



A Utah-Wyoming Cyberinfrastructure
Water Modeling Collaboration



Cyberinfrastructure Facility and Service Development in Utah

Steve Corbató

Deputy CIO, University Information Technology
Interim Director, Center for High Performance Computing
Adjunct Faculty, School of Computing
University of Utah

2013 CI-WATER Fall Symposium
Natural History Museum of Utah, University of Utah
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CI objectives

- Provide coordinated, high-performance information technology resources and services to CI-WATER team and other UT and WY 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



CI strategies

- Leverage campus facilities and services – new Downtown Data Center in Salt Lake City
- 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 regional HPC centers – new relationship with Univ. of Wyoming and NWSC plus long-standing ones with USU, BYU
- Leverage national HPC/Advanced Networking activities – CASC, XSEDE, Open Science Grid, Condo of Condos, Internet2

New Downtown Data Center

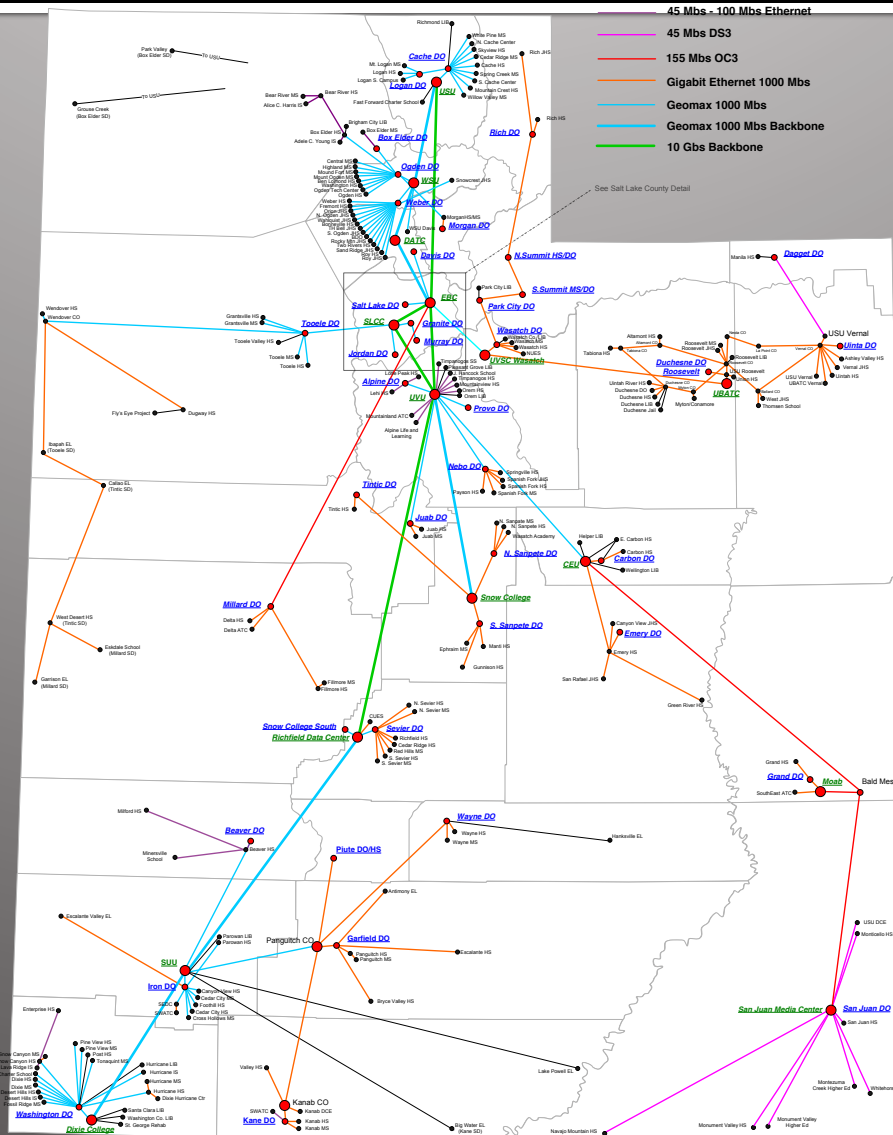


THE
UNIVERSITY
OF UTAH

- 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
- In production 3/2012; CHPC has moved



Key partner: Utah Education Network (UEN)



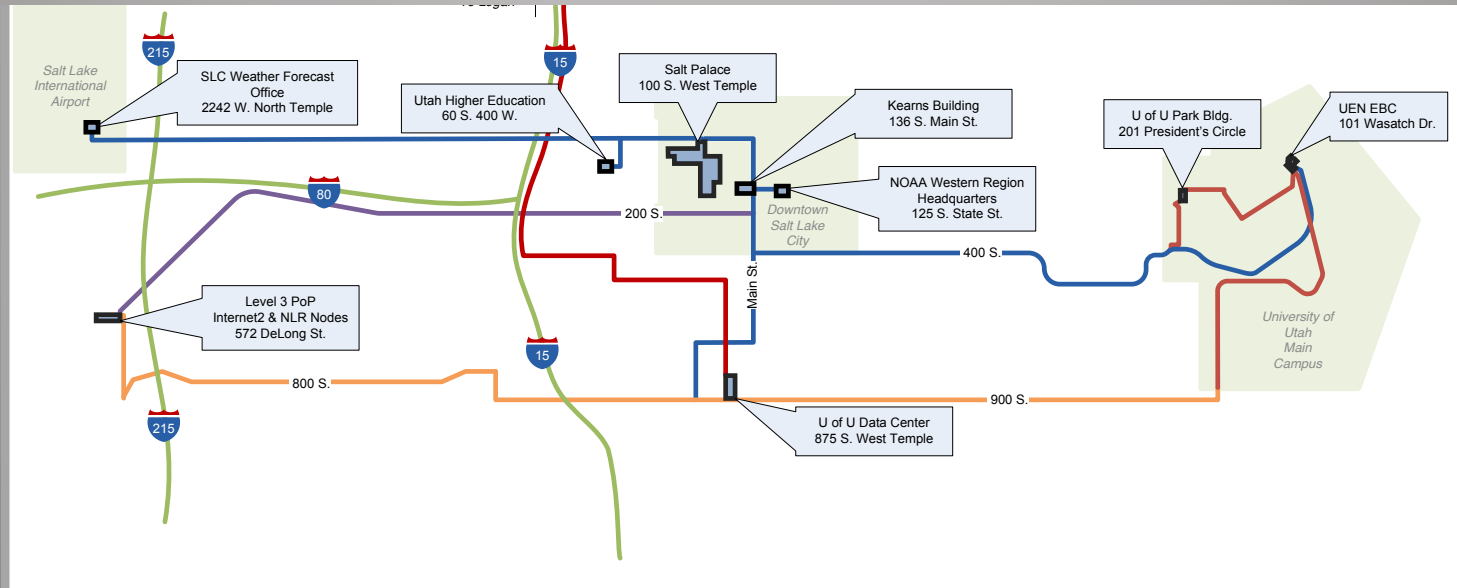
RII Cyber Connectivity Award



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- 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

Salt Lake City metro optical network



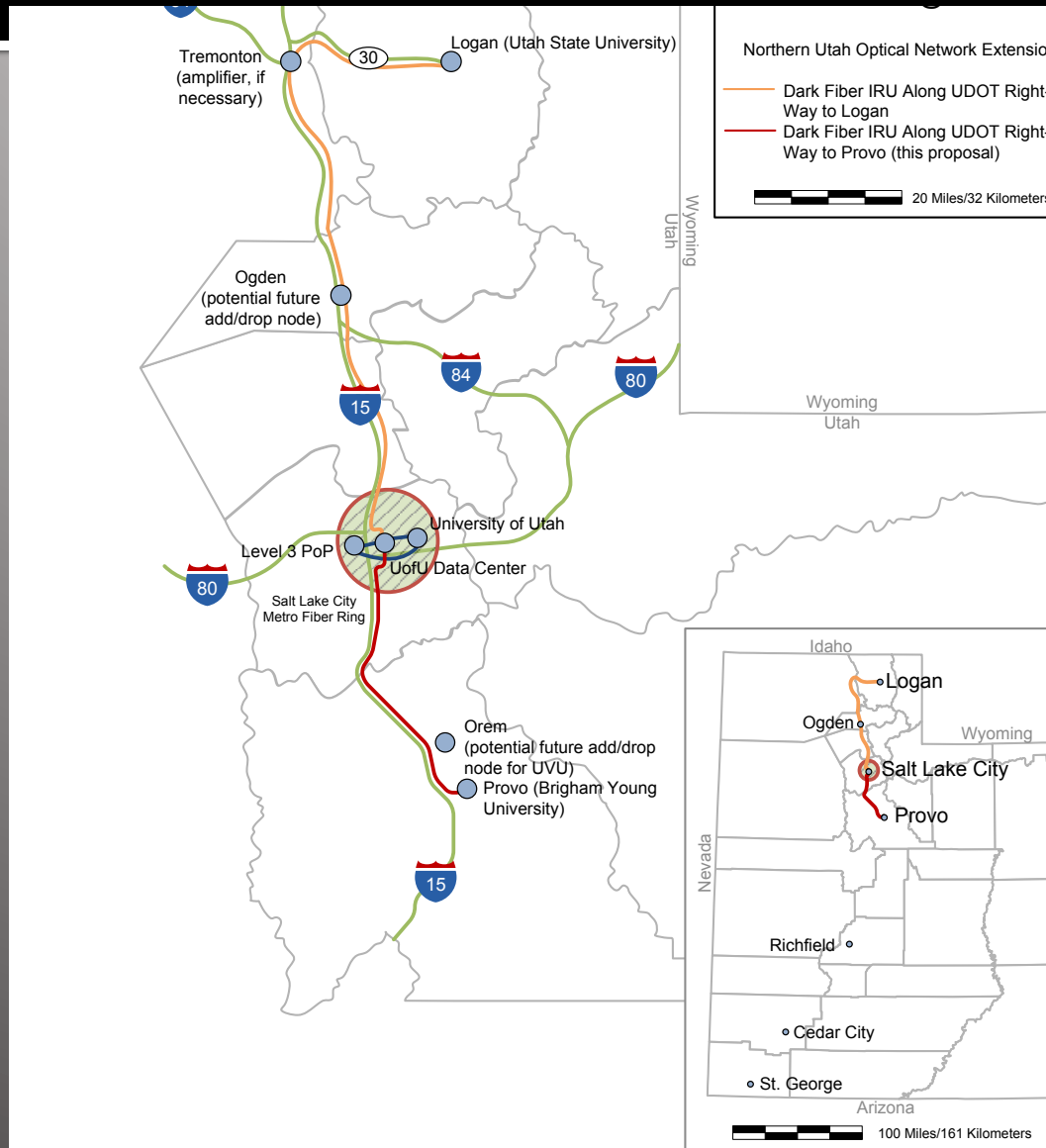
Research@UEN: Salt Lake City Metro Optical Network

- 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

Carrier proprietary information included

Extensions for USU and BYU





CI-WATER data repository for Big Data – June 2013

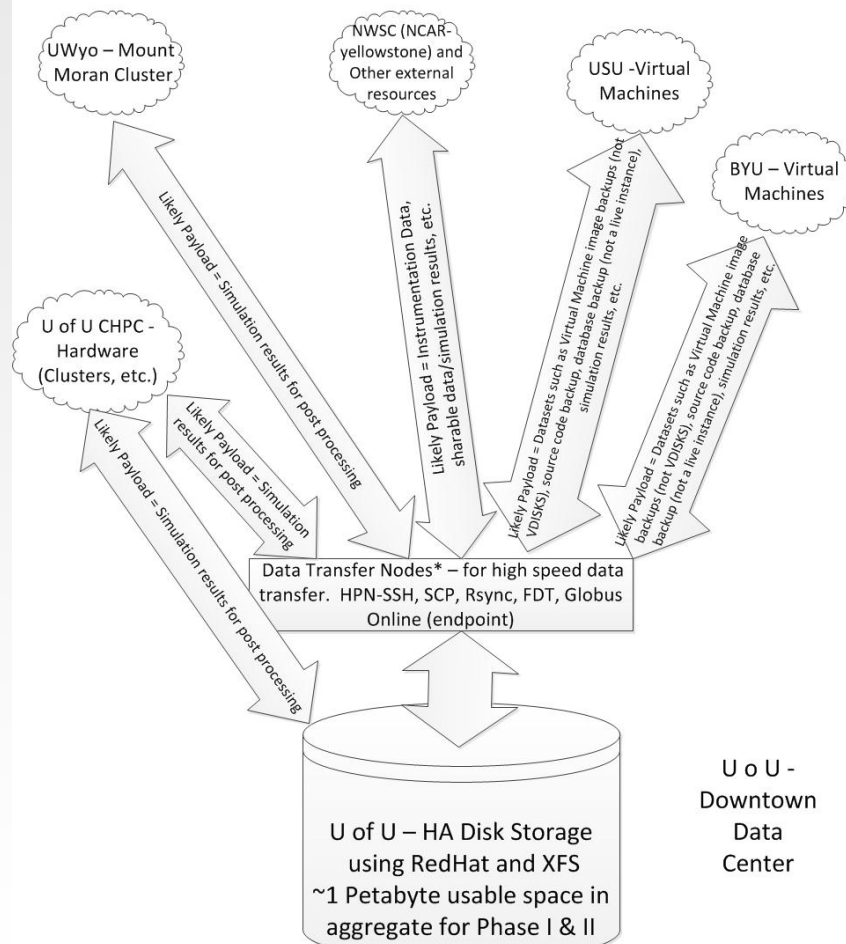
- CHPC is moving away from previous file storage system due to software reliability and performance issues, so we went to bid again
- Close coordination with another campus Big Data project
 - Partnered with UofU Physics & Astronomy in its role as data management site for Sloan Digital Sky Survey 4 (SDSS-4) – 175 TB (separate space)
- Selection: 1 Petabyte usable space (\$230/TB – Dell) including Data Transfer Nodes (DTNs)





- Shared data repository among CI-WATER and iUTAH institutions
- Supports both fast I/O computation and long-term data archiving
- Hosted at CHPC in UofU DDC
- Leverages high-speed, secure data transfer nodes (DTNs) as advocated by NERSC and ESnet

CI-WATER STORE – EPSCoR Data Repository Data Access Schematic – 2/8/2013



U of U -
Downtown
Data
Center

* Data Transfer Nodes are utilized for “put & get” type of operations. The software stack typically offers fast transfer of data.



CI-WATER data repository status

- Access: Open to all CI-WATER and iUTAH collaborators
 - DTN-DTN connections with U Wyoming and NWSC
 - Status: currently being installed and tested
 - 6/15 – friendly user mode
 - 7/15 – general collaboration use
- Steps completed
 - Testing network performance with UWyo and NWSC
 - Provisioning virtual machines from CHPC VM farm
- Next steps
 - Linking USU and BYU resources
 - Developing data curation and external data access policies





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CI-WATER data repository utilization

- Currently, 11 authorized users from UU, USU, BYU, and Uwyo
- Four VMs in CHPC VM Farm provisioned for CI-WATER use
- 103 TB used (with data mirroring)
- UofU<->UWyo DTN traffic – O(1) Terabyte per day



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Related NSF CISE/CI awards

- NSF MRI: Development of Apt, a Testbed Instrument With Adaptable Profiles for Network and Computational Science
 - \$3.4M, 4 years starting 10/1/2013
 - Rob Ricci, PI
- NSF CC-NIE Integration: Science Slices Converting Network Research Innovation into Enhanced Capability for Computational Science and Engineering at the University of Utah
 - \$1.0M, 2 years starting 10/1/2013
 - Steve Corbato, PI



The Condo of Condos Initiative

Condo of Condos

Founding Consortium Members



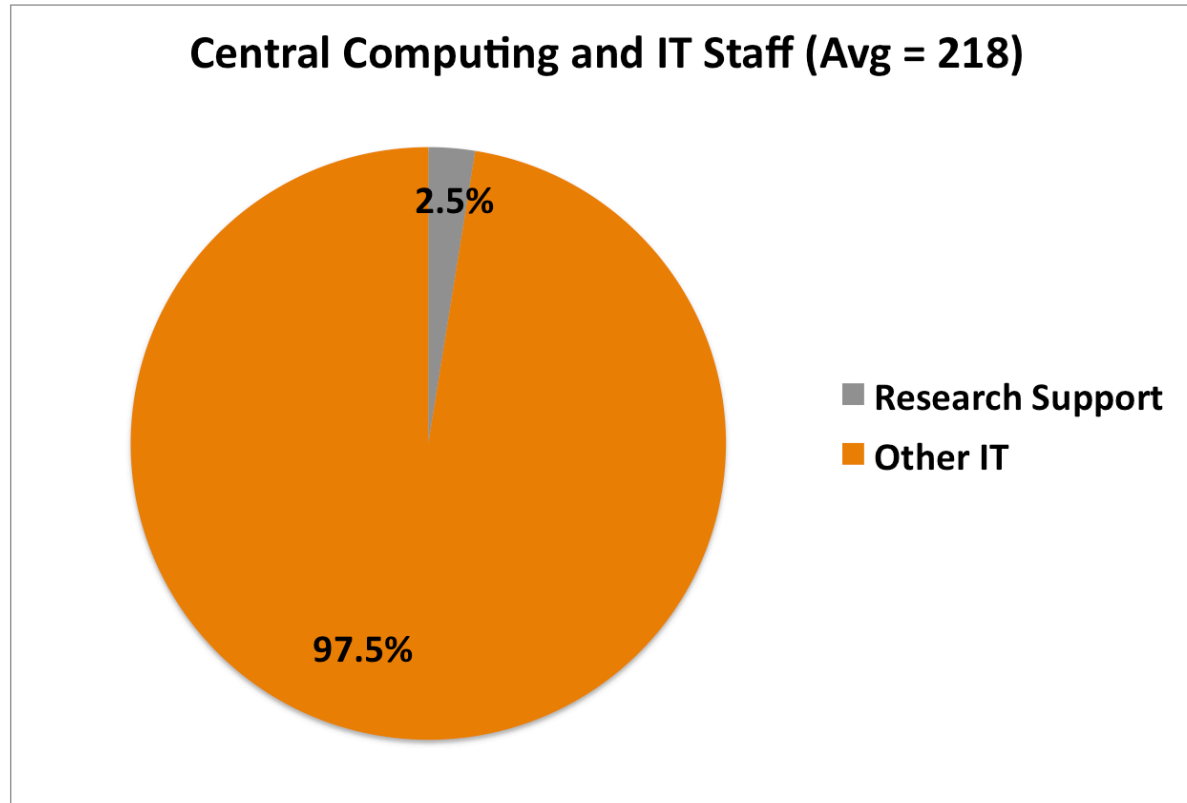
Vision

Advance our nation's research & scholarly achievements through the transformation of campus computational capabilities and enhanced coupling to the national infrastructure.

CoC Tenets

- Aggregation of resource
- Building a community through leveraging expertise
- Marginal investments - **transformational** change
- Innovation Platform deployment
- “Tiger Teams” – SDN
- Computational Science and Digital Scholarship

A Motivation

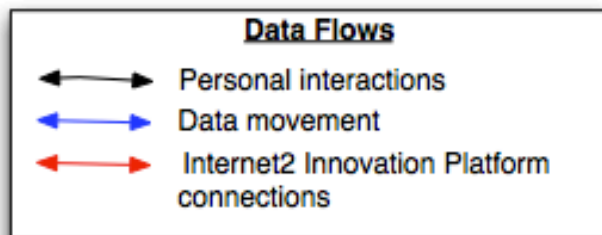
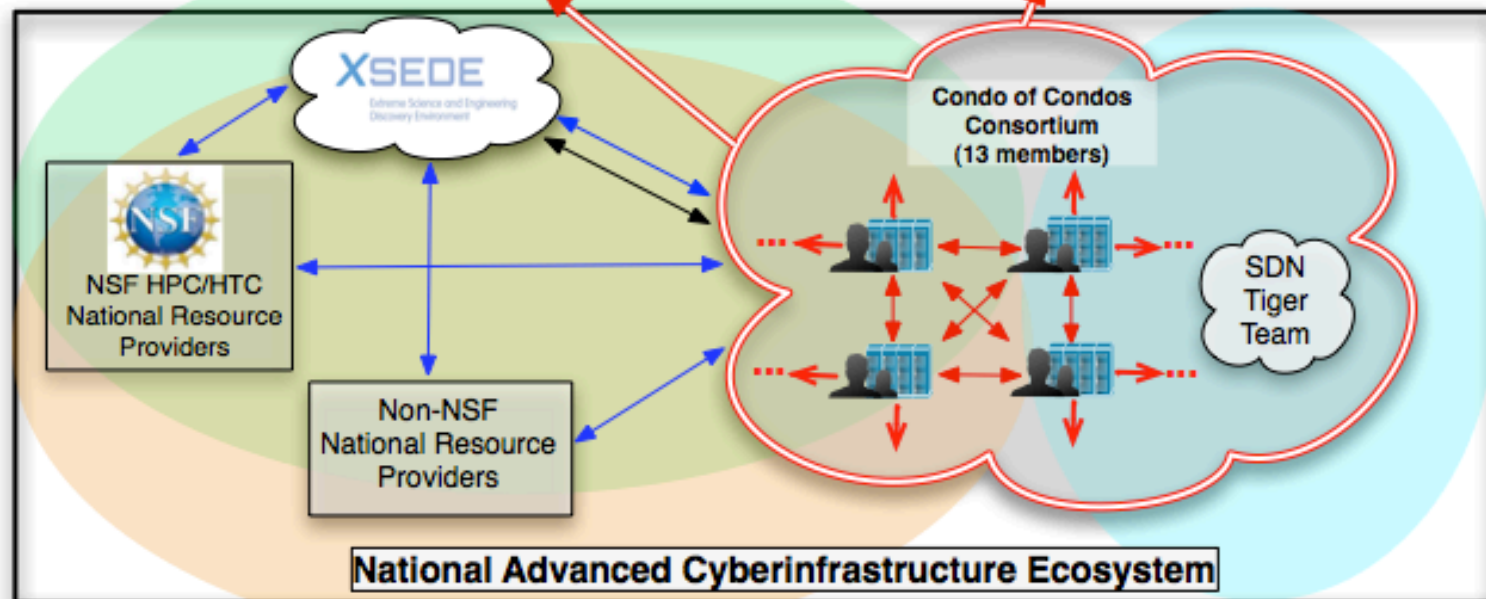
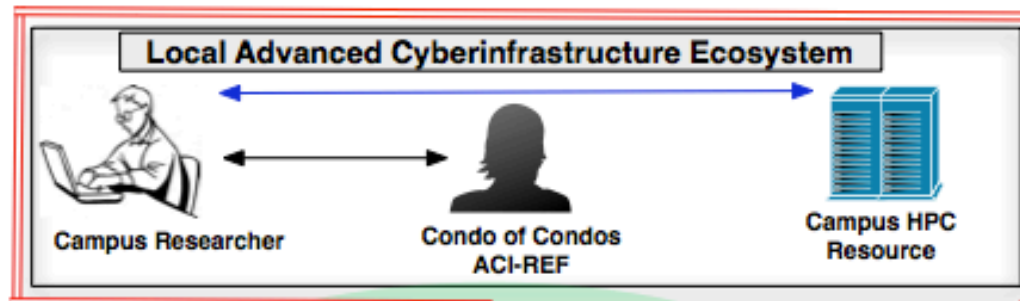


Source: Educause Core Data

Partners

Leverage existing national programs dedicated to interoperability. Condo of Condos addresses the needs of the steadily increasing “long tail” of advanced cyberinfrastructure (ACI) users.

- Internet2
- XSEDE
- Open Science Grid (OSG)
- FutureGrid
- GENI
- Blue Waters
- EPSCoR Track II





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Contact information

- Steve Corbato
 - steve.corbato@utah.edu
 - 801-918-4494 mobile