

National Cyberinfrastructure

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There is no Cyberinfrastructure, or Supercomputer without <u>People</u>

The People Powering Cl

- Datacenter
 - Technicians: Maintain and troubleshoot hardware
 - Engineers: Design and optimize data center infrastructure
 - Plumbers: Liquid cooling manifolds
 - Electricians: Powering up the room and racks
- Operations/Networking/Security
 - System Administrators: provisioning and monitoring nodes
 - Network Administrators: Ensure reliable and secure network operations
 - Security: Protect systems from cyber threats
- Account Management and Accounting
 - Creation and maintenance of groups and individual accounts, along with resource accounting
 - Accountants: Manage financial records and budgets.
- User Support
 - Technicians: Provide front-line technical assistance to users. •

- Scientific Support
 - Research Scientists: Collaborate on scientific projects and data analysis
 - Technical Consultants: Offer expertise in specialized scientific domains
- Communications
 - Manage internal and external communications
 - Scientific and technical writers for publications and manuals
- Project Management
 - Oversee project timelines and deliverables and assist in project planning and execution.
- Education, Training, Workforce Development
 - Develop and conduct training sessions and workshops for academics and professionals
- Business Office & Administration
 - Proposals, finances, procurement, coordination
- Librarians

...

• Data ingestion, curation, and management







National Cyberinfrastructure: NSF-Funded ACCESS Program

National Cyberinfrastructure Program



2001 - 2011 https://en.wikipedia.org/wiki/TeraGrid

Extreme Science and Engineering Discovery Environment ACCESS

Advancing Innovation

2011 - 2022

https://www.nsf.gov/news/news_images. jsp?cntn_id=121181&org=NSF



https://access-ci.org





A - C - C - E - S - S

- Advanced Cyberinfrastructure
- Coordination
 Ecosystem
- Services & Support

- Beyond-your-laptop → supercomputers; data storage; datasets; models; software
- Rich collection of NSF-funded resources
 working together
- Services: Requesting accounts; operating equipment; reporting/metrics Support: Assistance; training; consulting





"Outgrowing" Your Laptop

When and why to use shared cyberinfrastructure resources:

- If your tasks for research and/or coursework should take minutes but are taking hours or days to complete
- If your laptop regularly freezes due to high computational loads
- If the laptop's CPU, memory limitations, and storage requirements are consistently maxed out
 - e.g. when you run out of storage for program
 - e.g. when you don't have the hardware to run certain software
- When you need to share work with others
 - Collaborative projects
 - Classroom activities











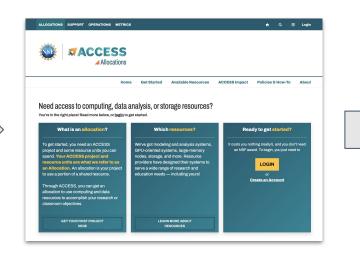
Connecting researchers and educators to the resources and services they need to accomplish their objectives.

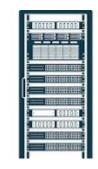
https://allocations.access-ci.org

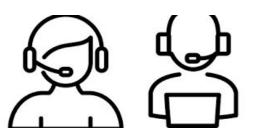
Research & Educational Community











Cutting-edge Hardware, Software + Expertise





Allocation Services Vision & Goals

Allocations Vision: The NSF-funded national CI must be accessible and equitable for all researchers no matter the size of the institution, the scale of the planned work, the discipline of the research, or the demographics of the requestor.

Our Goals:

- Create an open, inviting, and democratized allocations marketplace
 - With our emphasis on continuous improvement and democratization
- ...with an efficient, scalable, and simplified request and review framework
 - Through our policies and procedures
- ...built on a robust, decentralized, and flexible software platform
 - Made possible by the eXtensible Resource Allocation System (XRAS)





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Cyberinfrastructure Available

- Computing systems
 - Varying core counts & memory sizes
 - Cloud resources (persistent services)
- Accelerators
 - GPUs, vector processors, FPGAs
- Data storage systems
 - Archival, object, tiered
- Data repositories
- Software & workflow managers
- High performance networking
- CI Professionals & support tools
- System performance monitoring



ble	Check out the new catalog!
	ESS
Resources	ed computing resources at no cost to researchers and educators.
Browse resources Filter resources match for your research.	Computing resources at the cost to research let's and educators. Ask a question You have resource questions. Fi duta form to get resource our dBA both answermin or Request ACCESS Login
Compute & Storage Resou	
	ACES Group of GPU Compute Group of GPU Compute G
	Anvil Produe University © SPU Compute © ACCESS Preganus) © CPU Compute © ACCESS OnDemand Citage Memory Nodes) © Solarios Gateway support Produe University is the home of Anvil, a powerful new supercomputer that provides advanced computing capabilities to support a wide range of computational and data-intensive research spanning from traditional high-performance computing to modem artificial intelligence applications. Learn more about Anvil =
Bridge-2	Bridges-2 Philosoph Supercomputing Center: @ GPU Computer Strange C Large Memory Notes: Advance reservation: Store Calaxies support ACCESS OrDemand Findes-2, a resource of Philosophi Supercomputing Center, is designed for converged HPC+ AI + Data. Its custom topology is optimized for data-centric HPC, AI, and HPDA (High Performance Data Analytics). An extremely flexible software environment along with community data collections and BDaaS (Big Data as a Service) provide to toda nocessary for modern pionenting research. The data management system. Ocean, consists of two-lens, disk and tape, transparently managed as a single, highly usable namespace. Learn more about Bridges-2.

Browse all available resources: https://allocations.access-ci.org/resources



Science Gateways

Advancing

Innovation

- User-friendly web-based portals or platforms developed by a community that provide researcher and educators with access to advanced computing resources, data, software, and tools.
- Over 40 active community gateways currently running on ACCESS resources
 - Domains: quantum chemistry, genomics, computational anatomy, cryo-EM, climate research, music education research, earth and planetary materials, water education, natural hazards engineering, biomedical research, flood monitoring, proteomics, topography, protein structure, and more!
 - See <u>all active Science Gateways</u> powered by ACCESS





Requesting a Project

Simplified Request & Review Framework

- Explore ACCESS for getting started, evaluating resources, and small-scale activities
 - Only requires an abstract, reviewed by RPs for suitability
- Discover ACCESS for modest-scale work, large classroom exercises
 - One-page write-up, reviewed by RPs for suitability
- Accelerate ACCESS for more experienced researchers with mid-scale needs
 - Three-page proposal, subject to panel and RP review
- Maximize ACCESS for largest-scale projects, continued close scrutiny of most demanding computational work
 - 10-page proposal subject to panel and RP review



Policies and practices are designed for easier entry.

RPs are engaged in each request for their resource(s).



ACCESS Allocations Policies

- U.S.-based investigators are eligible to lead projects
- Graduate students can now lead projects
- Multiple supporting grants? \rightarrow Multiple projects
 - Separate projects for research, exploration, and classroom activities
- Standardized project types for flexibility
 - The "paperwork" required to request a project ranges from:
 - 1 paragraph; 1 page; 3 pages; 10 pages
 - Start small and upgrade later
- Award duration aligns with supporting grant

Policies and practices are designed for easier entry.

RPs are engaged in each request for their resource(s).

Available at no cost!

No supporting grants required!





Ecosystem Access Time

A "typical" project now takes ~10 days to go from submitting a project request to recording their first use of an ACCESS resource.

Accounts on resources are available in ~3 days.

KPI: Ecosystem Access Time (days)	2022 12.8	²⁰²³ 10.5
Preparation time (satisfaction)	4.1	4.23
Preparation time (days)	-	0.6
Median days to request decision	0.6	0.7
Median days to first credit exchange	4.0	1.9
Median days to approved exchange	1.1	1.0
Median days to first resource use	7.1	6.3





Step-by-Step Allocations Request

- <u>Register for an ACCESS ID</u>
- Select the **Project Type** that best fits your needs
 - If you're new, <u>start</u> with <u>Explore</u> and upgrade when you need more resources!
- Complete the Request Form
 - Add co-PIs, Allocation Managers, and other Users (make sure they have an ACCESS ID)
- Exchange your allocated credits for the Available Resources
- Start your research, development, or educational (classroom) work!

Link to full "Get Your First Project" guide

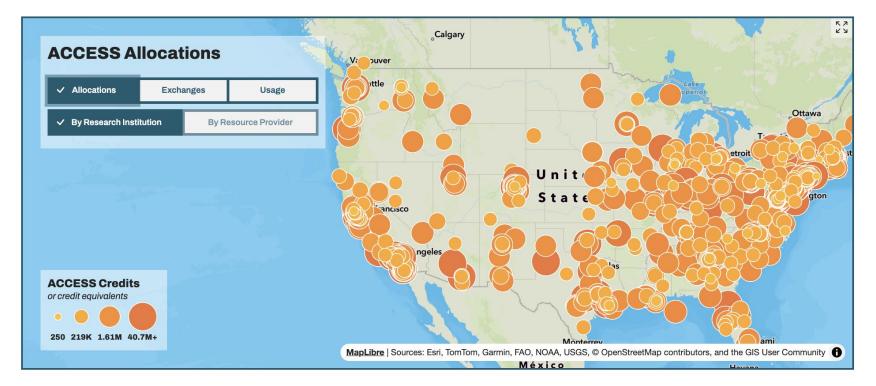
Over 95% of Requests are Approved!







Who's Utilizing ACCESS?

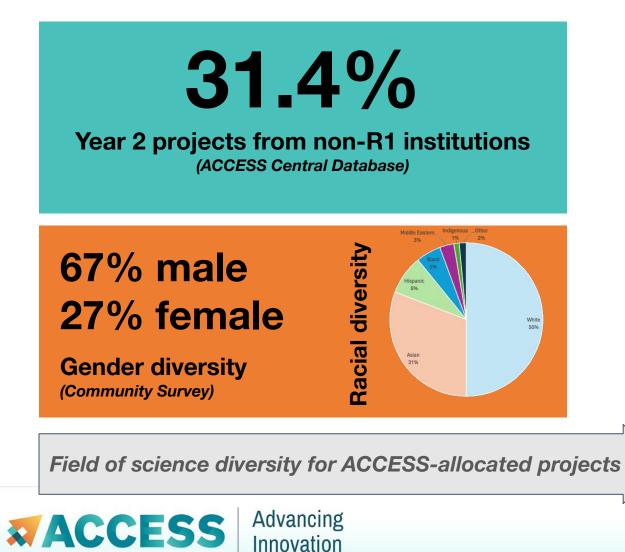


Explore the map for more in-depth information Check out our <u>Current Projects</u> page

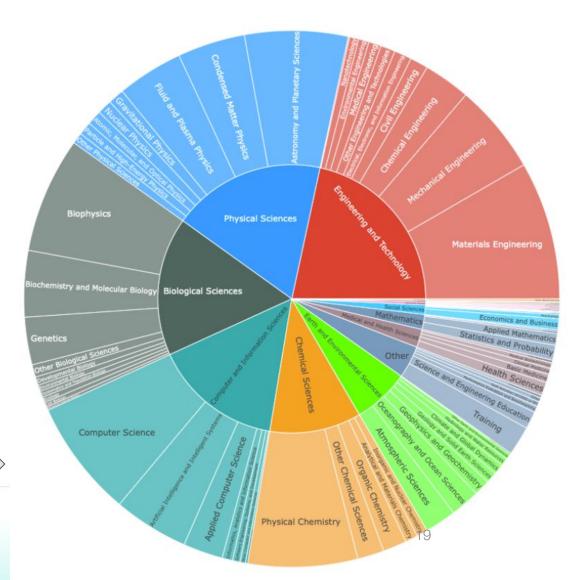




Extending the use of resources and services available via ACCESS to under-represented communities, under-resourced institutions, and non-traditional domains



Innovation



Where to Find Help

Ticket System

- Anything ACCESS related
 Must register for an <u>ACCESS ID</u> to open a ticket

Resource Providers (Directly)

The <u>Resource Catalog</u> has links to user guides with contact information •

Q&A Bot

https://support.access-ci.org/ •

Contact the Presenter

Drop me a line! (email on last slide) •



Ψ	JOHNS HOPKINS		Open Science Grid	copen storage network	VPSC
Indiana University (IU) Jetstream2	Johns Hopkins University (JHU) Rockfish	National Center for Supercomputing Applications (NCSA) Delta	Open Science Grid (OSG)	Open Storage Network (OSN)	Pittsburgh Supercomputin Center (PSC) Bridges-2
PURDUE UNIVERSITY.	SDSC SAN DIEGO SUPERCOMPUTER CENTER	Stony Brook University	TEXAS ADVANCED COMPUTING CENTER	TEXAS ARM	UNIVERSITY OF ELAWARE
Purdue Anvil	San Diego Supercomputer Center (SDSC) Expanse	Stony Brook University Ookami	Texas Advanced Computing Center (TACC) Stampede2 Ranch	Texas A&M University (TAMU) FASTER	University of Delaware DARWIN
HK.					
University of Kentucky KyRIC					





Bring ACCESS to your Campus, Institution, or Program (On-Ramps)

• Instead of sending your researchers and instructors to the ACCESS website, you can point them to your own!

https://allocations.access-ci.org/on-ramps

- Our initial offering lets individuals browse, filter, and learn about the ACCESS-integrated resources
 - They jump to the ACCESS website to make a request
 - No user information is collected at your end
- An on-ramp is just an embeddable Javascript component that you can put into any webpage
 - (14 lines of Javascript)
- We're looking for campuses to help us beta test the offering and collect feedback

SU JACKSON STATE am may be for you! nt in the National Science Foundation: Undergraduate Program am. NSF ACCESS is a powerful collectio Undergraduate Course Descriptions NSF ACCESS Resources Graduate Program Discover the nationwide NSF cyberinfrastructure Graduate Survey Form Need advanced computing and storage options for your research or classi Undergraduate/Graduate ACCESS program has been established and funded by the U.S. National Advising to help you - the nation's researchers and educators - to use some of the o Transfer Students advanced computing systems and services - at no cost to you. Scholarships Thousands of researchers, instructors, and students from institutions large Resources ACCESS-integrated resources every year. With more than 30 resources fro resource providers, there's bound to be a resource for you, your lab, or you Unite Pre-Engineering Program Facilities university of central florida UCF SIGN IN + Search UCF Association of Te Management, an Office of Research Engineering (ATI Cyberinfrastructure DESOUDCE **NSF's ACCESS Cyberinfrastructure** Program ACCESS is an advanced computing and data resource supported by the National Science Foundation and made possible through these lead institutions and their partners - Carnegie Mellon University; University of Colorado Boulder; University

Research Cyberinfrastructure provides assistance with all steps involved in requesting and using ACCESS

of Illinois at Urbana-Champaign; and State University of New York at Buffalo.



https://its.web.baylor.edu/nsf-access-program

https://www.jsums.edu/industrialsystems/nsf-access-resources/ https://rci.research.ucf.edu/resource/nsfs-access-cyberinfrastructure-program/



Baylor University

Information Technology Services

B Home

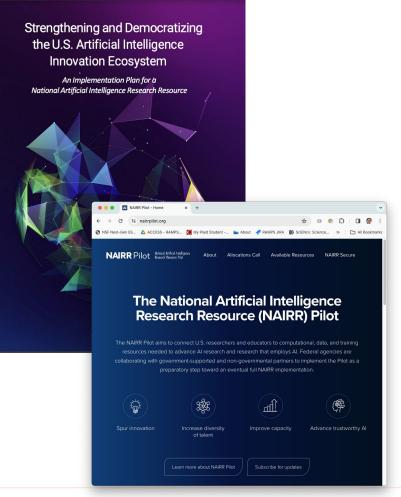
NSF ACCESS Program

Do you need advanced computing resources that exceed what can be provide Do you have research that is *NOT* subject to <u>a Protected, Restricted, or Gove</u>

National Al Research Resource Pilot Program

National Artificial Intelligence Research Resource Pilot

- NAIRR Task Force established by National Al Initiative Act of 2020, <u>launched in June 2021</u>, co-chaired by OSTP and NSF
- NAIRR Task Force's <u>final report issued</u> in Jan. 2023
 - Report provides a roadmap for standing up a national research infrastructure
- White House issued <u>Executive Order</u> on Oct. 30, 2023, with 90-day window to launch NAIRR Pilot
 - Among many AI-related directives to federal agencies





Apply for resources at <u>nairrpilot.org</u>



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Private Sector Resources in NAIRR

- Al2: Allen Institute for Al
- AMD
- Amazon Web Services (AWS)
- Anthropic
- Cerebras
- Databricks
- Datavant
- EleutherAl
- Google
- Grog
- Hewlett Packard Enterprise (HPE)
- Hugging Face
- IBM

- Intel
- Meta
- Microsoft
- **MLCommons**
- **NVIDIA**
- **Omidyar Networks**
- OpenÁl
- OpenMined
- Palantir
- Regenstrief Institute
 SambaNova Systems
- Vocareum
- Weights & Biases



Apply for resources at <u>nairrpilot.org</u>



Most ACCESS

resources

available in

NAIRR pilot

NAIRR Pilot Allocations Process

- https://nairrpilot.org
 - Research & Educational Calls currently open
- Must have an ORCID ID to start the submission process
 - <u>https://orcid.org/register</u>
- 3-page request
- Must be computing in the U.S.
- Multi-step allocations process
 - Request -> Vetting -> Review -> Matching -> Agency Concurrence





Which Do I Choose? ACCESS or NAIRR Pilot?





- Long-term research and educational initiatives
- <u>All</u> project types

 not explicitly Al-related

 Mainly CPU, GPU, Storage resources
- Most (83%) projects approved in ~1 business day
 - Accounts on resources available in ~3 days

NAIRR Pilot

National Artificial Intelligence Research Resource Pilot

- Short-term projects with immediate results
- <u>AI-focused</u> projects only
 - should align with current focus areas: https://nairrpilot.org/opportunities /allocations
- Diverse set of resources
- Requests take ~6-8 weeks • for review and processing





