SC22 Network Research Exhibition: Demonstration Preliminary Abstract

FABRIC-Chameleon Testbed Integration

Paul Ruth, RENCI, Joe Mambretti, Jim Chen, Fei Yeh, Se-Young Yu
International Center for Advanced Internet Research - Northwestern University
pruth@renci.org, j-mambretti, jim-chen, fyeh, young.yu@northwestern.edu

Abstract

Computer science requires experimental research on testbeds at scale. Two large scale National Science Foundation computer science testbed projects have been planning to provide integrated resources for their communities: Chameleon, a large-scale, deeply reconfigurable experimental platform for Computer Sciences systems research, and FABRIC, which enables cutting-edge and exploratory research at-scale in networking, cybersecurity, distributed computing and storage systems, machine learning, and science applications. Currently these projects are investigating methods of optimizing cross platform research.

Overview

As one step toward this integration, these projects are designing demonstrations that will be staged at the IEEE/ACM International Conference For High Performance Computing, Networking, Storage, and Analytics (SC22). These demonstrations will showcase capabilities for using distributed programmable environments for integrating computer science testbeds. The details of these demonstrations and their results will be widely communicated after the conference.

Goals

1 Demonstrations being considered are experiments using Jupyter notebooks to integrate Chameleon and FABRIC resources. These notebooks can be shared by being published with Trovi.

2 Also being considered is implementing an L2 stitched network between Chameleon and FABRIC and using it from slices deployed with a single Jupyter notebook.

3. Another potential project is an implementation of dynamic provisioning at the edge by placing devices on the SC22 show floor that will interconnect with the FABRIC-Chameleon integrated testbed.

4. Options are also being explored to extend the demonstration to wireless paths.

Resources

A key resource will be the Chameleon testbed, a large-scale, deeply reconfigurable experimental platform developed to support computer science systems research. It supports bare metal reconfiguration systems 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. The primary two clusters for Chameleon are located in Texas (at TACC) and Illinois (at Argonne National Laboratory) with interconnectivity 100 Gbps networking. An Associate Site has been implemented at the StarLight International/National Communications Exchange Facility.

Another key resource will be the FABRIC distributed environment, which is being implemented from the StarLight Facility to Dallas.

These demonstrations will be supported by the requested SC22 SCinet 1.2 Tbps path between the StarLight Software Defined Exchange SDX SC22 venue.

Involved Parties

- Paul Ruth, RENCI, pruth@renci.org
- Joe Mambretti, iCAIR, j-mambretti@northwestern.edu
- Jim Chen, iCAIR, jim-chen@northwestern.edu
- Fei Yeh, iCAIR,fyeh@northwestern.edu
- Se-Young Yu, iCAIR, young.yu@northwestern.edu
- David Bank dbank@renci.org
- Jason Anderson jasonanderson@uchicago.edu
- Metropolitan Research and Education Network
- StarLight International/National Communication Exchange Facility and Consortium
- SC22 SCinet