

PSC Research Ecosystem

The *Pittsburgh Supercomputing Center (PSC)* provides U.S. support for computational and data-intensive scientific research. PSC has an enviable, international reputation for its productive and innovative systems, support for researchers, internal research projects and support for computational and data needs of the local community.

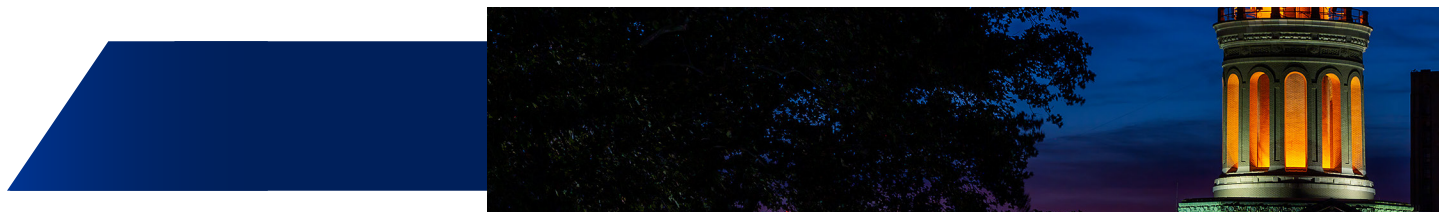
PSC, a computational research center with Carnegie Mellon University and the University of Pittsburgh, was established in 1986 and is supported by several federal agencies, the Commonwealth of Pennsylvania and private industry and is a leading partner in XSEDE (Extreme Science and Engineering Discovery Environment), the National Science Foundation cyberinfrastructure program.

PSC provides over 34 years of leadership in:

- high-performance and data-intensive computing
- data management technologies
- software architecture, implementation and optimization
- enabling ground-breaking science, computer science, and engineering across the nation
- leading research in biology/biomedicine, epidemiology, neuroscience, file systems, networking
- user support for all phases of research and education
- STEM outreach in data science, bioinformatics and coding

Our Mission

The mission of the Pittsburgh Supercomputing Center is to make the world a better place by providing advanced computing systems and the expertise needed to get the most out of them. Our two goals for accomplishing this are helping to expand the boundaries of knowledge and to solve the problems facing humanity.



PSC Research Ecosystem

Major Computing Resources



Bridges focuses on researchers who have never before needed advanced computing. The Bridges system is the only one of its kind to bring together high performance computing (HPC), artificial intelligence (AI) and Big Data to address emerging challenges in biomed and other disciplines. With our **Bridges-AI** platform we are pushing the field by providing hardware, software and collaborative expertise for scaling up AI, machine learning and deep learning in many areas.



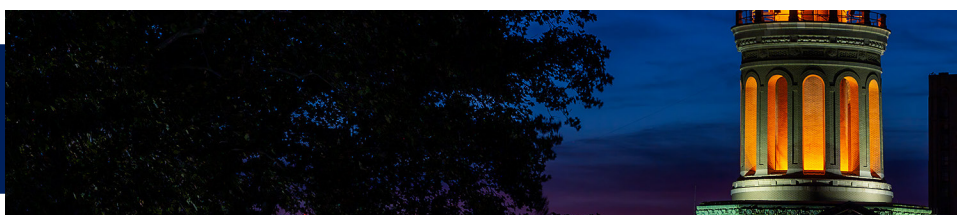
Building on PSC's experience with the Bridges system, **Bridges-2** will provide transformative capability for rapidly evolving, computation-intensive and data-intensive research, creating opportunities for collaboration and convergence research. Bridges-2 will integrate new technologies for converged, scalable HPC, artificial intelligence and machine learning (AI/ML) and data analytics; prioritize researcher productivity and ease of use; and provide an extensible architecture for interoperation with complementary data-intensive projects, campus resources, and clouds.



Neocortex will introduce fundamentally new hardware to greatly speed AI research. The system will do this by exploring a revolutionary combination of Cerebras Wafer Scale Engine (WSE) processors, which are designed specifically to accelerate AI, and an extremely large-memory HPE Superdome Flex system for massive data handling capability.



Our **Anton 2** system, is a special purpose supercomputer for biomolecular simulation designed and constructed by D. E. Shaw Research. Anton 2 is the only system of its kind available for open research and gives biomolecular researchers unprecedented ability to simulate chemical systems faster than ever before possible.



PSC Research Ecosystem

Research Collaborations



PSC's collaborations with major institutions and vendors have enabled us to promote and support innovative projects and programs that have had a national as well as international impact on our lives and the lives of future generations.

PSC is a leading partner in the **Extreme Science and Engineering Discovery Environment (XSEDE)**, the National Science Foundation cyberinfrastructure program.

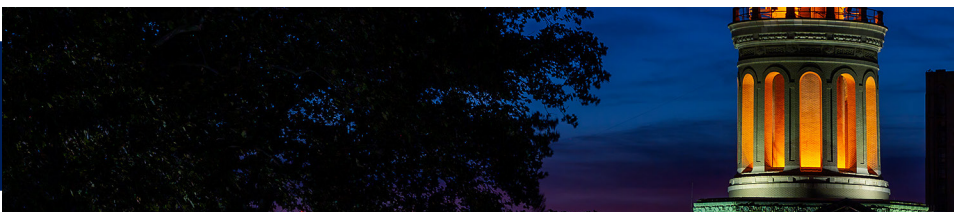
As a member of the **COVID-19 High Performance Computing Consortium**, PSC has worked with funding agencies, national labs, industry and academic partners, to provide computing resources and expertise to empower researchers around the world to accelerate understanding of the COVID-19 virus.

PSC and the University of Pittsburgh are working together with over 30 other institutions as part of the **Human BioMolecular Atlas Program (HuBMAP)**, funded by the Common Fund at the National Institutes of Health. HuBMAP is working to catalyze the development of a framework for mapping the human body at single cell resolution.

The **Brain Image Library**, is a national public resource enabling researchers to deposit, analyze, mine, share and interact with large brain image datasets, funded by the National Institutes of Health. The Brain Image Library is a collaboration with Carnegie Mellon University and the University of Pittsburgh.

The **National Center for Genome Analysis Support (NCGAS)** is a collaboration between PSC and Indiana University focused on supporting researchers with genomics projects that are funded by the National Science Foundation (NSF) or aligned with the NSF mission.

Web10G, a collaboration between the National Center for Supercomputing Applications (NCSA) and PSC, funded by the National Science Foundation, offers users, developers, and network engineers the tools to diagnose and correct hidden network issues.



PSC Research Ecosystem

Community Impact

Our **networking** group is the recipient of multiple research grants and also provides economical, high-performance networking to PSC and other university groups. Research activities include the development of tools for the automatic optimization of network performance and for assisting users and collaborators in improving their network performance.

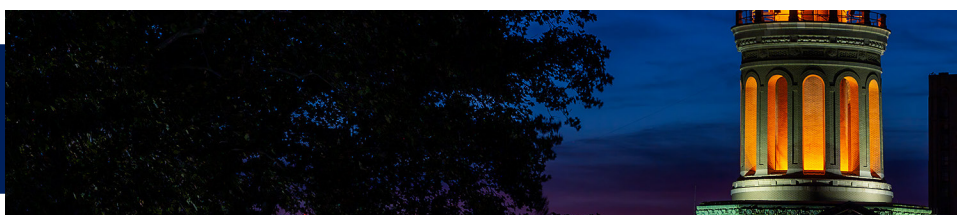
PSC's networking group played a major role in the founding of NSFnet, the precursor to the commercial Internet. They create and support PSC's internal networks and, through 3ROX (a sub-activity of PSC) provide wide-area networking to a wide range of Pennsylvania educational institutions. The group also advises regional universities on networking issues.

Education and training are a large part of our work at PSC, with a focus on the next generation of computational and data analytic scientists and specialists.

Our XSEDE workshop series has trained almost 8,000 researchers and students around the country in high performance computing, big-data analytics, use of novel architectures and AI computing.

We support several undergraduate interns (SURE Program) each year who gain valuable experience in computational techniques, systems administration and networking. Many of these students have gone on to be an active part of the Pittsburgh high-tech community.

We have expanded our ongoing programs to help increase the diversity of the workforce by introducing young women to computer programming (Project GCode), help to increase local high school teaching capacity through curriculum development (BEST Program) and to introduce students to data science and data analytics (Data Jam).



PSC Research Ecosystem

Advancing Research

Through the efforts of PSC's diverse research ecosystem, PSC has empowered the scientific engineering and research communities to solve the world's most challenging and complex problems.

The PSC research ecosystem has led to a number research advancements including:

- developing a clearer picture of how signals that kill pain work
- eliminating common network problems
- a new knowledge of how proteins interact with DNA
- spotting how microbes growing insides the intestines of people with diabetes differ from those in people who don't have diabetes
- the development for a drug for cancer treatment; findings of inadequacies in how an individual's private data is protected
- a better diagnosis of traumatic brain injury
- a system of pathology image matching that will improve analysis time and accuracy
- groundbreaking strides in new drug therapies for viral disease
- an efficient organ donor-matching system

Visit psc.edu for more information or
email us at info@psc.edu to start
collaborating with us today!

