XSEDE Campus Bridging Tools

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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

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)

- NSF Track 1
- Track 2 and other major facilities
- Campus HPC/ Tier 3 systems
- Workstations at Carnegie research...
- Volunteer computing
- Commercial cloud (Iaas and Paas)

TFLOPS

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)
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
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](https://www.xsede.org/campus-bridging)
- [https://www.xsede.org/globus-online](https://www.xsede.org/globus-online)
- [http://genesis2.virginia.edu](http://genesis2.virginia.edu)
- [campusbridging@xsede.org](mailto: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.