

The Shifting Landscape of CI Funding

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Henry Neeman's 2016 Super Awesome ACI-REF Virtual Residency Workshop



Where's the \$\$?



Everywhere...



Funding Agencies

National Science Foundation (NSF)

- eXtreme Science & Engineering Discovery Environment (XSEDE)
- Open Science Grid (OSG)
- Campus Cyberinfrastructure (CC)
- Computer & Information Science & Engineering (CISE) Research Infrastructure (CRI)
- Major Research Instrumentation (MRI)
- Experimental Program to Stimulate Competitive Research (EPSCoR)

Department of Energy (DOE)

- Innovative and Novel Computational Impact on Theory and Experiment (INCITE)
- National Energy Research Scientific Computing Center (NERSC)

Department of Defense (DOD)

- Defense University Research Instrumentation Program (DURIP)

National Institutes of Health (NIH)

- Shared Instrument Grant (SIG)
- High-End Instrumentation Grant (HEI)

United States Department of Agriculture (USDA), Private, Other?



NSF XSEDE = Free \$\$ (cycles)!!

portal.xsede.org/allocations-overview



Allocations Overview

Eligibility

Metrics

Allocation Types

Trial

Campus Champions *New!*

Startup

Education

Research

Writing and Submitting

Proposals

XSEDE Allocations Overview

An XSEDE allocation provides access to computing, visualization, and/or storage resources as well as extended support services at XSEDE service provider (SP) sites. An allocation is allotted to a researcher who serves as the principal investigator (PI) of an approved project. An account is the specific method through which an individual (or community, in the case of science gateways) logs in to a resource to utilize the allocation.

- **Computational Resources:** XSEDE SPs offer a variety of high-performance computing (HPC) and high-throughput computing systems for allocation. Computing platforms include clusters, scalable-parallel systems, and shared-memory systems with various CPU, memory, communication, and storage configurations. It is important that the platform you choose is a good match for your computational plans.
- **Visualization Resources:** SPs provide a variety of visualization resources and software services to the XSEDE user community. These systems provide a powerful way to interact with and analyze data at any scale. For complete information on available visualization resources, visit [XSEDE Visualization](#).
- **Storage Resources:** Several XSEDE SPs host storage platforms providing services such as data management, data



DOE & NSF OSG = Free \$\$ (cycles)!!

Might have to trade cycles/sysadmin time

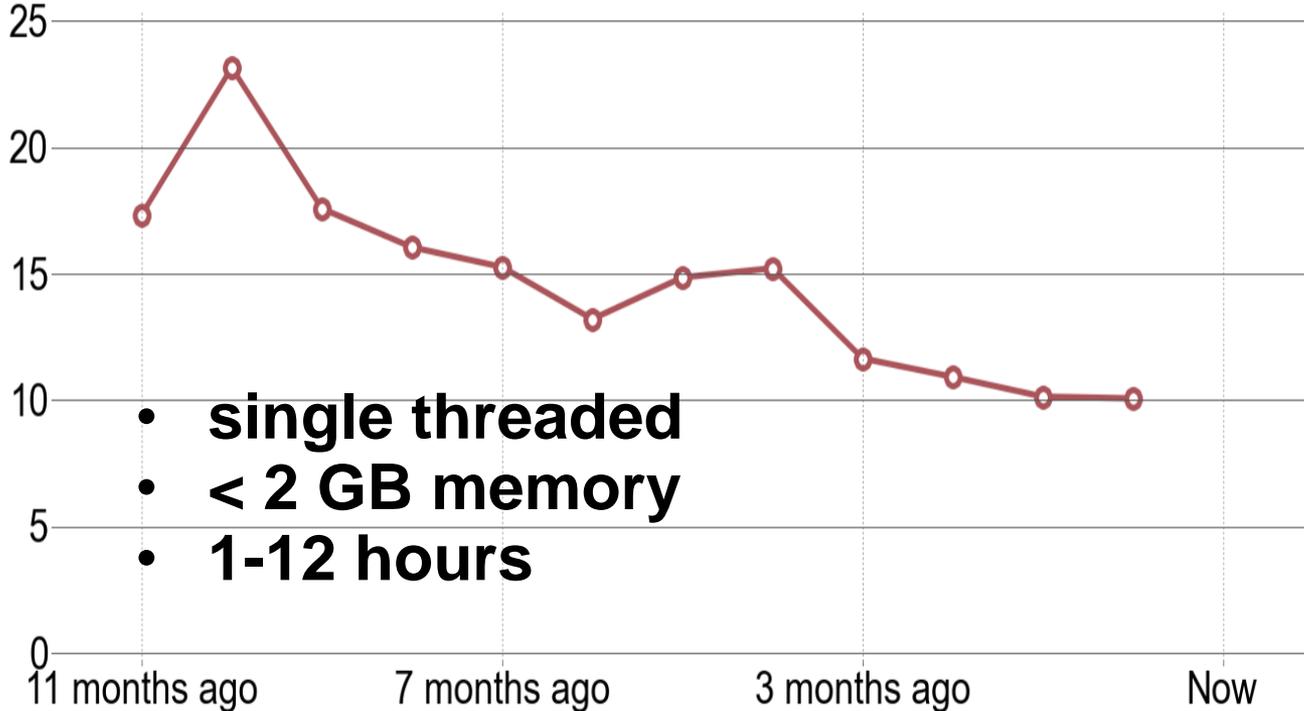
display.grid.iu.edu



A national, distributed computing partnership for data-intensive research

Status Map Jobs CPU Hours Transfers TB Transferred

Millions of Jobs/Month



- single threaded
- < 2 GB memory
- 1-12 hours

24 Hours 30 Days 12 Months

In the last 24 Hours	
295,000	Jobs
1,791,000	CPU Hours
6,432,000	Transfers
448	TB Transfers
In the last 30 Days	
9,436,000	Jobs
99,863,000	CPU Hours
181,490,000	Transfers
11,936	TB Transfers
In the last 12 Months	
175,459,000	Jobs
1,217,897,000	CPU Hours
1,864,142,000	Transfers
239,000	TB Transfers

OSG delivered across 130 sites



NSF CC-NIE, CC*IIE, CC*DNI, CC*

- Network Infrastructure and Engineering, 2012 - 2013
- Infrastructure, Innovation, and Engineering, 2014
- Data, Networking, and Innovation, 2015
- *, August 23, 2016 (12 days from now)

www.nsf.gov/funding/pgm_summ.jsp?pims_id=504748



NSF CC*

www.nsf.gov/funding/pgm_summ.jsp?pims_id=504748

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 21 to 33

The estimated number of awards per research area is as follows: Data Driven Multi-Campus/Multi-Institution Model Implementations is estimated to have 1-2 awards; Cyber Team is estimated to have 2-4 awards; Data Driven Networking Infrastructure for the Campus and Researcher is estimated to have 5-10 awards; Network Design and Implementation for Small Institutions is estimated to have 5-8 awards; Network Integration and Applied Innovation awards is estimated to have 2-5 awards; Campus Computing is estimated to have 2-4 awards; and Innovative Integrated Storage Resources is estimated to have 4-8 awards.

Anticipated Funding Amount: \$16,000,000 to \$18,000,000



NSF CC*

www.nsf.gov/funding/pgm_summ.jsp?pims_id=504748

Awards Area

- 1 - 2 Data Driven Multi-Campus/Multi-Institution Model Implementations awards will be supported at up to \$3,000,000 total for up to 4 years.
- 2 – 4 Cyber Team awards will be supported at up to \$1,500,000 total for up to 3 years.
- 5 - 10 Data Driven Networking Infrastructure for the Campus and Researcher awards will be supported at up to \$500,000 total for up to 2 years.
- 5 – 8 Network Design and Implementation for Small Institutions awards will be supported at up to \$400,000 total for up to 2 years.
- 2 – 5 Network Integration and Applied Innovation awards will be supported at up to \$1,000,000 total for up to 2 years.
- 2 – 4 Campus Computing awards will be supported at up to \$500,000 for up to 3 years.
- 4 – 8 Innovative Integrated Storage Resources awards will be supported at up to \$200,000 for up to 2 years.



NSF CRI

www.nsf.gov/funding/pgm_summ.jsp?pims_id=12810

Two classes of awards:

1. Institutional Infrastructure (II) awards support the creation of new (II-NEW) CISE research infrastructure or the enhancement (II-EN) of existing CISE research infrastructure to enable world-class CISE research opportunities at the awardee and collaborating institutions.
2. Community Infrastructure (CI) awards support the planning (CI-P) for new CISE community research infrastructure, the creation of new (CI-NEW) CISE research infrastructure, the enhancement (CI-EN) of existing CISE infrastructure, or the sustainment (CI-SUSTAIN) of existing CISE community infrastructure to enable world-class CISE research opportunities for broad-based communities of CISE researchers that extend well beyond the awardee institutions. Each CI award may support the operation of such infrastructure, ensuring that the awardee institution(s) is (are) well positioned to provide a high quality of service to CISE community researchers expected to use the infrastructure to realize their research goals.



NSF MRI

www.nsf.gov/od/oia/programs/mri/

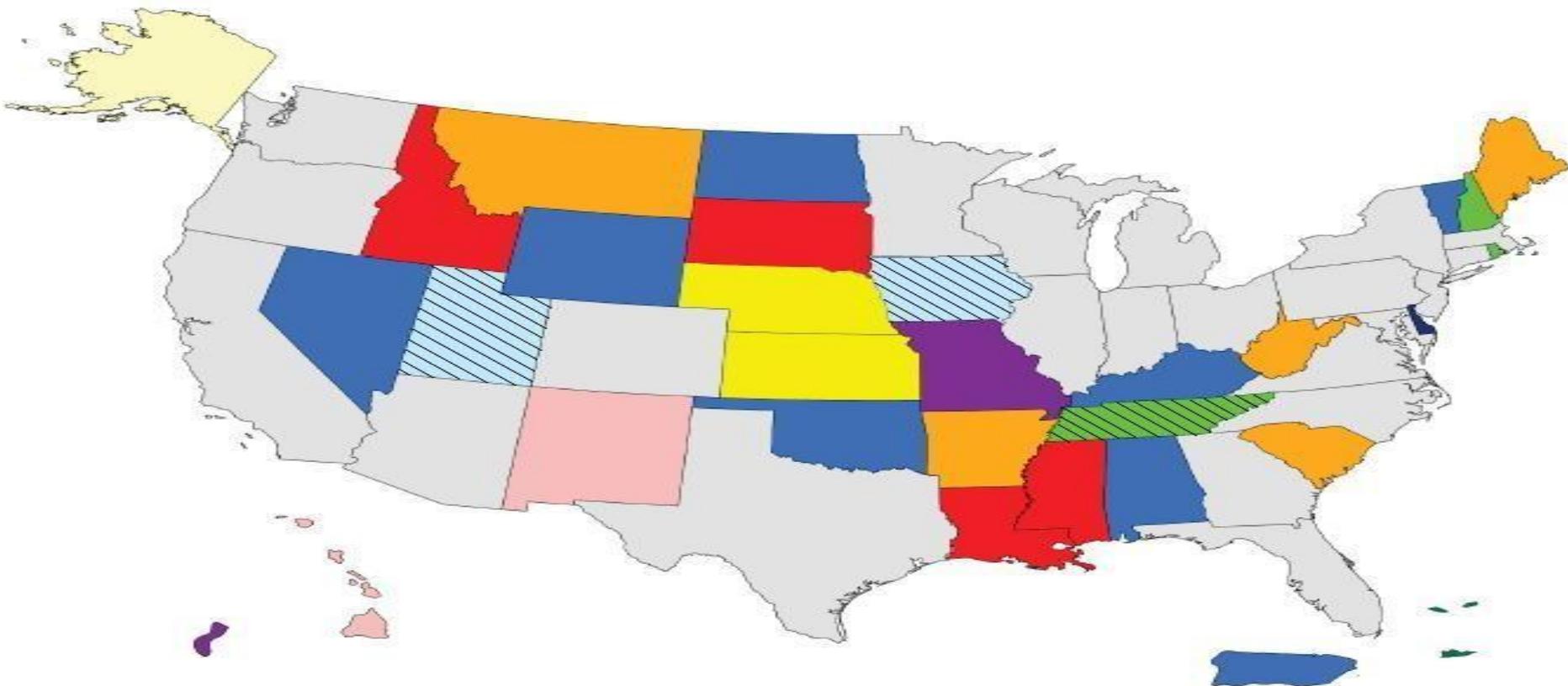
FY 2014 AWARD INFORMATION

- 811 proposals reviewed
 - 205 awards (a success rate of 25%).
 - $\frac{1}{4}$ development (<24% success)
 - $\frac{3}{4}$ acquisition (<26% success)
 - $\frac{1}{8}$ requested budgets > \$1 million (20% success)
-
- Biological Sciences 20%
 - Computer and Information Science and Engineering 45%
 - Engineering 20%
 - Geosciences 32%
 - Mathematical and Physical Sciences 25%
 - Social Behavioral and Economic Sciences 37%
- * Success varies - some directorates co-fund MRI awards with non-IA program funds while others do not.





EPSCoR JURISDICTIONS



1980

Arkansas
Maine
Montana
South Carolina
West Virginia

1985

Alabama
Kentucky
Nevada
North Dakota
Oklahoma
Puerto Rico
Vermont
Wyoming

1987

Idaho
Louisiana
Mississippi
South Dakota

1992

Kansas
Nebraska

2000

Alaska

2001

Hawaii
New Mexico

2002

U.S. Virgin Islands

2003

Delaware

2004

New Hampshire
Rhode Island
Tennessee

2009

Iowa
Utah

2012

Guam
Missouri

Note: Iowa, Tennessee, and Utah are no longer EPSCoR-eligible

www.nsf.gov/od/oia/programs/epscor/

Research Infrastructure Improvement Program Track-1 (RII Track-1)

- \$20 million total for 5 years to support physical, human, and **cyber infrastructure** improvements in research areas selected by the jurisdiction's EPSCoR steering committee as having the best potential to improve future R&D competitiveness of the jurisdiction.

Research Infrastructure Improvement Program: Track-2 (RII Track-2)

- \$1.5 to 2.0 million per year for up to 3 years to consortia of EPSCoR jurisdictions. The awards promote opportunities for collaborations among EPSCoR jurisdictions in all areas of science, engineering, and education supported by the NSF. RII Track-2 proposals must describe a clear, comprehensive, and integrated vision to drive discovery, and train a skilled workforce capable of solving science and engineering challenges of regional, thematic, and national relevance.



DOE INCITE

www.doeleadershipcomputing.org/incite-program/

- Nearly six billion core-hours will be allocated for CY 2017
- Average awards per project for CY 2017 are expected to be on the order of 75 million core-hours for Titan and 100 million core-hours for Mira, but could be as much as several hundred million core hours.
- Proposals may be for up to three years.
- Requests for small awards of time (typically 1 to 5 million core-hours) can be requested throughout the year from the Director's Discretionary Program



DOE NERSC

www.nerisc.gov/users/accounts/allocations/overview/

NERSC supports research that reflects the mission of DOE's Office of Science. All Principal Investigators funded by the Office of Science may apply for an allocation of NERSC resources. In addition, researchers who aren't directly funded by DOE SC but with projects that are relevant to its mission may also apply to use NERSC resources. If you are not funded by the DOE Office of Science you should explain how your research falls within the DOE mission.



DOD DURIP

www.defense.gov/News/Article/Article/684740/pentagon-announces-research-equipment-awards

- Army Research Office (ARO)
- Office of Naval Research (ONR)
- Air Force Office of Scientific Research (AFOSR)

Current Awards

- 176 proposals funded from 96 academic institutions (28%)
- \$50.1 million
- Received 622 proposals requesting \$209 million
- Awards range from \$53,000 to \$1.4 million
- Average approximately \$300,000 per award



NIH SIG & HEI

dpcpsi.nih.gov/orip/diic/shared_instrumentation

Office of Research Infrastructure Programs (ORIP)

- Shared Instrumentation Grant Program (S10)
 - \$50,000 to \$600,000 range
 - FY 2015, 91 awards to biomedical research institutions in 31 states totaling \$40,293,834
- High-End Instrumentation Grant Program (S10)
 - \$600,000 to \$2,000,000 range
 - FY 2015, 19 awards to research institutions in 13 states totaling \$26,162,569



USDA, Private, Other?

United States Department of Agriculture

- Telemedicine

www.rd.usda.gov/programs-services/distance-learning-telemedicine-grants

Silicon Mechanics Research Grant

www.siliconmechanics.com/i43744/research-cluster-grant-winners-circle.php

Other?



Questions?

Comments?

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