Resilient Distributed Processing

Booth 993

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Abstract

This demonstration will build on NRL's SC18 demonstration and again show dynamic arrangement and re-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 SC19 to the Naval Research Laboratory in Washington, DC, and back to SC19. 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 and multiple SCinet 100Gbs and 400 Gbps connections from DC and Chicago to Denver. 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

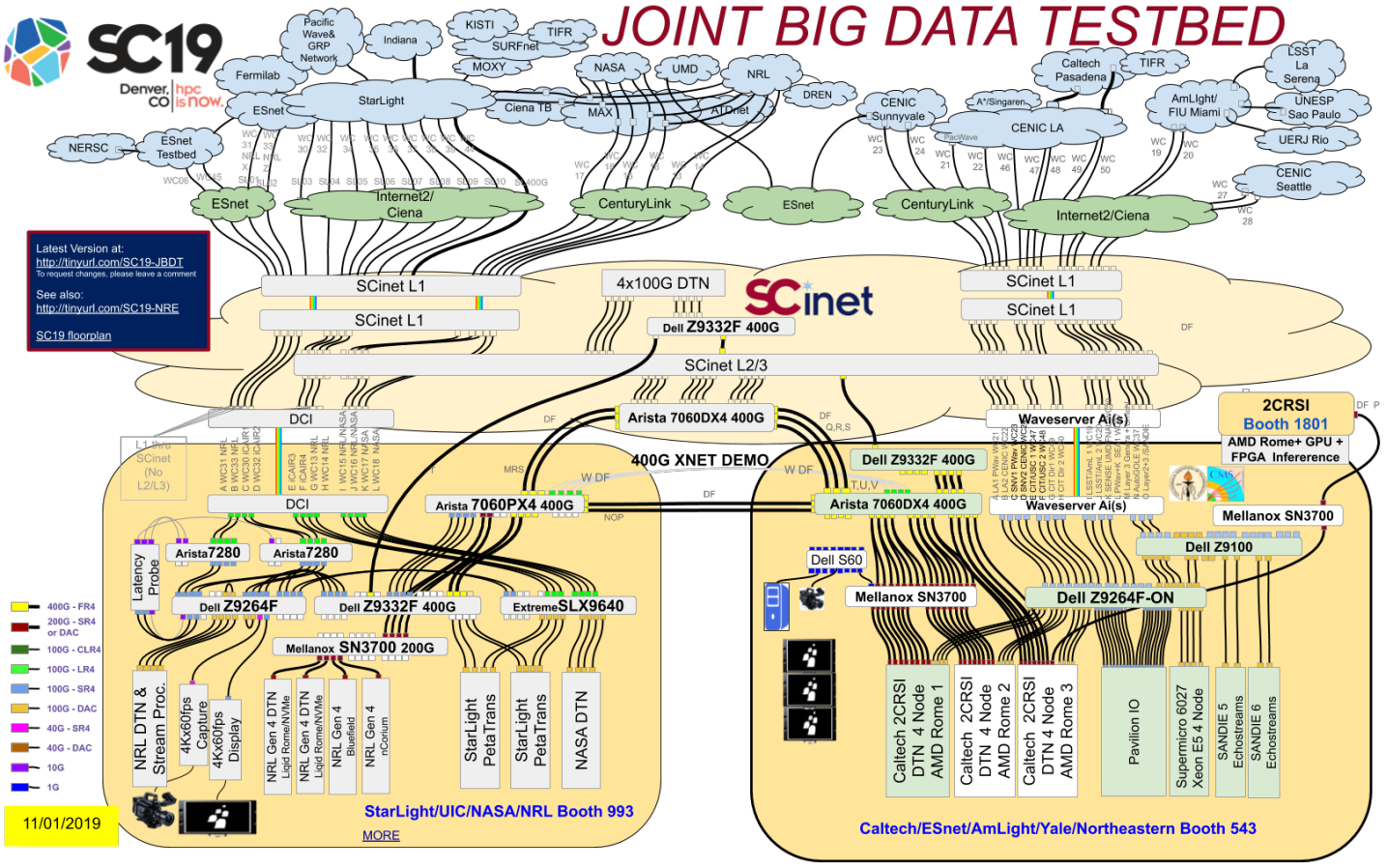
1. High quality real-time video processing (multiple streams of complex production quality (uncompressed), live, UHD (4K by 60 frames/second - possibly HDR) video processing workflows involving several locations (DC, SC19, StarLight, NERSC, …)
2. Concurrent bulk data transfer without introducing jitter on real-time stream (goal is >98% link utilization).
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.
5. Fast fault detection and location using an active probe

Resources

For this set of demonstration goals, NRL will leverage 4 100 Gbps WAN connections from DC to Denver provided by CenturyLink through the SC19 SCinet to the StarLight booth (2 of these are shared with NASA). We will also use 2 100G connections and a shared 400G connections from StarLight in Chicago.

In the DC area, we are worked with MAX research and Fujitsu to arrange the resources needed to extend the desired WAN connections to NRL.

We will also leverage equipment installed at StarLight and the CENI infrastructure between Baltimore and Chicago. Using this as a test environment we were able to test and stabilize some of the capabilities we will bring into SC19 and we will also leverage those paths for our demos.



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