

Working Across Boundaries: How the NSF NCAR Community Software Facility Fosters Collaboration for Scalable Science in a Rapidly Evolving Technical Landscape

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SC26: BoF Scientific Software and the People Who Make it Happen: Building Our Communities of Practices

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The Community Software Facility

Working across boundaries

The Community Software Facility (CSF) is an NSF NCAR strategic initiative aimed at transforming how NSF NCAR develops, supports, and sustains community models.

The CSF serves both as a technical and cultural catalyst, demonstrating that when development processes are designed with people, collaboration, and feedback at their center, the result is not only better software but also a more resilient, innovative, and connected research community.

ncarprojects.ucar.edu/csf

People

Cultivate a thriving workforce and community of practice for our software engineers in NSF NCAR.

Software Development Better Practices

Continuously improve and set standards for software quality across NSF NCAR.

Processes & Governance

Engage and partner with NSF NCAR labs to accelerate cross-lab model development.

Capabilities & Infrastructure

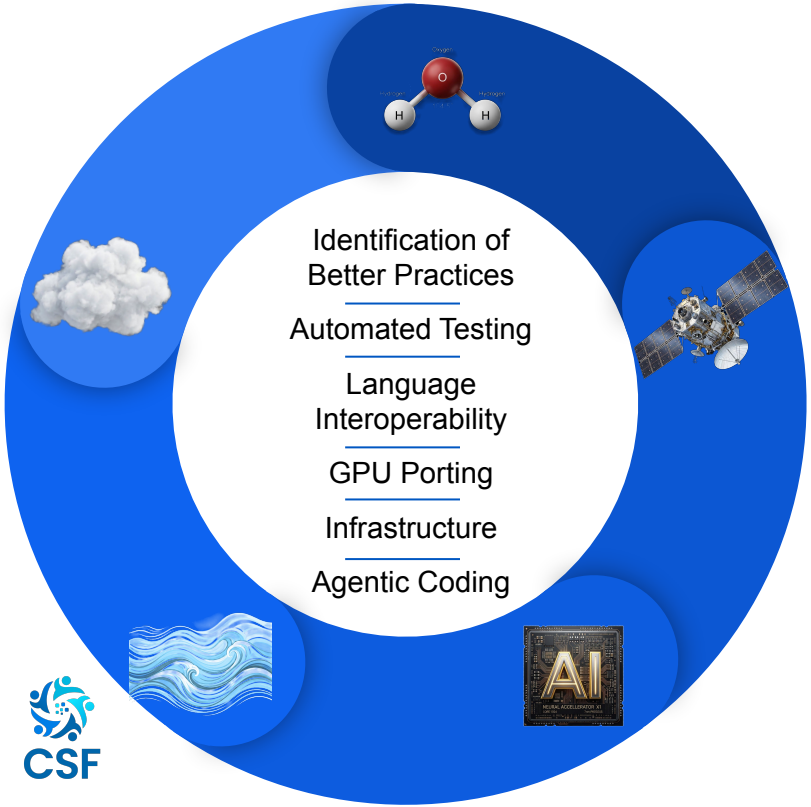
Deliver high quality interoperable, software components that provide critical capabilities for NSF NCAR and the broader community.

NSF | NCAR OPERATED BY UCAR

Learn more & see our SC schedule

The NSF NCAR Community Software Facility

Working across boundaries



- ➔ **Interoperable Atmospheric Physics**
- ➔ **Coupling Atmosphere to Ocean**
- ➔ **Interoperable Chemistry**
- ➔ **Interoperable ionosphere, magnetosphere, and heliosphere modeling**
- ➔ **Interoperability with Emulated Components**

Working across scientific boundaries

- We're learning how to connect the science together and observe the interactions.

Building cross-organizational teams

- We're bringing together people across the organization to deliver on clear goals.
  - Builds trust and forms stronger teams
  - Allows groups to understand how each other work
  - Allows scientists and software engineers to bring their expertise together to broaden their impact

The NSF NCAR Community Software Facility

Working across boundaries

Infrastructure and Better Practices



Identification of Better Practices for scientific development: Identifying the common practices to be used across the organization and within our modeling system.

Automated Testing: Ensuring code quality and scientific integrity within our modeling ecosystem. Automating where it makes sense to in order to allow our SEs to focus on the critical pieces of code contributions.

Language Interoperability: Creating the software infrastructure to easily bring code written in different languages and different GPU porting strategies together seamlessly within this system.

GPU Porting: Ensuring performance portability across heterogeneous HPC systems for our community.

Infrastructure: Includes building up capabilities to couple inter and intra modeling components together, creating an integrated build system, and a flexible user experience . This includes numerical and emulated models and components.

Agentic Coding: Accelerating productivity of code translation, porting, and software development.