Office of Advanced Research Computing

2024 End of Year Report

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2024 Accomplishments

As we reach the end of 2024, we wanted to take a moment to reflect on the accomplishments and changes that the Rutgers Office of Advanced Research Computing (OARC) has seen this year. Transitions throughout the Office of Information Technology (OIT) have resulted in new leadership for OARC in OIT Vice President Ellen Law, and our inclusion in the greater Enterprise Applications team. This new structure has strengthened OARC's base of expertise, leading to new partnerships and enhanced relationships, and further expanded our ability to provide top-level support for our research "customers" and the impact that OARC has university wide.

Our outreach and influence at the university and beyond have reached new heights, and our collaboration with OIT and research partners both at Rutgers and externally have matured significantly. We have reintroduced the influential and highly knowledgeable OARC Faculty Advisory Committee with a select group of faculty members representing all Rutgers Chancellor units. We have also begun exploring and implementing external research partnerships that we anticipate will grow and strengthen the HPC workforce in the coming decade, leading to an improved research computing landscape and the strengthening of Rutgers' research output and impact.

Our Impact: Advancing Research

- There are over 6,000 current users of the Amarel supercomputer and data analytics system comprised of Rutgers faculty, staff, students, alumni, and sponsored collaborators.
- 13 out of 30 Rutgers academic schools and colleges are represented in the Amarel owner population.
- We have reached 146 unique Amarel owners.
    - Nearly 2,000 total users (lab members and sponsored colleagues) benefit from owner privileges on the 146 owner allocations.

- OARC has collaborated by contributing people or equipment resources on over $130 million dollars in funded sponsored projects.
- Nearly 800 proposals have stated the need for OARC resources to perform the proposed research from September 2021–December 2024.
    - Of these, 142 have been awarded and 140 are currently active, representing over $87 million dollars in current sponsored projects.
    - Remarkably, 81% of these active awards (114 of the 140) are utilizing OARC resources without employing their grant budget to do so. Instead, they utilize general access compute and storage and work with the OARC team without purchasing equipment, paying for research support, or otherwise compensating OARC.

Team Growth

2024 marked significant growth for the OARC team in support of major university initiatives, namely the Clinical Research Data Warehouse (CRDW) and the centralization of REDCap support, both highly anticipated projects being managed by OARC. We are transforming the OARC workforce to enable and break ground for these initiatives, supported by budget for 11 new team members. While at the start of 2024 the original OARC team still consisted primarily of high-performance computing support specialists, we brought in seven specialized temporary staff members throughout the year to support the new projects. At the close of calendar year 2024, one of those temporary staff members joined the team full-time, with five others transitioning to permanent roles in early 2025. We aim for the rest of the vacancies posted to be filled as quickly as possible.

In addition, we have brought on two talented undergraduate students who are working with Senior Research Scientists part-time on essential research projects, learning the work of research computing professionals.

Milestones

Among many others, here are some highlights of select OARC accomplishments in 2024:

- Over the course of 2024, Amarel was expanded with two generations of new standard compute nodes, GPUs, and storage equipment, expanding our computational power and capacity. Allocations to owners and the general access

pools took place primarily in January and July, respectively. Amarel's total number of compute cores now exceeds 37,000 with 240+ GPUs available.

- In February, we deployed the iLab application for CRDW, enabling us to take in new data tenancy, data access, and data analytics projects. iLab is an all-encompassing tool for university core facilities, utilized for project initiation, billing, and tracking processes. At the same time, the project approval process via the Data Governance Committee and the internal workflows for project enablement with our colleagues at Enterprise Applications and Research Computing (EARC) and Cancer Institute of New Jersey (CINJ)/Biomedical Informatics Shared Resource (BISR) were put into motion. CRDW was "open for business!"
    - In 2024, we processed and delivered over 20 projects, compared to only two in the three years preceding 2024.
- In May, the Rutgers Institute for Translational Medicine and Science, led by Dr. Reynold Panettieri, was awarded a 7-year, $39 million renewal of the New Jersey Alliance for Clinical and Translational Science (NJACTS) grant [National Institutes of Health NCATS Award 1UM1TR004789-01]. Several OARC team members are critical project collaborators.
    - Among them, OARC Biomedical and Clinical Informatics Senior Scientist, Branimir Ljubic, M.D., PhD, and partners of the Clinical and Translational Science Award (CTSA) have designed and launched a certificate program in Clinical Informatics and Data Science, granted upon the completion of a digital three badge sequence: https://njacts.rbhs.rutgers.edu/education-training/workforce-development/certificate-in-clinical-informatics-and-data-science/
- In June, OARC submitted equipment substitution requests to the State of New Jersey after designing and obtaining updated quotes for Amarel expansion (infrastructure) and Amarel-PE (protected environment for CRDW) hardware to be supported by the New Jersey Equipment Leasing Fund (ELF) awards. The substitutions were approved by the State in September, at which point procurement of the equipment commenced. At the start of 2025, more than 50% of that equipment has been received by OARC and plans for installation and deployment are underway.
- The award period for the Price cluster hosted at Rutgers–Newark ended in September 2024. This Major Research Instrument (MRI) equipment was a collaboration led by PI Michele Pavanello, funded by National Science Foundation (NSF) with cost share by OARC [NSF Award OAC 2117429]. Price is a federated addition to the Amarel cluster, benefiting the entire research community on all campuses. It was built and is maintained by the OARC team

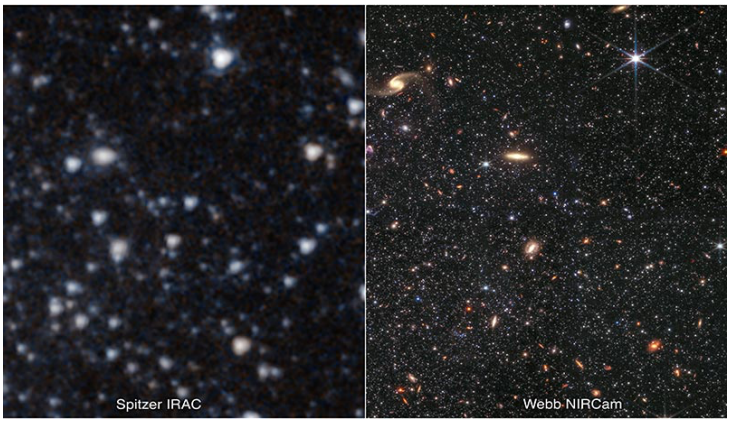
who will continue to manage and support it until it reaches end-of-useful-life, no sooner than early 2027.

- In November, the team officially began our NSF-funded Campus Cyberinfrastructure (CC*) collaboration with EDGE on an award meant to foster improved regional networking and foster collaboration throughout New Jersey [NSF Award 2346648]. The CRISPIE grant, as it is named, positions Rutgers as a lead in providing high performance compute resources, including essential trainings and workshops to be developed and led by OARC, as well as infrastructure access and support to lesser resourced institutions of higher education throughout the state, thereby supporting student workforce development and faculty research efforts.
- As we close the year, we are working closely with the Enterprise Applications and Enterprise Infrastructure teams to onboard ten Rutgers research groups representing all Rutgers Chancellor units as pilot users to the ELF-funded Research Data Storage (RDS) environment. The pilot researchers and their IT support team professionals are providing feedback on ease of or barriers to use for their research use cases, as the OARC team seeks solutions and coordinates with the vendor to improve software limitations. RDS is expected to be fully employed as soon as those issues are overcome.
- OARC has been actively involved in two university wide initiatives recently convened by sponsors Michele Norin, Michael Zwick, and Ellen Law.
    - The first initiative, the Research Data Task Force, aims to develop a comprehensive university wide plan that establishes a sustainable, efficient, and secure ecosystem for managing research data. This initiative will support the university's mission of advancing research and scholarship by enabling faculty, students, and staff to collect, manage, share, secure, and preserve research data throughout its lifecycle.
    - The second initiative, the Research AI Working Group at Rutgers University, is tasked with providing guidance on the development, implementation, and governance of artificial intelligence (AI) technologies. This group will assess the current AI landscape, recommend relevant policies and procedures, manage associated risks, engage stakeholders, promote AI literacy, and ensure alignment with other AI@Rutgers initiatives.
    - Dr. Vlad Kholodovych, OARC's Director of Research Support, serves as co-chair for both subcommittees.

In the News

- "*IntelliGenes, a first-of-its-kind software created at Rutgers Health, combines artificial intelligence (AI) and machine-learning approaches to measure the significance of specific genomic biomarkers to help predict diseases in individuals, according to its developers… Researchers tested the software using Amarel, the high-performance computing cluster managed by the Rutgers Office of Advanced Research Computing. The office provides a research computing and data environment for Rutgers researchers engaged in complex computational and data-intensive projects.*"
[Rutgers Today article, January 2024]

- "*Employing massive data sets collected through NASA's James Webb Space Telescope, a research team led by a Rutgers University–New Brunswick astronomer [Kristen McQuinn] is unearthing clues to conditions existing in the early universe… McQuinn credited the Amarel high performance computing cluster managed by the Rutgers Office of Advanced Research Computing for enabling the team to calculate the galaxy's history of stellar development.*"
[Rutgers Today article, February 2024]



- "*The Office of Advanced Research Computing, a division of the Office of Information Technology (OIT), and the Office for Research have partnered to bring the REDCap research survey tool to the university—a major initiative to support the research, scholarship, and creative endeavors of Rutgers faculty. REDCap, which stands for Research Electronic Data Capture, is an advanced research survey tool that will support the university's growing research enterprise.*"
[IT at Rutgers Newsroom, June 2024]

- "*Researchers from Rutgers'* Center for American Women and Politics *(CAWP) and the Office of Advanced Research Computing (OARC) have teamed up to analyze patterns in gender and campaign finance across state and congressional elections to provide a window into who has a voice in politics.*"
  [Rutgers Today article, August 2024]

- "*The Office of Advanced Research Computing (OARC), in collaboration with the New Jersey Alliance for Clinical and Translational Science (NJ ACTS) and the Rutgers Institute for Translational Medicine and Science (RITMS), has launched a new microcredential in Clinical Informatics and Data Science at Rutgers University. This microcredential is without charge to students and is best suited for medical students, doctors, or researchers at Rutgers who are searching to improve their technical skills.*"
  [IT at Rutgers Newsroom, August 2024]

- "*There are many ways to make coastal communities more resilient in the face of climate change, but deciding which path to take often comes down to one key question: How much will sea levels rise?*"
  [Coalition for Academic Scientific Computation annual brochure, page 11: Informing Action Amid Uncertainty, November 2024]

Workshops and Presentations

Among many presentations to schools, research deans and faculty, and IT professionals around the university, in 2024, OARC engaged with the Google AI team to provide three workshops for faculty, students, and staff to learn how to integrate Google AI tools into their research. Over 300 Rutgers community members joined the interactive sessions.

Other presentations of note included guest spots at meetings such as the Rutgers New Jersey Medical Schools' Institute for Infectious and Inflammatory Diseases (i3D) spring faculty meeting, the Rutgers Health Research Deans monthly meeting, NJACTS fall faculty meeting and Regulatory Workshop, an Institute for Health, Health Care Policy and Aging Research Data Analyst monthly meeting, and the Center for Psychiatric Health and Genomics (CPHC) fall meeting.

Advocacy/Outreach

OARC team members engage in many research facilitation committees and working groups in our efforts to strengthen this Rutgers and national community which collectively powers research and innovation. Some of those committees we've served on in 2024 include:

- Rutgers AI Task Force Co-Chair
- Rutgers Research Data Governance Task Force Co-Chair
- Rutgers Research Data Technical Committee
- Rutgers Electronic Lab Notebook RFP Leadership
- Coalition for Academic Scientific Computation (CASC) Communications Committee
- Practice and Education in Research Computing (PEARC) Communications Chair
- EDUCAUSE Research Computing and Data Community Group Steering Committee and Logistics Chair

Closing Statement

As we move into 2025, we are excited about the many new initiatives that are underway at OARC and alongside our OIT, Office for Research, and academic colleagues. We look forward to further growing our internal partnerships, helping the research community to navigate the landscape, and continuing to break new ground and grow our impact footprint.