



XSEDE: An Advanced and Integrated Set of Digital Resources for Science and Engineering

Linda Akli, SURA

Assistant Director, Training, Education & Outreach &
XSEDE Broadening Participation

XSEDE

Extreme Science and Engineering
Discovery Environment




What is XSEDE?

Foundation for a National
CI Ecosystem

Comprehensive
suite of advanced
digital services that
federates with other
high-end facilities
and campus-based
resources

Unprecedented Integration
of Diverse Advanced
Computing Resources

Innovative, open
architecture making
possible the
continuous addition
of new technology
capabilities and
services

The XSEDE logo is displayed in a large, bold, blue, sans-serif font. It is positioned in the bottom right corner of the slide, overlaid on a dark blue background that features a grid pattern and a faint image of a planet or celestial body.



XSEDE Team

- World-class leadership from CI centers with deep experience: partnership led by NCSA, NICS, PSC, TACC and SDSC
- Partners who strongly complement these CI centers with expertise in science, engineering, technology and education

SURA

Cornell

Purdue

Shodor

National Center for Atmospheric Research

Ohio Supercomputer Center

Indiana University

Rice

University of Chicago



XSEDE



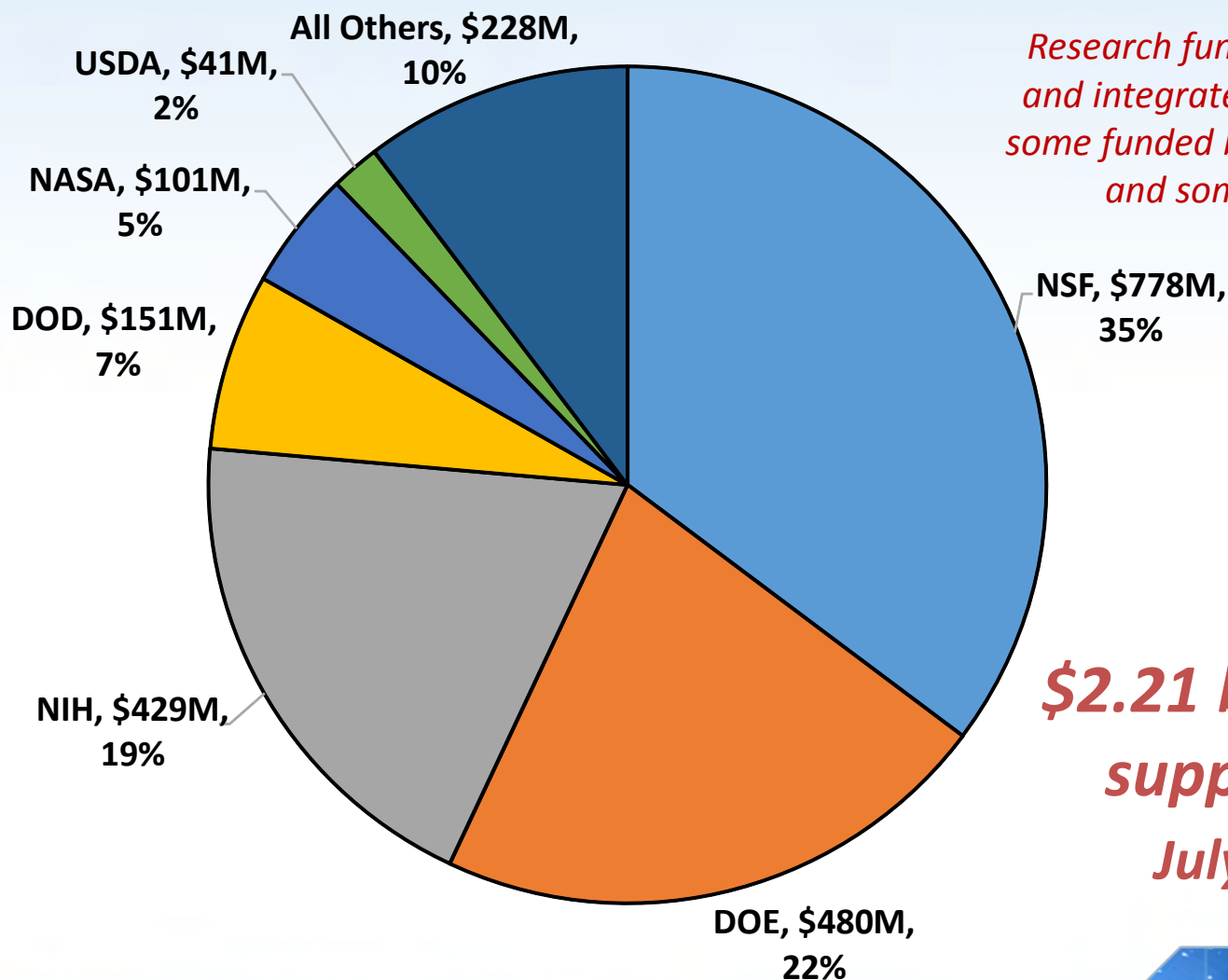
XSEDE Mission and Goals

Mission: Accelerate scientific discovery

Goals:

- **Deepen and Extend Use**
 - Raise the general awareness of the value
 - Deepen the use and extend use to new communities
 - **Contribute to the preparation of current and next generation scholars, researchers, and engineers**
- **Advance the Ecosystem**
- **Sustain the Ecosystem**

Total Research Funding Supported by XSEDE



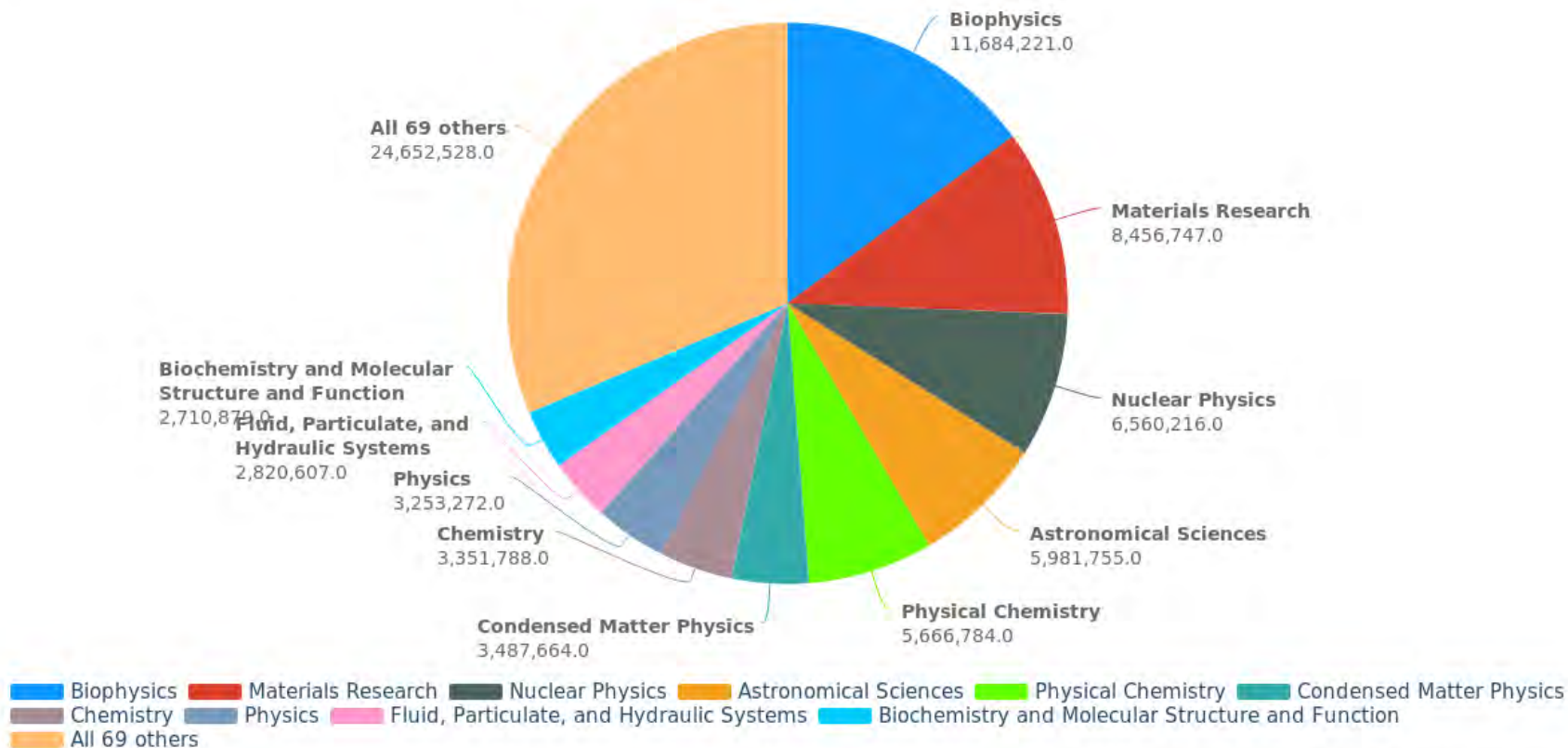
Research funding only. XSEDE leverages and integrates additional infrastructure, some funded by NSF (e.g. Track 2 systems) and some not (e.g. Internet2).

***\$2.21 billion in research supported by XSEDE
July 2011-May 2016***

XSEDE

Field of Science Using XSEDE

XD SUs Charged: Total: by Field of Science



2016-07-06 to 2016-07-13 Src: XDDB, Powered by XOMoD/Highcharts

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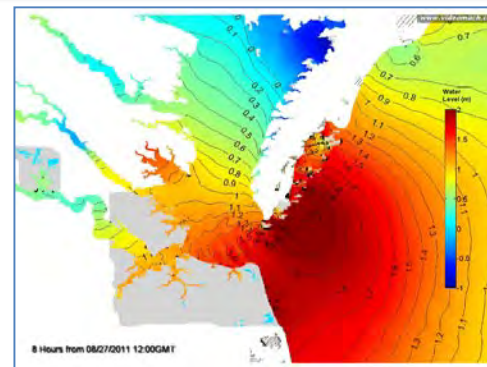


XSEDE Supports a Breadth of Research

- Earthquake Science
- Molecular Dynamics
- Nanotechnology
- Plant Science
- Storm Modeling
- Epidemiology
- Particle Physics
- Economic Analysis of Phone Network Patterns
- Large Scale Video Analytics (LSVA)
- Decision Making Theory
- Library Collection Analysis



Three-dimensional model of major vessels and bifurcations of the human arterial tree reconstructed with gOREK from a set of computed tomography (CT), digital subtraction angiography CT and magnetic resonance angiography images.



A snapshot of an animation for water level prediction including the wind-wave signature.

XSEDE



Ruby Mendenhall, an associate professor of sociology, African American studies and urban and regional planning at the University of Illinois (UI) at Urbana-Champaign, is leading a collaboration of social scientists, humanities scholars and digital researchers that hopes to harness the power of high-performance computing to find and understand the historical experiences of black women by searching two massive databases of written works from the 18th through 20th centuries.



Why XSEDE?



XSEDE



XSEDE Compute Resources



Featuring interactive on-demand access, tools for gateway building, and virtualization.



Comet: hosting a variety of tools including Amber, GAUSSIAN, GROMACS, Lammps, NAMD, and VisIt.



A self-provisioned, scalable science and engineering cloud environment



Stampede: Intel's new innovative MIC technology on a massive scale



Super Mic: Equipped with Intel's Xeon Phi technology. Cluster consists of 380 compute nodes.



Wrangler: Data Analytics System combines database services, flash storage and long-term replicated storage, and an analytics server. IRODS Data Management, HADOOP Service Reservations, and Database instances.



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XSEDE Visualization and Data Resources

Visualization



Maverick@ TACC

- HP/NVIDIA cluster
- 132 TB memory
- VisIt
- ParaView
- Interactive Data Language



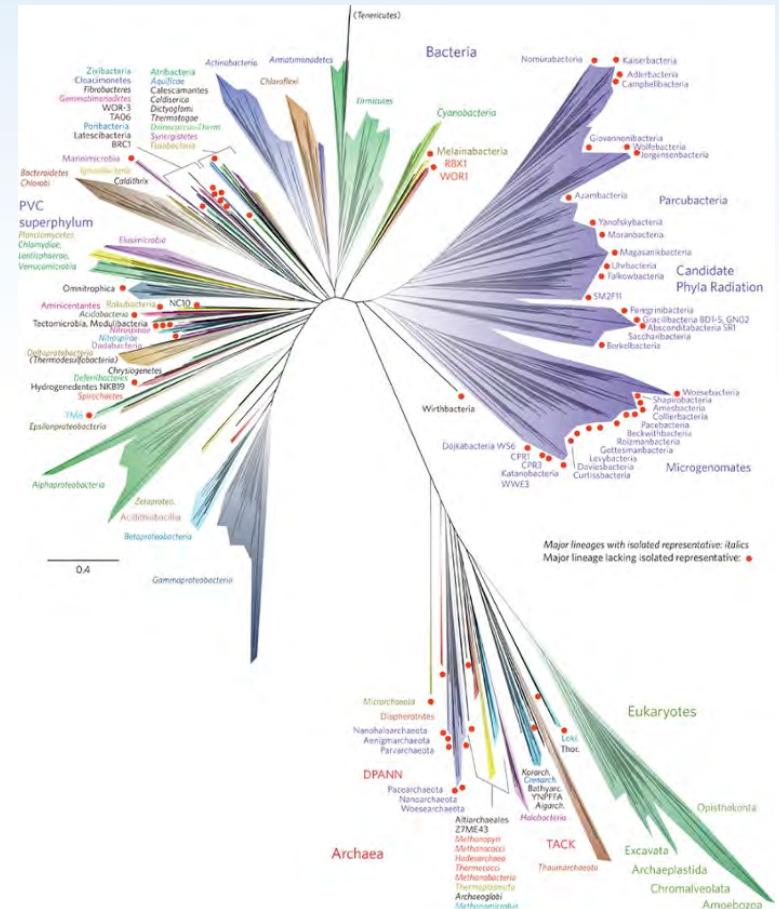
Visualization Portal

- Remote, interactive, web-based visualization
- iPython / Jupyter Notebook integration
- R Studio Integration

Storage

- **Resource file system storage:** All compute/visualization allocations include access to limited disk and scratch space on the compute/visualization resource file systems to accomplish project goals
- **Archival Storage:** Archival storage on XSEDE systems is used for large-scale persistent storage requested in conjunction with compute and visualization resources.
- **Stand-alone Storage:** Stand-alone storage allows storage allocations independent of a compute allocation.

Science Gateways



The CIPRES science gateway: A NSF investment launching thousands of scientific publications with no sign of slowing down.

<https://scicencenode.org/feature/cipres-one-facet-in-bold-nsf-vision.php?clicked=title>

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Allocations



Champion



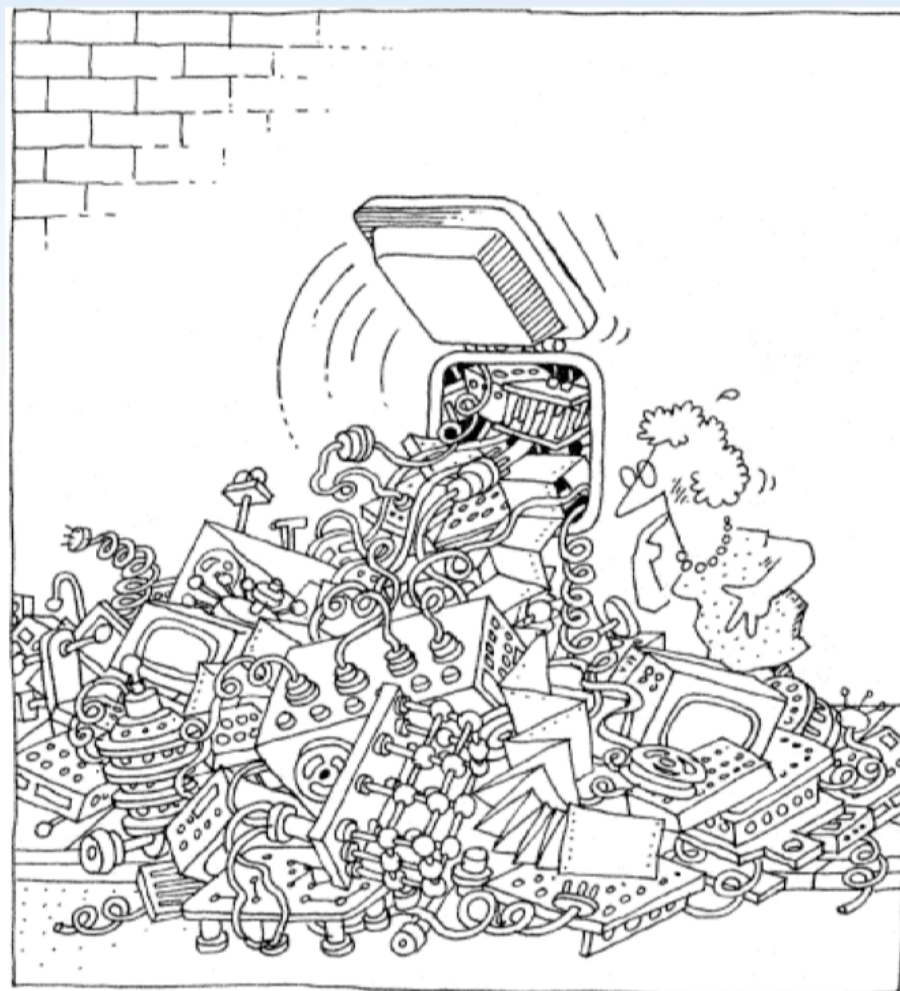
Education



Research



Startup



Other Resources

Technical information

Training

Help Desk/Consultants

Extended Collaborative Support Services

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Community Engagement & Enrichment (CEE)



Workforce Development

User Engagement

Broadening Participation

User Interfaces & Online Information

Campus Engagement

Campus Engagement: Champions Program

Campus Champions

Student Champions

Regional Champions

Domain Champions



Workforce Development: Education Program

Development of competencies for undergraduate and graduate computational science programs

Campus visits to promote computational science

Facilitates Collaborative Online Courses

Workforce Development: Training

XSEDE provides extensive training

- Covering every major resource
- From beginner to advanced classes
- At locations across the country
- Online via
 - asynchronous technologies
 - Webcasts

Web-based education credit courses



Workforce Development: EMPOWER

PROJECTS: Computational, Data Analytics, Visualization Research or Networking and System Maintenance

MENTORS are XSEDE staff, researchers, and educators who recruit and mentor undergraduate students to engage in projects.

STUDENTS are undergraduates who participate as a learner, apprentice or intern participation for students.

COMPENSATION: Ranges from \$750 to \$3,000 (based on student level and duration)

PROJECT PROPOSALS must contain a Training plan for the student.

What Can I
Do?





Faculty Opportunities

Use XSEDE Resources for research or teaching

Attend a webinar or in-person training

Use online training materials (XSEDE and HPC University)

Participate in a faculty development workshop

Attend PEARC17, New Orleans, July 9 - 13 <http://www.pearc.org/>



Student Opportunities

Attend a training event www.xsede.org

Apply for Travel Support, Present a Poster or Visualization at PEARC17
<https://www.pearc.org/student-program>

Apply to XSEDE's Empower Student Internship Program
<http://computationalscience.org/xsede-empower>

Participate in the SC17Student Cluster Challenge, Nov 12 – 17
<http://sc17.supercomputing.org/studentssc/student-cluster-competition/>

Visit HPC University for more student opportunities.
www.hpcuniversity.org

Workshop Agenda

Today

- Research @SUBR with XSEDE resources
- Break
- Computational Thinking w/Kate Cahill (OSC)

Tomorrow Morning

- New User Training w/Jay Alameda (NCSA)

Tomorrow Afternoon (a choice of two sessions)

- Python w/Antonio Gomez (TACC)
- Matlab w/Anirban Jana (PSC)


More Information

- Today's XSEDE Presentations - <http://hpcuniversity.org/trainingMaterials/237/>
- XSEDE Website: www.xsede.org
- XSEDE Staff
 - Linda Akli, akli@sura.org
 - Jay Alameda, alameda@illinois.edu (New User & ECSS)
 - Kate Cahill, cahill.167@osu.edu (Education & Curriculum)
 - Antonio Gomez, agomez@tacc.utexas.edu, Python
 - Anirban Jana, anirban@psc.edu, Matlab
 - Rachel Vincent-Finley, rachel_finley@subr.edu

Questions



XSEDE



Our reach will forever
exceed our grasp, but,
in stretching our horizon,
we forever improve our world.

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