Cyberinfrastructure
Facilities in Utah

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CI objectives

- Provide coordinated, high-performance information technology resources and services to CI-WATER team and other Utah and Wyoming EPSCoR researchers

- Support research data analysis, management, and curation; modeling; and simulation needs

- Tools: computing cycles, data storage, advanced networking, visualization environments, middleware, software libraries, software development, data centers

- Strategies
  - Leverage campus facilities and services – new Downtown Data Center
  - Leverage Utah Education Network (UEN), Front Range Gigapop (FRGP), and Internet2 for advanced networking
  - Leverage other public sector partners – e.g., UDOT, UTA
  - Collaborate with local HPC centers – new relationship with University of Wyoming
  - Leverage national HPC activities – CASC, XSEDE, Open Science Grid
New Downtown Data Center

- 74,000+ sq ft² former industrial building south of downtown SLC (~4 miles off-campus)
- Designing for enterprise & HPC (2.4 MW)
- Co-location by research groups & partners
- Low industrial electric power rates in Utah
- High desert climate: energy efficiency
- Now in production – March 2012
Why build an optical network?

- **Research capacity and competitiveness**
  - Matching network capacity to the research data explosion and remote collaboration demands by providing greater capacity and scalability
    - 30 Gbps at outset
    - 10 Tbps maximum
  - Enhancing competitiveness for research funding and faculty hiring
  - Enhancing potential for in-state collaboration with UofU and BYU
    - Joint NSF EPSCoR projects
    - Utah Field Station Network
  - Interconnection with new 100-Gbps Internet2 network

- **Economics**
  - Buying vs. renting - home/condo ownership analog
  - Additional network capacity can be added at incremental cost
  - Customer (UEN, BYU & USU) control of bandwidth, provisioning, and services
  - Trend toward customer ownership & control of networks in higher education

- **Technology**
  - Ability to innovate in new network technologies
  - Support for new applications
  - Support for enhanced disaster recovery capabilities
SALT LAKE CITY - THE (OPTICAL FIBER) CROSSROADS OF THE WEST
Key partner: Utah Education Network (UEN)
**RII Cyber Connectivity Award**

- Special EPSCoR program based on ARRA funding
- Collaboration partners: UofU, USU, BYU, and UEN
- Award: $1.17M (9/1/2010 for three years)
  - One-year no-cost extension granted through 8/31/2013
  - Better coordination with Tracks -1 and -2 outreach efforts
- Leadership
  - S. Corbató (PI) and Jim Ehleringer, U. of Utah
  - Larry Baxter and Kelly McDonald, BYU
- Key partners
  - Eric Hawley and Robert Spall, USU
  - Jim Stewart and Laura Hunter, UEN
Regional Optical Network Development in Utah

- Collaboration of Utah Education Network (UEN), Univ. of Utah, Utah State, and Brigham Young Univ.
  - Leverage UEN operational capability & statewide reach
- Motivations
  - New University off-campus data center in downtown SLC
  - Reach national R&E networks (Internet2, ESnet, N-Wave) at SLC Level 3 PoP at 100 Gbps
  - Enhanced interconnectivity among 3 research universities in Utah – BYU, USU, and UofU
  - Connect federal R&D partners: NOAA/NWS, USFS RSAC
Regional Optical Network Development in Utah - II

- Leverage public sector partner assets (fiber & conduit) wherever possible
  - UDOT (Interstate/state highway RoW)
  - Utah Transit Authority (UTA/TRAX light rail)
- Work with wholesale oriented carriers (e.g., Zayo, Syringa)
- Leverage federal stimulus funding
  - NSF EPSCoR RII Cyber Connectivity award - $1.18M (S. Corbató, U of Utah)
  - NTIA BTOP Round 1 award - $13.4M (M. Petersen/ D. Sampson, UEN) – revised statement of work
Salt Lake City metro optical network

Research@UEN: Salt Lake City Metro Optical Network

- U of U Campus Fiber
- UTA Light Rail Routes (proposed)
- CENIC/LLC Fiber IRU (through AFS)
- AFS Fiber IRU (proposed)
- Northern Utah Extension (proposed)

1 Mile
Extensions for USU and BYU
Support acquired and simulated data curation needs of project
- Key driver: atmospheric science simulations (Court Strong)
- Needs: access to high speed computation; long-term preservation
- Help support EPSCoR Track 1 projects

Goal: 250 Terabytes in Year 2; 350 Terabytes by Year 3

Leverage existing data storage system at Univ. of Utah CHPC (HP iBRIX)

Location: new Univ. of Utah Downtown Data Center in Salt Lake City

Distributed storage: Develop and maintain high-performance connectivity to ARCC resources at UWyo as well as HPC/CI resources at BYU and USU

Access: Open to all CI-WATER collaborators

Status: Hardware specification and procurement underway
• CHPC is moving away from previous file storage system (HP) due to software reliability and performance issues

• Started new RFI/bid process

• Coordination with another campus Big Data project
  • Partnered with UofU Physics & Astronomy in its role as data management site for Sloan Digital Sky Survey 4 (SDSS-4) – 175 TB (separate space)

• Successful bid: 1 Petabyte usable space ($230/TB – Dell) including DTN

• Access: Open to all CI-WATER and iUTAH collaborators
  • DTN-DTN connections with U Wyoming and NWSC HPC sites

• Status: Purchase underway – in production early May
- Shared data repository among CI-WATER and iUTAH institutions
- Supports both fast I/O computation and long-term data archiving
- Hosted at CHPC in Utah DDC
- Leverages high-speed, secure data transfer nodes (DTNs) as advocated by NERSC and ESnet
November 10-16, 2012 – Salt Palace
- International conference and exhibition for HPC & computational science
- Large Utah research and EPSCoR presence

>10K attendees and >160K s.f. exhibit space
- General chair: Jeff Hollingsworth, U Maryland
- SCinet chair: Linda Winkler, Argonne National Lab
  - Jim Stewart & Kevin Quire, UEN
- Exhibits: Mary Hall & Steve Corbató, Univ. of Utah

http://sc12.supercomputing.org/
Questions?

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