

Computing at the Cyclotron Institute for 2024-2025

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This past year, the Cyclotron Institute's Scientific Compute Group (CI-SCG) increased the institute's maximum computing capacity and improved our operational visibility. We continued testing and building infrastructure to enable High Availability (HA) services for critical operations while maintaining our current infrastructure.

We achieved this by provisioning the remaining ADA compute nodes with their supporting infrastructure, maintaining and enhancing our critical services framework, and upgrading failing components.

Computers

The CI-SCG expanded the institute's computing capacity by bringing online all eighteen ADA crates, increasing our compute capacity from approximately 4,024 to 7,540 job slots. The installation process utilized Zero-Touch Provisioning, specifically leveraging Preboot Execution Environment (PXE) Boot and our Infrastructure as Code (IaC) approach. To enhance our situational awareness and operational visibility, we implemented services to monitor critical metrics, including server room temperature, top node switch utilization and throughput, subnet utilization, and Condor job utilization and status to detect issues before users experience problems.

Network

We upgraded and enhanced our computer networking capacity by replacing a daisy-chained topology with a tree topology, thereby increasing throughput while reducing single points of failure. We upgraded our Faculty, Student, and Staff network infrastructure with new mid-enterprise switches for our core deployment, addressing network outages caused by failing switches.

Astatine-211 LMI radiation monitor

To ensure the At-211 Project had reliable access to radiation data during and after their measurements, we implemented a comprehensive process for collection, extraction, display, and storage of data from the Ludlum Measurements, Inc. (LMI) monitors. The system monitors LMI data by collecting UDP packets, decoding them, and sending the information to InfluxDB as well as creating comma-separated values (CSV) data history files that are backed up to a nearby computer. The system features a web interface to view radiation data in real-time and allows users to download data files of interest at will.