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# XSEDE Campus Bridging Tools

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# XSEDE

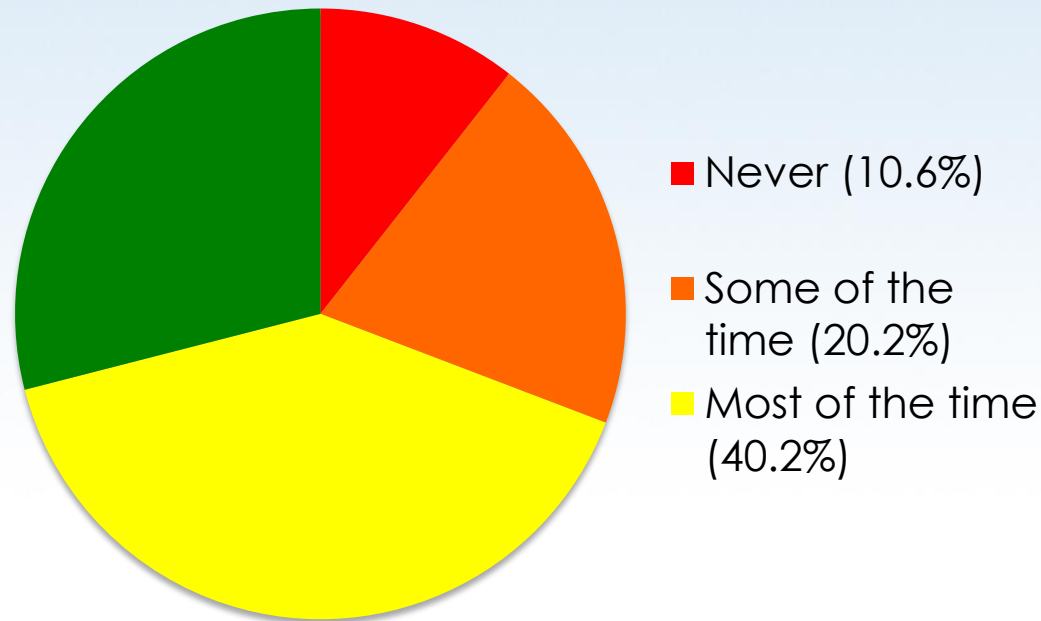
Extreme Science and Engineering  
Discovery Environment



# What is Campus Bridging?

- “Bridging” the gap between local researcher cyberinfrastructure, campus CI, and national CI resources
  - Hardware
  - Software
  - Support
  - Outreach

# Adequacy of research CI



Responses to asking if researchers had sufficient access to cyberinfrastructure resources – survey sent to 5,000 researchers selected randomly from 34,623 researchers funded by NSF as Principal Investigators 2005-2009; results based on 1,028 responses

Stewart, C.A., D.S. Katz, D.L. Hart, D. Lantrip, D.S. McCaulay and R.L. Moore. Technical Report: Survey of cyberinfrastructure needs and interests of NSF-funded principal investigators. 2011. [hdl.handle.net/2022/9917](http://hdl.handle.net/2022/9917)



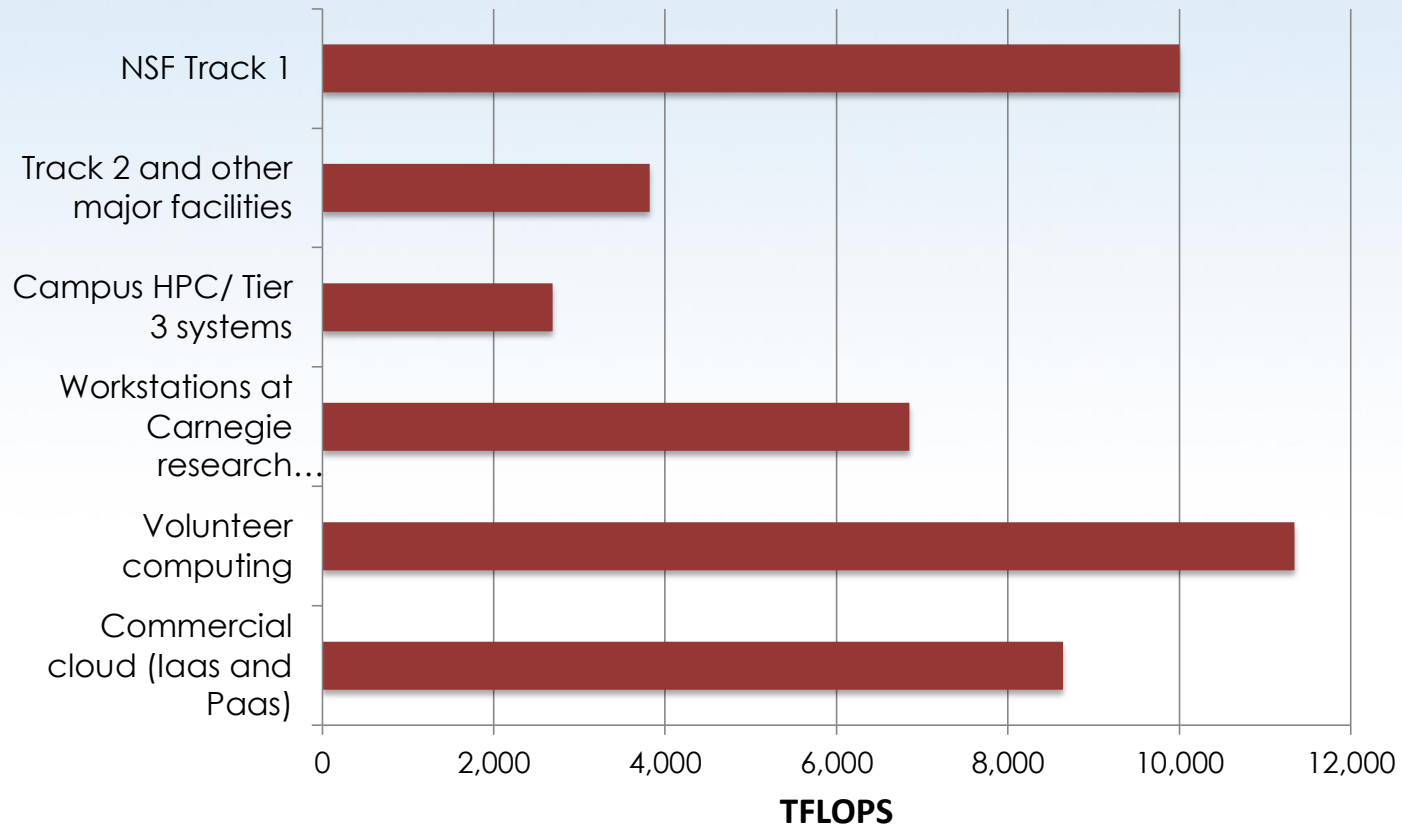
# More on Campus Bridging

- The goal of campus bridging is virtual proximity ...
- The biggest problems:
  - Not enough CI resources available to most researchers
  - When you go from your campus to the national cyberinfrastructure it can feel like you are falling off a cliff! That's why you need bridging....
- Campus bridging is a major priority within XSEDE





# Some CI resources available to science and engineering researchers in US (March 2011) <sup>5</sup>



Based on: Welch, V.; Sheppard, R.; Lingwall, M.J.; Stewart, C. A. 2011. Current structure and past history of US cyberinfrastructure (data set and figures). [hdl.handle.net/2022/13136](http://hdl.handle.net/2022/13136)

# XSEDE Campus Bridging

- Even for those researchers with enough computing time, there has traditionally been little support once the allocation process is complete
  - XSEDE has prioritized training and documentation, as well as a number of initiatives designed to make the transition appear seamless to the user:



# Campus Bridging services today

- UNICORE – Grid system developed in Europe, supported and continually evolving, adopted by XSEDE for optional deployment on level 1 and 2 Service Providers. Nearly universal.
- Cluster Rocks Rolls and YUM Repo
- Globus Online – File transfer utility, approved for use on XSEDE resources. Globus Connect Multiuser also through engineering process.
- Genesis II – global file system and job submission service under evaluation & development

# UNICORE

- Production CI suite
- Installation instructions at <https://www.xsede.org/unicore>
- Server and Client software available, web interface under development
- Under continued development at Forschungszentrum Jülich in Germany, one developer on XSEDE team.



# GlobusOnline

- Simple, Dropbox-like interface for moving files back and forth
- Can be configured to connect between multiple computers and larger resources to transfer data
  - Screenshot courtesy of [http://genome.jgi.doe.gov/pages/portal\\_apps.jsf](http://genome.jgi.doe.gov/pages/portal_apps.jsf)

The screenshot displays the Globus Online web interface. At the top, the logo and navigation links (Manage Data, Groups, Support, jdoe) are visible. Below the navigation bar, there are links for 'start transfer', 'view transfer activity', 'manage endpoints', and 'dashboard'. A 'Get Globus Connect' button is also present. The main area is titled 'Transfer Files' and shows two endpoint panels. The left panel has an endpoint of 'jgi#portal' and a path of '/~/By\_Proposal\_Name/~/Acidic\_Mine\_Environ'. The right panel has an endpoint of 'nersc#dtn' and a path of '/~/data/'. Both panels show a list of files and folders, with the left panel listing several folders related to 'Acidic\_Mine\_Environmental\_sample'. At the bottom, there is a 'Label This Transfer' field with a text input and a 'more options' link.

# Globus Online 2

- Set a transfer and start it, walk away, and get a notification when the transfer is complete
- During Q3 2013, GlobusOnline allowed researchers to move over 630TB of data onto the XSEDE network
  - That's just ONE direction!

# Rocks Rolls + YUM Repository

- Tools to allow cluster administrators to create a “basic XSEDE-compatible cluster software stack”
- Make your cluster more XSEDE-like
  - Eases later transition to larger CI
  - Saves investment on development and updates
  - Allows researchers to benefit from XSEDE-wide training
  - Teaches students interested in HPC to operate within a context similar to XSEDE

# Rocks Rolls + YUM Repository 2

- Maintained and updated by XSEDE Campus Bridging
- New cluster? Rocks ISOs can automate much of the work of setting up a basic XSEDE-like cluster

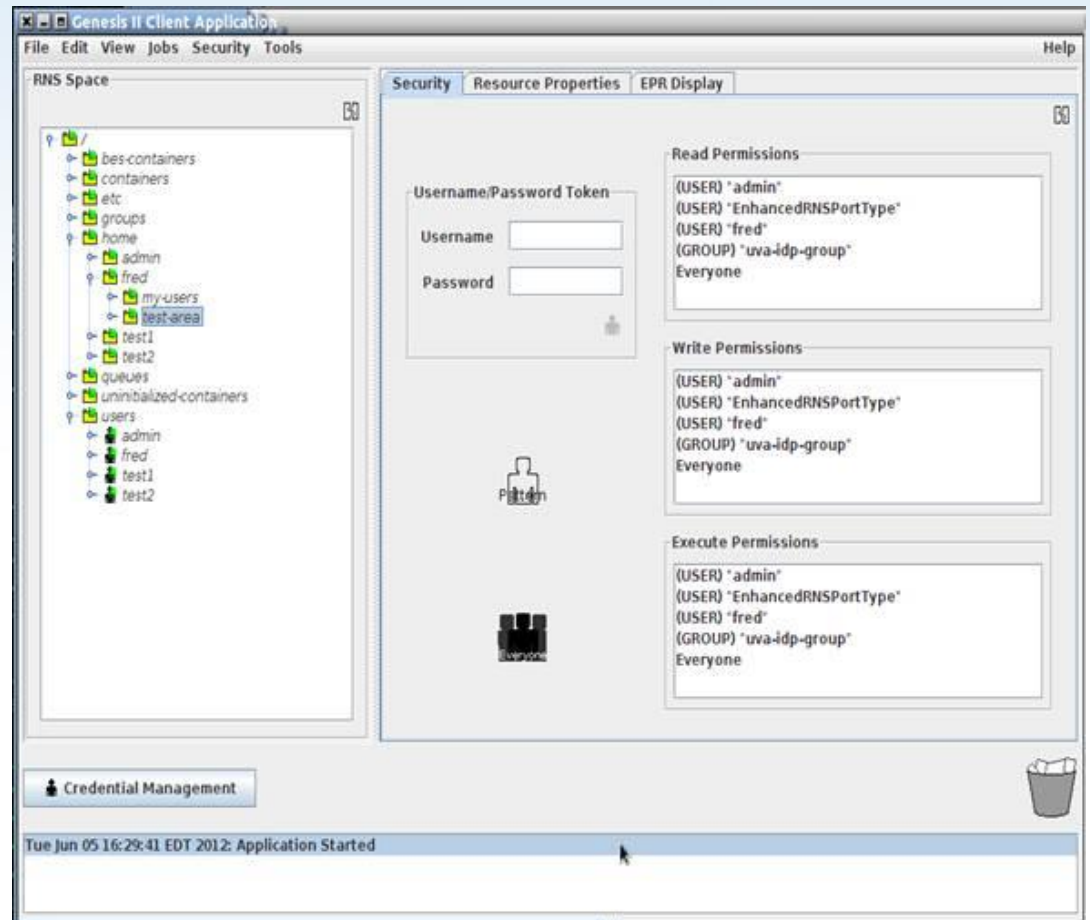
# Rocks Rolls + YUM Repository 3

- Existing cluster? XSEDE provides documentation to configure your cluster such that you can use these resources
- Install YUM Repo locally, manage XSEDE packages as if they were part of the OS, just like you would with the base or EPEL repositories



# GenesisII

Screenshot  
courtesy  
<http://genesis2.virginia.edu>  
u



## GenesisII 2

- GenesisII allows users to export a directory into a globally federated file system that is visible from any system which is running a GenesisII client
- GenesisII provides a fuse-based filesystem, mountable in userspace with hooks to job management

# GenesisII 3

- Two components
  - Unicore 6 Basic Execution Services (BES)
    - Allows for jobs to be submitted as files into a directory
    - Directory is a jobs queue and BES executes job files as jobs in a queue
  - Global Federated File System (GFFS)
    - Standardizes user interface across compute resources
    - GUI component allows drag and drop uploading, user and group management, and POSIX-style permissions management independent of the command line


# Summary

- Campus bridging aims to create virtual proximity between researchers and resources
- Streamlining and easing the analysis part of research
- Ways we are working to bridge research computing:
  - Basic XSEDE-compatible software stack
  - Full-time dedicated support and consulting
  - GlobusOnline
  - GenesisII

# For more information...

- <https://www.xsede.org/campus-bridging>
  - <http://cb-repo.iu.xsede.org/xsederrepo/>
  - <https://www.xsede.org/globus-online>
  - <http://genesis2.virginia.edu>
  - [campusbridging@xsede.org](mailto:campusbridging@xsede.org)
  - +1 (812) 318-2872 (M-F, 9a-5p Eastern)
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- Any questions?





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

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Extreme Science and Engineering  
Discovery Environment