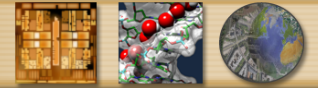# OpenStack Activities at Notre Dame

Jarek Nabrzyski, Director, CRC

naber@nd.edu

Some facts

- ND's CRC is a RedHat shop
- We've been running a prototype OpenStack infrastructure in collaboration with Rackspace
  - OpenStack is predominantly built and tested on Ubuntu, while ND/OSG is RHEL/CENTOS/SELinux
  - The goal was to streamline each OpenStack release with RedHat OS upgrades
  - Several libraries were still conflicting with a Dec 2013 release
- ND has been in touch with OSG on OpenStack +OSG integration for some time (9 moths or so)
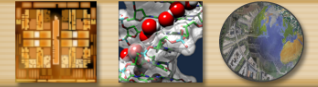
OpenStack and OSG

- OSG supports only Amazon's API

- There is limited/deprecated Amazon API support in OpenStack

- We decided to focus on OSG+Condor +OpenStack (NOVA) native API support

- UWisc (Ted T.), FNAL and UTSA are working on this (not sure what the status is, but seems things got delayed).
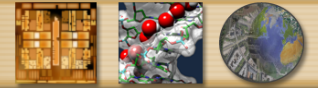
Notre Dame Apps

- Vectorbase.org

- Vecnet.org

- CMS

- Molecular dynamics simulations (Folding@Work)

- Psychology: Multivariate Data Mining for the Analysis of Personality (human subjects!)
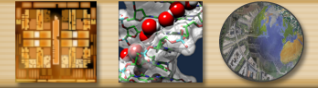
# Other OpenStack related efforts @ ND

- NSF proposal: CC*IIE Integration: Application Driven Dynamic Cloud Network and Data Provisioning
- ICTBioMed Consortium

INTERNET2®

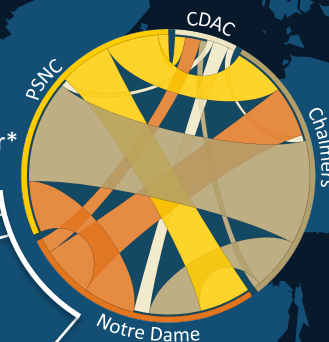## COLLABORATE WITH RESEARCHERS ANYWHERE AND ANYTIME

Connect with your Partners

- Connect to 250 universities and 70 government agencies.
- Access major data repositories like NCBI, EBI, and Bionimbus.
- Monitor connectivity with your partners – see the Circos diagrams.*
- Simplify data transport with the NET+ Globus Online service.
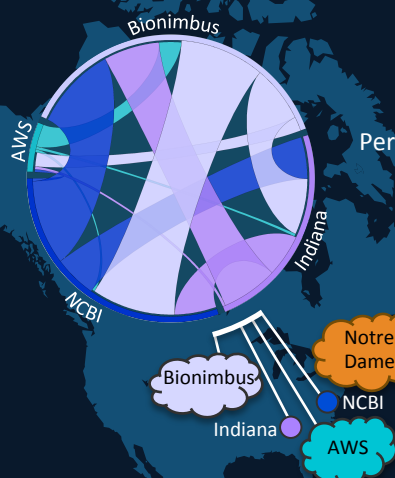
Access Cloud and HPC Resources

- Join a federation of connected HPC clouds like ICTBioMed.
- Exchange data with international partners over NRENs.
- Extend workflows and pipelines across oceans and continents.
- Monitor your connectivity 24/7 to assure good performance.

NCBI Group Performance Monitor*

ICTBioMed Group Performance Monitor*

Bionimbus

AWS

Indiana

NCBI

Notre Dame

Bionimbus

NCBI

Indiana

AWS

Chalmers Sweden

PSNC Poland

CDAC India

CDAC

PSNC

Chalmers

Notre Dame

Move Data at 100 Gigabits

- Transport data at 100 Gigabits over the Internet2 Network.
- Leverage the NET+ Azure Cloud service to avoid egress fees.
- Authenticate users with the InCommon Trust Federation.
- Tailor your network with Layer 1, 2, or 3 services.
- Upgrade to the Internet2 Innovation Platform.

Internet2 Innovation Platform

100 Gigabits, SDN, Science DMZ

Science DMZ†
Border Router with ACLs
Data Transfer Node (DTN)
perfSONAR Node

†source: fasterdata.es.net/science-dmz/

* Performance data represents projected throughput for Dec 2014.

Visualization: Circos Table Viewer v0.63-10 © 2008-2014 Martin Krzywinski