system, the university saw a significant improvement in performance and system stability as expected. A unit of measurement for I/O latency, which used to be milliseconds in the previous HCI environment, improved to microseconds.<sup>2</sup> It led to a huge improvement in application response for security and log management.

"Performance improvement related to write in the management system is particularly evident. Previously, as write to DB took a long time, I used to go out for a coffee or do other processing in the back end during that time, sometimes completely forgetting about it. It feels so much better now that responses are returned immediately. These improvements eventually led to more efficient management operations, which in turn has given us more time to try introducing new technologies into the Media Network Center."

– Mr. Igarashi

## Considering Use of Kubernetes for System Virtualization

Seijo University plans to replace their Wi-Fi system in 2020 to run virtualized appliances on HCI. They are launching a new initiative to use Kubernetes, which manages containerized workloads, for system virtualization that will validate performance and workloads for the continuous migration from virtual machines to containers on the HCI environment.

The university is also considering using and analyzing stored data from the HCI environment by building a separate data lake that stores image data or audio data obtained from interactive AI robots provided to the students. They are exploring various new technologies in the design of IT environments to be implemented in a few years' time. "We plan to implement the latest IT so that the students can fully enjoy their university life. We expect Intel to meet our demands with their extensive range of technologies covering processors to SSDs, networks and IoT devices," says Mr. Igarashi.

Learn more at <https://intel.com/optanedatacenter>



1. Based on tests by Intel comparing Intel Optane SSD DC P4800X and Intel SSD DC P4600. Source: Intel. "Breakthrough Performance Expands Datasets, Eliminates Bottlenecks." January 2019. [intel.com/content/dam/www/public/us/en/documents/product-briefs/optane-ssd-dc-p4800x-p4801x-brief.pdf](https://intel.com/content/dam/www/public/us/en/documents/product-briefs/optane-ssd-dc-p4800x-p4801x-brief.pdf).

2. Source: Seijo University internal testing.

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Performance results are based on testing as of dates shown in configurations and may not reflect all publicly available updates. See backup for configuration details. No product or component can be absolutely secure.

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