ACCESS | Advancing Innovation

Leveraging National Supercomputing Resources for Research and Education- ACCESS & NAIRR Pilot Allocations Cyberinfrastructure (CI) Resources

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ACCESS Allocations

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There is no Cyberinfrastructure, or Supercomputer without ***People***

The workforce supporting research and education.

The People Powering CI

- 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
- ...

NSF-Funded ACCESS Program

For researchers, educators, students, facilitators, department heads, IT staff, VPs, … and more!

National Cyberinfrastructure Program

2001 - 2011

https://en.wikipedia.org/wiki/TeraGrid

2011 - 2022

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

2022 -

https://access-ci.org

A - C - C - E - S - S

- **A**dvanced **C**yberinfrastructure
- **C**oordination **E**cosystem
- **S**ervices & **S**upport

- 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

ACCESS Allocations

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

ACCESS Allocations

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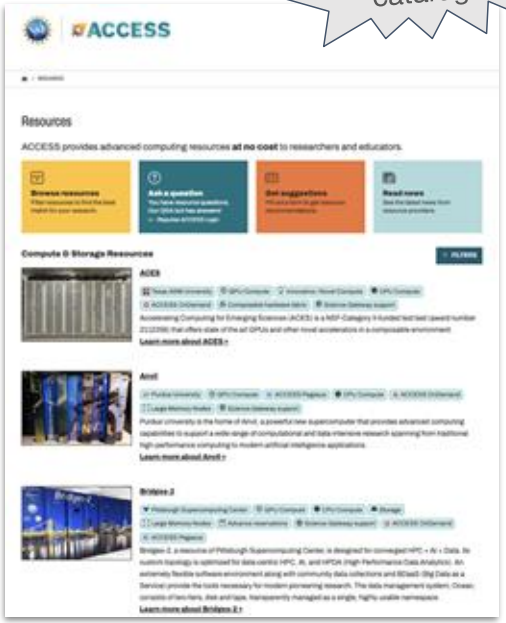
Cyberinfrastructure Available

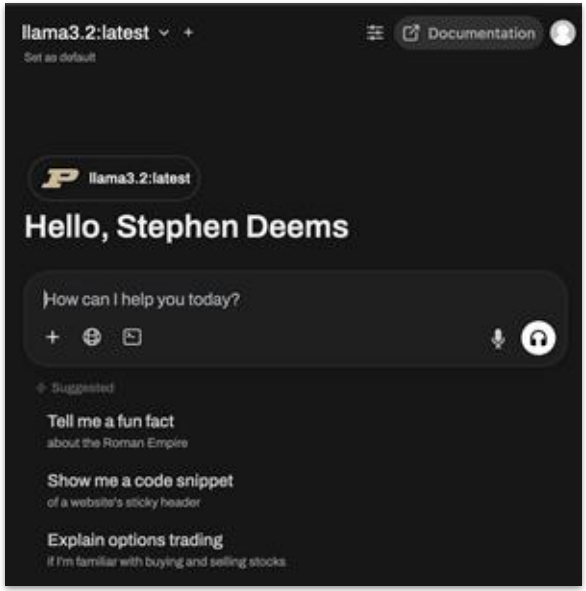
- Computing systems
  - Varying core counts & memory sizes
  - Cloud resources (persistent services)
- Accelerators
  - GPUs, vector processors, FPGAs
- Data storage systems
  - Archival, object, tiered
- Data repositories
- Software & workflow managers
- High performance networking
- CI Professionals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

Check out the new catalog!

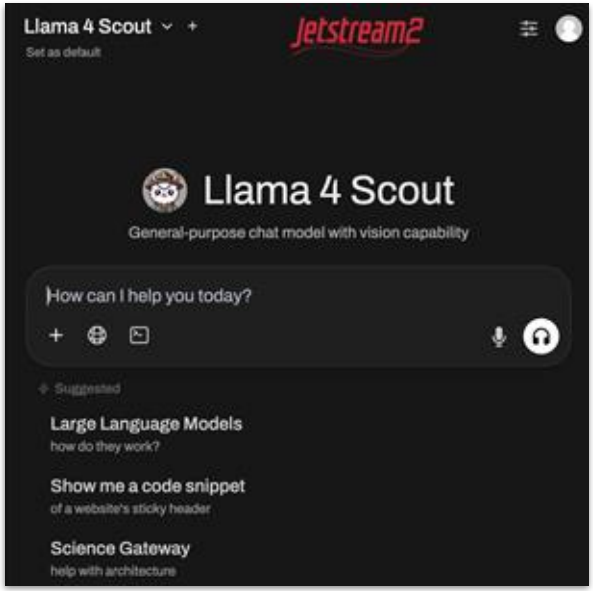


Browse all available resources:
https://allocations.access-ci.org/resources

“New” Resources: LLM Services



Purdue Anvil GPT
https://anvilgpt.rcac.purdue.edu/



IU Jetstream2 Inference Service
https://llm.jetstream-cloud.org/

Science Gateways

- 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 all active Science Gateways powered by ACCESS

Requesting a Project

Want accounts on these systems? Here's how you get them!

ACCESS Allocations Policies

- U.S.-based investigators are eligible to lead projects
- Graduate students can now lead projects
- Multiple supporting grants? → 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).

No supporting grants required!

Quick, Simple Request Framework

Most requests are approved in **under 24 hours**

Explore ACCESS *— for getting started, evaluating resources, and* ***small-scale coursework***

- 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.

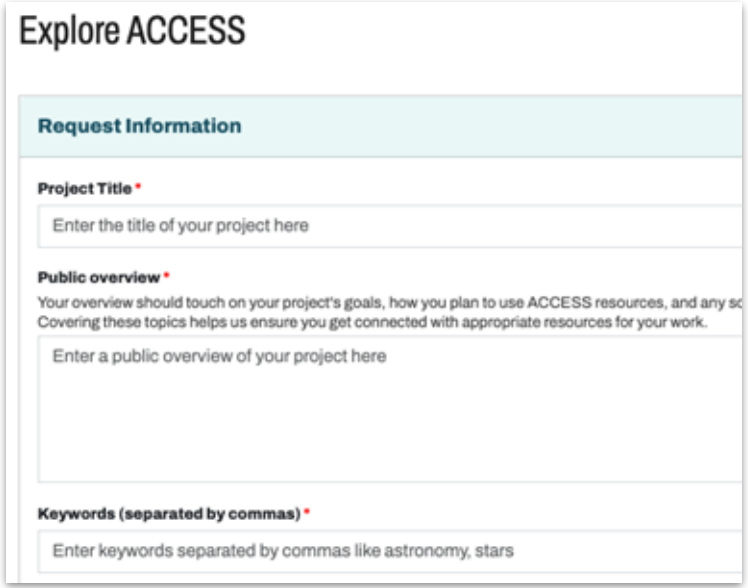
RPs are engaged in each request for their resource(s).

ACCESS

Request a project at: allocations.access-ci.org

Required Components

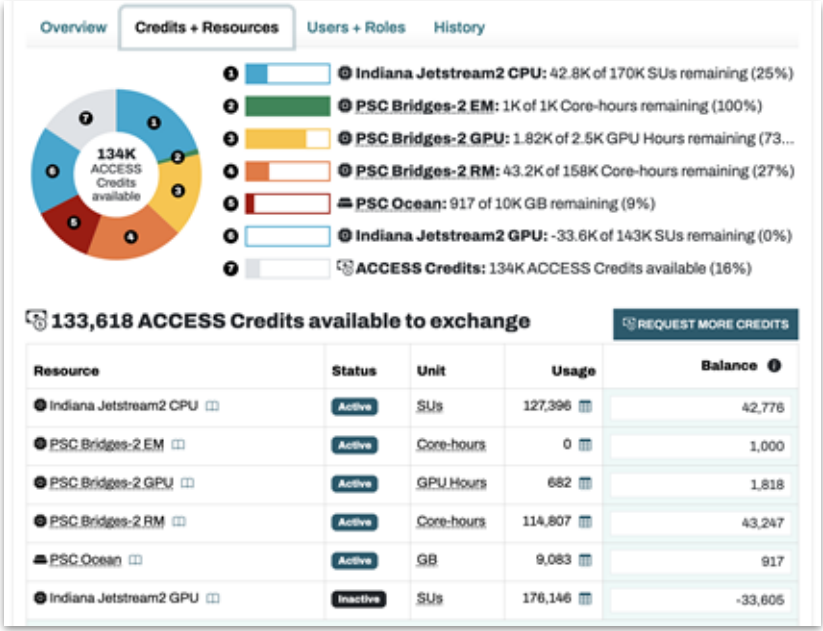
- Title
- **Public overview** (3-4 sentences)
  - Project's goals, how you plan to use ACCESS resources, and any software packages you need.
- Keywords
- Fields of Science
- Any additional personnel
  - Can add users after the allocation is approved, as well
- **Supporting Grant** (if applicable)
- CV



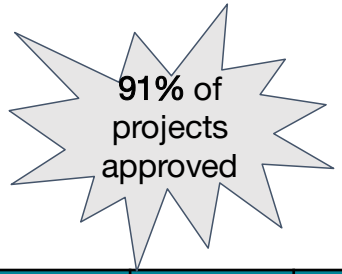
"This process works well." - NSF Program Officer

Managing a Project

- Allocated **credits are exchanged for** time on specific RP **resources**
- Users can be added and assigned elevated roles (e.g. Allocation Manager)
- Can request time extensions, supplemental credits, and transfer between resources



Turnaround Time Metrics



A "typical" project now takes ~9 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**	2024 **9.0** ✦
Preparation time (days)	-	0.6	0.6
Median days to request decision	0.6	0.7	**0.65**
Median days to first credit exchange	4.0	1.9	**1.7**
Median days to approved exchange	1.1	1.0	1.0
Median days to first resource use	7.1	6.3	**5.1**

Step-by-Step Allocations Request

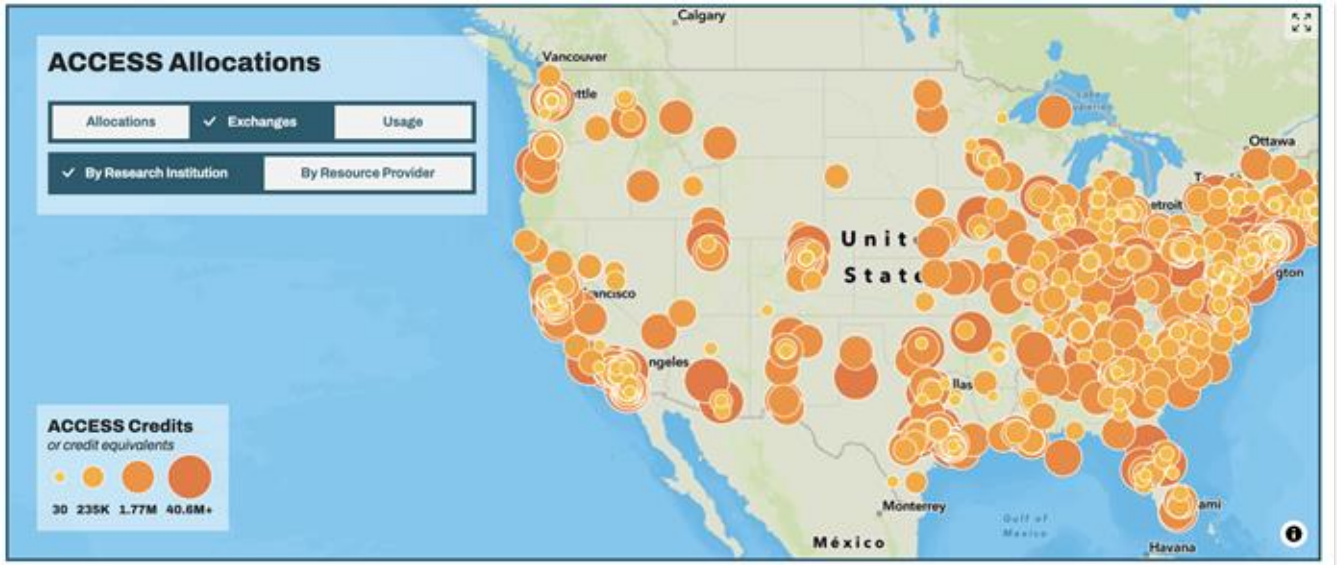
- Register for an ACCESS ID
- Select the Project Type that best fits your needs
  - If you're new, ***start with Explore*** and upgrade when you need more resources!
- Complete the Request Form
  - Add co-PIs, Allocation Managers, and other Users (make sure they have an ACCESS ID)
- Exchange your allocated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

Link to full "Get Your First Project" guide

ACCESS Allocations

Over 90% of Requests are Approved!

Who's Utilizing ACCESS?



A map of allocations, exchanges, and usage since the start of the ACCESS program in September 2022. Values are displayed in ACCESS Credits, or ACCESS Credit equivalents for Maximize ACCESS requests and usage.

Explore the map for more in-depth information. Check out our Current Projects page

Where to Find Help

Ticket System

- Anything ACCESS related
  - Must register for an ACCESS ID to open a ticket

Resource Providers (Directly)

- The Resource Catalog has links to user guides with contact information

Q&A Bot

- https://support.access-ci.org/

Contact the Presenter

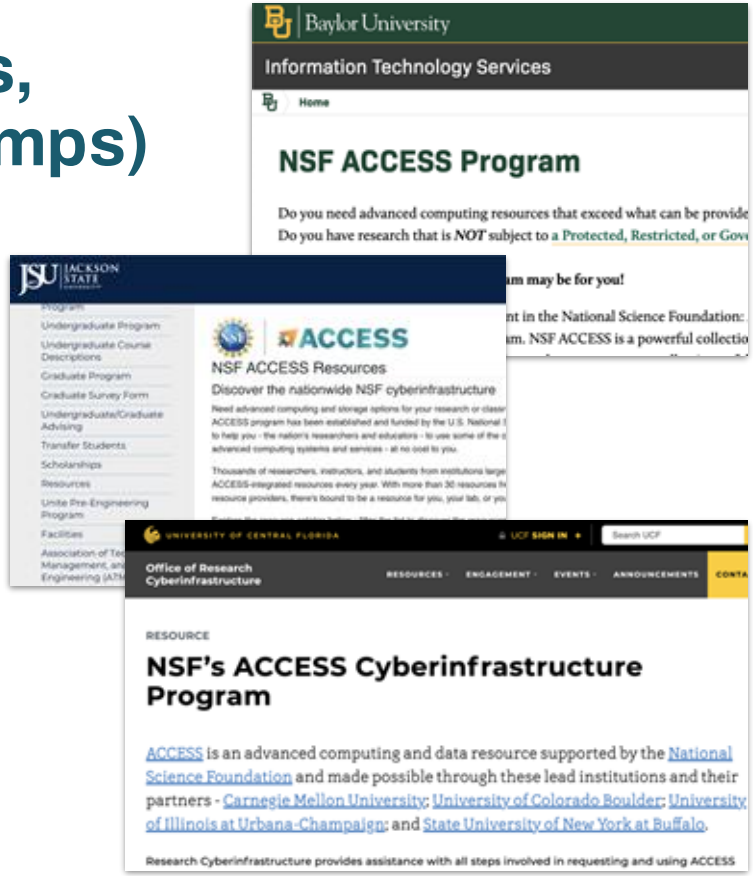
- Drop me a line! (email on last slide)

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



ACCESS Allocations

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/

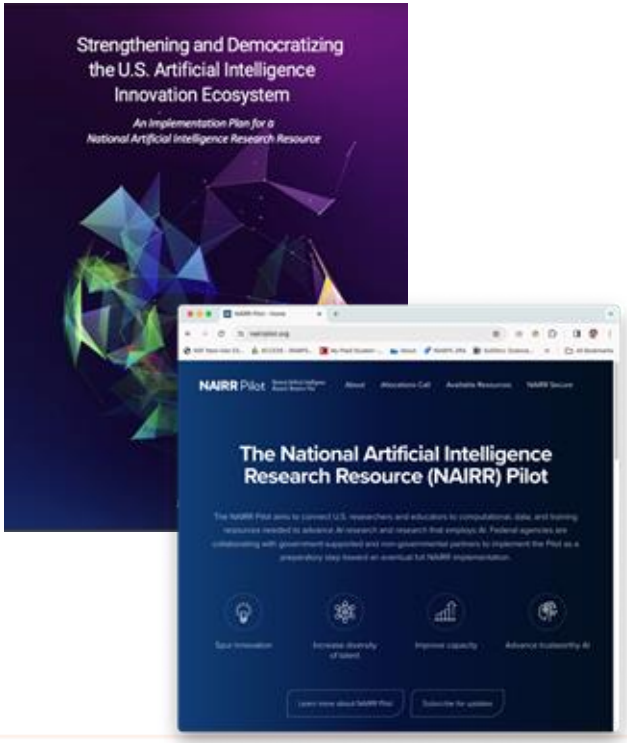
National AI Research Resource Pilot Program

Led by NSF.

Made possible by many agencies and private sector partners.

National Artificial Intelligence Research Resource Pilot

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



ACCESS Allocations

Apply for resources at nairrpilot.org

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NAIRR Pilot Allocations

- Researchers and instructors from U.S. 2- or 4-year academic institutions
  or non-profit organizations
  - *and private sector if they have a federal research grant*
- Any — or no — source of funding for the research
  - *including NAIRR Pilot Expansion awards*
- Any application domain of AI
  - *in line with NAIRR and NSF priorities*

- Visit **https://nairrpilot.org/**
- Under "Current Opportunities," select
  - Researcher Resources Call, for research projects
  - Classroom/Educators Resources Call, for classroom activities
- Requests require a 3-page proposal
  - See website for proposal instructions
  - NAIRR Pilot Expansion awards have an accelerated review process
- ***New!*** NAIRR Start-Up Opportunity
  - Short project description and small, fixed resource allocation amount, awarded within 2 weeks
- Feel free to submit a help ticket to NAIRR
  - If you have proposal or resource questions

Writing proposals for resource access

- *Resource proposals are not research proposals*
  - These programs are not re-reviewing your funded research activities
- *Summarize* your research (or instructional) objectives
  - Emphasizing your computational plan or approach
- *Justify* your resource needs
  - Some programs offer opportunities that provide you access to get started and collect info to estimate your total resource needs

- Calculating resource needs for AI is less precise than traditional HPC cost calculations
- “Less precise” is not the same as “no way to know”
- Describe your resource flexibility
- Consider if non-GPU hardware is an option
- Being able to run on more than one GPU or more than one node is an important workflow feature to describe

NAIRR Pilot – Private Sector Resources

These resources represent leading-edge offerings from corporate and non-profit organizations. So new we're still trying to decide how to classify them.

Cloud Providers

Amazon Web Services

Google Cloud Platform

Microsoft Azure

GPU Systems

NVIDIA DGX Cloud

Training Hardware

Cerebras CS-2

Inference/Model Services

Anthropic

Groq LPU Inference Engine

OpenAI

SambaNova Cloud

Tools and Software

DataBricks

Eleuther AI

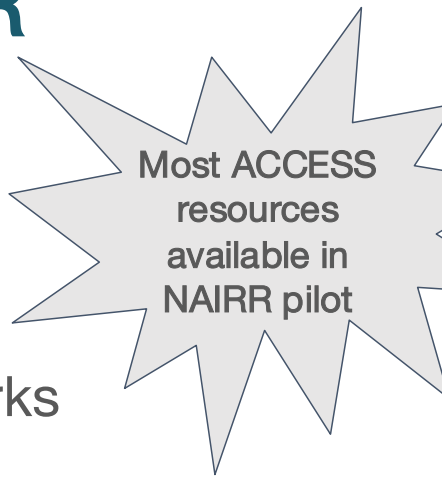
Hugging Face

OpenMined

Weights & Biases

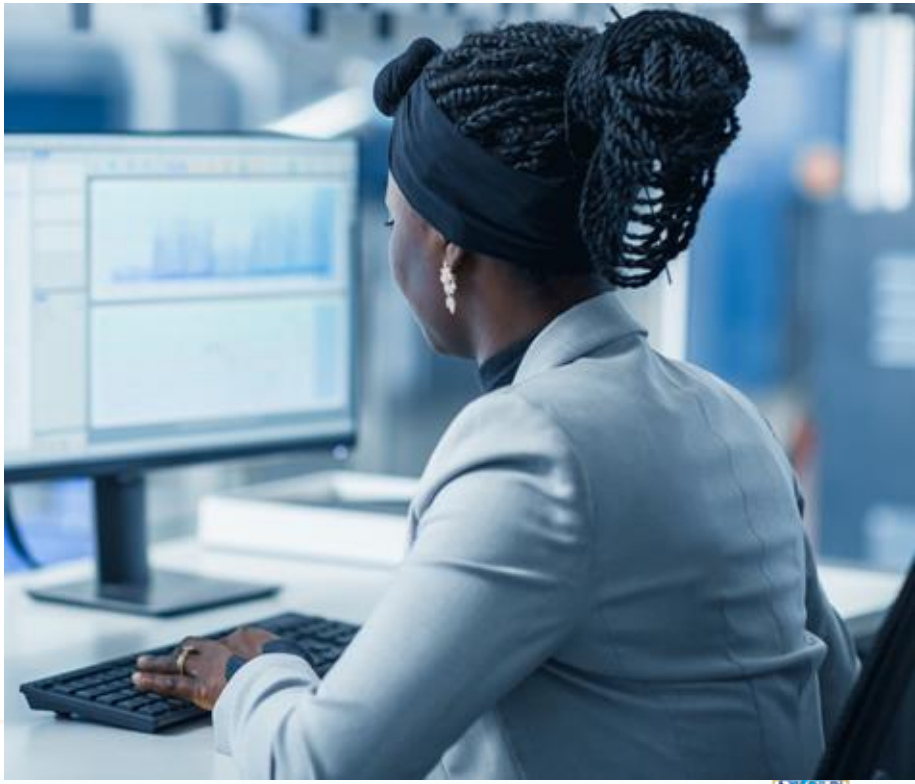
Private Sector Resources in NAIRR

- AI2: Allen Institute for AI
- AMD
- Amazon Web Services (AWS)
- Anthropic
- Cerebras
- Databricks
- Datavant
- EleutherAI
- Google
- Groq
- Hewlett Packard Enterprise (HPE)
- Hugging Face
- IBM
- Intel
- Meta
- Microsoft
- MLCommons
- NVIDIA
- Omidyar Networks
- OpenAI
- OpenMined
- Palantir
- Regenstrief Institute
- SambaNova Systems
- Vocareum
- Weights & Biases



AI-ready Research Environments

- Most sites have standard AI software tools ready to go
  - PyTorch, TensorFlow, and so on
- Some public-sector sites now hosting open-source LLMs
  - Llama, DeepSeek, and more
- NAIRR Pilot offers wide variety of alternate options
  - Inferencing services, commercial LLMs
  - Many different models
  - Commercial workflow and data management software and tools



More Than Just Hardware

- All the resources mentioned are “full service” — not only hardware but also support teams, training courses, and related activities.
- Many separate training and support efforts being offered through the NSF-funded CyberTraining and SCIPE programs.
- Start with the program or provider for resource-specific training.
- Try HPC-ED for general training resources.

Which Do I Choose? ACCESS or NAIRR Pilot?

ACCESS

- ***Long-term*** research and educational initiatives
- All project types
  - not explicitly AI-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
- AI-focused 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

Thank you!

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access-ci.org