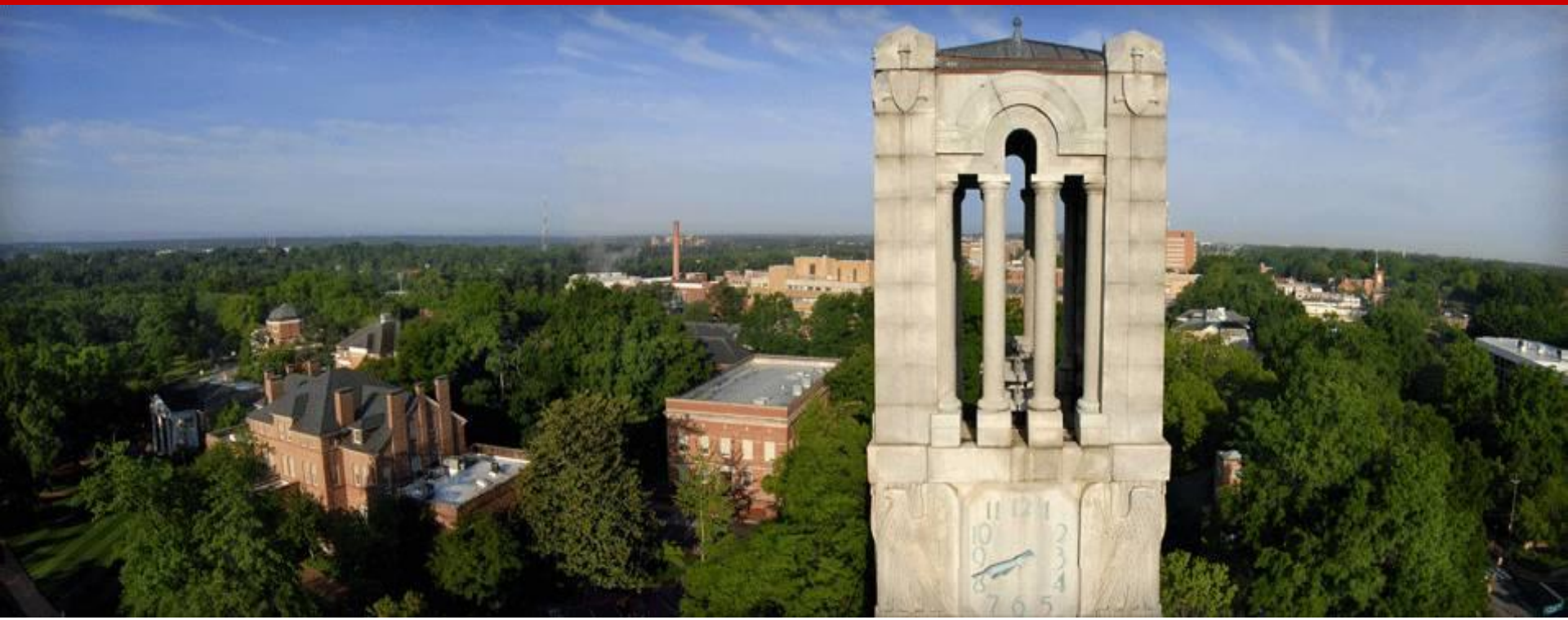
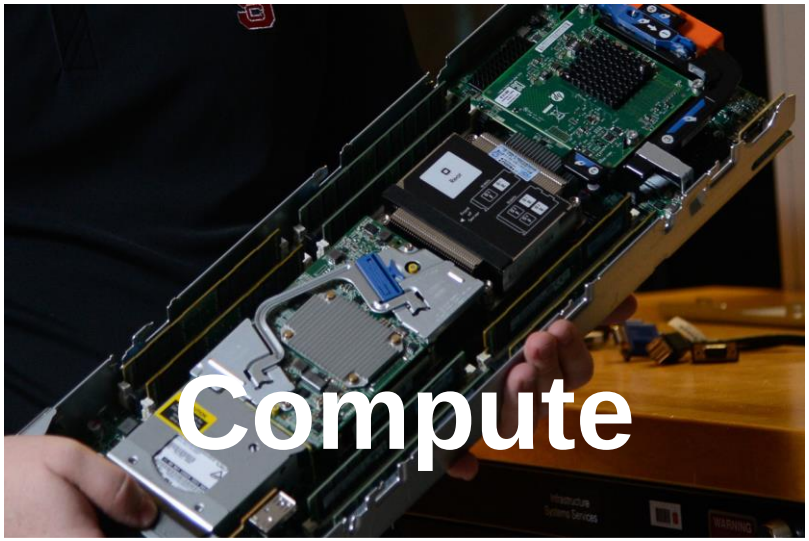
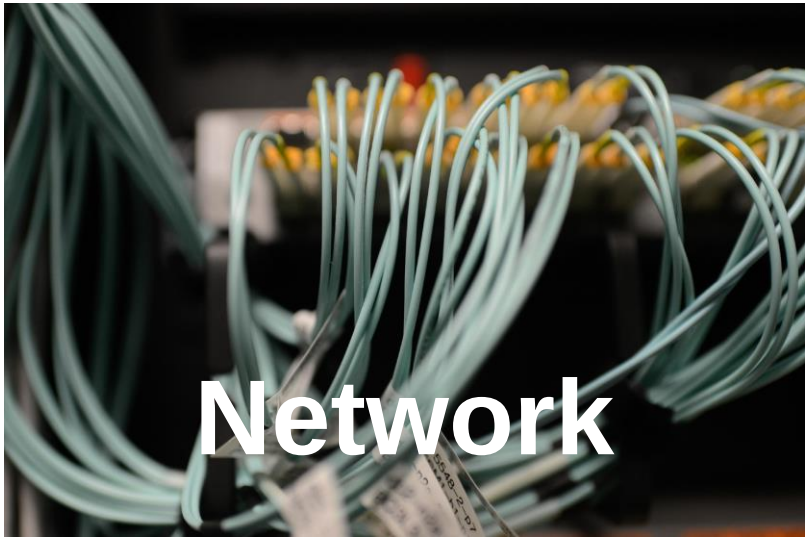


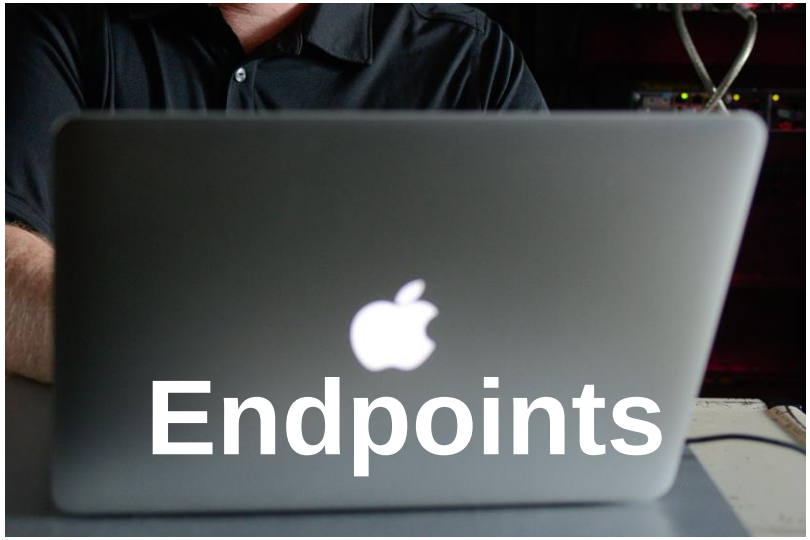
Research Cyberinfrastructure & Cybersecurity at NC State

Marc Hoit, PhD
Office of Information Technology

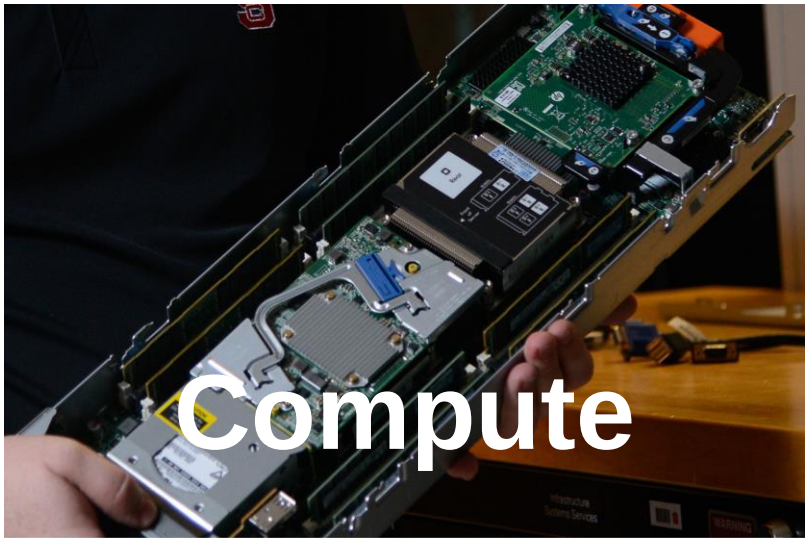
Research Resources







Compute



On Campus

- HPC Cluster (Henry2) 10,000 cores
- VCL

Generally no direct charge to use these on campus resources

National services (NSF HPC centers)

- Need to request allocation (fairly easy)
- Very large computational demands

Cloud

- Amazon Web Services (AWS)
- Azure (Microsoft)

Generally use of cloud services is fee-based and are the responsibility of researcher (with contract approval)

HPC Partner Program

General limited access:

- Available to any NC State faculty member - set up HPC Project
  - research projects
  - course projects
- Any number of Unity IDs can be added to Project

Partner Model for regular access:

- Partners add compute nodes
  - Most compute nodes have been added by faculty partners
- University provides infrastructure
- Dedicated partner queue
- Idle resources shared with other generally available queues

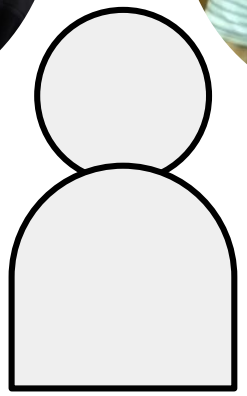
HPC Software/Support

Software

- Compilers
- Debuggers
- Libraries
- Applications
  - hpc.ncsu.edu/software

Scientific Support

- Cluster use
- Code porting/debugging
- Consulting
- Collaboration

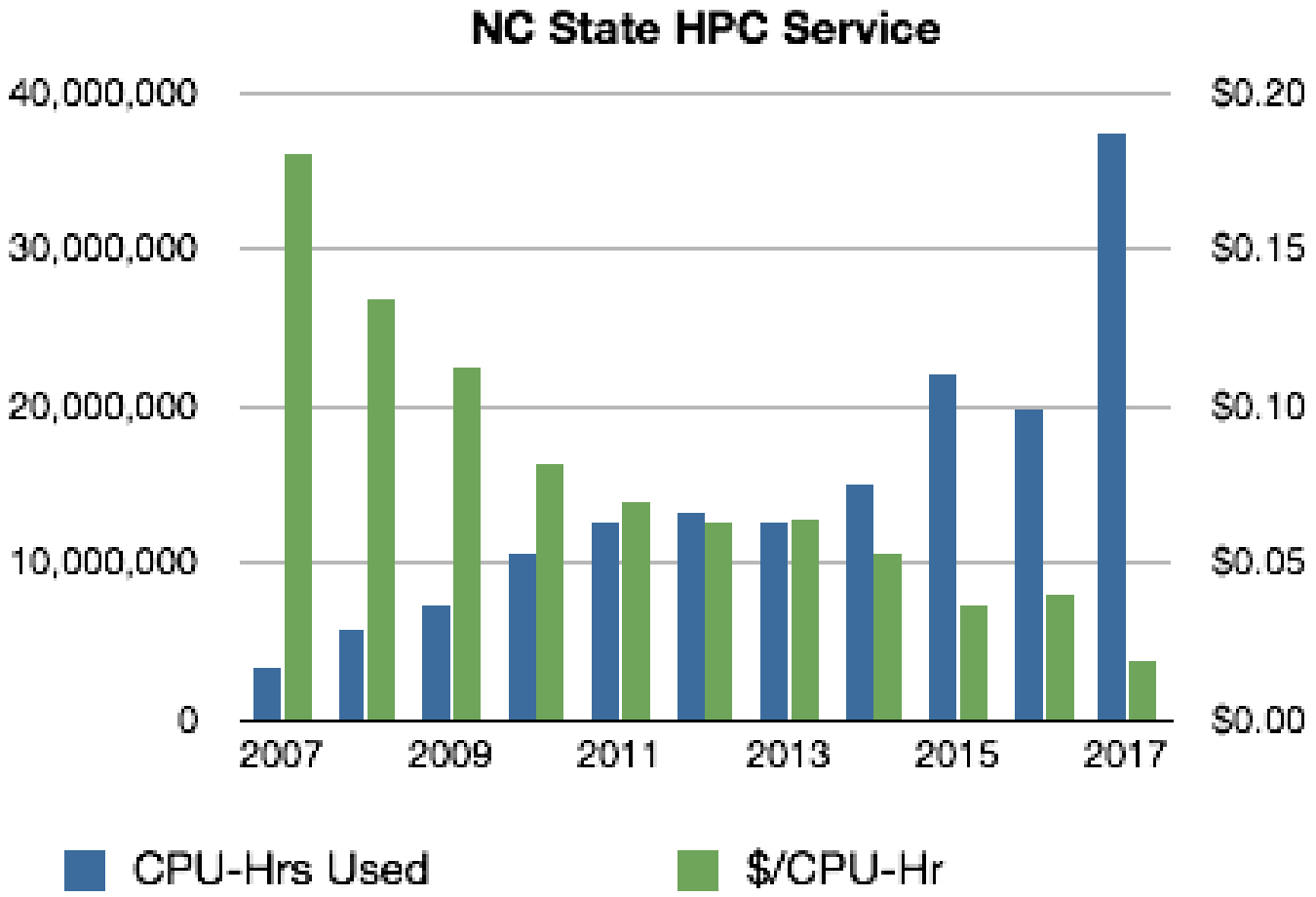


henry2 Usage

Historical HPC Cluster usage and compute infrastructure cost per unit of use

Use is primarily by research projects, however, also have course projects using henry2 for instruction

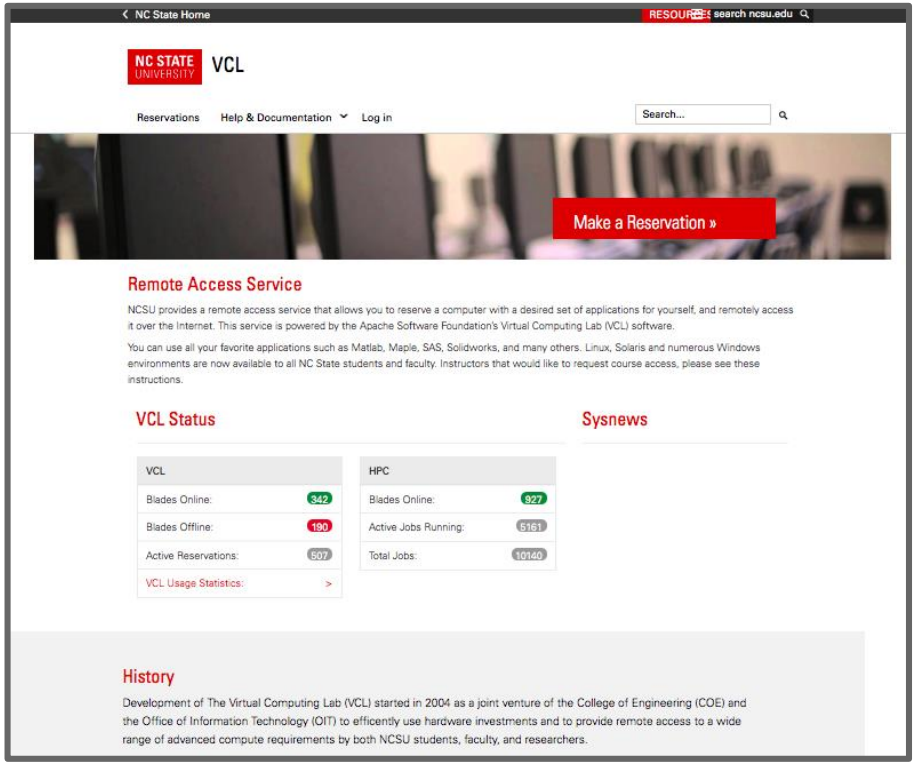
FY2016 usage data is lower than actual, new parameters some users began to use caused some use to not be captured



Security Standard Compliance

- NIST 800-171: guidance to ensure federal Controlled Unclassified Information (CUI) shared with a non-federal entity is protected as prescribed
- Most prevalent application of CUI in higher ed: research conducted under federally funded contracts
- Working toward NIST 800-171 compliance for HPC cluster by end of 2018 fiscal year
- Some controls will impact all henry2 HPC users, others will be specific to projects with CUI

Virtual Computing Lab



Working on NIST 800-171 compliance, 3-6 months behind HPC

- Virtual Computing Lab (VCL)
- Flexible, on-demand, configurable service
- Reusable environments
- henry2 dedicated login node
- Cluster on demand
- Server reservations
- vcl@help.ncsu.edu

- Access:
  - **vcl.ncsu.edu**

Data Sciences Resources

- 10 node Power Linux cluster (160 cores)
- 1PB iRODS storage federated with UNCC and RENCI -- accessible from VCL reservations
- VCL Hadoop cluster-on-demand
- VCL large memory (512GB) and GPU (Nvidia P100) servers
- https://research.ncsu.edu/dsi/oit/

Research Resources

Storage resources:

- Research Storage
- NCSU Drive
- Andrew File System (AFS)
- Google Drive
- Microsoft OneDrive
- Amazon

Research Storage

Research Storage for Grants

- 1TB per awarded contract/grant (RADAR ID)
  - since July 2016
  - duration of grant + 10 years
- AD group based file permissions - Unity IDs
- IP address based access - fixed campus IP addresses
- NFS v4 and SMB protocols
- oitrsvprd.oit.ncsu.edu

Coming Features

- Purchase additional space allocation
- Expanded access via secure VPN
  - Campus Wi-Fi
  - Off Campus
- NIST 800-171 compliant version
  - via secure network to secure endpoints

Recommended File Management

- Team Drive with Google Group
  - Owned by domain instead of individual
  - Access control simplified using group
  - Copy of team drive data stored in Vault - eDiscovery and retention

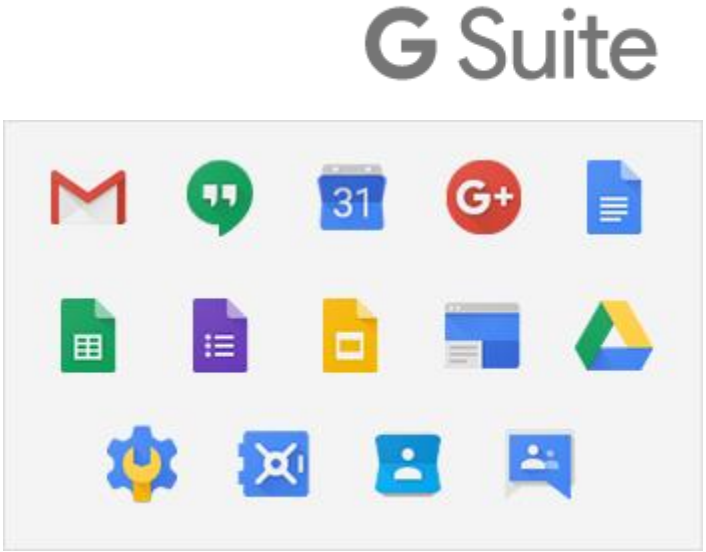
- Approved for ‘Red/Highly Sensitive' level data and lower

G Suite for Government

NCState.GOV

Provides G Suite tools in a secure environment

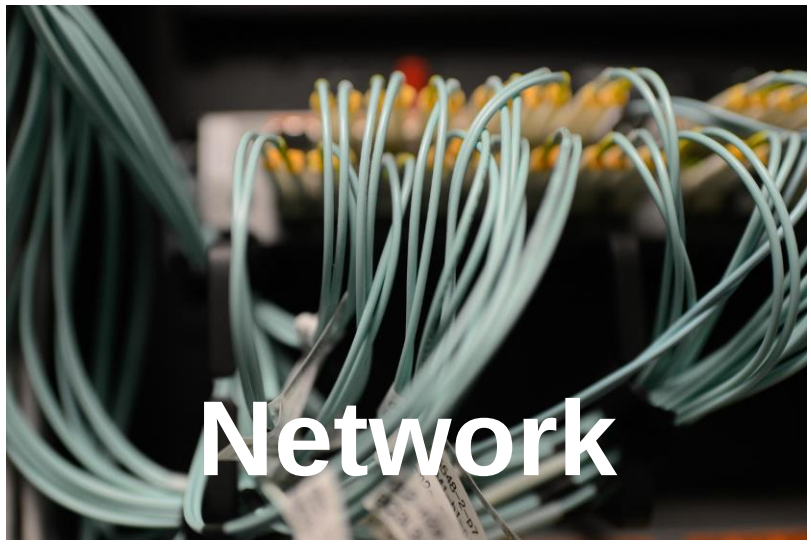
- Can provide accounts to off campus researchers
- Per user annual fee--responsibility of researcher
- Additional central administrative costs--responsibility of researcher
- Can be set up to meet NIST 800-171
  - FedRAMP compliant
  - Needs other campus services



Research Resources

Network Resources for Research:

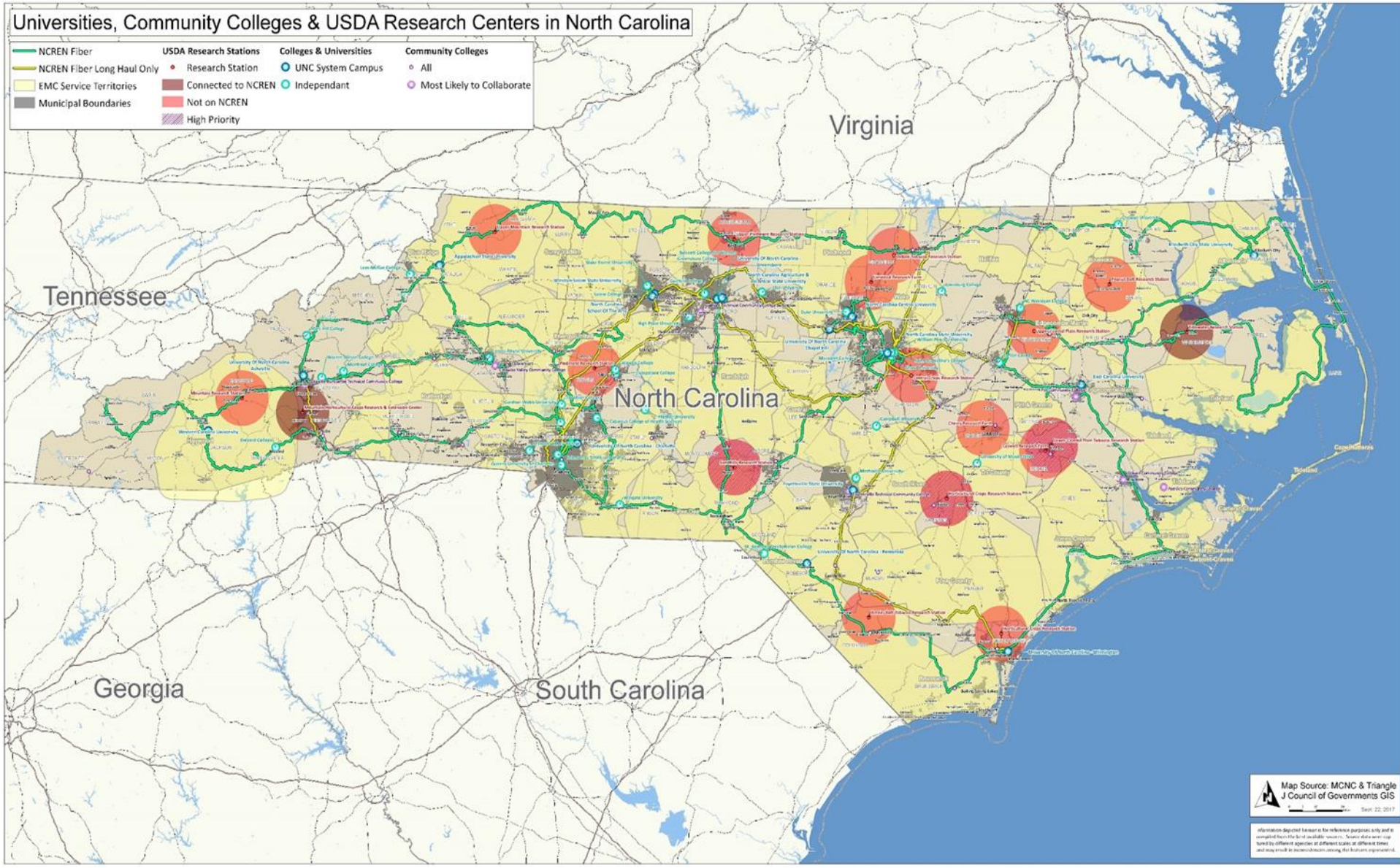
- MPLS network for secure research data
- VPN Tunnels to AWS
- 10Gbs endpoint connections
- Secure VPN for endpoint connections



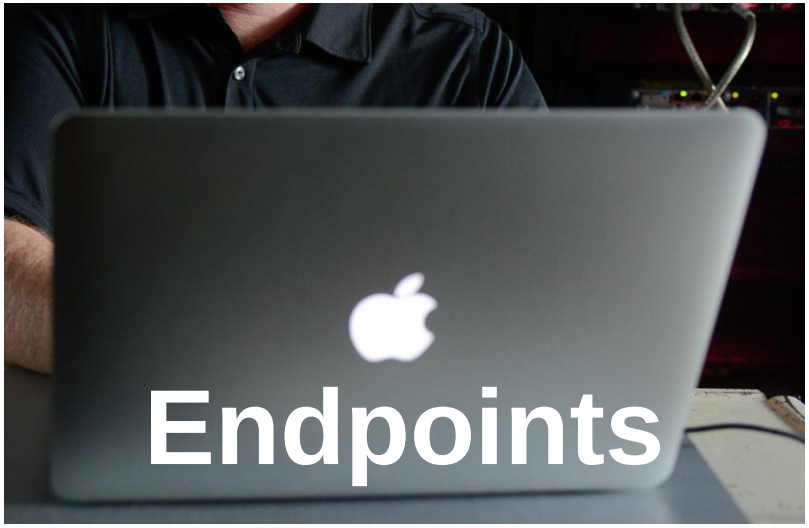
Access to:

- MCNC Network across state
- Internet2 across nation
  - Net+ services

MCNC Map


Universities, Community Colleges & USDA Research Centers in North Carolina
NCREN Fiber
NCREN Fiber Long Haul Only
EMC Service Territories
Municipal Boundaries
USDA Research Stations
Research Station
Connected to NCREN
Not on NCREN
High Priority
Colleges & Universities
UNC System Campus
Independant
Community Colleges
All
Most Likely to Collaborate
Virginia
Tennessee
North Carolina
Georgia
South Carolina
Map Source: MCNC & Triangle J Council of Governments GIS

Research Resources

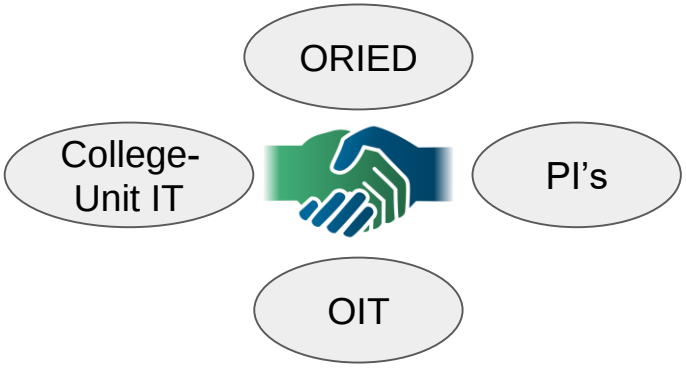


Secure Endpoints:

- Endpoints are a critical part of NIST 800-171 compliance and must meet security requirements
- Short term solution for NIST 800-171 using AWS VMs
  - Provides a secure environment for applicable research data
  - Scalable and flexible configurations
- Long term solution TBD

Secure University Research Environment

- Computing services to meet sensitive research data requirements, e.g. NIST 800-171
- Currently several DOD/DOE contracts require the additional controls and security
  - Anticipate many more federal grants will require NIST 800-171 compliance
- ORIED reviews contracts to determine needs, then OIT works with PI and team to review & configure environment



NC STATE UNIVERSITY

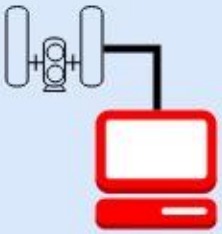
SURE: short term implementation

Non-CUI data

- General use computers
- Lab equipment
- Data acquisition devices
- Storage

General use computers

Local & Network Storage



Instrumentation & Data Acquisition

Non-CUI Data

Sponsor-provided CUI Data

SURE @ AWS
CUI Data by acquisition or analysis

Virtual SURE Compute Endpoints

- Same management as campus endoints
- Nimble, flexible and scalable to meet Researcher needs
- Accessible only from specified Campus endpoints
- Resources are dedicated to PI/Researcher(s)

Network Storage

- Active project data
- Archive storage for completed work

CUI DATA

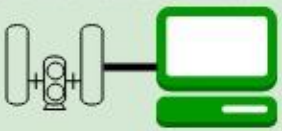
SURE @ NCSU Campus
CUI Data by acquisition or analysis

"Local" SURE endpoints

- Fully-Managed in NCSU CMS per OS
- hard-wired to NCSU Research Network
- 2FA, Logging, Traffic filtering,
- Encrypted, Access controlled, AV, FIM,
- Security policies as necessary

Local & Network Storage

Instrumentation & Data Acquisition



Questions?