OIT Research Computing Services

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Current Services

- High Performance Computing -
  - henry2 Linux Cluster ~1000 nodes, ~9000 cores
    - Distributed Memory Computing
    - Shared Memory Computing
    - Attached GPU Computing
- “Big Data” Computing
  - Power Linux Cluster - 10 nodes, 160 cores - pre-prod
  - 1PB iRODS accessible local storage federated with UNCC and RENCI
  - VCL Hadoop cluster-on-demand
- VCL
  - Cluster on demand (Hadoop, Windows, etc)
  - Dedicated henry2 login node
  - Server Reservations (eg DB or Web Server)

Current Services

- Google Apps for Education
  - “unlimited” storage (drive)
  - Collaborative Document Editing (docs, sheets, slides)
  - Video Conferencing (hangouts)
  - Web Sites (sites)
- Office 365
  - 1TB storage (OneDrive)
  - Online Word, Excel, Powerpoint
  - Access to downloadable copies of Word, Excel, Powerpoint
- Amazon Web Services
  - Master agreement with Internet 2 Net+ service provider

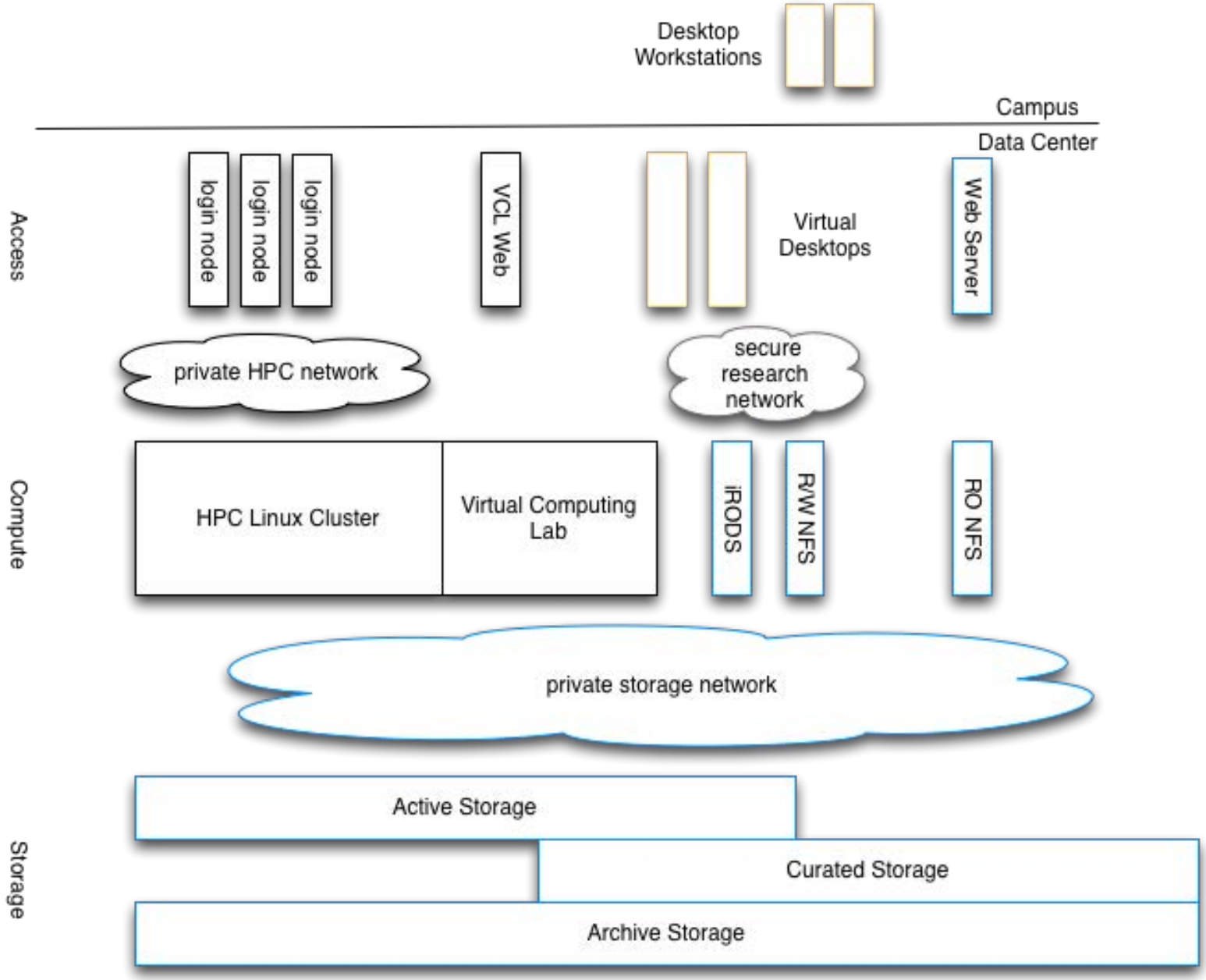
Services Coming Soon

- On Campus Research Storage
  - NIST 800-53 moderate compliant
  - 1TB/awarded grant for life of grant + 10 years
  - Active, Curated, and Archive areas
  - Targeting initial availability of active storage this spring
- Google .gov accounts
  - FEDRAMP certified (FISMA compliant)
  - under development

Potential Future Services

- Secure endpoints for researchers
  - Desktop workstations on secure network
  - Virtual desktops delivered from campus data center
- Integrated network, storage, compute, endpoint environments

Potential Architecture



Linux Cluster Compute Nodes

- Use a continuous refresh acquisition strategy
  - continuously adding new compute nodes (as funding becomes available)
  - retire old nodes as operation (power/cooling) becomes inefficient - typically 6-7 year life cycle
- Partner Program
  - most compute nodes purchased by faculty partners
  - OIT provides racks, chassis, Ethernet network, power, cooling, operation
  - Partner has dedicated queue with access to number of cores added and increased priority to general queues

Continuous Refresh

- Advantages
  - steady demand on staff resources for hardware installation
  - always adding some of newest available hardware
  - good alignment with funding availability
- Disadvantages
  - heterogeneous cluster
  - no really large pool of identical resources.. ~1000 nodes but less than 500 of any single type

Access to Linux Cluster

- HPC Project - available to any faculty member
- Any number of Unity IDs can be authorized for access under an HPC Project
- Unity ID affiliated with single project
- Project Types
  - Research
  - Instruction - associated with specific course section - Unity IDs loaded from R&R class roll

Data Sciences Support

- Power Linux Cluster
  - 10 nodes - Power 7 processors with attached FPGAs
  - IBM Big Insights, Watson Content Analytics
- ROI Data Science Resources
  - NAS Storage - accessible for computation from Linux cluster and VCL
  - iRODS server - Federated with UNCC and RENCI
  - VCL managed large memory server (512GB)
- Staff resource to support systems and applications
- pre-production status - request access oit_hpc@help.ncsu.edu

Virtaual Computing Lab

- Production service targeted for delivery of applications for short term use
- Some shared hardware and staff resources with HPC Linux Cluster
- Research support (beyond regular short term application use)
  - dedicated HPC login node - interactive work, visualization
  - cluster on demand
  - long term server reservations
- Staff support focuses on proper operation of the VCL infrastructure - beyond the centrally maintained application images do not support operation of individual environments

Research Storage

- Google Drive and Office 365 OneDrive
- Campus research storage
  - target to be NIST 800-53 moderate compliant
    - data encrypted at rest and in motion
    - only accessible via secure endpoints/servers
  - 1TB/awarded grant for life of grant + 10 years
  - Active, Curated, and Archive areas
  - Staff resources
    - systems position
    - security position
    - libraries position

Secure Endpoints

- Initial concept - collecting requirements to develop service
- Managed desktop workstations connected to secure research network
- Virtual managed desktops delivered from secure data center servers
- unknowns
  - Operating system support
  - Application installation processes and procedures
  - Remote access requirements