Contribution ID: **144** Type: **Poster**

Building a High-Availability and User-Friendly Neutron Scattering Data Computing Infrastructure

To address the urgent need for efficient data analysis platforms in the neutron scattering field, this report presents a cloud-based computing infrastructure solution based on the technical architecture of OpenStack and WebRTC. Based on this infrastructure, a deeply integrated system for data management and storage is constructed to provide researchers with a one-stop analysis platform that integrates data processing, tool invocation, and resource scheduling.

Aiming at the pain points in traditional data analysis workflows of the China Spallation Neutron Source (CSNS), such as decentralized data management, complex analysis workflows, and inadequate system scalability, the platform builds a high-availability computing cluster using OpenStack. Through standardized images pre-installed with professional tools (e.g., Mantid, SasView), it enables dynamic creation and intelligent scheduling of computing resources. The platform integrates unified authentication and establishes a user permission management mechanism to support data mounting strategies and secure access control based on user roles.

In terms of interactive layer innovation, to solve issues such as high-latency interaction and lack of functional components (e.g., file transfer, clipboard sharing) in traditional NoVNC remote desktops, the real-time communication technology WebRTC is innovatively introduced. This technology allows users to access interactive analysis environments directly via browsers without installing clients. Relying on its native low-latency data transmission protocols and adaptive encoding technology, it significantly improves the smoothness of remote desktop operations while enabling enhanced functions such as high-resolution display and cross-platform copy-paste, creating an immersive user experience similar to a local environment.

The platform deeply integrates core functional modules including elastic scheduling of computing resources, data security isolation, and seamless browser-based access, effectively resolving the efficiency bottlenecks of traditional analysis workflows. It provides high-availability and highly interactive cloud-based analysis services for neutron scattering research, promoting the intelligent and collaborative development of experimental data processing in this field.

Significance

Based on the technical architecture of OpenStack and WebRTC, this platform deeply integrates core functional modules including elastic scheduling of computing resources, data security isolation, and seamless browser-based access, effectively resolving the efficiency bottlenecks of traditional analysis workflows. It provides high-availability and highly interactive cloud-based analysis services for neutron scattering research, promoting the intelligent and collaborative development of experimental data processing in this field.

References

Experiment context, if any

Author: Mr LEE, Binbin (Institute of High Energy Physics)

Co-author: Mr LEE, Yakang (Institute of High Energy Physics)

Presenter: Mr LEE, Binbin (Institute of High Energy Physics)

Session Classification: Poster session with coffee break

Track Classification: Track 1: Computing Technology for Physics Research