

SC21 Network Research Exhibition: Demonstration Abstract

IRNC Software Defined Exchange (SDX) International Testbed Integration

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Abstract

Computer science requires experimental research on testbeds at scale, including those that are implemented world-wide. iCAIR is designing, developing, implementing and experimenting with an International Software Defined Exchange (SDX) at the StarLight International/National Communications Exchange Facility, which supports a multi-service platform that enables integration of resources world-wide including computer science testbeds. This demonstration will showcase a testbed integration prototype implemented among several international testbeds.

Goals

1 As a part of an initiative funded by the National Science Foundation's (NSF) International Research Network Connections (IRNC) program, iCAIR is designing, creating and implementing as a prototype, and experimenting with an international Software Defined Exchange (SDX) at the StarLight International/National Communications Exchange Facility (StarLight).

2 This SDX has been optimized for supporting multiple services, which can be isolated and individually programmed.

3. This demonstration will showcase capabilities for using that programmable environment for integrating computer science testbeds.

4 One StarLight SDX service supporting the demonstration will be the international Automated GOLE (AutoGOLE) fabric, established by a worldwide collaboration of GLIF Open Lightpath Exchanges (GOLEs) and R&E networks to deliver capabilities for dynamic end-to-end network paths with the Network Service Interface Connection Service (NSI-CS). These capabilities can be accessed using Jupyter Notebooks to add/delete the light paths.

5 Another component will be the NSF Chameleon testbed, a large-scale, deeply reconfigurable experimental platform developed to support Computer Science systems research. It supports a bare metal reconfiguration system giving users full control of the software stack including root privileges, kernel customization, and console access, and also a virtualized KVM cloud to balance the need for finer-grained resource sharing sufficient for some projects.

6) The primary two clusters for Chameleon are located in Texas (at TACC) and Illinois (at Argonne National Laboratory) with interconnectivity 100 Gbps networking.

7) The StarLight SDX is being used to extend Chameleon's reachability via NSI/AutoGOLE.

Resources

Required resources are an AutoGOLE control point at the StarLight SDX, new AutoGOLE paths on existing endpoints, the Chameleon testbed, orchestrators (e.g., Jupyter Notebooks), and capacity on the requested 1.2 Tbps path between the StarLight facility and the SC21 venue.

Involved Parties

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