COMPUTING AND
INFORMATION TECHNOLOGY
Research Computing and Data

VIRTUAL TOWN HALL
JUNE 2023

CLEMSON

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To Participate:

- Type Questions into Q&A
  - You have the option of selecting "Anonymous" when submitting the question
- Raise your Hand to Speak

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AGENDA

- Introducing new Research Computing & Data (RCD) People
- The Condo Model is alive & well
- New Services since last Town Hall
- Maintenance Week of July 10-14
- Migration from PBS to SLURM
- REDCAT Faculty advisory body
- Indigo highspeed storage/retiring zfs
- Slow responses week of July 24-28
- Open discussion and Q&A

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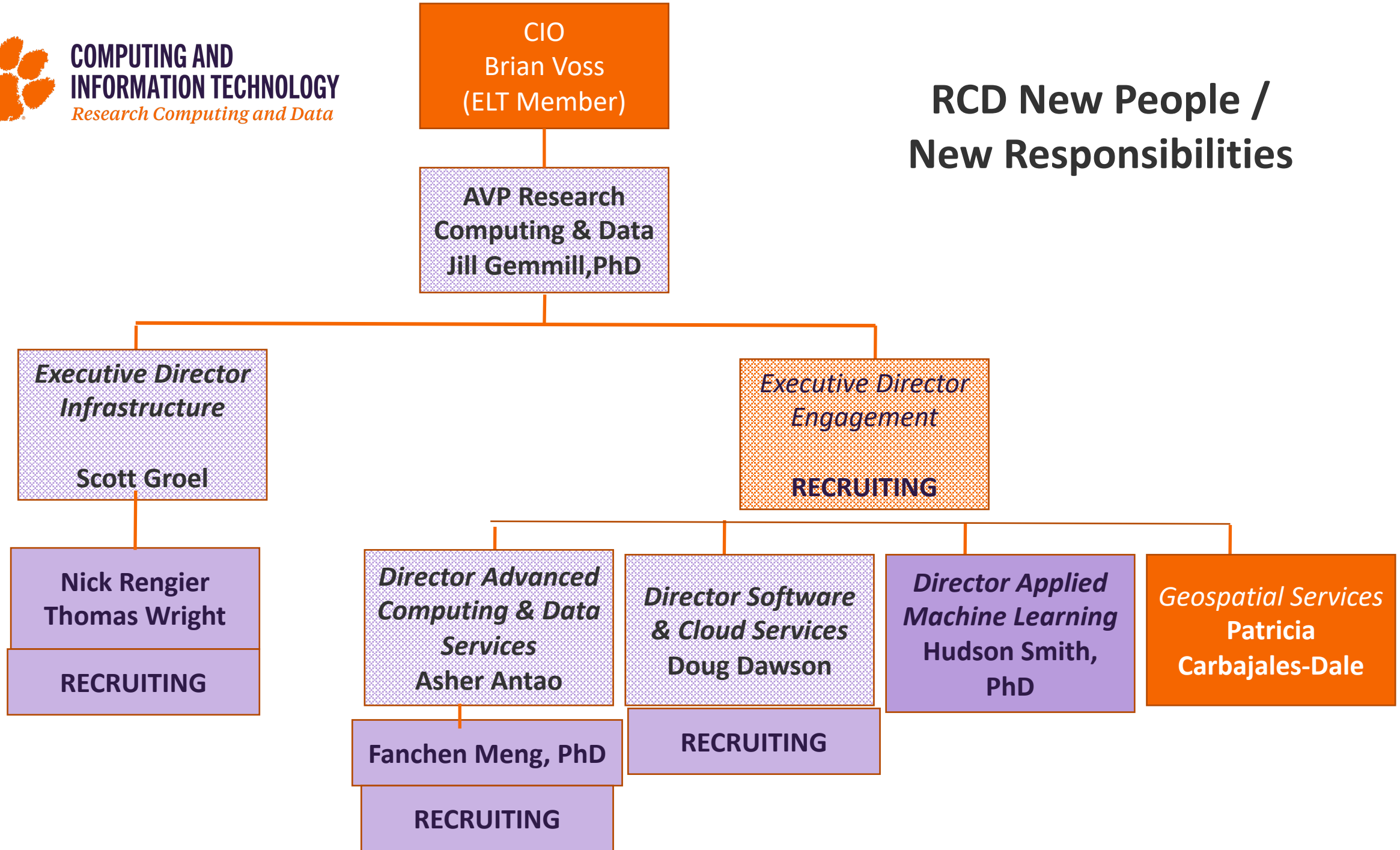
RCD New People / New Responsibilities



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The Condo Model is Alive and Well

Double Research by 2035

Initiative 2: Create world-class research infrastructure

Key actions:

- Increase total research space from 861,000 to 1,100,000 square feet by 2028 and 1,300,000 square feet by 2035.
- Align new space additions plus renovations with the cluster hiring strategy.
- Add research administrative staff to provide the foundation and management of the growth.
- Upgrade high-performance computing (HPC) systems and add specialized HPC research faculty.
- Add additional centrally operated research cores.

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The Condo Model is Alive and Well

- Is Palmetto available for everyone at Clemson to use, at no charge? **YES**
- Can faculty purchase nodes to own, for priority use and to share with external collaborators? **YES**
- Does RCD provide data center space, system administration, user support and training at no charge? **YES**
- Does RCD provide racks, network, power and cooling at no charge? **YES**
- So, what has changed?
  - Defining on-going funding will be addressed as part of RBB
  - Node prices are increasing because
    - Many more CPU/GPU cores packed into each node
    - We no longer subsidize by purchasing GPU cards

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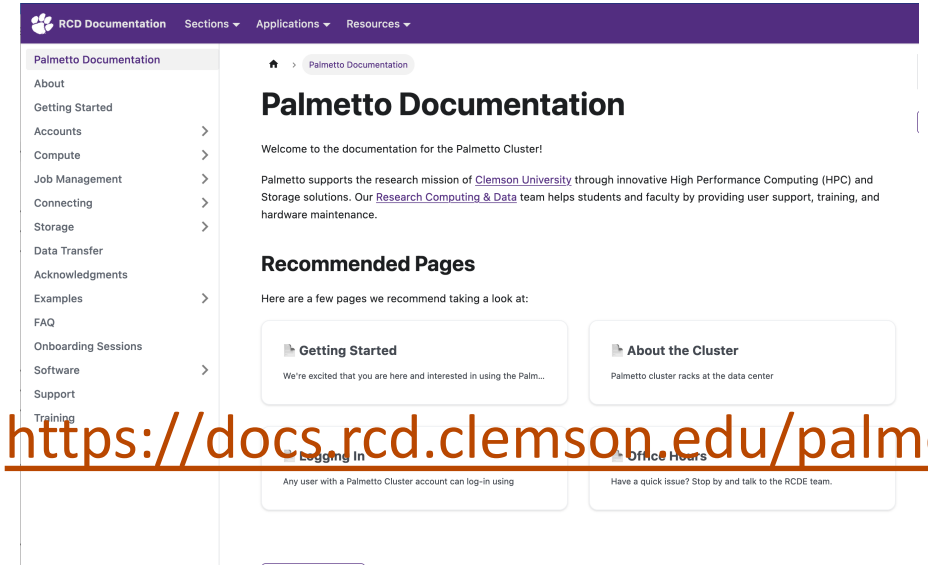
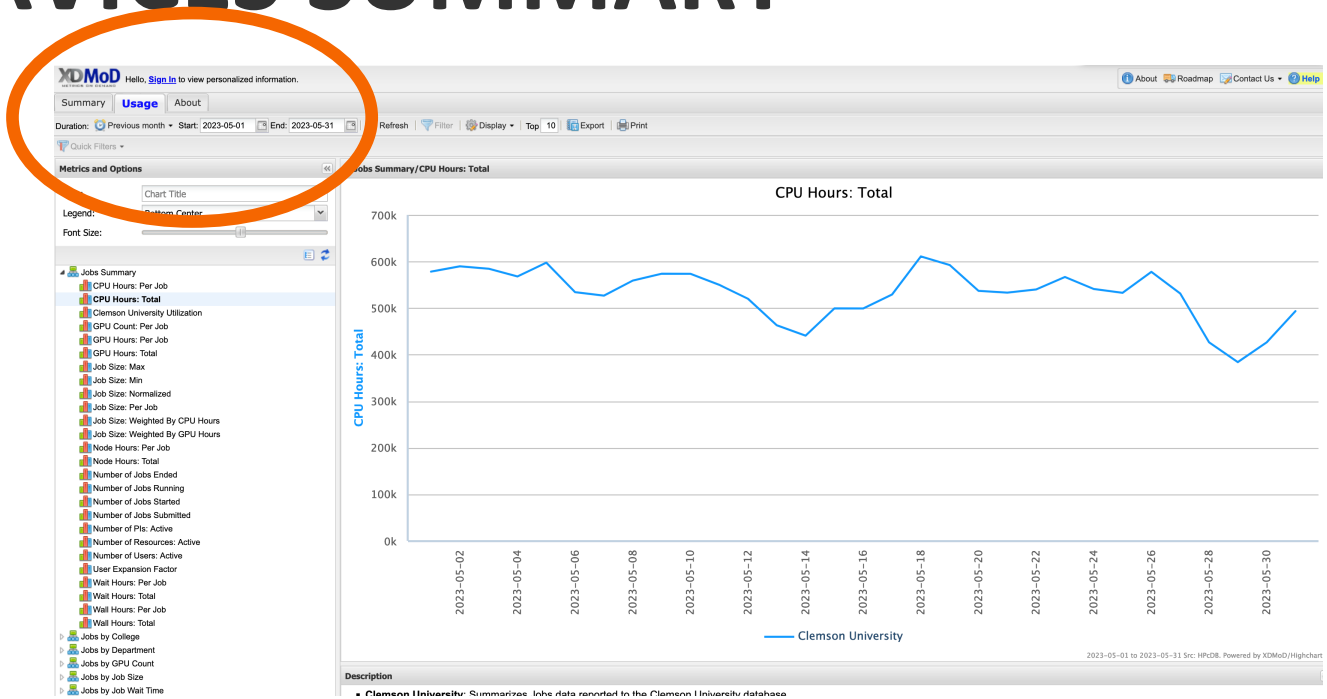
NEW SERVICES SUMMARY



https://docs.rcd.clemson.edu/palmetto/



https://xdmod.palmetto.clemson.edu
(on campus or VPN needed)

GITLAB

MATTERMOST – chat w. us & each other

Kubernetes/K8 in beta

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REDCAT Advisory Body

Research Data Computational Advisory Team

- **Two-way conversation between faculty users and RCD team**
- **Open meetings w. representative steering committee**
- **Term-limited positions**
- **Foster Clemson computational community activities**
- **MONTHLY commitment; help w. administrivia**

If interested in helping to define and/or serve:

Contact gemmill@Clemson.edu

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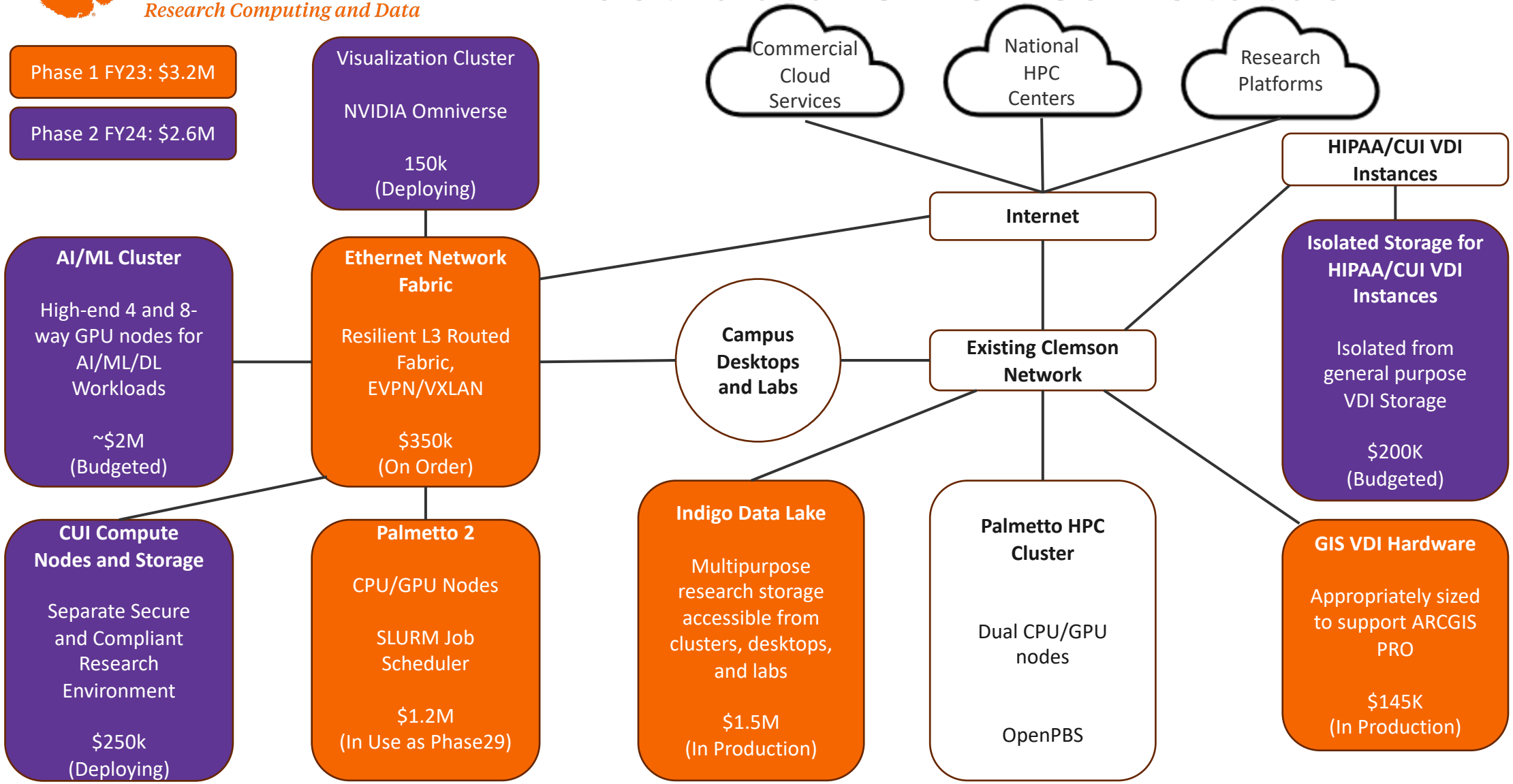
Infrastructure Refresh Status



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MAINTENANCE JULY 10-14

Infrastructure Team Tasks:

- Operating System and Driver Updates
  - Updates to NVIDIA GPU Drivers to support newer CUDA versions
  - Update HDR IB Drivers for bug fixes
  - New Feature Deployment: GPU Direct Storage – Access Indigo Data Lake direct from node GPUs
- System Patching
  - Compute nodes locked to Rocky Linux 8.6
  - Update to Rocky Linux 8.8 elsewhere for latest security patches
  - Update system firmware on cluster hardware
- /scratch, /scratch1, and /fastscratch will be re-initialized
- Move all virtualized services/systems to new VMWare Cluster
- Indigo Filesystem – Add additional Ethernet/IB bandwidth to cluster
  - Will have a total of 800Gbit of IB Connectivity, and 400Gbit of Ethernet Connectivity
- Deploy the initial SLURM-based cluster for testing
  - Palmetto will be undergoing a ***gradual transition*** to the SLURM job scheduler

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MAINTENANCE JULY 10-14

Engagement Team Tasks:

- Benchmarking of applications
  - Applications will be benchmarked pre and post maintenance to ensure no regressions introduced
- Moving the scientific software stack to the VAST all-flash system:
  - Improve performance/ Increase Capacity
  - Should be no change in the modulefile naming system
    - User-side minimal changes in workflow
  - Unused modulefiles/software will be removed
    - Software to be removed will be listed prior to maintenance
- Open OnDemand will be updated to the latest stable version

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Why SLURM?

- Larger community and support group
  - More parity with peer institutions making workflows more portable
- More actively maintained than PBS
  - New features added regularly
  - Faster response to bug/security issues
- Plug-in support
  - Adds additional functionality
- More efficient and better control over scheduling – better fair sharing
- Less management overhead, simpler to maintain

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SLURM

- Supports accounting based on unit allocation
  - Allows the possibility of providing compute as a service
- Priority access to nodes owned within condominium model maintained
  - Retains existing PBS behavior for node owners
- Automated fair share for user jobs
- Tools available to convert PBS scripts to SLURM
- Built in tools to check the status of job(s)

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SLURM

- **Stage1 – Initial Deployment (Beta) July 2023**
  - **20 Phase29 Nodes moved to SLURM**
  - **Separate Login Node**
- Stage2 – Early Access (EA) December 2023
  - Remaining phase29 nodes moved to SLURM
  - Owner resources moved to SLURM on request
- Stage3 – Production Summer Est. 2024
  - All nodes Sky Lake or newer moved (All nodes on HDR IB) to SLURM
  - Cluster now known as Palmetto 2
- Stage4 – Est. 2025
  - Palmetto 1 cluster converted to SLURM

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SLURM – Transition Assistance

- New Documentation on using SLURM
  - Will be based on current documentation
- Reference SLURM scripts
  - Examples of what PBS scripts will look like as a SLURM script
- Additional Office hours to help troubleshoot
- Tools to convert PBS scripts to SLURM
- Workshops/Training on using SLURM

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STORAGE – What is Indigo?

- Approximately 5PB of all NVMe flash with erasure code resiliency
  - Total Capacity varies due to Data Reduction and Deduplication
  - All paid storage backed-up, snapshots also available
  - Large speed-up over current BeeGFS and ZFS filesystems
- High resiliency architecture to reduce downtimes
  - On-line software updates, hardware fault tolerant
- High Speed Interconnects for better performance and added features
  - Infiniband connectivity provides GPU-Direct Storage, NFSoRDMA
  - Ethernet Connectivity to Campus resources, and C1 compute resources

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STORAGE – Indigo Features

- Unified storage space for all filesystems
  - NFS, SMB, S3 access to same directories
  - 1TB of project space for researchers at no charge
  - Scratch space provided (available now at /scratch)
    - 5TB space limit and 5 million file limit per user
- Data analytics using Starfish provided by request

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STORAGE – Indigo in, ZFS out

- ZFS project space no longer being sold
  - Indigo will replace ZFS
- New rates for Indigo storage coming
  - Will be sold as service by the TB by the month
- ZFS renewals, including partial dataset renewals, result in entire dataset being moved to Indigo
  - Renewals will be charged at Indigo prices
  - Active agreements for remaining partial dataset will be honored
- Starting in July 2024, ZFS filesystems will be migrated to VAST as ZFS equipment is decommissioned
  - Any existing storage agreements honored in VAST

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SLOW week –Conference *"Practice & Experience in Advanced Research Computing" (PEARC)*

July 23-30 RCDE responses (Help Desk Tickets) will be slow – staff are at a training conference

Systems will be being monitored and infrastructure team is available

Discussion & Questions ?

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