

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

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XSEDE TEOS team

XSEDE

Extreme Science and Engineering
Discovery Environment

XD Solicitation/XD Program

- eXtreme Digital Resources for Science and Engineering (NSF 08-571) -- Extremely Complicated
 - High-Performance Computing and Storage Services
 - aka Track 2 awardees
 - High-Performance Remote Visualization and Data Analysis Services
 - 2 awards; 5 years; \$3M/year
 - proposals due November 4, 2008
 - Integrating Services (5 years, \$26M/year)
 - Coordination and Management Service (CMS)
 - 5 years; \$12M/year
 - Technology Audit and Insertion Service (TAIS)
 - 5 years; \$3M/year
 - Advanced User Support Service (AUSS)
 - 5 years; \$8M/year
 - Training, Education and Outreach Service (TEOS)
 - 5 years, \$3M/year



XSEDE

XSEDE Vision

The eXtreme Science and Engineering
Discovery Environment (XSEDE):

enhances the productivity of scientists and
engineers by providing them with new and
innovative capabilities

and thus

facilitates scientific discovery while enabling
transformational science/engineering and
innovative educational programs

The XSEDE logo, consisting of the letters "XSEDE" in a large, white, sans-serif font, set against a dark blue background with a grid pattern and a glowing blue sphere. The background of the entire slide also features a blue and white image of a planet's horizon with some green and blue spheres in the foreground.

XSEDE

Science requires diverse digital capabilities

- XSEDE is a comprehensive, expertly managed and evolving set of advanced heterogeneous high-end digital services, integrated into a general-purpose infrastructure.
- XSEDE is about increased user productivity
 - increased productivity leads to more science
 - increased productivity is sometimes the difference between a feasible project and an impractical one



XSEDE

XSEDE's Distinguishing Characteristics - Governance

- World-class leadership
 - partnership is led by NCSA, NICS, PSC, TACC and SDSC
 - CI centers with deep experience
 - NICS (National Institute for Computational Sciences) is a joint project of UT-Knoxville and Oak Ridge National Lab.
 - partners who strongly complement these CI centers with expertise in science, engineering, technology and education
- Balanced governance model
 - strong central management provides rapid response to issues and opportunities
 - delegation and decentralization of decision-making authority
 - openness to genuine stakeholder participation
 - stakeholder engagement, advisory committees
 - improved professional project management practices
 - formal risk management and change control



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How we engage stakeholders

- Collection of stakeholder needs:
 - surveys, ticket mining, ...
 - focus groups, usability panels, ...
 - interviews, shoulder surfing, ...
- Prioritization of identified need and derived requirements
 - User Requirements Evaluation and Prioritization (UREP) Working Group
- Assessing plans and deployments
 - through a variety of stakeholder-focused, facilitated workshops
- Representation in the management of XSEDE
 - XSEDE Advisory Board (XAB)
 - User Advisory Committee
 - Service Providers Forum
 - TEOS Advisory Committee (overlaps XAB)



XSEDE

Requirements Management

- XSEDE requirements are formally managed
 - traceability from statements of need through delivered capabilities
 - provides several paths for XSEDE users to influence requirements
 - integrated with change management processes to ensure controlled evolution
 - integrated with testing processes to ensure continuous improvement



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TEOS Partners

- Indiana University
- I-STEM (U.Illinois)
- NCSA
- NICS
- OSC
- PSC
- Purdue University
- Rice University
- Shodor
- SURA
- TACC
- UC Berkeley



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Opportunities in Supercomputing

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Extreme Science and Engineering
Discovery Environment

NSF support of high-performance computing

- First RFP and awards for supercomputing centers made in 1985.
 - Followed panel recommendations and unsolicited proposals from Illinois, UC-San Diego
- Time on resources is Free for U.S. based researchers.
- Allocated much like large, shared scientific instruments, through a peer-review process.
- Specific set-asides for educational and other purposes.



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Free Resources for U.S. Researchers

- Compute Resources (listed next)
- Human Resources, or Extended Collaborative Support Services (ECSS)
 - Over 20 full-time equivalent staff spread around the country.
 - Includes several computational scientists locally at NICS at UT-Knoxville.
 - Can be requested by new users as well as experienced users.



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Current XSEDE Compute Resources

- Kraken @ NICS
 - 1.2 PF Cray XT5
- Ranger @ TACC
 - 580 TF Sun Cluster
- Lonestar (4) @ TACC
 - 302 TF Dell Cluster
- Forge @ NCSA
 - 150 TF Dell/NVIDIA GPU Cluster
- Trestles @ SDSC
 - 100TF Appro Cluster
- Steele @ Purdue
 - 67 TF Dell Cluster
- Blacklight @ PSC
 - 36 TF SGI UV (SMP)
- Dash @ SDSC
 - 5 TF Appro Distributes SMP cluster



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Current XSEDE Visualization and Data Resources

- Data Analysis & Visualization
 - Nautilus @ UTK
 - 8.2 TF SGI/NVIDIA SMP
 - 960 TB disk
 - Longhorn @ TACC
 - 20.7 TF Dell/NVIDIA cluster
 - 18.7 TB disk
 - Spur @ TACC
 - 1.1 TF Sun cluster
 - 1.7 PB disk
- Storage
 - Albedo
 - 1 PB Lustre distributed WAN filesystem
 - Data Capacitor @ Indiana
 - 535 TB Lustre WAN filesystem
 - Data Replication Service
 - 1PB iRODS distributed storage
 - HPSS @ NICS
 - 6.2 PB tape
 - MSS @ NCSA
 - 10 PB tape
 - Ranch @ TACC
 - 70 PB tape
 - HPSS @ SDSC
 - 25 PB tape



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Current XSEDE Special Purpose Resources

- Condor Pool @ Purdue
 - 150 TF, 27k cores
- Keeneland @ GaTech/NICS
 - developmental GPU cluster platform
 - Production level machine July 2012
- FutureGrid
 - Experimental/development distributed grid environment



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How do You get time?

- Go to:
<https://www.xsede.org/web/guest/allocations>
- Pay particular attention to 'Startup' and 'Education' allocations.
- For standard allocation requests, human help is available.
- Invite your comments on the Allocation web pages.



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XSEDE Training, Education & Outreach

- Prepare the current and next generation of researchers, educators and practitioners.
- Create a significantly larger and more diverse workforce in STEM.
- Inculcate the use of digital services as part of their routine practice for advancing scientific discovery.



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Training

- Live, synchronous and asynchronous delivery
- List of events posted on web site
- Span introductory (MPI, OpenMP, CUDA) to advanced topics (parallel I/O, performance tuning, visualization)
- Address domain specific needs
- Roadmap for training - a sequence of topics and training materials
 - <http://hpcuniversity.org/roadmap/>



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National student opportunities

- XSEDE 2012 Conference

<https://www.xsede.org/web/xsede12/students>

- SC12 Conference

<http://sc12.supercomputing.org/content/student-volunteers>

- Subscribe or bookmark the XSEDE TEOS blog to see other local & national opportunities

<https://www.xsede.org/education-outreach-blog>



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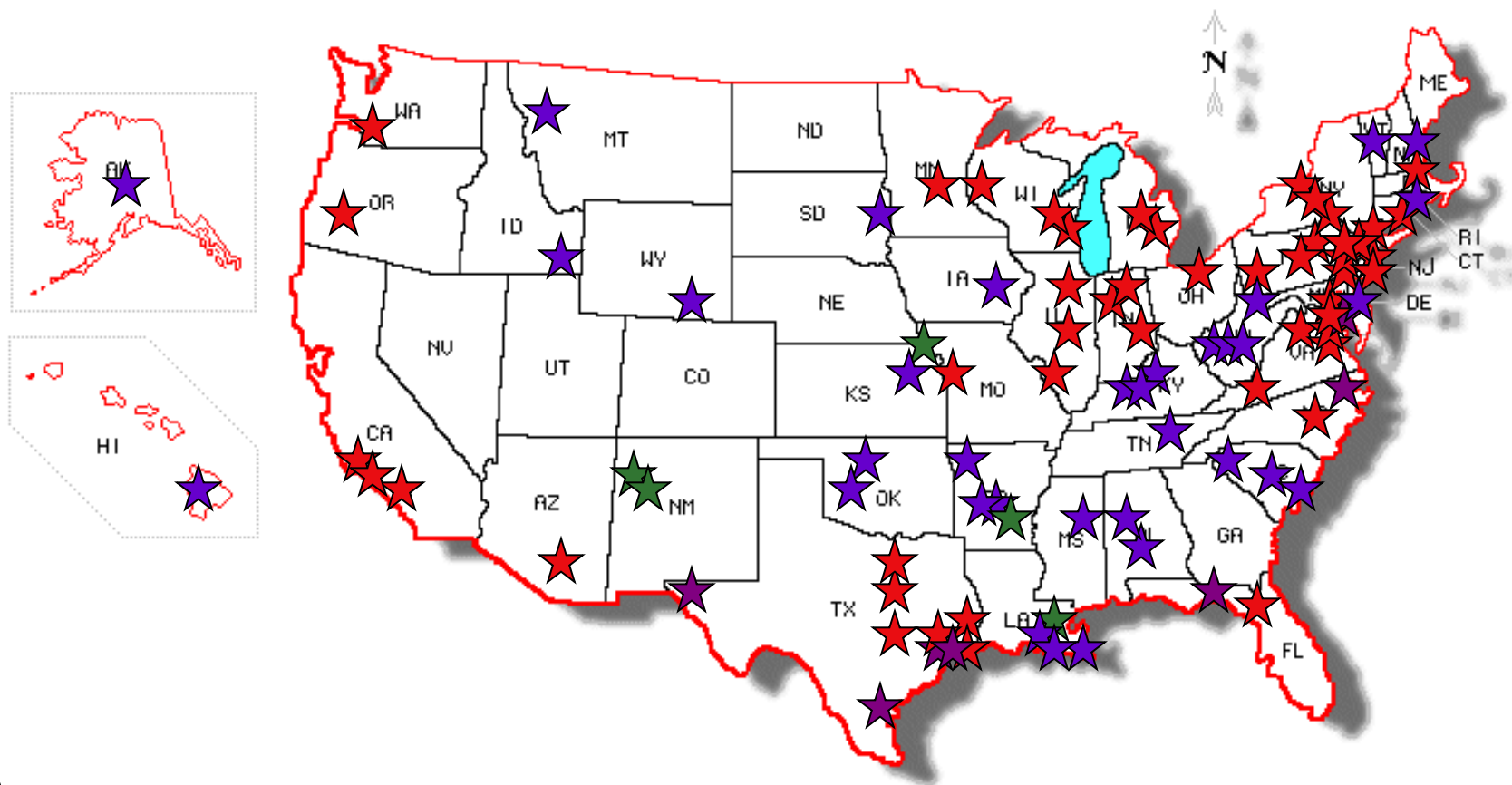
Campus Champions

- Over 100 institutions; ~150 individuals
 - Champions serve as a bridge from their campuses to local users of XSEDE resources
 - Champions share information via frequent calls, and stay connected with XSEDE staff.
 - XSEDE'12 program for Champions
 - XSEDE values feedback from Champions




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Campus Champion Institutions



- ★ Current Campus Champion Institutions (unclassified) – 50
- ★ Current Campus Champion Institutions (EPSCoR states) 34
- ★ Current Campus Champion Institutions (Minority Serving Institutions)-- 7
- ★ Current Campus Champion Institutions (both EPSCoR and MSI) – 5



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

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