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Software Defined Networking (SDN) For High Performance Computing (HPC)



S&T Campaign: Computational Sciences
Advanced Computing Architectures

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Research Objective

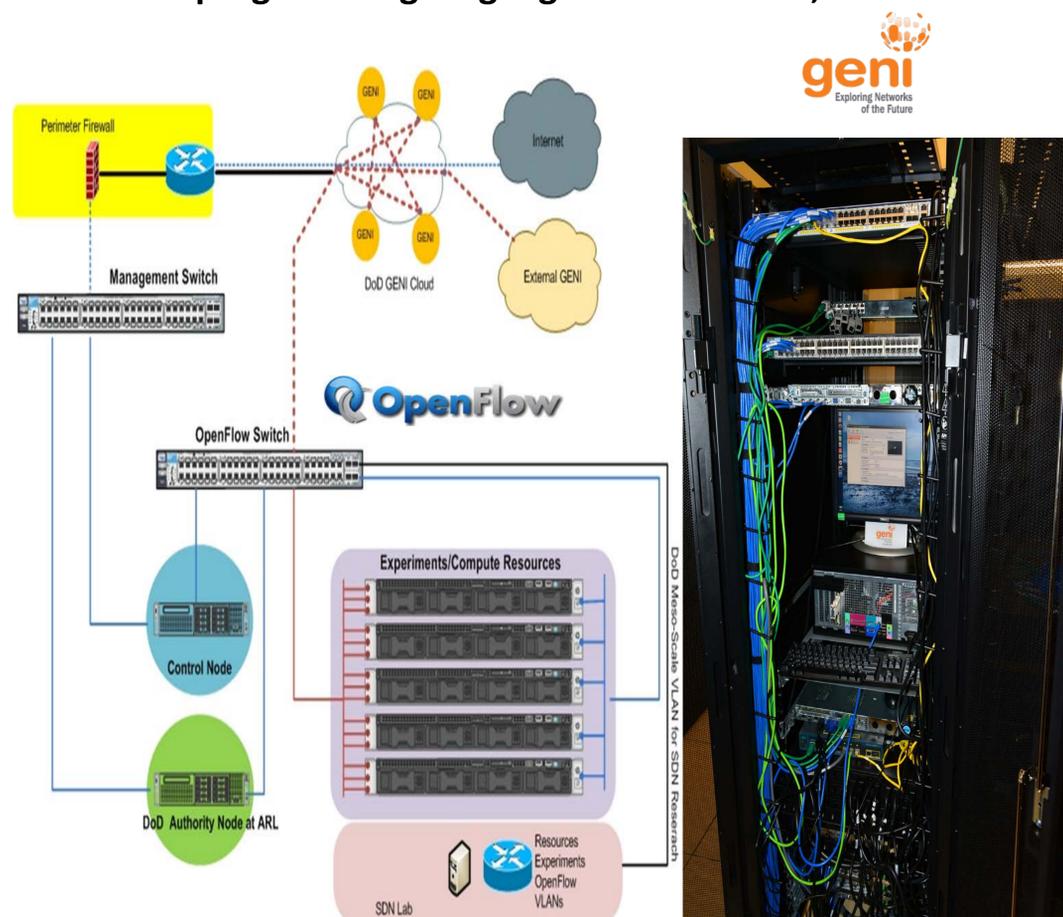
- To investigate and develop modified SDN protocols like *OpenFlow* to support distributed HPC clusters to solve computationally complex and high throughput data intense problems (Big Data) in DOD environment
- To develop SDN based programmable low latency network topology for HPC node communication.

Challenges

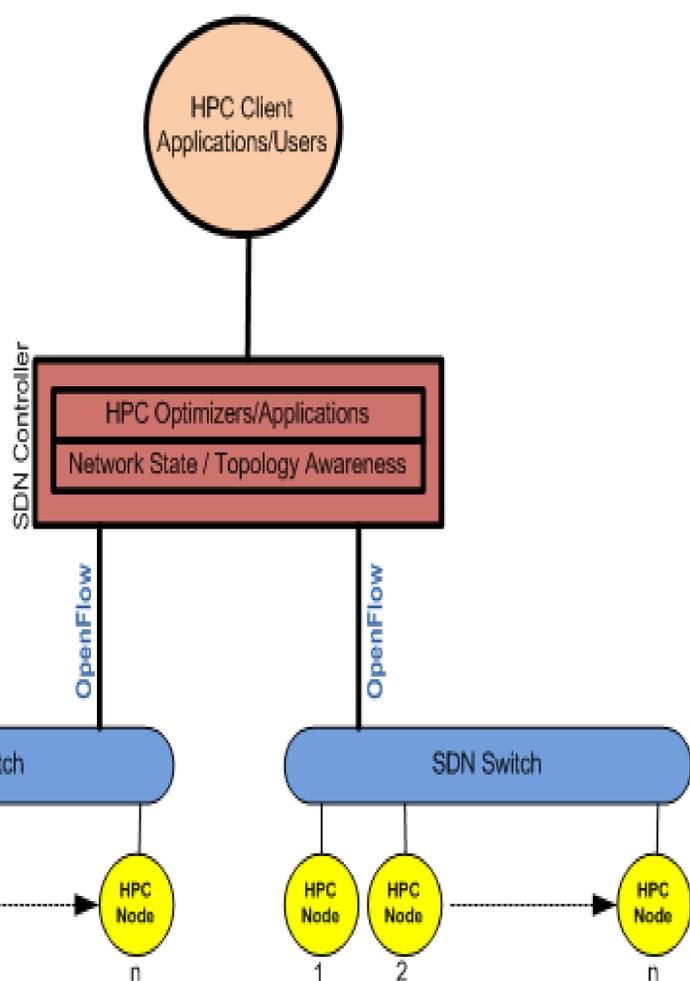
- The programming of *OpenFlow* to rapidly build HPC network fabric topologies with efficient handling of state transitions.
- Investigating and identifying right SDN network topologies that work well towards achieving distributed HPC cluster design goals
- Programmatically controlling unified network across larger topologies with wire speed switching, centralized resource provisioning, and management

ARL Facilities and Capabilities Available to Support Collaborative Research

- First Global Environment for Network Innovation (GENI) testbed environment to rapidly simulate and study the SDN fabric for HPC
- Multi-Node SDN Lab to validate the simulations
- SDN Network programming/Modeling expertise
- HPC Assets like 100,000 core supercomputing capabilities
- Parallel programming language tools like MPI, etc.



GENI Node at ARL



Proposed SDN approach to Distributed HPC Fabric

Complementary Expertise/ Facilities/ Capabilities Sought in Collaboration

- Expertise with SDN based network programming
- Teams with network modeling and simulation capabilities
- Teams looking to expand their traditional HPC network programming expertise into developing SDN based HPC architectures and programming interfaces

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