



**Supercomputer
Center**

2025-2026

RESEARCH REPORT



AI GENERATED ILLUSTRATION



“The Ohio Supercomputer Center offers massive economies of scale, superior performance, and centralized expertise to allow Ohio institutions to engage in complex research. We lean into shared infrastructure because it makes sense.”

— Mike Duffey, Chancellor,
Ohio Department of Higher Education



The Ohio Supercomputer Center (OSC) empowers Ohio higher educational institutions and private industry by providing capable, accessible, reliable, and secure computational services enhanced by training, consulting, and research partnership. Through OSC’s high performance computational resources, the State of Ohio leverages significant economies of scale resulting in better services and cost savings. OSC can help position Ohio’s higher educational institutions and companies as world leaders with a computationally enabled workforce and research endeavors.

Governed by the Chancellor of the Ohio Department of Higher Education (ODHE), the Ohio Technology Consortium (OH-TECH) serves as the technology and information division of ODHE. The consortium comprises a suite of widely respected member organizations collectively unsurpassed in any other state: OSC, OARnet, and OhioLINK. The consortium drives efficiencies through common services provided to member organizations through the Shared Infrastructure and Consortia Services divisions.

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Highlights

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With OSC resources, more Ohio students are exploring how AI tools can advance their research and creative activities. Educators can easily access software and hardware that supports AI work in the classroom. This cover image captures the goal behind our work: turning the massive power of our supercomputers into practical, accessible tools for students and faculty across the state.

Director's Letter

At a time when higher education institutions, industry leaders, and nonprofit entities require more powerful and sophisticated high performance computing (HPC) resources to advance research, education, and innovation, the Ohio Supercomputer Center (OSC) continues to deliver incredible value for the state.

As a shared resource used by more than 7,715 clients in Ohio, OSC offers an estimated \$50 million in annual cost savings compared to alternative providers. Our centralized computing systems located at the State of Ohio Computer Center also offer greater benefits than smaller stand-alone systems distributed across campuses, including reliability, disaster resilience, and cybersecurity; the ability to scale up computational usage as demands rise; and software and expert technical support that boosts productivity.

States around the country are investing in centralized supercomputing resources and public-private partnerships that can capitalize on the growing interest and promise of artificial intelligence (AI) to advance technology innovation. The State of Ohio is a national leader in this field, continuously supporting OSC operations for almost 40 years. In addition, OSC has prioritized partnerships with private industry and higher education institutions that have granted its entire client community access to leading-edge systems and services.

One key example is OSC's collaboration with The Ohio State University Wexner Medical Center and



OSC revamped the Ascend cluster to offer greater computing power for AI work.



David Hudak, Ph.D.
Executive Director

College of Medicine to transfer significant new computing resources to OSC's Ascend HPC cluster over the last year. The project meets the rising demand for graphics processing units (GPUs) that can handle intensive AI work. The revamped Ascend, now boasting eight times the computing power of the original cluster launched in 2022, not only supports medical research and education at Ohio State, but also serves OSC's broader client needs.

Our 2025–2026 Research Report demonstrates just how those clients are innovatively using OSC resources, solving problems on topics such as credit card fraud detection, the impact of physical exercise on aging and memory, the conservation of wildlife, and how plasma physics can lead to advancements in fusion power and our understanding of cosmic phenomena. In addition, we spotlight how OSC's open-source web portal Open OnDemand is being used by a growing number of institutions around the globe to make HPC more accessible to researchers and students, from small liberal arts colleges and large research universities in the United States to centers in Europe, Asia, and Africa that are leading the way for science in their respective regions.

It's clear from these stories that more fields—from the social sciences to the health and medical disciplines—are relying on HPC to accelerate knowledge generation and innovation that keeps the State of Ohio economically competitive. We are proud to play a role in supporting this critical work.

David Hudak, Ph.D.
Executive Director

IMPACT

OSC serves higher education, nonprofit, government, education, and commercial communities in Ohio, with services available to clients across the nation and globe. From hardware and software offerings, computing resources and data storage, to training and educational opportunities, OSC continued to make a measurable impact on clients' discovery, learning, and innovation in the last year.

Infrastructure

Ascend expands resources

In collaboration with The Ohio State University Wexner Medical Center and College of Medicine, OSC further upgraded the Ascend cluster to provide greater access to graphics processing units (GPUs) for AI and machine learning computation. Ascend is now a ~16 petaflop (PF) system that features 776 GPUs, 40,448 cores, and 322 Dell nodes.

The new resources support all academic and commercial clients and are helping to advance medical research and education.

Secure Enclave planning

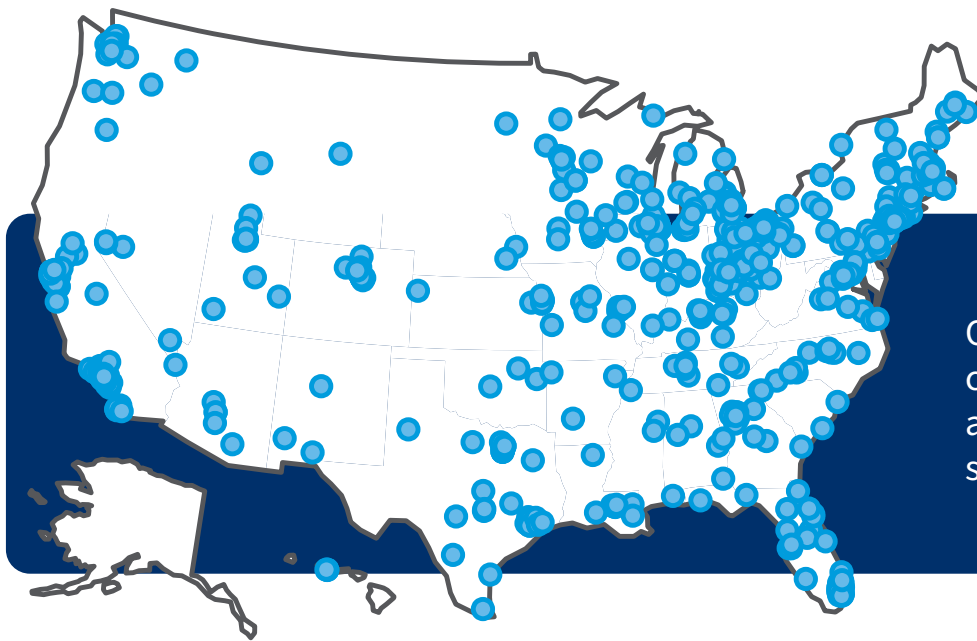
An October 2025 workshop allowed researchers, IT professionals, and institutional leaders to discuss requirements, priorities, and implementation strategies for OSC's proposed statewide Secure Enclave for research computing. The initiative would support researchers and organizations that require HPC resources with strict security controls for sensitive and federally funded research. The workshop highlighted the benefits of a statewide



service, gathered client feedback, and reviewed the next steps in development.

Storage system upgrades

OSC launched a major upgrade of its storage system, which houses and protects an ever-growing volume of research data generated by thousands of clients in the state of Ohio and



OSC served **7,715** clients in CY 2025, an increase of 1,337 since CY21.

beyond. The upgrade features greater capacity and stronger performance than OSC’s previous storage system deployed between 2017 and 2020. The new system also provides additional capabilities, such as long-term archiving and management now required by many federal grants.

Client Services

New Service Center

OSC has launched a [new web-based Service Center](#) to enhance the overall support experience for clients. With HPC credentials, clients can open and manage cases, view all current and past cases, communicate directly with OSC staff, request various services, and access relevant documentation. The center, which launched in fall 2025, streamlines the support process, making case resolutions quicker and more efficient. Additionally, a new entry point for prospective clients, start@osc.edu, helps new users onboard with OSC.

Research Partnerships and Training

Cyberinfrastructure training, support

OSC staff continued to participate in several NSF-funded partnerships with Ohio and U.S. universities designed to provide more tools and

training to the cyberinfrastructure professionals at research computing centers. These initiatives help HPC centers support the growing number of academic researchers who use their services and resources, particularly in the areas of AI and machine learning. The collaborations include the OH-SCIFE project, an effort with Case Western Reserve University and the University of Cincinnati to support the research community in leveraging AI advancements in their research workflows; the ACCESS MATCH project, an initiative led by the University of Colorado Boulder to reimagine cyberinfrastructure user support services and delivery to keep pace with the evolving needs of academic scientific researchers; and the Rutgers University-led hpcGPT project, an HPC-enriched generative AI program that can provide technical support to HPC center users.

AIRE student program

The [annual AI Research Experience \(AIRE\) program](#) allowed Ohio college students to learn

7,252 enrollees

across **72** departments
and **28** organizations
utilized OSC resources.



how to use AI technologies to solve various research and engineering problems during summer 2025. AIRE, managed by the [OH-SCIPLE project](#), seeks to increase awareness of the work of cyberinfrastructure professionals by pairing students with faculty and staff from Case Western Reserve University, The Ohio State University, the University of Cincinnati, and OSC. The program will welcome a new cohort in summer 2026.

NSF ACCESS workshop

OSC will host the [NSF ACCESS Regional Workshop on AI](#) in April 2026. The in-person workshop provides a unique opportunity for researchers, educators, and students to learn how to integrate AI tools in research and classroom settings. Part of a regional series based on the National AI Research Resource (NAIRR) Pilot's [AI Unlocked: Empowering Higher Ed through Research and Discovery workshop](#), the event is designed to help institutions across the United States navigate the rapidly evolving AI landscape.

AI research

The NSF-funded [Artificial Intelligence \(AI\) institute for Intelligent Cyberinfrastructure \(CI\) with Computational Learning in the Environment \(ICICLE\)](#) project completed its fifth and final year of work, with a focus on interdisciplinary collaboration within the large team and implementation of cyberinfrastructure components into real-world use cases. ICICLE, which draws on OSC's resources and staff expertise, strives to enhance the accessibility of

AI by developing cyberinfrastructure across three initial domains of focus: smart foodsheds, digital agriculture, and animal ecology.

Open OnDemand

Open OnDemand version 4.1

OSC has [released version 4.1 of Open OnDemand](#), the Center's open-source, web-based platform used by HPC centers around the world to provide researchers, educators, and students with easier, more flexible access to advanced computing resources. Version 4.1 introduces a series of enhancements shaped by feedback from the Open OnDemand community, with a focus on improving usability, customization, and administrative efficiency.

GOOD Conference returns

The second annual [Global Open OnDemand \(GOOD\) Conference](#) was held at The University of Utah from March 9-12, 2026. The event brought together the community that uses OSC's web portal to share expertise and learn about advancements in the technology. The conference, which attracted 90 attendees, featured talks, panel discussions, networking opportunities, and a "contributor jam" to engage more community members in Open OnDemand development. Sessions explored topics such as customization, apps, classroom usage, cloud computing, job monitoring, and support for AI workflows.



Open OnDemand has been deployed in over **100** countries by more than **2,100** organizations.

Engagement and Outreach

Client engagement

The [Research Symposium](#), held in April 2025, attracted three dozen talks and poster presentations from faculty, staff, and students at higher education institutions across Ohio. The event, which occurs annually each spring, offers an opportunity for members of the research community to share how they are using HPC to advance work across many disciplines. In addition, OSC hosted a [Community Briefing](#) in fall 2025 to highlight its new Service Center, planned storage upgrade, and AI resources, among other topics.

Industry conferences

OSC engaged with the [national research computing community](#) in 2025 through four major conferences: ISC High Performance, PEARC, Gateways, and SC25. Staff showcased Open OnDemand and participated in various presentations, panel discussions, and workshops. These conferences provided opportunities for OSC to connect with researchers, developers, and industry leaders, fostering collaboration and innovation in HPC.

Summer youth programs

Dozens of students across Ohio participated in OSC’s summer youth education programs, exploring topics such as watershed science, data analysis, cybersecurity, and machine learning. The [STEM Institute](#) (for ninth, tenth, and eleventh grades) and [Youth STEM Institute](#) (for sixth and seventh grades) allow Ohio youth to use HPC resources to solve complex problems in a team environment.

State of Ohio outreach

The Ohio Technology Consortium and OSC, in collaboration with the Ohio Department of Higher Education, unveiled an updated “Universe of Opportunity” virtual reality experience at the 2025 Ohio State Fair. The experience offers tours of Ohio’s two- and four-year colleges, universities, and technical centers to help the public explore the state’s comprehensive higher education system. The “Universe of Opportunity” is now available to explore on the [Ohio Department of Higher Education website](#).

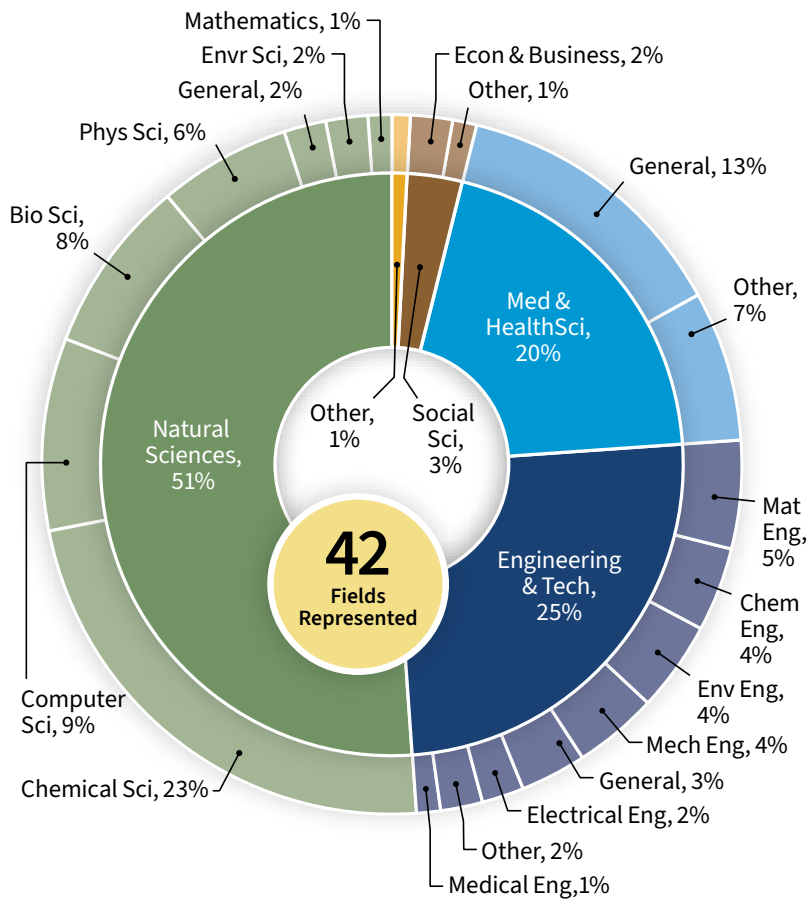


Dozens of students from around Ohio participate in OSC’s annual summer youth education programs, which allow them to learn about HPC in a team environment.



Visitors to the Ohio Department of Higher Education booth at the Ohio State Fair explored the “Universe of Opportunity” virtual reality experience.

Usage by Field of Study



Client Scholarship



1,069
PUBLICATIONS



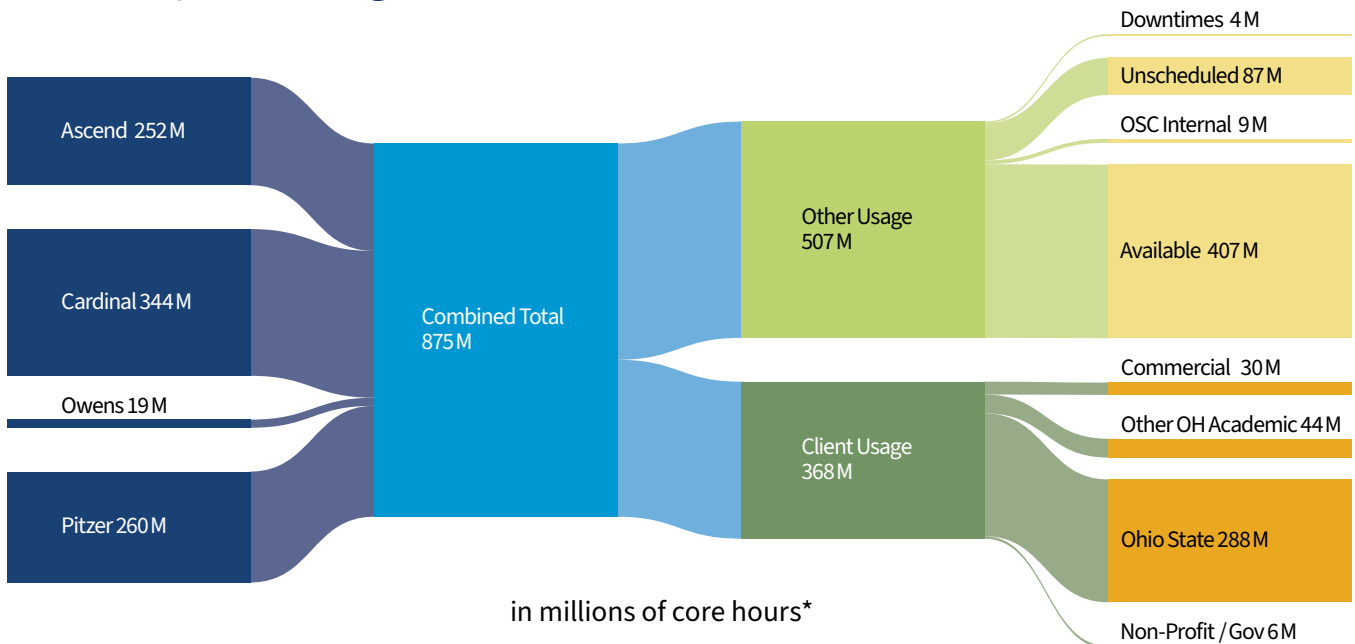
349
VENUES



5,230
CITATIONS

Data from CY2023-CY2025

Overall System Usage



* All data: CY2025

CLIENT RESEARCH SPOTLIGHTS



Swarthmore College

Through a long-standing partnership with Lafayette College, Swarthmore College combined research computing operations and adopted Open OnDemand as the primary gateway to the shared HPC resources. The browser-based platform reduces reliance on command-line workflows, making advanced computing more approachable for current and prospective faculty and students. As Open OnDemand can be easily customized, both colleges created interfaces branded for their specific academic communities. Swarthmore has hosted the Research Computing at Smaller Institutions conference since 2024 to help other liberal arts colleges address HPC needs.

osc.edu/oodcolleges



The Ohio State University/ Psychology

A team of Ohio State researchers investigated how physical activity relates to memory performance, revealing that the way activity is measured affects outcomes. Using data from adults aged 18–87, the study compared self-reported activity with objective measurements from wearable devices and lab memory tests. Leveraging HPC at OSC allowed the team to run thousands of complex models that wouldn't run efficiently on a laptop. Results showed a clear, positive relationship between objectively tracked movement and better memory, while self-reported activity showed no link. Researchers suggest that future studies should prioritize unbiased, device-based measures to understand how physical activity supports cognitive health more accurately.

osc.edu/memory



Denison University

Denison University has significantly expanded faculty and student engagement with HPC by partnering with OSC. When instructional technologist Lori Kumler explored how to integrate HPC into teaching and research, she and OSC staff conducted workshops, class visits, and one-on-one consultations to demystify OSC resources and help users get started. By spring 2025, the university saw a 100% increase in faculty research projects using OSC and launched 11 classroom computing projects across fields from data analytics to ancient studies. Denison also added OSC information to new faculty orientation and developed quick-start guides, making advanced computing resources more accessible and supporting emerging programs in data science and digital humanities.

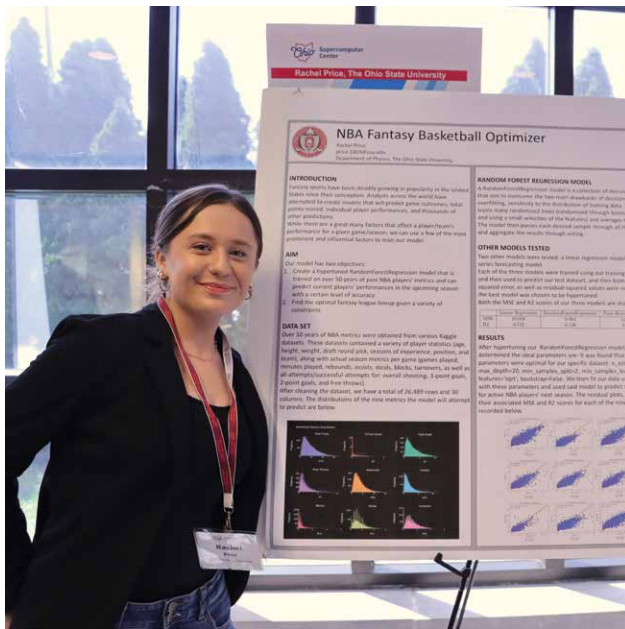
osc.edu/denison



Kent State University

Graduate students at Kent State University's Ambassador Crawford College of Business and Entrepreneurship used machine learning and HPC to rethink credit card fraud detection. Tackling more than 500,000 transactions, the team used OSC's powerful systems to train and test dozens of models aimed at balancing speed and accuracy while minimizing false alarms — a challenge that frustrates consumers and costs financial institutions billions annually. By combining statistical techniques with domain expertise to refine data features and ensemble model approaches, their work highlights how advanced computing can improve real-time fraud prediction.

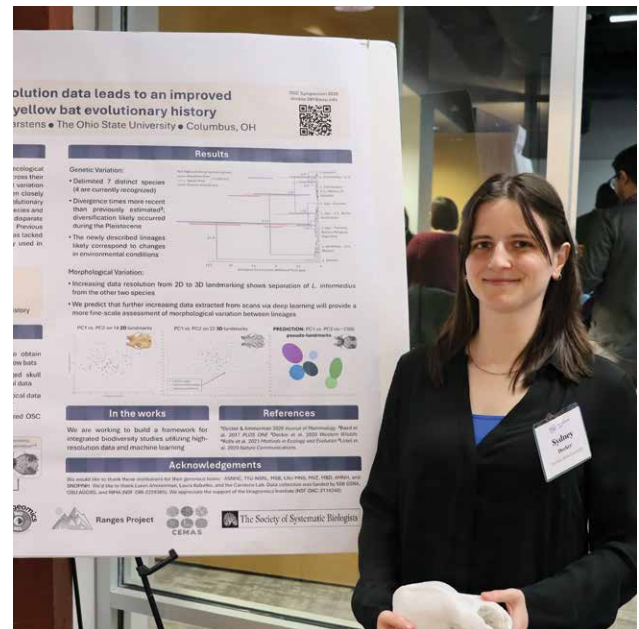
osc.edu/credit



The Ohio State University/Physics

An undergraduate physics course at Ohio State helped astrophysics major Rachel Price find her calling in data science through a hands-on project powered by OSC's resources. For her final project in Physics 5680: Big Data Analytics in Physics, Price used OSC's Open OnDemand tools to train a Random Forest Regressor on five decades of NBA statistics—predicting player outputs and generating an optimized fantasy basketball roster. Her creative use of machine learning on real-world data went beyond traditional physics problems and introduced her to advanced computational workflows. That experience persuaded Price to pursue graduate study in machine learning and data science, illustrating how applied projects can reshape academic paths.

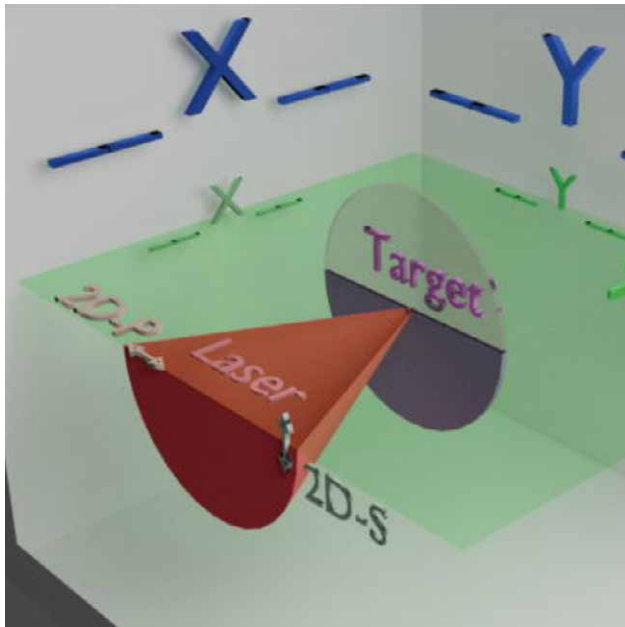
osc.edu/basketball



The Ohio State University/Biology

A postdoctoral researcher at Ohio State used machine learning and HPC to uncover hidden diversity among yellow bat populations. By sequencing more than 40,000 genomic regions from 132 specimens and pairing the data with high-resolution 3D skull scans, Sydney Decker relied on OSC's resources to run large-scale analyses and computational models that wouldn't fit on a laptop. Her genomic results revealed that what were thought to be four species actually represent seven distinct lineages, suggesting earlier evolutionary splits likely tied to Pleistocene climate shifts. This work not only advances understanding of species formation but also has implications for biodiversity research and conservation strategies.

osc.edu/yellowbats



Marietta College

At Marietta College, physics professor Joseph Smith advanced plasma physics research with support from OSC's HPC resources. Smith and his undergraduate students ran large-scale plasma simulations that would be impossible on standard campus machines, which allowed them to explore magnetic confinement, energy transport, and fusion-related phenomena. The partnership gave students hands-on experience with computational research early in their academic careers, strengthening analytical skills and preparing them for graduate study. Access to advanced computing has significantly expanded Marietta's research capacity, demonstrating how smaller institutions can pursue high-impact scientific inquiry through shared cyberinfrastructure.

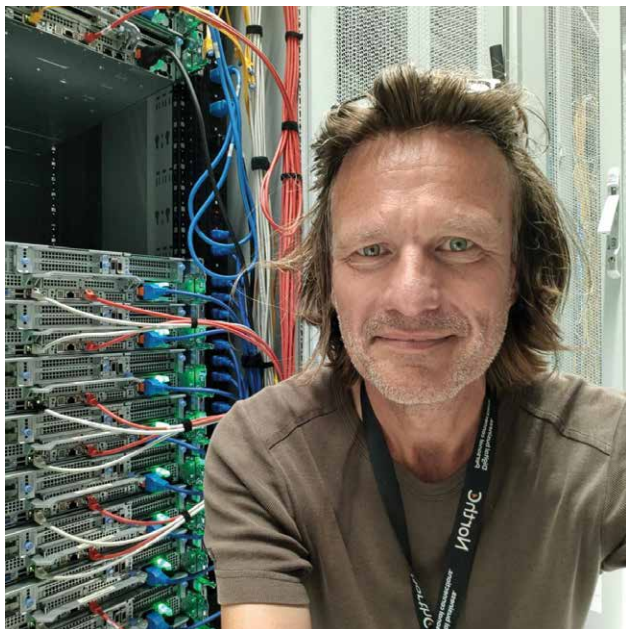
osc.edu/marietta



Texas A&M University

The High Performance Research Computing (HPRC) team at Texas A&M University enhanced OSC's Open OnDemand portal with custom dashboards and apps tailored to its 3,000+ faculty, staff, and student users. By deploying Open OnDemand across all five of its HPC clusters, the team made the browser-based interface the primary way researchers access computational resources, simplifying job monitoring, resource utilization, help requests, and software discovery. Beyond dashboards, HPRC developed tools like a CryoSPARC app for cryo-electron microscopy research, a Jupyter AI Assistant, and workflow engines that improve usability and support AI workloads. The group actively shares these innovations and app repositories with the global Open OnDemand community.

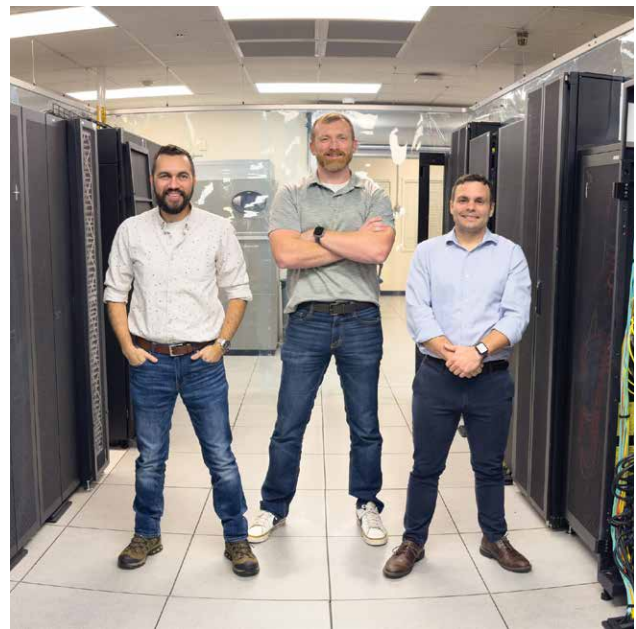
osc.edu/tamu



Eindhoven University of Technology

Researchers and students at Eindhoven University of Technology (TU/e) are transforming how HPC is used across campus through the adoption of Open OnDemand. What began as a small experiment quickly expanded university-wide, lowering barriers for new users and enabling access to tools such as MATLAB, Ansys, and Jupyter notebooks. The platform has reshaped teaching and training by making HPC more approachable, sparking curiosity among students, and encouraging broader participation in computational research. TU/e continues to expand its use of Open OnDemand, refining the platform to support long-term, accessible, user-friendly HPC across campus.

osc.edu/tue



Wake Forest University

At Wake Forest University, a small research computing team is using Open OnDemand to embed HPC directly into undergraduate coursework. By creating custom, course-specific portals, the team enables students to access tools like Jupyter, RStudio, MATLAB, and VS Code through a familiar, browser-based interface that complements the university's learning management system. This approach allows faculty to quickly integrate HPC into classes on emerging topics such as artificial intelligence and large language models. Students engage with advanced computing as a natural part of coursework, building skills that seamlessly carry over into research and future academic pursuits.

osc.edu/wakeforest

ENGAGE WITH US



Research Symposium

Present your research findings and share information with others in the Ohio HPC community during this annual spring event.



Campus Champions

Advocate for OSC's HPC resources at your academic institution and receive project accounts with no-cost access to a range of OSC services.



Community Briefing

Join OSC leadership each fall to learn about major new initiatives; provide feedback about services, products and needs.



Client Continuity

Inquire about opportunities to continue to use OSC resources at your next institution or private sector employer.



Social Media

Follow our news and events on LinkedIn, Facebook, or X and share your activities.

osc.edu/engagement

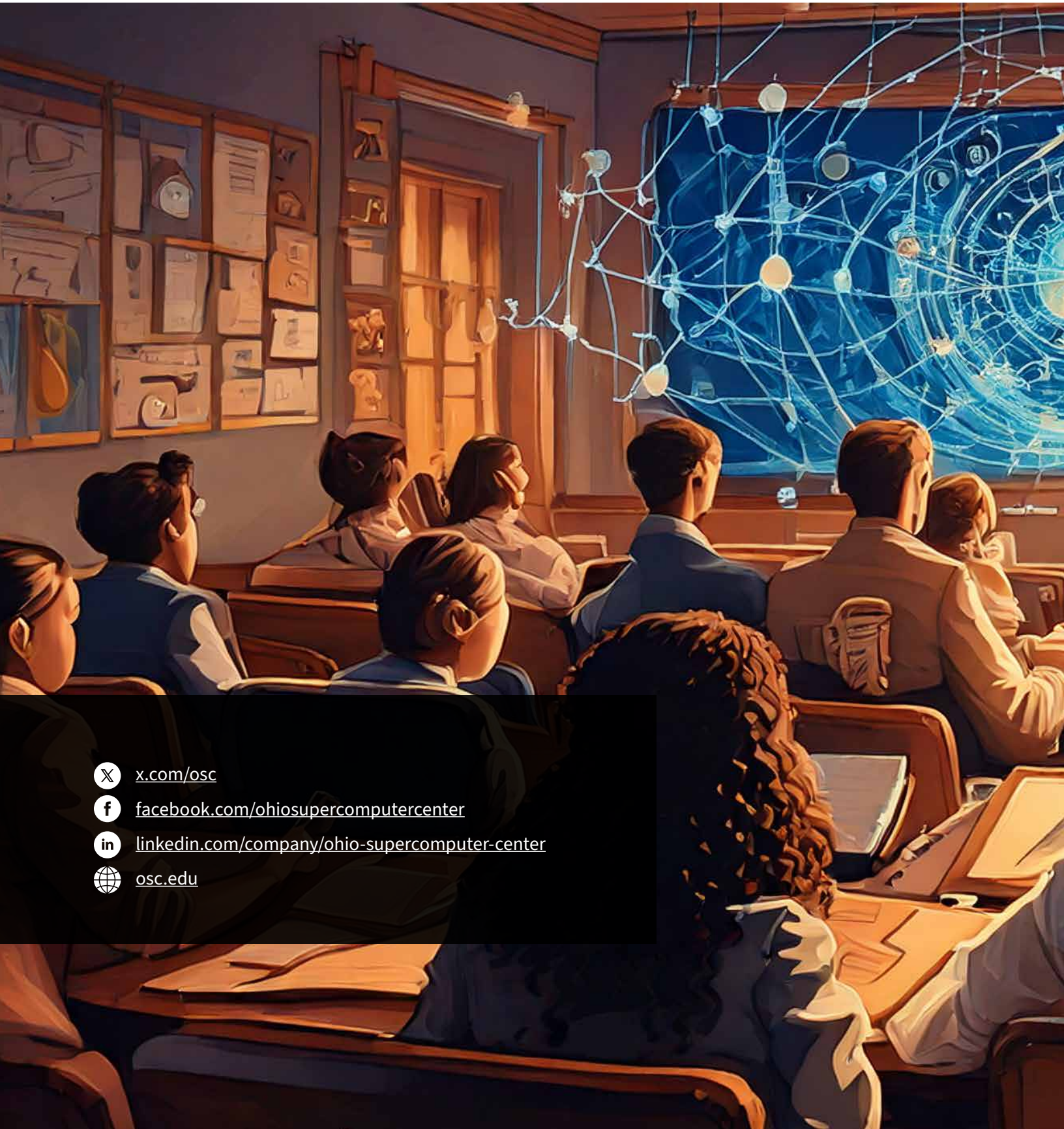
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