

Integrating visualization peripherals into Powerwalls and similar tiled display environments

Tiled displays like the EVEREST – Exploratory Visualization Environment for REsearch in Science and Technology – facility at the Oak Ridge National Laboratory are excellent venues for visualizing data on a large scale. However, addition of visualization peripherals will aid scientific discovery by enhancing the immersive and collaborative aspects of visualization environments. A number of current computational science applications at ORNL also involve researchers at institutions across the country. The need exists to share visualizations among collaborators whether they are collocated or not. There are many factors that have to be considered when picking peripherals to integrate into the EVEREST facility. The EVEREST facility, for example, is powered by a cluster of 27 computers running Linux (SUSE 9.3). Therefore, visualization peripherals for tiled displays must have libraries and drivers for Linux as it is the operating system of choice for tiled displays. Other considerations such as size of the display venue and the physical distribution of the researchers using the facility are also among the operational considerations for visualization peripherals. Tracking is a peripheral that has previously been used in other types of visualization facilities at ORNL; however, the technology has evolved since this work was performed, and reevaluation was needed. Tracking, as it pertains to scientific visualization, is the rapid polling of relative position and orientation information by a computer for the purpose of modifying rendered computer graphics. Tracking is useful for practically every computational science area such as enabling chemists to swim with fluids inside nanotubes, or climate dynamics researchers to investigate cloud formations. The tracking system must be transparently usable by scientists, which calls into question issues of weight, size, degrees of freedom (DOF), and communications methods (magnetic, wireless, or other). With those requirements in mind, three tracking systems were researched with two of these requested for demo from the manufacturers. Another type of peripheral, cameras for remote viewing, were investigated to address the issue of research teams separated by hundreds or thousands of miles. The types of display facilities and modes of human interactions had to be considered. For example, the interior of EVEREST is black, but intense light comes from the projector array. Any camera must be able to capture video in such conditions and have remote control pan, tilt and zoom (PTZ) to enable remote collaborators to focus on any part of visualization, or to look at a person. In the course of this work, a number of promising peripheral solutions were discovered and, where possible, similar visualization peripherals were tested. This will enable the ORNL Visualization Task Group to more easily make purchasing decisions to enhance their facilities.

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