Toward Unified Resource Discovery and Programming in Multi-Domain Networks

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Abstract
The Yale, IBM, ESNet and Caltech team will demonstrate a novel, unified multi-domain resource discovery and programming system for data-intensive collaborative sciences. Specifically, this system provides three key components: (1) a fine-grained, accurate, highly-efficient multi-domain multi-resource discovery framework (a substantial extension of the team's SC'18 Mercator paper), (2) a strong machine learning component to provide accurate performance prediction for dynamic, reactive science workflows, and (3) a high-level resource programming and composition framework. This demonstration will include: (1) efficient discovery of multiple available resources in a multi-domain wide-area collaborative science network connecting Los Angeles and Denver, (2) real-time, accurate performance prediction for dynamic, reactive science workflows in this wide-area network, and (3) high-level resource programming and composition in science network with automatic resource orchestration update.

Goals
1. Demonstrate how the proposed framework can discover fine-grained, global multi-resource information across networks while preserving the privacy of different networks [1-3];
2. Demonstrate how machine learning techniques can be utilized to provide accurate performance prediction for dynamic, reactive science workflows [4];
3. Demonstrate how a high-level resource programming language simplifies the resource orchestration in science networks [5].

Resources
This demo is composed of three domains. In particular, we will use 2-4 data transfer nodes (DTNs) and 2 switches in the Caltech booth at SC19 exhibit floor to form one network. This network will be connected to the Caltech SDN testbed located at Pasadena, California via a 100 Gbps WAN circuit, provided by SCinet, CenturyLink and CENIC Los Angeles. In the SDN testbed, several switches and DTNs will be used to form two other domains.

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Publications


