



ID de Contribution: 16

Type: Non spécifié

(zoom) The Future of Discovery: Converged Computing, Agentic Science, and the Evolution of the HPC Center

mercredi 14 janvier 2026 16:45 (45 minutes)

<https://computing.llnl.gov/projects/flux-building-framework-resource-management>

The traditional High-Performance Computing (HPC) center is undergoing a fundamental metamorphosis. Driven by the need to double national scientific productivity, initiatives such as The Genesis Mission are moving beyond simple resource provision toward the creation of a center as an autonomous discovery engine. This new paradigm requires a departure from the monolithic, static scheduling models of the past in favor of a fluid, software-defined infrastructure that can seamlessly integrate exascale simulation with large-scale AI and services.

At the heart of this evolution is Converged Computing—a strategic unification of the performance of HPC with the agility and modularity of cloud-native ecosystems. By leveraging the Flux Framework in coordination with user-space orchestration (Usernetes) and the Flux Operator, centers can now deploy ephemeral, sovereign “MiniClusters” that bridge the gap between bare-metal execution and automated service management.

This presentation explores how this converged foundation enables the next frontier: Agentic Science. Through the implementation of the Model Context Protocol (MCP), we define a standardized interface between AI reasoning partners and the workload manager. We demonstrate how a Flux MCP server transforms the supercomputer into a responsive API for AI agents, allowing them to autonomously navigate complex resource graphs, steer multi-step scientific workflows, and close the loop on discovery. We conclude by discussing vision for the next decade, where the HPC center functions not merely as a compute provider, but as an intelligent collaborator in the scientific process.

Temps d'intervention ?

Type d'intervention

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Classification de Session: community talks