XSEDE Campus Bridging Tools

Jim Ferguson
National Institute for Computational Sciences
jwf@utk.edu
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
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
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.