Office of Advanced Research Computing

2025 End of Year Report

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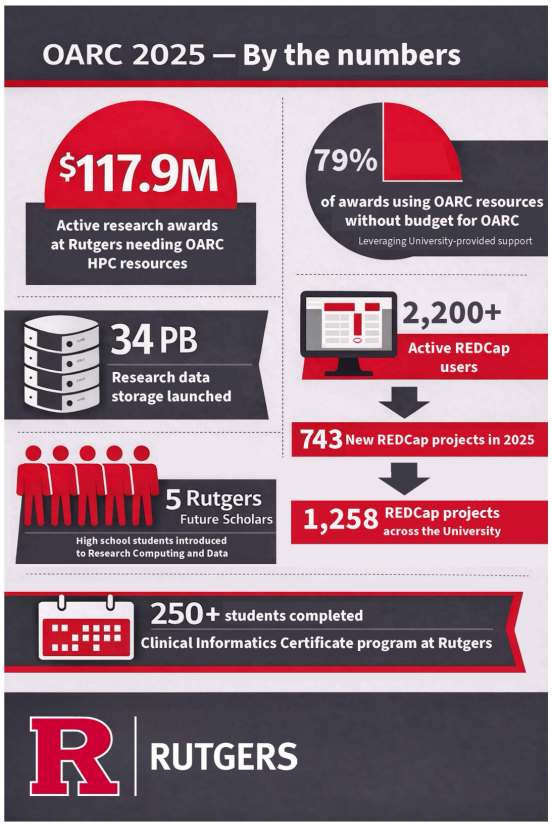
2025 Accomplishments

The Rutgers Office of Advanced Research Computing (OARC) has experienced substantial growth and change in 2025. Supported by Office of Information Technology (OIT) leadership, under Ellen Law, Vice President of Enterprise Applications and Research Computing, OARC has been sought to establish new university-wide projects and platforms, increasing our scope across the university and beyond to new levels.



We saw long-planned research-driven platforms fully come to fruition and become operational in 2025. Both the move to a centralized REDCap platform for use by the Rutgers clinical/medical community and the establishment of a new 34PB Research Data Storage (RDS) resource for Rutgers researchers were accomplished. In addition, extensive progress was made in enabling a protected environment for regulated data in the Clinical and Research Data Warehouse (CRDW), as well as early groundwork completed for a faculty-driven enterprise Electronic Lab Notebooks (ELN) solution.

The OARC project portfolio has successfully expanded even while the organizational structure has undergone transformation. In July 2025, the Advanced Cyberinfrastructure (ACI) team of systems administrators, senior technologists, and automation specialists supporting OARC infrastructure across platforms (high-performance computing, clinical and protected environment operations, REDCap, research data storage, and others) was moved under the umbrella of Enterprise Infrastructure Service Delivery (EISD) led by OIT Vice President Bill Lansbury. We continue to work very closely with the ACI team under their new leadership, while embracing the opportunities presented by rethinking infrastructure operations.

2025 was also marked by the search for a new OARC Associate Vice President, from which we look forward to welcoming the successful candidate in early 2026.

Our Impact: Advancing research at Rutgers and beyond

- **Medical Informatics and Advanced Research Computing:** In 2025, the Medical Informatics and Advanced Research Computing (MIARC) Research Team within OARC continued to advance its mission of supporting education, research, and service in medical informatics, Health AI, and advanced computing. MIARC provides a range of educational and training opportunities, including clinical informatics certification programs in collaboration with NJ ACTS, summer and year-round internship programs, and postdoctoral fellowship opportunities in Health AI. (More information on the NJ ACTS certification program is below in Workshops and Presentations.)

- **Regional Networking: Connectivity through Regional Infrastructure for Scientific Partnerships, Innovation, and Education (CRISPIE):** The Office of Advanced Research Computing (OARC), in partnership with NJEdge and five additional New Jersey higher education institutions, was awarded a National Science Foundation (NSF) grant to expand access to advanced research computing and networking resources across the state. The CRISPIE initiative (NSF Award #2346648) is focused on supporting smaller and underserved institutions, helping to reduce barriers to participation in high-performance computing and data-intensive research.

  OARC's Director of Advanced Compute Infrastructure, Eric Marshall, leads Rutgers' contribution to the project, coordinating a team of ACI professionals led by Rutgers IT team member Jeremy Schafer and senior research scientists led by OARC research facilitator Dr. Paul Arias. This team is responsible for enabling access to computing resources as well as developing and delivering workshops and training programs that build local expertise and research capacity.

  According to Principal Investigator Dr. Forough Ghahramani of NJEdge, "The project creates new and diverse research collaboration opportunities for faculty across New Jersey, while enabling further data-intensive research and education in a wide range of disciplines including physics, astronomy, biology, genomics, earth and environmental sciences, data science, and cybersecurity." Through

these efforts, CRISPIE is strengthening regional collaboration, broadening participation in advanced research computing, and fostering innovation across New Jersey's academic community.

- **Shaping the AI @ Rutgers Roadmap:** OARC leadership has taken a front-and-center role in the AI @ Rutgers Steering Committee and working groups. Our directors, Vlad Kholodovych, Eric Marshall, and Kristin Lepping, are actively engaged with the Research and Infrastructure Working Groups, both tasked with evaluating the university's future hardware requirements to enable research through different lenses. Dr. Kholodovych has co-chaired the Research Working Group with Dr. Diane Ambrose of the Office of Research and Sponsored Projects, evaluating the importance of strategic research support. The groups' collective recommendations along with the rest of the AI @ Rutgers working groups focusing on clinical, academic, and administrative needs, expected in early 2026, will serve as the blueprint for Rutgers' AI growth and strategy.

Team Growth

The year was marked by strategic organizational transformation and continued team growth. While the ACI team now reports to Dmitry Berezin at Enterprise Infrastructure, the previous Director of ACI, Eric Marshall, continued managing day-to-day operations, project priorities, and system planning through 2025. This structural shift strengthened the backend infrastructure supporting research computing while remaining largely invisible to OARC's research stakeholders. The ACI team's transition to a new support structure at EI provides redundancy and data center support that was previously lacking. Meanwhile, in 2026, Eric's focus will shift to enable a new system architecture and security effort that is severely needed by all higher education research computing and data (RCD) organizations in today's technology climate.

Additionally, our newly formed **REDCap team is now fully staffed** and actively managing the platform's rapid scaling across the university. More information on REDCap is found below.

Milestones

The physical and digital landscape of Rutgers' research computing was redefined this year:

- **Storage Expansion:** OARC and EI partnered to launch the Research Data Storage (RDS) platform, providing 34 PB of usable capacity for researchers who need high-capacity, reliable data retention outside the high-performance environment at a very low, sustainable cost to the researcher. Through most of 2025, RDS was piloted with early adopters to test usability, identify operational hurdles, and develop best practices before full university-wide rollout which was accomplished in November (see announcement in “In the News” below). Long-term cost and sustainability models are currently under review with OIT and Office for Research leadership.

- **Scaling REDCap:** REDCap centralization has grown rapidly, reaching 1,258 projects and 2,268 users, specifically 743 new projects added in a single year, reflecting the success of the university-wide migration and onboarding strategy. Of these projects, 650 support active research studies. Major institutional groups—including New Jersey Medical School—have begun migrating legacy instances to the centralized OIT-managed platform and engaging in training and workshops developed and led by the OARC REDCap team to ease the transition and ensure all projects remain fully functional. Importantly, REDCap went through a series of critical security upgrades under OARC in 2025, ensuring the platform is secure and compliant with federal standards for protected data.

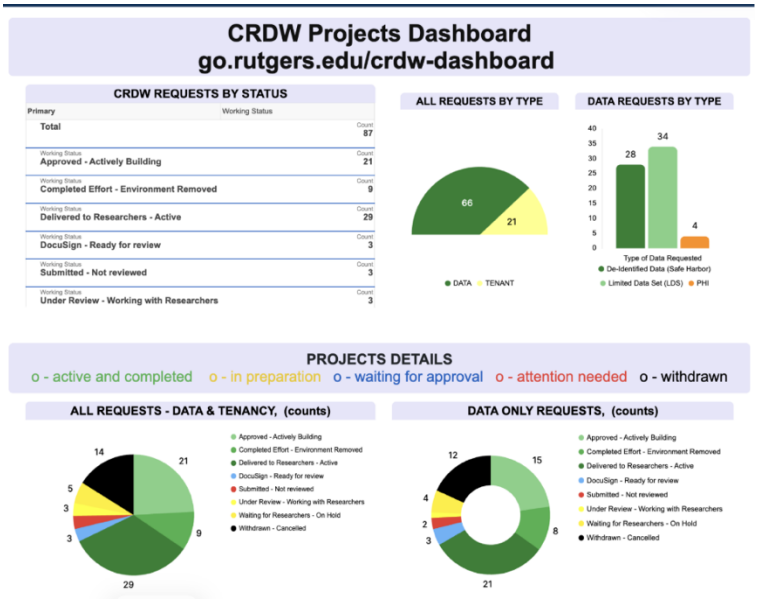
- **Compliance Leadership:** CRDW is now the only centrally supported Rutgers platform at the university that is deemed compliant with NIST SP 800-171 and CMMC Level 2. This positions CRDW as the unique hub for storing and processing Controlled Unclassified Information (CUI), specifically the new requirements for NIH dbGaP data, as well as the university’s source of expertise for researchers seeking assistance.

  Additionally, the Amarel Protected Environment (Amarel PE) high-performance cluster entered production this year as part of the CRDW, providing a

secure environment for the processing of protected and sensitive research data. This capability enhances Rutgers' capacity to support clinical and regulated research workflows while maintaining rigorous data security standards.

Throughout 2025, a collaborative effort between OARC/EARC and EISD has been underway to revise the CRDW rates to make them more consistent with similar Core Facilities at Rutgers as well as to bring them closer to reality with costs. This effort has been ongoing for more than 12 months and is expected to produce fully approved new rates effective in mid-2026, along with a new business model for accessing Amarel PE hardware.

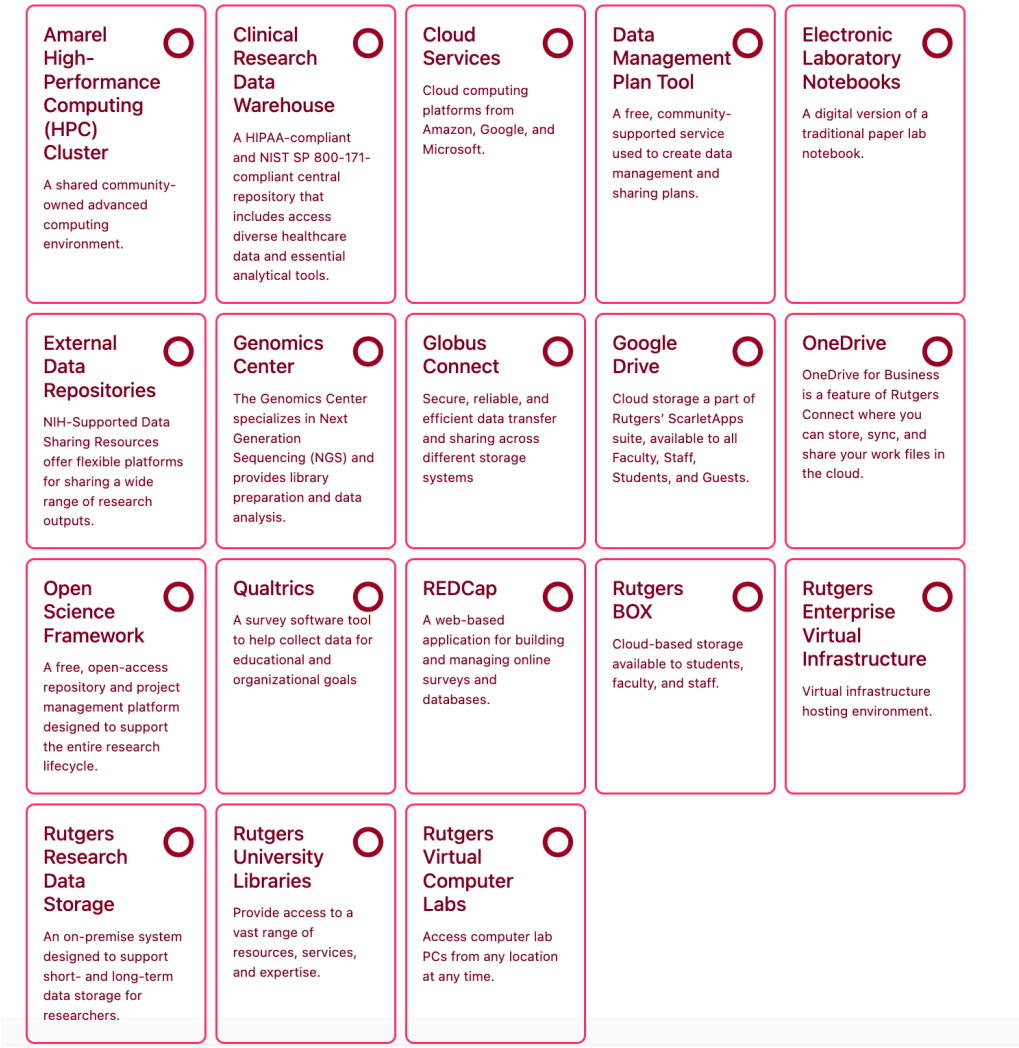
We also launched the CRDW Dashboard and a new i2b2 web application instance, providing researchers with a branded, single sign-on (SSO) portal to efficiently explore synthetic and clinical datasets.



- **Globus:** Early in the year, OARC began providing Rutgers researchers with access to a university-wide GLOBUS license, supported by OARC, at no cost to the community. Globus, a data transfer, sharing, search and discovery tool, is widely utilized by the research community and has been in high demand by Rutgers researchers seeking a reliable and effective solution. Access to the license can be gained via the University Software Portal here.

- **Data Storage Finder:** Utilizing an open-source tool originally developed by Cornell University, the OARC team in collaboration with EI has produced and refined a Data Storage Finder solution to simplify the complex task of which university and external data storage solutions are available and suitable for different data types. Since its limited release, this Data Storage Finder has been applauded by the Office for Research, IT staff, and faculty members

throughout the university. New webpages have been produced for CRDW and REDCap, giving users easy paths to access resources and team information.



In the News

A sampling of newsworthy mentions of OARC and OARC resource users/Amarel owners in 2025

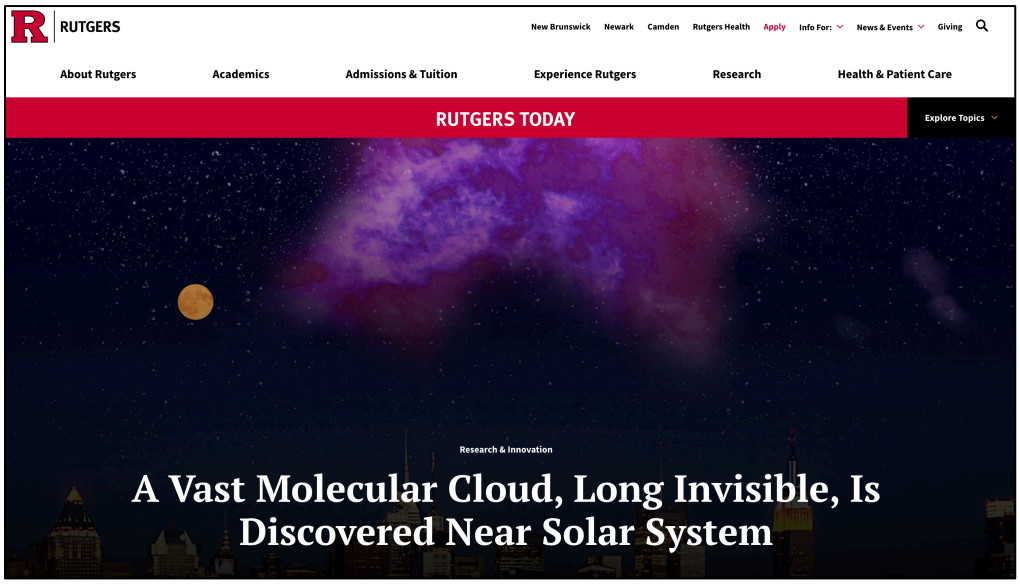
- Innovative research discoveries using Amarel supercomputer
  The Rutgers Office of Advanced Research Computing (OARC) continues to enable innovative research through its Amarel supercomputer, supporting breakthroughs in fields ranging from astrophysics to health sciences. Researchers have used Amarel to catalog star ages in distant galaxies and to apply artificial intelligence and machine learning techniques for disease

prediction. With more than 6,000 students, faculty, and researchers utilizing the system, Amarel remains a critical resource for advancing data-driven discovery across the university.

"Amarel has helped to make ground-breaking research discoveries, including cataloging star ages in distant galaxies and integrating AI and machine learning to predict diseases."
[Rutgers Tech Matters, March 2025]

- A Vast Molecular Cloud, Long Invisible, is Discovered near Solar System
  An international research team led by Rutgers University–New Brunswick astrophysicist Blakesley Burkhart has discovered a massive, nearby molecular hydrogen cloud named "Eos," offering a rare opportunity to study star formation and the interstellar medium. Detected using far-ultraviolet fluorescence rather than traditional radio or infrared methods, the cloud had remained invisible to scientists despite being one of the largest structures in the sky. Located about 300 light-years from Earth, Eos provides new insight into how galaxies transform gas and dust into stars and planets.

  "This is the first-ever molecular cloud discovered by looking for far ultraviolet emission of molecular hydrogen directly," Burkhart said. "This opens up new possibilities for studying the molecular universe."
  [Rutgers Today, April 2025]



- A Massive, Glow-in-the-Dark Cloud Lurking in Our Cosmic Backyard
  Stars and planets are born inside swirling clouds of cosmic gas and dust that are brimming with hydrogen and other molecular ingredients. On Monday, astronomers revealed the discovery of the closest known cloud to Earth, a colossal, crescent-shaped blob of star-forming potential. Named Eos, after the Greek goddess of the dawn, the cloud was found lurking some 300 light-years from our solar system and is as wide as 40 of Earth's moons lined up across the sky. According to Blakesley Burkhart, an astrophysicist at Rutgers University, it is the first molecular cloud to be detected using the fluorescent nature of hydrogen.

  "If you were to see this cloud on the sky, it's enormous," said Dr. Burkhart, who announced the discovery with colleagues in the journal Nature Astronomy. And "it is literally glowing in the dark," she added.
  [NY Times, April 2025]

A Massive, Glow-in-the-Dark Cloud Lurking in Our Cosmic Backyard

The cloud, named Eos, is chock-full of molecular hydrogen and possibly rife with star-forming potential in the future.

Listen · 5:15 min

Share full article

A newly discovered potentially star-forming cloud that is one of the largest structures in the sky. Thomas Müller (HdA/MPIA) and Thavisha Dharmawardena (NYU)

- Amarel owners Alyson Brooks and Avram Holmes receive Rutgers Faculty Excellence Awards

"Executive Vice President Prabhas Moghe and [University President Jonathan Holloway] are pleased to announce the recipients of the 2024-25 Universitywide Faculty Year-End Excellence Awards. We do so with pride in the entire Rutgers faculty and with admiration and gratitude for the efforts of all our faculty members over the course of the academic year.

Each year these awards honor members of the Rutgers community selected by their colleagues for outstanding contributions to teaching, research, and public service. Awardees come from all four academic units across the university: Rutgers University–Camden (RU–C), Rutgers University–Newark (RU–N), Rutgers University–New Brunswick (RU–NB), and Rutgers Biomedical and Health Sciences (Rutgers Health)."

Among the 30 individuals selected for recognition in eight award categories were OARC resource superusers and Amarel owners, Alyson Brooks and Avram Holmes.

The Board of Trustees Research Fellowship for Scholarly Excellence
Avram J. Holmes, Psychiatry, Rutgers Health

The Presidential Outstanding Faculty Scholar Award
Alyson Brooks, Physics and Astronomy, RU–NB
[Email announcement to all Rutgers University staff and students, April 2025]

- OARC End of Year report highlighted on "IT at Rutgers News"
  The Rutgers Office of Advanced Research Computing (OARC) reported a year of significant growth and expanded impact in 2024, strengthening its role as a central hub for research computing and data science across the university. Key advancements included major upgrades to the Amarel supercomputer, the launch of the Clinical and Research Data Warehouse (CRDW), and continued support for research projects totaling more than $130 million since 2015. With a user base exceeding 6,000 and nearly 800 funded proposals citing OARC resources, the office also expanded its team and introduced new initiatives such as a microcredential in Clinical Informatics and Data Science.

  "These advancements illustrate OARC's commitment to evolving resources that strengthen Rutgers' research output and impact," the report noted, highlighting continued investment in infrastructure, collaboration, and innovation.
  [Rutgers IT website, May 2025]

- Galaxies Reveal Hidden Maps of Dark Matter in the Early Universe
  A Rutgers-led team of scientists has uncovered new evidence of how galaxies grow and evolve by mapping the influence of dark matter, the invisible substance that forms the universe's underlying structure. Using one of the largest datasets of Lyman-alpha emitting galaxies from the ODIN survey and COSMOS deep field observations, the researchers analyzed how galaxies cluster across billions of years after the Big Bang. Their findings reveal patterns—described as "cosmic fingerprints"—that indicate where dark matter is most concentrated, offering new insight into how galaxies like the Milky Way formed and evolved within these dense regions.

  "We used the clumpiness of these galaxies to identify where the dark matter was densest," said Eric Gawiser, Distinguished Professor at Rutgers. "Analyzing these fingerprints gives us insight into the mass of dark matter surrounding the galaxies."
  [Rutgers Today, September 2025]

The researchers focused on data taken from a region of the sky known as the Cosmic Evolution Survey Deep Field (COSMOS), in one of the largest deep-sky surveys ever conducted.

ESA/Webb, NASA & CSA, G. Gozaliasl, A. Koekemoer, M. Franco, and the COSMOS-Web team

- "Solving the Superworm Mystery" - Amarel owner Jason Kaelber featured in the annual Coalition for Academic Scientific Computation brochure
  The Coalition for Academic Scientific Computation (CASC) is proud to represent a community of professionals who are building the foundation for America's competitiveness in science, technology, and innovation. Our members provide the advanced cyberinfrastructure high-performance computing, data

management, and expertise that enables America's greatest minds to tackle questions that matter for our future: from accelerating drug discovery, to advancing artificial intelligence (Al), to enabling more resilient supply chains. The stakes have never been higher…

At CASC, we see every day the impact of computational science on American innovation. Our members serve as both the technical backbone and the intellectual drivers of progress in the fields that will fuel the future. We play a critical role in preparing the next generation of the Al workforce-students who will graduate with the skills needed to drive discovery, grow businesses, and strengthen our economy. This brochure highlights CASC's role in amplifying those efforts.

["Solving the Superworm Mystery," Coalition for Academic Scientific Computation annual brochure, Page 15, November 2025]

- Clinical trial in N.J. gives patients with incurable cancer a new chance at life
  This article highlights a breakthrough cellular therapy developed by Amarel owner Dr. Christian Hinrichs at Rutgers Cancer Institute that has shown strong results in treating advanced HP and blood-related cancers. While the clinical outcome is patient-focused, the internal work relies heavily on advanced research computing to support genomic analysis, cellular engineering, and clinical data processing. Resources provided by the Rutgers Office of Advanced Research Computing (OARC) enable researchers to analyze complex biological data, model treatment responses, and manage large-scale clinical datasets, all of which are essential to developing innovative therapies such as engineered T-cell treatments. This connection underscores OARC's critical role in accelerating translational research and advancing precision medicine initiatives at Rutgers and beyond.

HEALTH

Clinical trial in N.J. gives patients with incurable cancer a new chance at life

Updated: Dec. 01, 2025, 7:56 a.m. | Published: Nov. 29, 2025, 7:00 a.m.

Maria Pascale is in remission from advanced stage cancer after receiving cellular treatment at Rutgers Cancer Institute and RWJBarnabas Health. Rutgers Cancer Institute

- **Research Data Storage announcement:** OIT Vice Presidents Ellen Law and Bill Lansbury sent an email to the university community announcing the launch of a new data storage platform exclusively for research data.

  The Office of Information Technology (OIT) is pleased to announce the availability of the Research Data Storage (RDS) platform, a new storage solution for the Rutgers research community.

  What are the advantages of utilizing the Research Data Storage platform?
  RDS provides reliable, highly available, high-capacity storage for research data of any size. It offers a simple and consistent way for researchers to store, access, and share their data, ensuring that research data remains secure and accessible over time.

  [From the email, "Storage supercharged_ Research Data Storage now available for Rutgers researchers," November, 2025]

- **Clark announcement:** In an email to the Rutgers IT and research community dated December 11, 2025, OARC's Director of Strategic Engagement, Kristin Lepping, announced Amarel's next generation of hardware, called Clark, after the New Jersey city of the same name.

We are excited to announce that Amarel's newest phase, named Clark, is expected to launch in late 2025. This round of hardware, compute nodes, and system upgrades for Amarel, the Office of Advanced Research Computing (OARC)'s high-performance research computing and data cluster, will provide more power and increased storage for Rutgers users.

What are the benefits of the new Amarel phase, Clark?

- *Clark hardware significantly increases Amarel's resources, doubling a standard node's computing power from 256GB per node to 512GB per node.*
- *A limited number of high-memory (2TB/node) and NVIDIA 3x L40S GPU nodes will be available to users.*

[From the email, "Introducing Clark: Amarel's next generation," December 2025]

Workshops and Presentations

Education remains a core pillar of our mission, as evidenced by the many presentations OARC representatives are asked to give around the university and the trainings that are requested by stakeholders. Workshops and panels covering topics such as REDCap, high-performance computing (HPC), machine learning, and artificial intelligence help to build technical proficiency among students, faculty, and researchers. These initiatives emphasize practical skill development, including programming and applied machine learning, while fostering interdisciplinary collaboration across Rutgers and partner organizations.

OARC's new series of REDCap trainings is aimed at assisting distributed users in transitioning to the centralized resource and providing an overview for new and experienced users. Covering fundamental concepts, features, and how-to resources, the new training videos provide project building instructions, highlights of special features, types of REDCap projects, and more.

January's week-long IQB Cryo-EM Bootcamp provided an intensive, hands-on experience where participants vitrified samples and processed data using Amarel resources with the assistance of the OARC ACI and REF teams throughout the week.

In May, OARC Sr. Research Scientist Travis Williams represented OARC on a panel on Ethics, Bias, and Fairness in AI with other experts from Rutgers Health, Amazon,

Google Health, IEEE, and Oracle at the Frontiers in Biomedical Informatics and Health AI annual symposium. Other Rutgers experts speaking included Prabhas Moghe, Kathleen Scotto, Antonina Mitrofanova, David Foran, Bishr Omary and many other Amarel owners, users, and stakeholders.

In July, OARC Senior Research Scientist, Dr. Paul Arias, partnered with the Rutgers Health Center for Biomedical Informatics & Health Artificial Intelligence (BMIHAI) to support the Summer Bootcamp in Biomedical Data Science and HealthAI, providing the infrastructure and technical support necessary for hands-on training in AI-driven biomedical research workflows.

In addition, Dr. Kholodovych served as a featured panelist at the NJACTS Intro to Clinical Bioinformatics Workshop, and Dr. Branimir Ljubic is preparing research submissions to major academic venues including AMIA and the Yale Medical AI Symposium, expanding Rutgers' visibility in the national biomedical AI research community.

Also in July, Senior Research Scientists, Drs. Paul Arias and Ernesto Sandoval, and ACI Systems Administrator Tom Skipper supported a School of Arts and Sciences Genomics workshop, providing a "great experience for both students and instructors," according to the organizers, and Dr. Vlad Kholodovych designed, hosted, and facilitated a multi-organizational CRDW retreat to collaborate on efficiencies and process improvements.

Throughout the year, we expanded on the Clinical Informatics certificate program, a three-course accredited sequence supported by NJACTS, which covers traditional machine learning, deep learning, and Generative AI as used in clinical research and reporting. It is designed for students who are already professionally engaged in health care or public health and who want to improve their technical skills. To date, over 250 students have completed the certificate requirements, developing the knowledge and skills needed to take advantage of new health information technologies for clinical research, quality reporting, and surveillance, and care delivery improvement. Topics center largely on various methods of machine learning as applied in health care and the context in which they are used, including compliance and legal issues and fair AI considerations.

Later in the summer, the REDCap team, led by Senior Scientist Yassmine Habba and REDCap Systems Administrator Kia Huffman, presented to the RU Health IT Managers group on the migration process.

Advancing Education and Student Initiatives

OARC is actively building a pipeline for entry-level and student researchers to utilize HPC and other research computing, data, machine learning, and artificial intelligence resources in their education and future work at Rutgers and beyond. OARC's scope is evident beyond the traditional hard sciences. See below for various initiatives.

- **Rutgers Future Scholars:** OARC hosted five local rising 11th-grade students for the Rutgers Future Scholars internship week in July. Participants learned about high-performance computing, explored research projects from the Rutgers Brain Health Institute and the Rutgers–Camden Center for Computational and Integrative Biology, toured the Hill Data Center, and recreated research workflows using HPC and GIS applications alongside OARC scientists.
- **Internships:** We expanded our commitment to student success by mentoring more than 10 students through paid internship and volunteer education programs, including the development of a proposed Postdoctoral Fellowship in Medical Informatics.
- **Faculty and student feedback:**
    - In May 2025, OARC ACI team member Tom Skipper coordinated and hosted a Rutgers-Camden Commercial Photography class visit to the Camden data center, where the students photographed Amarel-C (part of the Amarel supercomputer cluster located in a Camden campus data center). After the shoot, Dr. Alejandro Lorenzo, Rutgers Professor and Director of Photography at Rutgers University – Camden, invited the OARC team to the student thesis exhibition of their work, a final show held at the Stedman Gallery. This experience encouraged students to interpret research computing environments through a creative lens, broadening their understanding of technology as both infrastructure and subject within humanities and arts-based inquiry.

> **The students had a fantastic experience, and OARC ACI team member, Tom Skipper, was amazing. We all saw beyond the everyday 'surfaces' of our university.**
>
> - Dr. Alejandro Lorenzo, Rutgers professor

- In June 2025, a message of thanks came to OARC GIS specialist and research scientist, Susan Oldenburg, from Dr. Andrea Restrepo-Mieth of the Bloustein School for "above and beyond" assistance with a recently published article, acknowledging Sue.

> **I know I have said this before, but I am incredibly thankful for your help. In a world where so many people seek to do the bare minimum, you went above and beyond. As someone with zero GIS experience, being asked to include maps was more problematic than the reviewers realized. You made it happen and, through that, helped me have this publication ready just in time for reappointment. Thank you for generously sharing your skills.**
>
> - Dr. Andrea Restrepo-Mieth, Rutgers professor

- Kudos was also sent to OARC Senior Research Scientist, Dr. Robert Palmere, for his assistance to a postdoctoral researcher, Meghal Desai, of Dr. Pabitra Sahoo's lab in the Department of Biological Sciences at Newark. The researcher won BEST POSTER at the ISN/ASN meeting (International Society of Neurochemistry / American Society of Neurochemistry) in August 2025! Both Robert and OARC Director of Research Support, Dr. Vlad Kholodovych, were cited as authors on the poster.

Closing Statement

The achievements of 2025 have solidified OARC's reputation as a strategic research partner over a traditional service department. By successfully delivering the Amarel Protected Environment (Amarel-PE) hardware, achieving rigorous CUI and data security compliance, expanding secure research environments, establishing a new research-focused data storage platform, growing

our academic footprint, and helping develop a robust AI research framework, we have provided the Rutgers community with the tools necessary for 21st-century discovery.

As we welcome new leadership and enter 2026, our focus remains on scaling these secure, high-performance solutions to empower every researcher and student across the university.