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Northern Arizona University
Case Study

Nexenta Delivers Software-Defined Storage Benefits to Support Growth at Northern Arizona University

Flagstaff, AZ
www.nau.edu
Education and Research

Summary

Challenge: Strained storage capacity and declining response times, especially during usage spikes
Solution: NexentaStor
Platform: Dell, SanDisk, Citrix
Use Case: Storage Update / Performance Improvement

Benefits:
• Improved performance
• Ease of scalability
• Dynamic allocation
• More efficient use of hardware

Business Overview

Northern Arizona University (NAU) is a public university offering undergraduate, graduate, and professional degrees. The main campus in Flagstaff accommodates more than 20,000 students, with an additional 7,000 students enrolled in NAU's 36 extended campuses throughout the state of Arizona. Originally founded in 1899, NAU offers 87 bachelor degree programs, 48 master's degree programs and 10 doctoral degree programs, along with 38 undergraduate and 26 graduate certificates.

The centralized Information Technology Services Department must make sure everything runs smoothly for students, faculty and administrators. This includes telecommunication services; network infrastructure; Internet connectivity; web services such as payroll, HR, enrollment and financial aid; remote desktop support; specialized academic software packages for both Windows and Mac environments; and more.

Hardware support includes VMs, thick clients (both Mac and PC), on-campus kiosks, and close to 300 printers, which are printing up to 2.5 million pages each year.

All of this is across multiple locations, labs, and departments. All of which means technology infrastructure challenges at NAU are complex enough without the team having to worry about storage.

> "
> [We now have improved] performance, an infrastructure that is far more flexible and modular, the ability to dynamically allocate and re-allocate assets without worrying about performance or storage implications, a storage pool where we can use part of our license as a separate IO test system... [and we no longer throw] more hardware at the storage problem.
> "

Tobias Kreidl
Academic Team Lead
Central IT

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Challenges

As NAU's IT needs grew, the strain on storage capacity began to manifest itself campus-wide in a variety of ways. One of the main factors was slow user response times because of high I/O latency. NAU had already exhausted various tuning options. NAU's disk storage capacity was running out, and it experienced high IOPS during usage spikes that were saturating the capabilities of the existing storage array.

"It was a vicious cycle," according to Duane Booher, Software Systems Engineer Senior at NAU. "We kept adding more storage at more cost where the controllers were already having a hard time keeping up, but it felt more like triage than a real solution. We needed to change the way we thought about storage in order to break out of this cycle."

In light of these challenges, NAU sought a solution that would scale more effectively and remove the university from the paradigm of needing more controllers and more hard disks to handle their expansion.

Booher and his colleague Tobias Kreidl decided to move away from linear storage. They went looking for options at Citrix Synergy, with Software-Defined Storage (SDS) at the top of their list to research.

"We needed a solution that worked well with thin provisioning, that integrated smoothly with our XenDesktop and XenServer implementation, and we were determined to speak with as many companies as we could at Synergy to come away with a way out of our legacy storage implementation," says Kreidl. "We walked from booth to booth, from meeting to meeting and demo to demo until we finally came across Nexenta."

Things moved quickly from there. NAU and Nexenta worked together to create a test environment to learn to what extent NAU could leverage existing hardware in a Nexenta solution.

System Configuration

- NexentaStor
- 16TB capacity
- Dell R720 128G
- 128GB memory
- (46) 15k SAS 146GB
- Two SanDisk Optimus Ultra 150GB
- Two 10GB LACP bonds in production; a single 1GB connection in test configuration

Solution and Benefits

Solution

"Software-Defined Storage makes a lot of sense, but would be more challenging for us if it meant we had to rip and replace our existing hardware," added Booher. "NAU is a big Dell shop, and Nexenta's existing relationship with Dell makes purchasing and support very simple. We had some JBODs that we wanted to leverage and eventually replace, but replace on our own terms."

After getting a feel for NexentaStor, NAU prioritized its four main requirements as solid performance, the ability to leverage existing hardware, the means to support thin provisioning, and improved economics.

NAU students and staff no longer have to worry about unacceptably slow computers. Thin clients, thick clients, and VMs now have faster performance because of the new storage infrastructure.

According to NAU's Kreidl: "We now have better than a 93 percent cache read rate, we very rarely see latency above 10 milliseconds - a speed that's practically unprecedented here, and this type of performance is consistent even as usage spikes significantly throughout the academic calendar. The IT team used to sweat out the traffic spikes around class registration, but no longer."

Because NAU was able to retain its Dell storage infrastructure, there was no hardware rip and replace. But more importantly, NAU broke the cycle of throwing more storage hardware at the problem. The move to SDS has had other benefits as well.

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"We have seen between a 50:1 to 20:1 reduction in storage capacity since moving to NexentaStor," according to Kreidl. "On top of that, we were able to significantly reduce the amount of data under management with thin provisioning. We've also seen huge advantage with SSDs and S logs, and the difference in our spikes went from about 20K IOPS to rates of 2 to 3K IOPS now by reducing the number of reads to just a few hundred."

The end-user experience is back to where students and faculty don't even care what interface they are using. Users have the same high-performance, highly reliable experience from anywhere and any device.

"When students and faculty at NAU pay attention to IT, that's usually not a good sign. The more successful we are, the less attention we get," says Kreidl.

"In making the move to Nexenta and SDS we went out on a limb for something we really depend on," says Booher. "Whether it is performance, reliability or lower total cost of ownership (TCO), I'm very happy with how well it's gone. And as pleased as we've been thus far, we feel like we are only scratching the surface of what we can be doing. We are only using about six percent of the storage capacity we have under license."

Benefits

The original goal of the team's trip to Citrix Synergy was to shore up performance university-wide by solving NAU's storage issues. The team accomplished that and more.

"Our search parameters began with improving performance, but we wound up with so much more," concludes Kreidl. "The scalability of our academic computing technology infrastructure is far more flexible and modular. We can dynamically allocate and re-allocate assets without worrying about performance or storage implications. We have enough of a storage pool that we can use part of our license as a separate IO test system. All of this and we have jumped off the vicious cycle of throwing more hardware at the storage problem."