National Resources for AI and Large-scale Computing

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NSF NCAR • NSF ACCESS • NAIRR Pilot

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Campus Champions Call

Who are these resources for?

You!

(and your campuses)

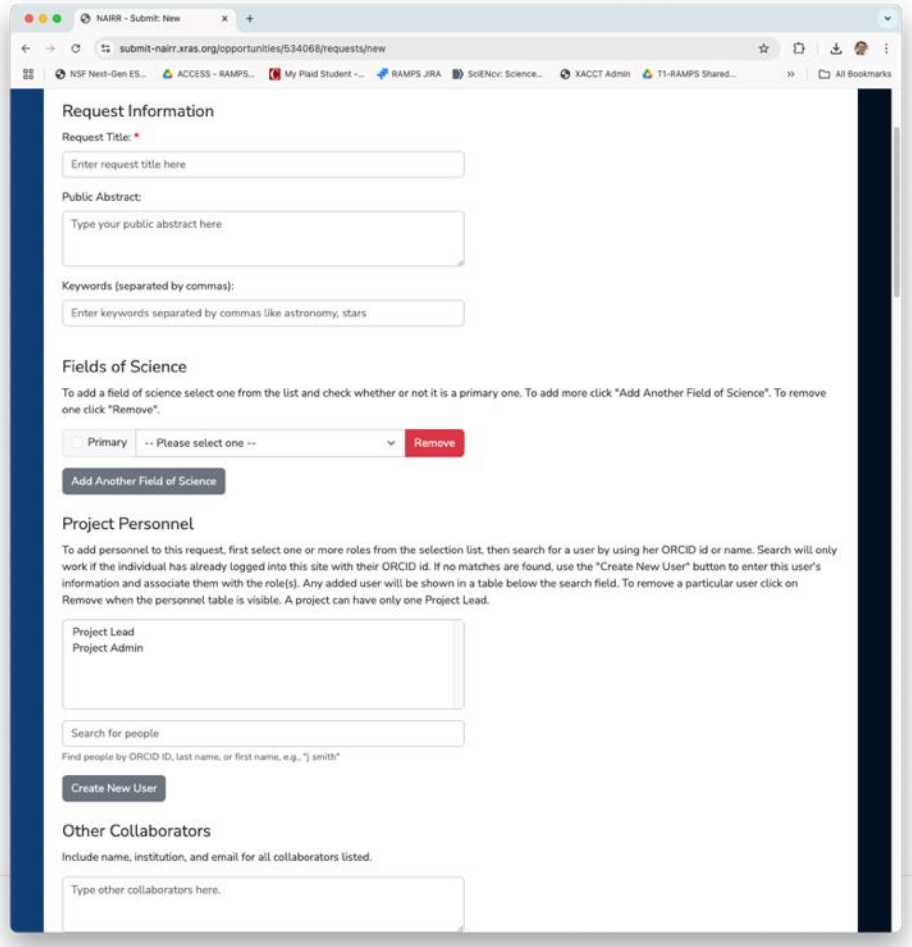
No experience necessary!

No cost to you!

- Researchers and instructors from U.S. 2- or 4-year academic institutions or non-profit organizations
  - *(sometimes even broader eligibility in some cases)*
- Any — or no — source of funding for the research
  - *(some limitations in specific cases)*
- Any application domain of AI
  - And non-AI work, in many cases
  - *(some limitations in specific cases)*

What do you need to get started?

- You need to bring the idea for the work and the ability to carry it out
  - While resource access is no cost, you need to cover costs for staff time
- Information about your project
  - Title & Abstract
  - Personnel
  - Project proposal or description
    - *Instructions vary depending on the scale of work and the program providing resource access*
  - Supporting grant information
    - *If applicable to your project*



NSF ACCESS

What is NSF ACCESS?

ACCESS has been established by the U.S. National Science Foundation (NSF) to connect researchers and educators to the resources and services they need to accomplish their objectives.

access-ci.org

allocations.access-ci.org

Allocations on NSF ACCESS

- Visit **https://allocations.access-ci.org/**
- Select ***Get Your First Project Here*** in the first box
- You'll typically have an Explore ACCESS project within a day or so
- Many projects go from submitting their project request to completing their first resource job in about 10 days.
- Select ***Resources*** from top navigation menu to explore resources

If you're new to national-scale resources, you need to tell the provider about your project to get an "**allocation**" to use a resource. It's an amount of resource units (core-hours, GPU-hours, etc.) that you have permission to spend to pursue the goals of your project.

NSF ACCESS
Multi-core Compute

- **Anvil (Purdue)** — 1,000 AMD Milan nodes, 128 cores per node, some large memory nodes
- **Bridges-2 (PSC)** — 504 AMD Rome nodes, 128 cores per node, large memory nodes available; extreme memory (4 TB) nodes allocated separately
- **Delta (NCSA)** — 124 AMD Milan nodes, 128 cores per node
- **Expanse (SDSC)** — 728 AMD Rome nodes, 128 cores & 1 TB NVMe per node
- **KyRIC (U Kentucky)** — Five large-memory (3 TB, 6 TB) nodes, 300 TB storage
- **Launch (Texas A&M)** — 35 AMD EPYC 9124 nodes
- **Stampede 3 (TACC)** — 1,848 nodes with Intel Sapphire Rapids, Ice Lake, and Skylake

NSF ACCESS
GPU Computing

- **Anvil GPU (Purdue)** — 16 nodes, 4 NVIDIA A100 GPUs each
- **Bridges-2 GPU (PSC)** — 33 nodes, 8 NVIDIA V100 GPUs & 7.68 TB NVMe per node
- **Delta GPU (NCSA)** — 4 node configs: 100 nodes w/ 4x A100s; 100 w/ 4x A40 GPUs; five w/ 8x A100s; one w/ 8x AMD MI100 GPUs
- **Delta AI (NCSA)** — 114 nodes, each with four Grace Hopper chips
- **Expanse GPU (SDSC)** — 52 nodes, 4 NVIDIA V100 GPUs each

NSF ACCESS
Novel / Innovative Computing

- **ACES (Texas A&M U)** — Composable PCIe fabric with Intel Sapphire Rapids cores, Graphcore IPUs, NEC Vector Engines, Intel Max GPUs, Intel FPGAs, Next Silicon co-processors, NVIDIA H100 GPUs, Intel Optane memory
- **FASTER (Texas A&M U)** — 180 nodes on a composable fabric, 2x Intel Ice Lake processors each, 260 NVIDIA GPUs (five different architectures)
- **Jetstream2 (Indiana U)** — Cloud environment with AMD Milan nodes, and 90 nodes with 4x A100 GPUs
- **Neocortex (PSC) —** 2 Cerebras CS-2 Wafer Scale Engine systems
- **Ookami (Stony Brook U)** — 176 nodes with Riken/Fujitsu A64FX processors; additional nodes with AMD Milan, Thunder X2, and Skylake/V100 architectures
- **Voyager (SDSC)** — 42 Intel Habana Gaudi training nodes, each with 8 training processors

NSF ACCESS
Storage

Storage options also available for most compute systems, and capacity is awarded alongside compute allocations for those resources. The following storage resources can be requested separately.

- **Granite (NCSA) —** 19-frame Spectra Tfinity tape library; 3.6 PB available for ACCESS allocations
- **Open Storage Network (OSN)** — Cloud object storage resource, comprised of geographically distributed pods, accessed via S3 interfaces
- **Ranch (TACC)** — Large-scale, tape-based archival storage system

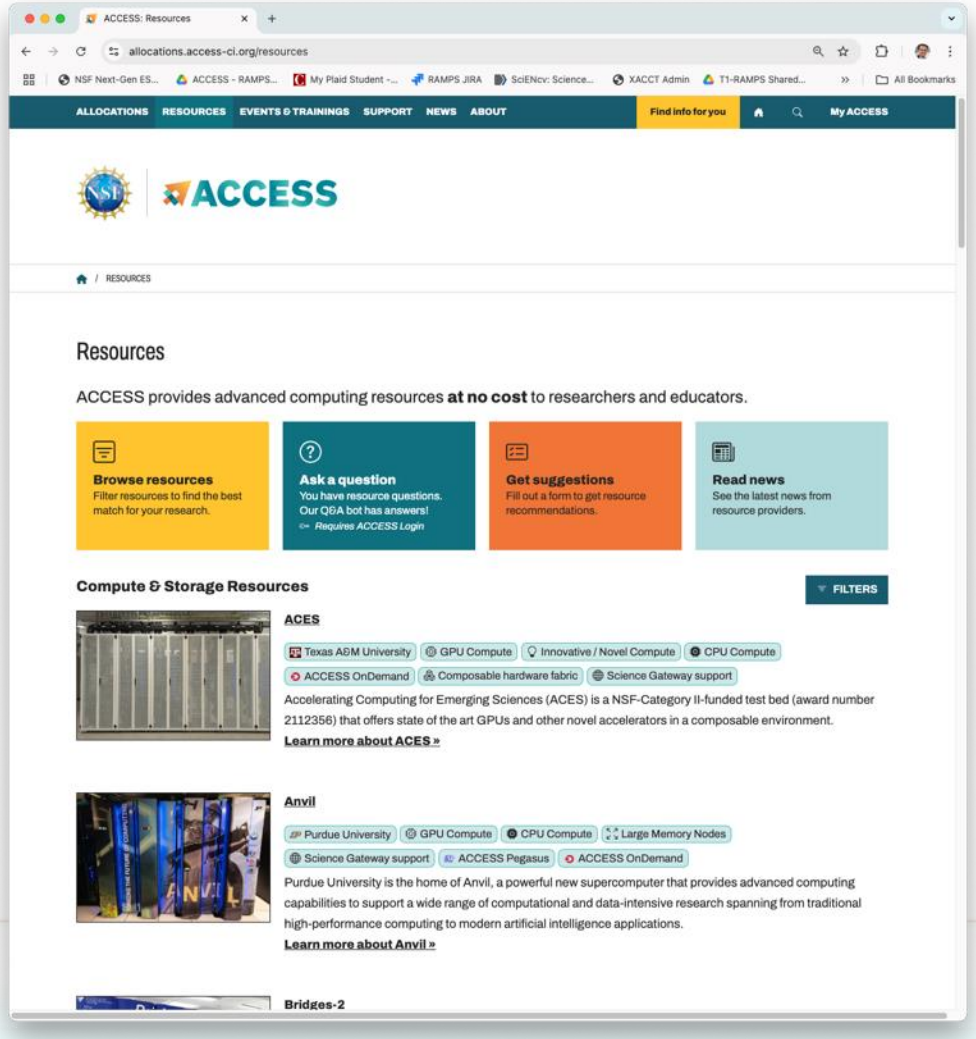
NSF ACCESS
Affiliated Resources

Beyond the preceding resources, which are all allocated via ACCESS-managed processes, you can also find out about additional resources and services via the ACCESS Resource Catalog

- **Open Science Pool —** High-Throughput Computing environment, no allocations necessary
- **FABRIC** — Distributed infrastructure with configurable in-network computing capabilities
- **Sage** — AI@Edge cyberinfrastructure with deployed and configurable sensor networks
- **SGX3** — Science Gateway consulting and services

Your On-Ramp to NSF ACCESS

- On-Ramps are a new feature developed by the ACCESS Allocations team that lets you bring ACCESS resource information to your campus community.
- Our goal was to help researchers find out about ACCESS in the first place they go for IT information—their campus websites.



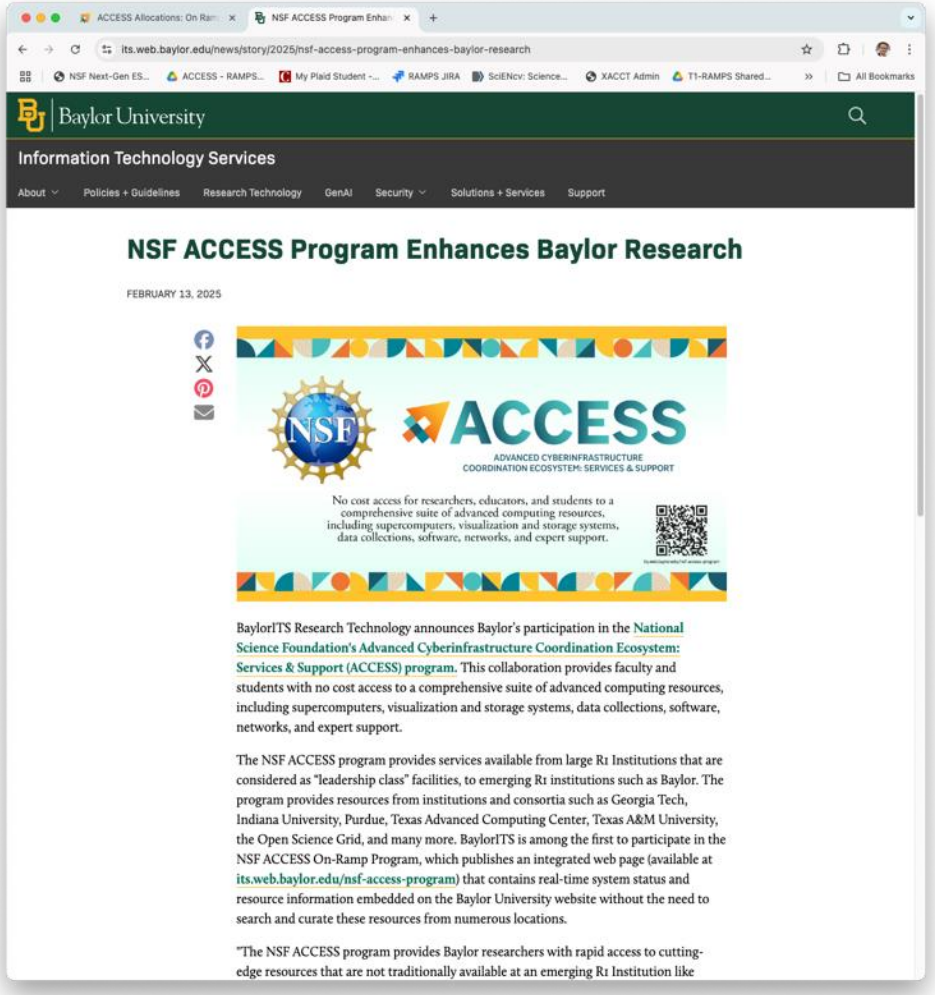
ACCESS Allocations

How It Works

- Visit our On-Ramps page
  - *allocations.access-ci.org/on-ramps*
- Copy the 17 lines of JavaScript
- Paste the JavaScript into your page about ACCESS, and save

Content is dynamically generated from ACCESS sources, so maintenance is not an issue.

You'll always have the latest info.

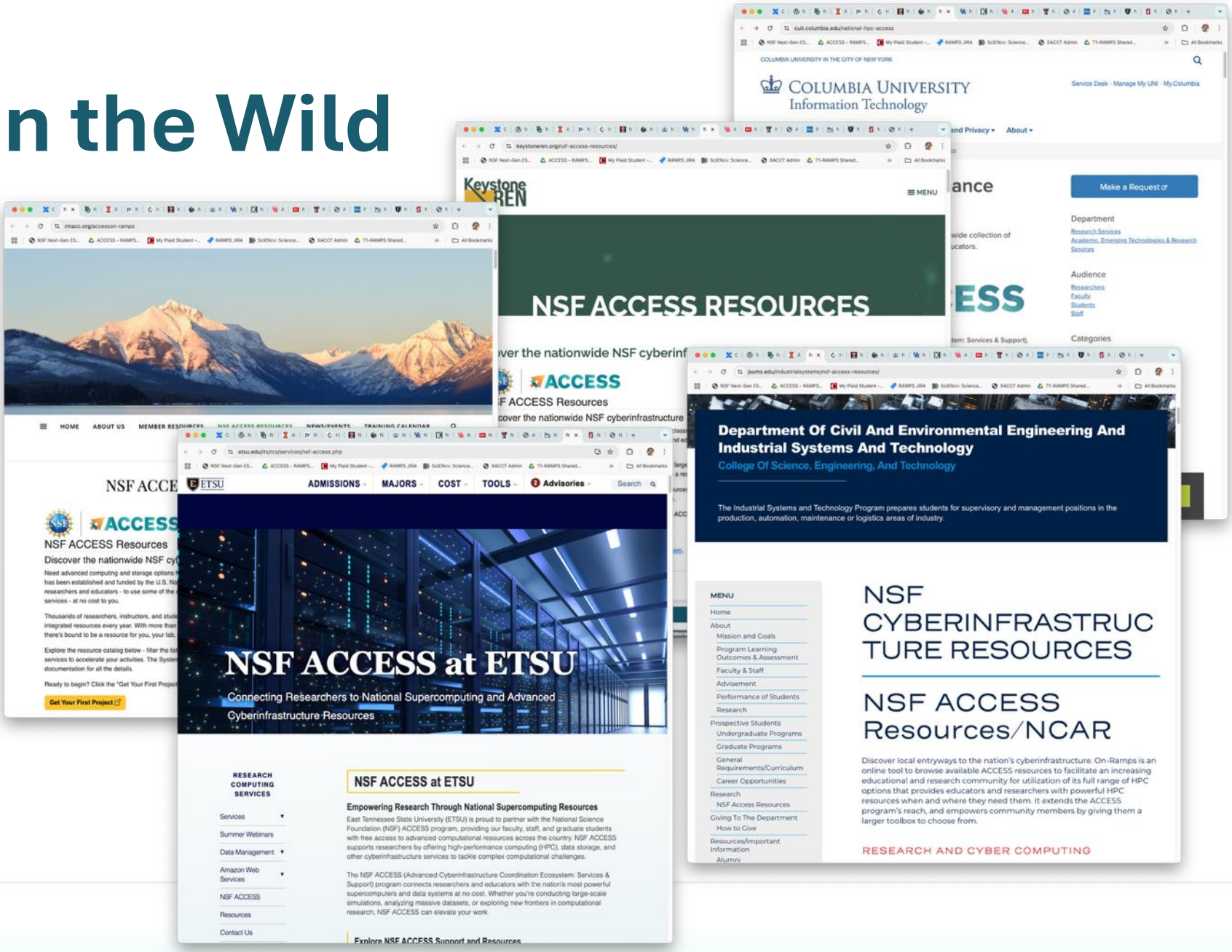


"Baylor ITS Research Technology announces Baylor's participation in the National Science Foundation's Advanced Cyberinfrastructure Coordination Ecosystem: Services & Support (ACCESS) program. …"

NSF | ACCESS Allocations

On-Ramps in the Wild

- Rocky Mountain Advanced Computing Consortium
- Baylor University ITS
- Illinois Computes
- Jackson State University
- University of Hawai'i
- Texas A&M University
- University of Central Florida
- Columbia University
- University of Kentucky
- Keystone REN
- University of Houston
- Boston University
- Texas Tech University
- MS-CC
- NSF NCAR CISL
- East Tennessee State University
- Stanford University
- UC Riverside

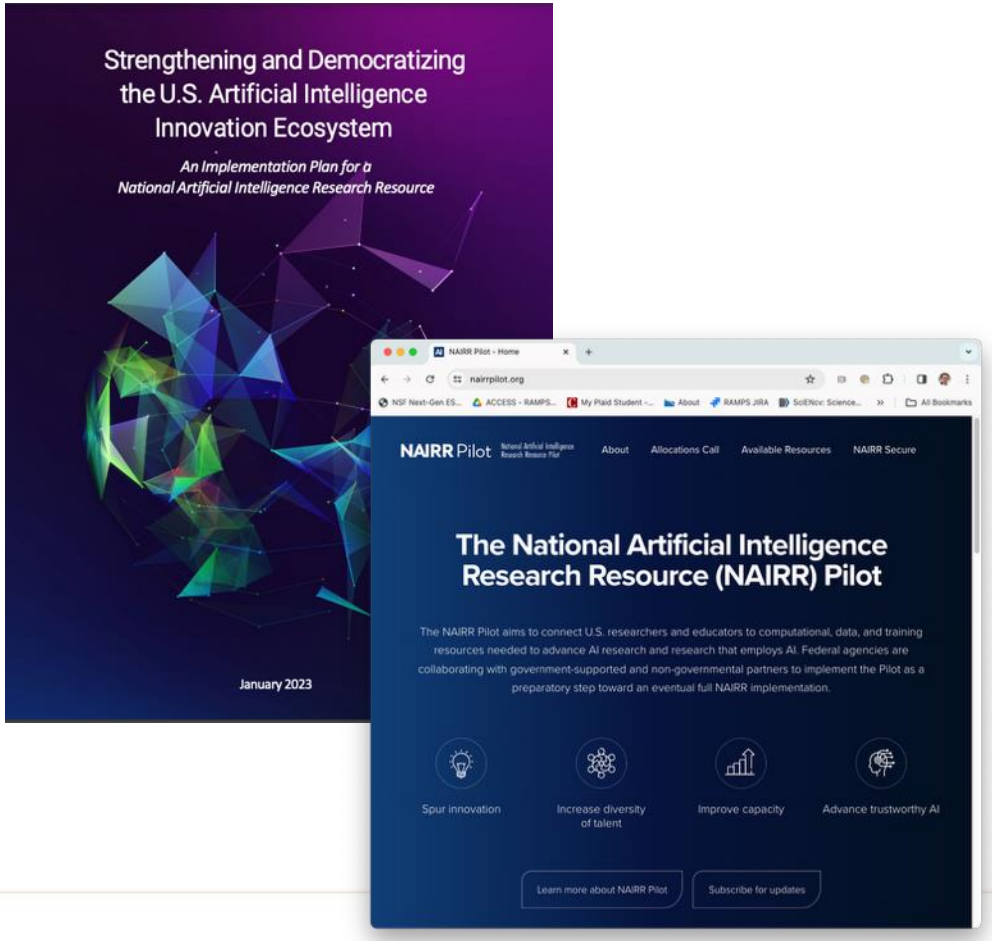


ACCESS Allocations

NAIRR Pilot

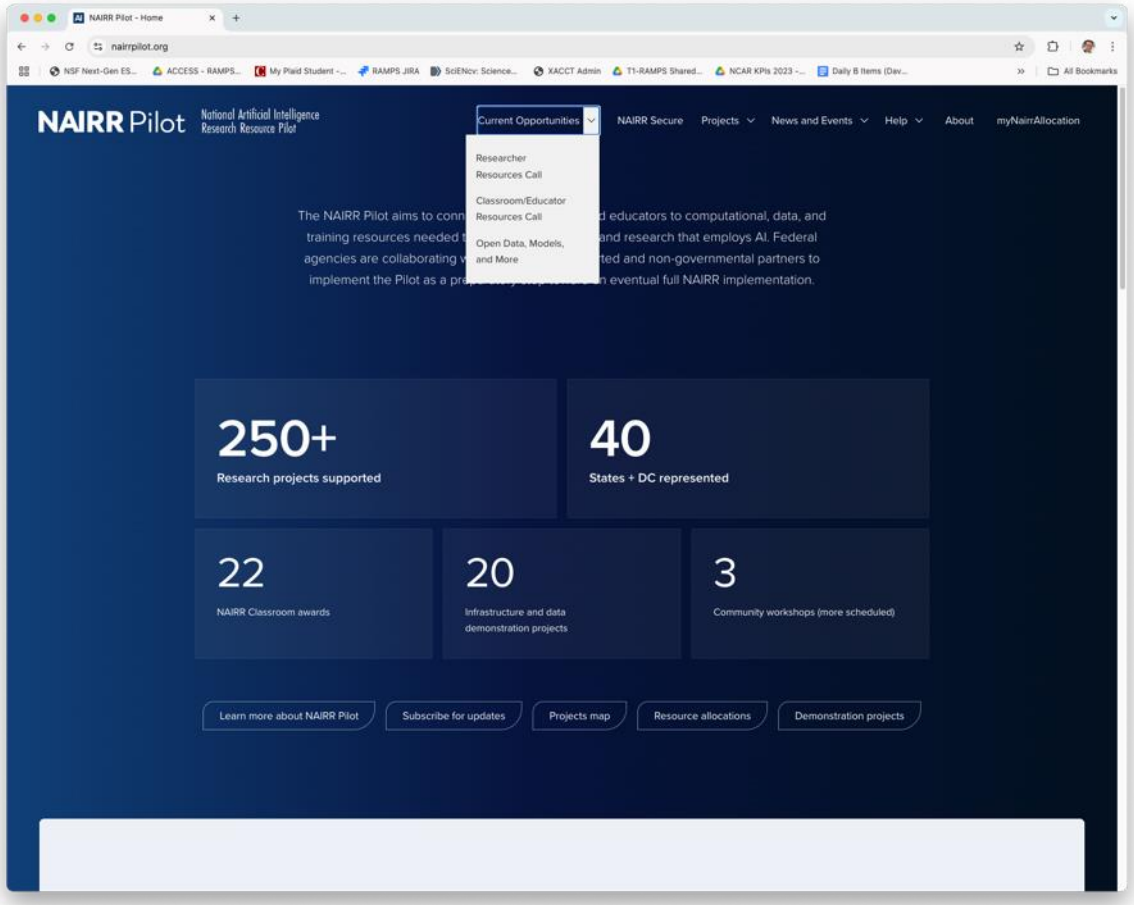
What is the National AI Research Resource (NAIRR) Pilot?

- 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, providing a roadmap for standing up a national AI 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



Allocations in the NAIRR Pilot

- 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
- Feel free to submit a help ticket to NAIRR
  - If you have proposal or resource questions



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 Systems

Cerebras CS-2

SambaNova Suite

Inference Services

Anthropic

Groq LPU Inference Engine

OpenAI

SambaNova Cloud

Tools and Software

DataBricks

Eleuther AI

Hugging Face

OpenMined

Weights & Biases

NAIRR Pilot
GPU and CPU Resources (federal)

These resources comprise mostly homogeneous partitions or are dominated by a single processor type. The number and types of hardware vary from resource to resource.

NVIDIA V100

PSC Bridges-2 GPU
280 V100s

SDSC Expanse GPU
208 V100s

NVIDIA RTX-5000

TACC Frontera GPU
360 RTX-5000s

NVIDIA A100 / A40

NCSA Delta GPU
400 A100s & 400 A40s

Purdue Anvil GPU
64 A100s

TACC Lonestar-6 GPU
48 A100s

PATh Facility
A100s & AMD Milan

NVIDIA H100 / Grace Hopper

TACC Vista
608 GH H100s

NCSA DeltaAI
456 GH H100s

Purdue Anvil AI
80 GH H100s

AMD Milan

Purdue Anvil CPU
TACC Lonestar-6

AMD Rome

PSC Bridges-2 CPU
SDSC Expanse CPU

Intel Cascade Lake

TACC Frontera

Large-Memory Nodes

PSC Bridges-2 EM
(Extreme Memory)

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nairrpilot.org/opportunities/allocations

NAIRR Pilot
AI, Cloud, and Composable Resources

The NAIRR Pilot includes resources that offer alternative architectures designed to support a wide range of needs beyond the more conventional HPC architectures.

AI Accelerators

PSC Neocortex

Two Cerebras CS-2 systems

SDSC Voyager

42 8x Intel Habana Gaudi training nodes

DOE ANL AI Testbed

four different architectures

- Cerebras CS-2
- SambaNova DataScale SN30
- Graphcore Bow Pod 64
- Groq LPU Inference Engine

Cloud

Indiana Jetstream-2 GPU

360 A100 GPUs

Composable & Distributed

Texas A&M U ACES

composable system with a wide range of processor and accelerator options

FABRIC

distributed compute / network platform

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nairrpilot.org/opportunities/allocations

NAIRR Pilot
Classroom Resources

The NAIRR Classroom opportunity provides resources aimed at undergraduate or graduate courses or shorter training sessions that include AI subject matter.

NIH Cloud Lab

- Targeted to instructors in biomedical courses
- Up to 90 days of access to AWS, GCP, or MS Azure, plus up to $500 cloud credits / student

Prototype National Research Platform (PNRP)

- Offers GPU resources for your students and a Jupyter platform

Vocareum AI Notebook

- Licenses for advanced, training-oriented, Jupyter-based notebooks

Indiana Jetstream-2 GPU

- Provides flexible, on-demand, programmable tools and services

NSF National Center for Atmospheric Research (NSF NCAR)

Allocations at NSF NCAR

- **SMALL**
  - Requires NSF research award
  - 2,000,000 core-hours ***OR*** 5,000 GPU-hours
- **EXPLORATORY**
  - Support for grad students, post-docs, certain unfunded activities
  - 1,000,000 core-hours ***OR*** 3,000 GPU-hours
- **CLASSROOM**
  - Support for classroom, training activities
  - Same limits as Exploratory projects
  - No funding constraints
- **DATA ANALYSIS**
  - Requires need to analyze NCAR-hosted data set
  - Casper only (no Derecho access)
  - No funding constraints

LARGE UNIVERSITY PROJECTS

- Require NSF research award
- More than 2 million core-hours ***OR*** more than 5,000 GPU-hours
- Reviewed twice annually by panel
- ***Next deadline: September 2025***

All university allocations require

- US-based project lead
- Academic or non-profit institution affiliation for the project lead
- **Must be work in the Earth system sciences or related activities**

ACCESS

arc.ucar.edu/allocations

NSF NCAR's Compute and Data Services

Derecho

- 2,488 AMD Milan nodes, each w/128 cores and 256 GB
- 328 40GB A100 GPUs (82 4-GPU nodes)
- 60 PB scratch file system

Casper

- For high-throughput workflows, data analysis, and AI/ML
- ~100 V100, A100, and H100 GPUs

NCAR Data (data.ucar.edu)

- Find datasets in the more than 10 PB of curated data collections housed at NSF NCAR
- Download data or analyze on Derecho & Casper

And That’s Not All

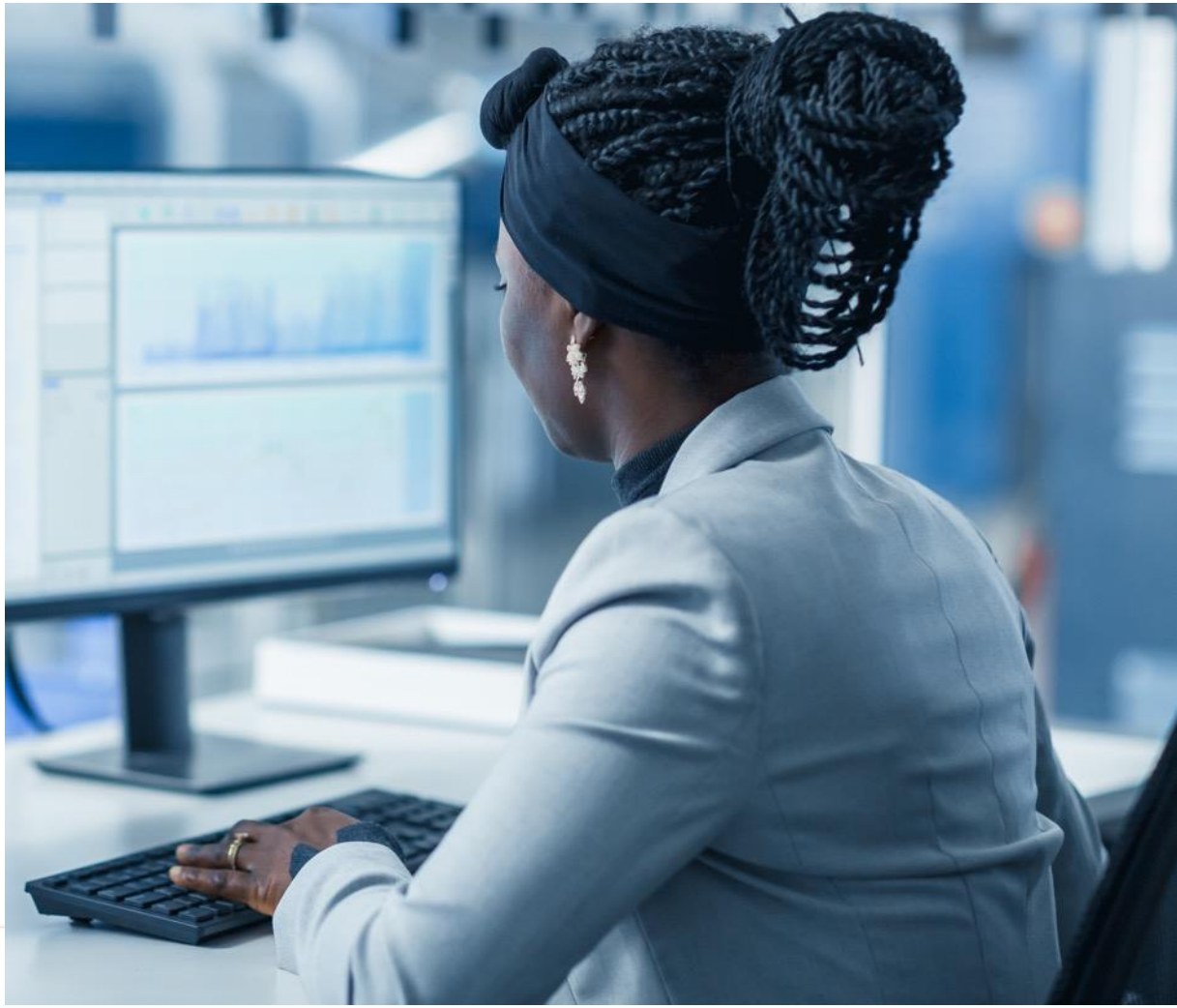
Other Resource Options

Beyond the programs and sites already mentioned, there are yet more options for those in need of computing support. Many of these resources are aimed at large-scale problems.

- **Frontera & LCCF** — Texas Advanced Computing Center (TACC), https://tacc.utexas.edu/
- **Department of Energy National Labs**
  - National Energy Research Scientific Computing Center (NERSC), https://nersc.gov/
  - Argonne Leadership Computing Facility (ALCF), https://www.alcf.anl.gov/
  - Oak Ridge Leadership Computing Facility (OLCF), https://www.olcf.ornl.gov/
- **Closer to home**
  - A number of regional organizations provide access to research computing and data services.

Research-Ready Software Environments

- Most sites have standard HPC and AI software tools ready to go
- Many sites now hosting open-source LLMs
  - Llama, DeepSeek, and more
- Most sites willing to install open-source software upon request
  - Some commercial software available, esp. if you have a paid license



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.

QUESTIONS?

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