Scalable Web-based Scientific Visualization for Ultra Resolution Display Environment

Research Objective
- Leverage the existing SAGE2 framework to enable scalable, high resolution viewing and interaction of datasets powered by ParaView.
- Lay groundwork to enable JavaScript visualization libraries in tiled displays without having to fully rewrite the means of interaction.

Challenges
- Comply with SAGE2 app framework (sagecommons.org).
- Repurpose existing ParaViewWeb packets that were designed for a single user, single display setting.
- Maintain a synchronized view across multiple displays with consideration that the SAGE2 server is incapable of knowing app specifics and in actuality each display client runs an app copy.
- Writing a library to convert SAGE2 pointer data to javascript events.

Architectural Design
- Tiled Display.
  - Three vis nodes each with eight 1080p monitors for a total of 24 monitors arranged in 6x4 layout.
  - A head node that sits on two networks.
    - 40 GbE for the head and three vis nodes.
    - 1 GbE that users connect to SAGE2 with.
- SAGE2 is a web server.
  - Clients are users and displays.
    - Both connect to SAGE2 through a browser.
    - Display clients view into the workspace is determined by the web addresses.
    - This allows displays on different physical devices to be incorporated and enables remote mirroring.
    - Apps run on display clients (in the browser). Each display client runs their own copy of the app, which allows them to take advantage of existing javascript libraries.
- ParaSAGE, a SAGE2 app, directly connects to the ParaViewWeb server.
  - Communication must be managed to prevent duplicated commands.
  - The SAGE2 pointer isn’t a real cursor. Its effects must be applied to all display clients, even if ParaSAGE or the cursor isn’t visible at the time.

40GbE network to handle the data transmission volume necessary for high resolution render view and a 1GbE wireless network allowing clients to comfortably connect from anywhere within the viewing room.