Resilient Distributed Processing

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This demonstration will show dynamic arrangement of widely distributed processing of large volumes of data across a set of compute and network resources organized in response to resource availability and changing application demands. A real-time processing pipeline will be demonstrated from SC18 to the Naval Research Laboratory in Washington, DC, and back to SC18. High volume bulk data will be transferred concurrently across the same data paths. A software-controlled network will be assembled using a number of switches, four 100G connections from DC to Denver, two 100G connections from StarLight and one 100G connection from NERSC. We plan to show rapid deployment and redeployment, real-time monitoring and QOS management of these application data flows with very different network demands. Technologies we intend to leverage include SDN, RDMA, RoCE, NVMe, GPU acceleration and others.

Goals

1.   High quality real-time video processing (multiple streams of complex production quality (uncompressed), live, UHD (4K by 60 frames/second) video processing workflows.

2.   Concurrent, highly efficient bulk data transfer without introducing jitter on real-time stream.

3.   Dynamic shifting of processing, network, storage resources from one location/path/system to another (in response to demand and availability).

4.   Sensing and control to obtain lossless WAN data flow even with congestion at distant location.

Collaborating organizations: Naval Research Laboratory, University of Missouri, International Center for Advanced Internet Research, Northwestern University (iCAIR), Defense Research and Engineering Network (DREN), Energy Science Network (ESnet), Mid-Atlantic Crossroads (MAX), StarLight International/National Communications Exchange Facility Consortium, USC Shoah Foundation, SCinet, and the Large Scale Networking Coordinating Group of the National Information Technology Research and Development (NITRD) program (Big Data Testbed).