Programmable Cyberinfrastructure

Introduction to building Clusters in the Cloud

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Speakers

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What is XCRI?
(XSEDE Cyberinfrastructure Resource Integration)

• Very similar to Campus Bridging!
• XCRI provides software toolkits to ease use of local resources, and facilitate easy transitions between local and XSEDE resources
• We also do site visits and remote consultation!
• Continually looking for feedback from XSEDE users, Campus Champions, and service providers to keep our offerings up-to-date with current needs
XCRI Toolkits

- XCBC
  - Build a cluster based on OpenHPC
- XNIT
  - Get open-source scientific software
  - Globus Connect Server configuration management
  - Easily set up a local globus connect server using Ansible
- Jetstream Virtual Clusters
  - Build a cluster in Jetstream, with Openstack and Ansible
- Cluster Monitoring toolkit
  - Easily set up Ganglia and XDMoD for cluster load and usage statistics
Jetstream Virtual Clusters

- Inspired by a need for more resources on Science Gateways
- Science Gateways allow users to submit jobs through a web interface, to a variety of resources – local, XSEDE, or cloud.
- The Airavata middleware developed by the SGRC (Science Gateways Research Center at Indiana University) makes these easy to use
- This model of virtual cluster was specifically developed for the SEAGrid project, available and easily configurable for anyone else.
What we’re going to build:

- **Client machine**
  - OpenStack API

- **Router**
  - `compute-0 slurmd`
  - `compute-1 slurmd`

- **Headnode**
  - slurmd

**Jetstream**
Pieces of the whole:

- OpenHPC Project
  - Slurm – for managing compute resources and scheduling
  - Spack – for building software
  - Lmod – for module environment
- Ansible – for compute node configuration
- Openstack client - for elasticity
Let’s get started!

https://goo.gl/FmoHZ5
You’ve already got a headnode:

- Client machine
- OpenStack API
- Router
  - compute-0 slurmd
  - compute-1 slurmd
- Headnode slurmd
Now, create the compute nodes:
Now, configure the scheduler (etc.)!
Where can I get help?

- User guides: https://portal.xsede.org/user-guides
- XSEDE KB: https://portal.xsede.org/knowledge-base
- Email: help@xsede.org
- Campus Champions: https://www.xsede.org/campus-champions
- Training Videos / Virtual Workshops (TBD)
Spack configuration for OpenHPC:

- Spack installs in
  - /opt/ohpc/admin/spack/0.11.2/
- Configuration files in:
  - /opt/ohpc/admin/spack/0.11.2/etc/defaults/
  - /root/.spack/linux/
- Should be run as privileged user
- Need to make sure software will install in a public directory:
  - Edit install_tree and tcl modules path in
    /opt/ohpc/admin/spack/0.11.2/etc/defaults/config.yaml
  - Provide OpenHPC compiler Module names in
    /root/.spack/linux/compilers.yaml