

National Aeronautics and Space Administration

Supercomputing Systems Team

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CSS (Compute Support Services) Group

- Our Mission
  - Provide integrated, balanced, reliable HPC and storage systems in support of NASA missions
  - Evaluate, test, design, procure, build, and maintain High End Computing hardware and software systems components
  - Maximize user productivity and achievements



Hardware Components

- CPU Clusters
  - Pleiades/Electra/Aitken (17,066 nodes)
  - Shared Memory Nodes (2 nodes)
  - Aitken-Milan (512 nodes) (ETA July 2024)
- GPGPU Cluster
  - Cabeus (128 nodes)
- Visualization Cluster
  - Hyperwall 4 (128 monitors/nodes)
- Storage
  - Lustre
  - VAST
  - Data Archive
- Support Infrastructure
  - Front Ends
  - Data Analysis
  - Data Movers



Cabeus GPGPU Cluster



Aitken-Milan Cluster



Software Components

- Operating Systems (RHEL)
- Cluster Management (HPCM)
- Job Scheduling (PBS)
- Filesystems (Lustre, NFS, CXFS/DMF, VAST)
- Secure Unattended Proxy (SUP)
- Shift Transfer Tool (shiftc)
- Configuration Management (Ansible)

Red Hat

Hewlett Packard Enterprise

ALTAIR



System Maintenance

- Dedicated Times
- Regular patching of operating systems, software, kernels to remediate vulnerabilities
- Implementation of operating system configuration changes to meet NASA CSET requirements
- Troubleshooting hardware issues, including coordination with external vendors
- Updating device firmware for performance and security



Security

- Improved compliance
- Improved patching metrics
- Improved documentation of risk
- NIST SP 800-223



Recent/Near Term Capabilities:

- Cabeus GPGU Cluster (128 nodes, 512 A100 GPUs)
- Hyperwall4
- Independent Cluster Model
- Cluster Specific Front Ends
- Evaluation of test systems (Grace-Grace, Grace-Hopper, IBM P10, Intel Sapphire Rapid/Aquamarine)
- Improved Configuration Management (Ansible)
- Improvements to test environment (Pathfinding)
- Improved DDN stability
- VAST



Getting CSS Support

- CSS uses a tiered support model
  - Tier 0:
    - Online documentation
    - Webinars
  - Tier 1 Support:
    - Users submit tickets to support@nas.nasa.gov
    - Control Room triages tickets to appropriate groups
  - Tier 2 Support:
    - CSS has a 24/7 POC on-call to further triage
  - Tier 3 Support:
    - For more involved tickets, Tier 2 can escalate to Tier 3 for SME intervention



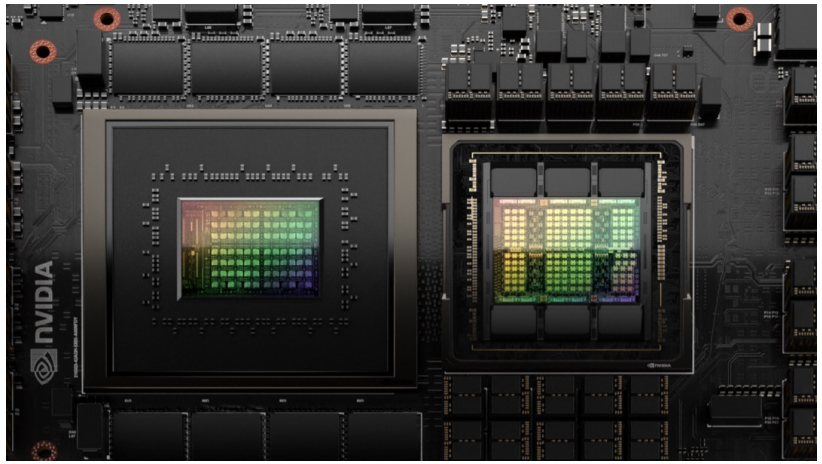
In-depth Support and Customized Services

- Reservations/Special Queues
  - SWOT (Surface Water Ocean Topography) Testing
  - Foundational Models
  - ARMD
- Code TI – Neo Bolide Project – custom workflows
- TESS (Transiting Exoplanets Survey Satellite) – Dedicated resources, dedicated servers in enclave
- Red Rover – High-speed data transfer system with the UPWT (Unitary Plan Wind Tunnels) to NAS



Looking Forward

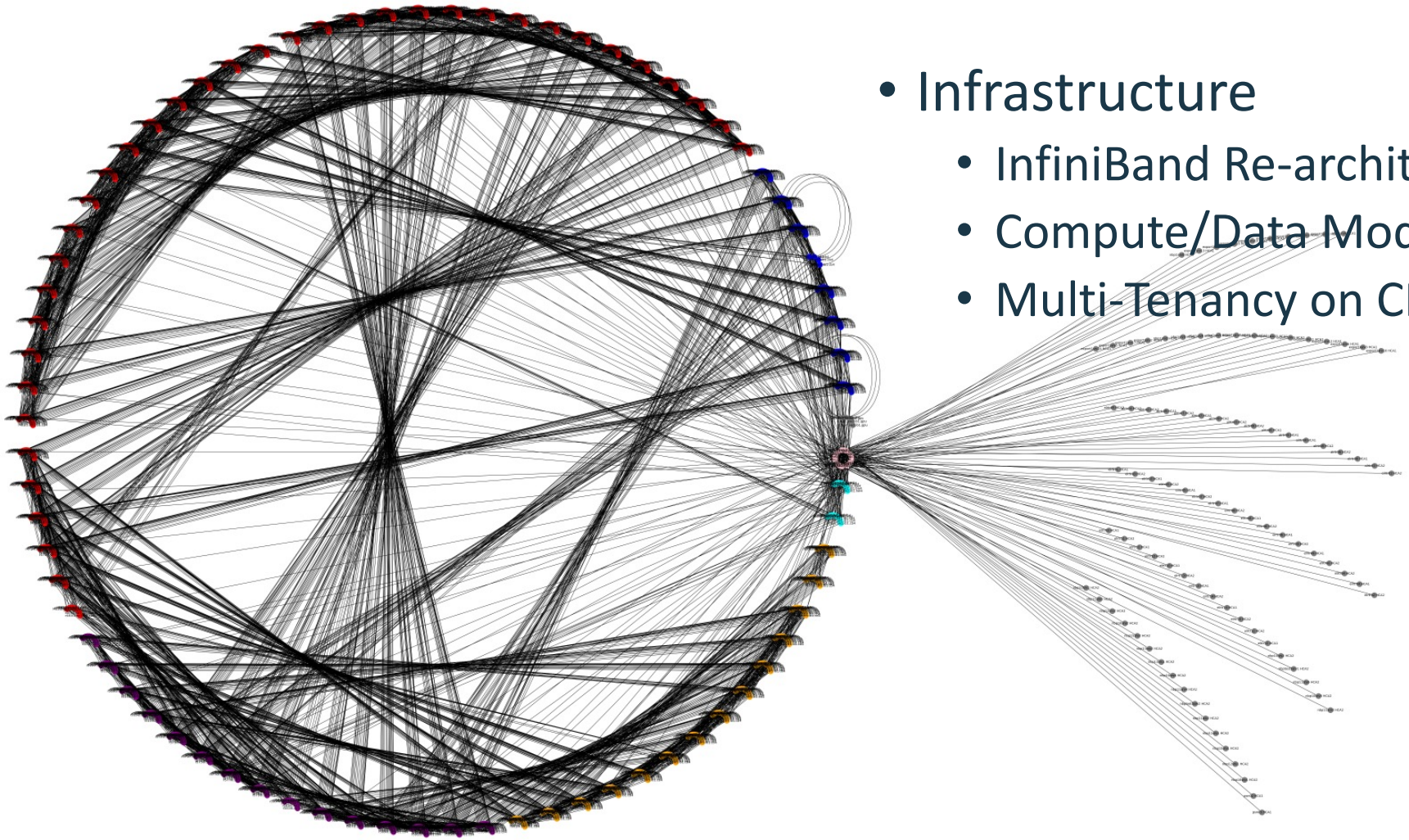
- New systems
  - Milan CPU System
  - Grace-Hopper GPGPU System
  - New CPU System
- Software Upgrades
  - PBS Pro 2024
  - JupyterHub
  - DMF7



NVIDIA GH200 Grace Hopper Superchip



Looking Forward (continued)



Pleiades InfiniBand IB1 fabric

- Infrastructure
  - InfiniBand Re-architecture
  - Compute/Data Modules
  - Multi-Tenancy on CPUs



National Aeronautics and Space Administration

Ideas?
Questions?
Suggestions?

We want to hear from you!
support@nas.nasa.gov
1 (800)-331-8737

