The Future of Higher Ed: Ohio State's Bold Move to Modernize the Student Information System

The first few weeks for a first-year university student are often a whirlwind: Moving into dorms, selecting classes, meeting advisors, and navigating the many systems that will shape their academic journey.

Ideally, students remain blissfully unaware of the intricate technology that undergirds this experience. As Ginger Breon, chief technology officer and interim chief information officer for the Office of Technology and Digital Innovation (OTDI) at The Ohio State University (OSU), puts it, "When you're managing a technology team and the magic is happening behind the curtain, most people don't care," Breon says. "But the return on investment is high, and the impact on the academic missions is significant."

Ensuring a seamless student experience requires substantial behind-the-scenes effort, as Ohio State recently demonstrated. After an exploratory phase beginning in late-2022, OTDI undertook a massive infrastructure overhaul from May 2023 to October 2023. The university's previous reliance on on-premise systems led to sluggish performance during peak demand periods and a monolithic system that was difficult and expensive to maintain.

Recognizing the need for significant infrastructure change, David Renner, director of cloud services at Ohio State, and Bob Mains, senior director of application services at the university, worked with Breon and a team of skilled IT professionals to spearhead an infrastructure transformation initiative. Their mission: Migrate critical systems to the cloud, adopt DevOps and agile workflows, and implement infrastructure as code management.

By modernizing its technology stack and embracing DevOps — a development process that combines development and IT operations — Ohio State is building a world-class student experience and liberating its staff from manual work, allowing them to focus on innovative initiatives. Having considered the change management burden of implementing a new student system, inclusive of asking business administrators to learn new interfaces, Ohio State elected instead to find bandwidth by modernizing their existing solution.

BUILDING THE CASE FOR A CLOUD MIGRATION

Higher-education institutions worldwide face a common challenge: Doing more with less. Many are burdened by monolithic legacy systems that require time-consuming manual maintenance, limiting teams' abilities to innovate.

These outdated systems impact the entire higher-education ecosystem. Students face system crashes during class registrations, researchers endure long waits for computing resources, and faculty struggle with inflexible systems that hinder teaching.

Colleges and universities are having to make significant budget cuts, meaning higher-education leaders are facing tough choices about how to provide exceptional stakeholder experiences in resource-constrained environments. But, as Breon says, "Technology changes all the time, and there are opportunities to improve operational efficiencies and provide access to new technologies that would be much more costly to do otherwise."

This pattern mirrors the evolution of research libraries. In the past, universities invested heavily in vast physical libraries with extensive card catalogs. Today, digital repositories and advanced search algorithms provide more comprehensive and accessible information at a fraction of the cost and space. Similarly, modern IT infrastructure offers exponentially greater capabilities at potentially lower long-term costs — if institutions can make the case for the initial investment in change.

At Ohio State, building a business case for cloud migration required a shift in mindset. "We like to be technical people, and we don't necessarily want to be financial people," Renner says. "But we're financial people now. We all are."

The team focused their case on three key areas.

- **Agility & Innovation**: Showcasing how automation accelerates the pace of change and frees staff for creative, student-benefiting projects.
- **Resilience**: A more performant application during usage spikes and improved DR capabilities.
- **Cost**: Illustrating reduced financial and staffing needs while increasing capabilities.

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These benefits were key to winning over university leadership. By translating technical improvements into tangible outcomes — like smoother first days of classes, class registration, or quicker research setups — the team made their case in terms everyone could understand.

The result? A compelling narrative of innovation and efficiency that's now inspiring other institutions to follow suit.

SAVING COSTS, REDUCING MANUAL WORK, AND IMPROVING THE STUDENT EXPERIENCE

Early on, Renner and his team developed objective KPIs to capture and track the improvements possible as it worked on modernization and as new environments replaced the older systems. This data-driven approach was crucial in winning leadership support. "We showed significant savings to build trust and the opportunity to partner with leadership and get that support. That includes providing the follow-up that shows, 'This is what we anticipated, and this is actually what resulted.'" Working from anticipated outcomes and shared metrics of success, the team developed a plan to migrate the student information system (SIS).

Crucially, however, this plan wasn't the start of Ohio State's work but the culmination of foundational work the team had been building for years prior. Well before the SIS migration, Ohio State established a commitment to DevOps and started to look for ways to refresh its infrastructure

and automate its underlying processes. Given that universities are necessarily risk-averse about changes to their SIS due to the systems' centrality to university operations, the team needed to both develop its internal cloud skills and build confidence amongst stakeholders about the viability and benefits of cloud migrations.

The team worked on many projects before the eventual SIS migration to build their skills and familiarity, such as moving the osu.edu web hosting environment into Amazon Web Services (AWS). By focusing first on less risky workloads, the team was able to make material progress and show objective improvements while also giving themselves the space to develop their skills.

Soon, the team was ready for more ambitious projects. After evaluating which hardware was reaching the end of life, the PeopleSoft SIS stood out.

The SIS was an ideal candidate for cloud migration due to its fluctuating demand and the level of automation that can be achieved in the cloud. A migration to the cloud, if done right, would provide scalability and modernization in one fell swoop, both eliminating performance issues and reducing the cost and time required to upgrade and maintain the system.

The benefits, however, were swift and substantial:

- 50 percent savings on infrastructure management costs.
- Ability to keep up with increased patching of both student financial aid and security fixes.
- Scheduled downtime dramatically reduced.
- Scalability improvements to handle peak demand periods.

"We can't have the system going down on the first day of classes," Renner explains. "To mitigate that risk, we had to size systems accordingly on-premise. But in the cloud, we just rely on auto-scaling."

This shift had its challenges. The pay-as-you-go model initially caused a "system shock," early in Ohio State's cloud journey, prompting Renner's team to build a cloud center of excellence (CCoE) to manage cloud resources effectively.

As the team further honed its approach to DevOps and automation, infrastructure as code — managing computing infrastructure through code rather than manual configuration — proved an essential ingredient for OSU's technical approach. This method allowed the team to automate more processes, reduce errors, and significantly speed up deployments. "We wanted to evaluate what the options were," Breon says, "so making this move extended our capabilities and timeline for making those decisions."

The transition wasn't easy at first. The Ohio State team was as accustomed to configuring environments manually as they were provisioning physical servers. Renner worried old habits would set in, so he and his team took a strict step: "No one on the team had the authority to create anything manually in the environment," Renner says. "It all had to be done through code."

This rule traded short-term friction for long-term payoff. "It was only by tying our own hands that we ensured our success and forced ourselves to automate every little thing," Renner says. "And there were many temptations. 'Oh, couldn't we just go into the console and do that?' 'No, no, we're not doing that. We've got to have it end-to-end infrastructure as code.'" This strict policy was crucial for breaking old habits and ensuring the team fully embraced the new paradigm, preventing any backsliding to manual processes that could undermine the benefits of automation.

The results were striking:

- PeopleTools upgrades now take six weeks instead of six to nine months.
- Upgraded footprint and associated work saw a 50-percent infrastructure cost reduction.
- Need to hire two new full-time employees to manage the upgrade cycle was eliminated.

Ohio State, with 65,000 students, stood apart from other higher-education institutions that have made similar efforts because it didn't require a consulting partner. Thanks to its earlier investments in building out DevOps and infrastructure as code capabilities, the university was able to transform with its own staff and reap the rewards of new technologies, processes, and skills.

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With these improvements in place, Ohio State is poised to innovate further into improving its student experience and research capabilities.

UPSKILLING TO KICKSTART THE "INNOVATION UPWARD SPIRAL"

Upskilling was the catalyst of Ohio State's cloud journey, extending far beyond mere certifications. The team adopted a hands-on, practical approach, focusing on iterating across real-world applications of their newfound knowledge.

"You can't do it all at once," Renner advises. "It's better to start small, get a success, and then build from there and build up the skillset and the ecosystem."

Breon echoes this sentiment: "You have to get that foundation first, start with low-risk items, and build each success upon them."

This approach kickstarted a virtuous cycle of learning and improvement — a positive feedback loop that Renner calls an "innovation upward spiral." As team members honed their skills, they developed time-saving processes, freeing up bandwidth for further learning and innovation. The result? Faster, more dependable online experiences for students and on-demand compute resources for researchers.

The impact of this upskilling extends far beyond the SIS migration:

- Previously a daily race against a 7:00 a.m. deadline, application data loading now finishes by 1:00 a.m. As a result of the data integration team's innovations and alignment between operational and analytics infrastructure, both platforms are in AWS, allowing key analytics customers around campus consistent and timely access to the data.
- Some of the enabling technologies, such as OpenTofu infrastructure as code, are cross-pollinating other groups to improve agility and change control in other areas, accelerating deployment and agility in those areas.
- On-premise environments that once took months to build are now deployed in as little as two hours eliminating the need to "stockpile" environments and just use them when you need them — and hence provide further savings opportunities.

"We're already seeing new kinds of innovation, things that weren't possible before," Renner says. "We can move faster and innovate, and we aren't just drowning in production support and manual build processes."

"The people on my team are no longer building platforms," Renner explains. "They're managing the process that builds platforms. They're abstracted up a layer, allowing them to think more strategically and be more innovative."

This newfound efficiency has transformed the SIS from a burden into an asset. With automation handling routine tasks, the team has the bandwidth to explore cutting-edge technologies like artificial intelligence (AI) and machine learning.

"If we were busy patching systems, we would have zero bandwidth to even experiment with AI," Breon points out. AWS provides a secure platform for this experimentation, balancing innovation with data protection.

"Using AI within providers like AWS helps us reduce risk," Breon continues, "And it also allows our team members to be innovative."

AWS AS AN EXPERIENCED PROVIDER

Reflecting on Ohio State's journey, Renner emphasized a crucial lesson: The importance of inclusivity and collaboration. "We have to include everyone on the journey," Renner says, referring to teams beyond IT, including information security, IT finance, and institutional leadership.

Throughout this ambitious undertaking, the AWS Cloud provided the university with the capability to host its most mission-critical application, and AWS's background with higher-education institutions and PeopleSoft migrations gave Ohio State a solid foundation for success.

The AWS Migration Assistance Program (MAP) played a pivotal role in mitigating financial risk. "Higher education does not have much leeway for significant financial risks," Renner notes. The program provided essential support, allowing the university to undertake this transformative project.

As the team upskilled, AWS helped to tackle critical issues. "Scheduling something like this in higher education is very hard," Renner explains. "You get your one shot, and that sets the timeline."

AWS's extensive work with other universities helped Ohio State avoid potential pitfalls, such as premature adoption of container technology. "We decided not to move in that direction," Renner says. "based on the lessons AWS learned with other institutions."

To learn more about how AWS has helped thousands of enterprise customers migrate to the cloud, check out AWS's Migration Acceleration Program.