XSEDE Campus Bridging Tools

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XSEDE

Extreme Science and Engineering
Discovery Environment

NSF

Quick Advertisement: Student Programs

- Research Experience
  - 12-18 students per summer, 10 weeks
  - Work with researcher / mentors on real projects
  - Includes travel for training and to XSEDE15.
  - $5K stipend

- XSEDE Scholars
  - Annual program, 30-40 students per year
  - Targets under-represented groups from all institutions
  - Specific training provided on HPC, research
  - Includes XSEDE15 travel

For Student, Educator, Workshop news…

- XSEDE website, Education & Outreach
    - Now under 'Education & Outreach Blog' but soon to reorganized under 'Students' section
- Facebook: Computational Science Education News
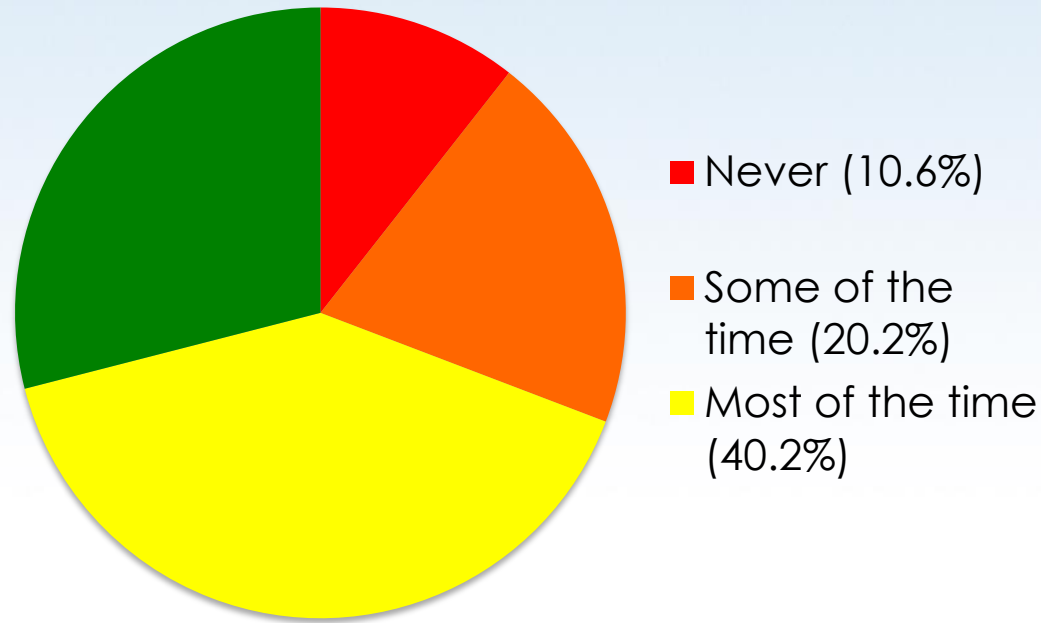- hpcuniversity.org website

What is Campus Bridging?

- "Bridging" the gap between local researcher cyberinfrastructure, campus CI, and national CI resources

- It is not just one thing
  - Hardware
  - Software
  - Support
  - Outreach

Adequacy of research CI

- Never (10.6%)
- Some of the time (20.2%)
- Most of the time (40.2%)

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

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

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.

- XSEDE Compatible Basic Cluster: Rocks Rolls and YUM Repo

- Globus Online – File transfer utility, approved for use on XSEDE resources. Globus Connect Server also through engineering process.

- Genesis II – global file system (GFS) and job submission service under evaluation & development

UNICORE

- Production CI suite

- Installation instructions at *https://portal.xsede.org/software/unicore*

- Server and Client software available, web interface under development

- Under continued development at Forschungszentrum Jülich in Germany, one developer on XSEDE team.

Rocks Rolls + YUM Repository

- Tools to allow cluster administrators to create a XCBC: the "XSEDE-compatible basic 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

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

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!

Genesis II

- 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

GFFS

Screenshot courtesy http://genesis2.virginia.edu
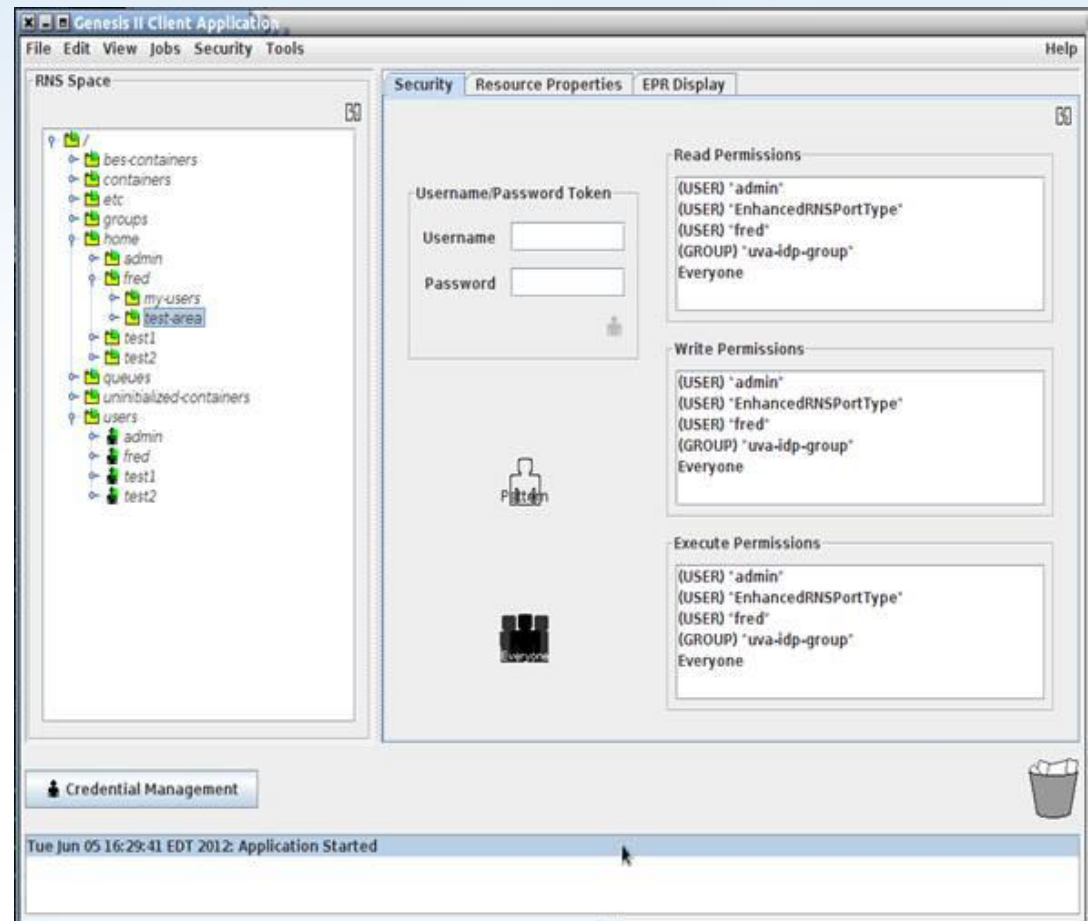
GFFS 2

- Allows users to export a directory into a globally federated file system that is visible from any system which is running a GenesisII client

- Provides a fuse-based filesystem, mountable in userspace with hooks to job management

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:
  - XSEDE-compatible basic cluster stack
  - Full-time dedicated support and consulting
  - GlobusOnline
  - Unicore 6
  - GFFS

For more information…

- https://www.xsede.org/campus-bridging
- http://cb-repo.iu.xsede.org/xsederepo/
- https://www.xsede.org/globus-online
- http://genesis2.virginia.edu
- campusbridging@xsede.org
- +1 (812) 318-2872 (M-F, 9a-5p Eastern)

- Any questions?

Our reach will forever

exceed our grasp, but,

in stretching our horizon,

we forever improve our world.

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