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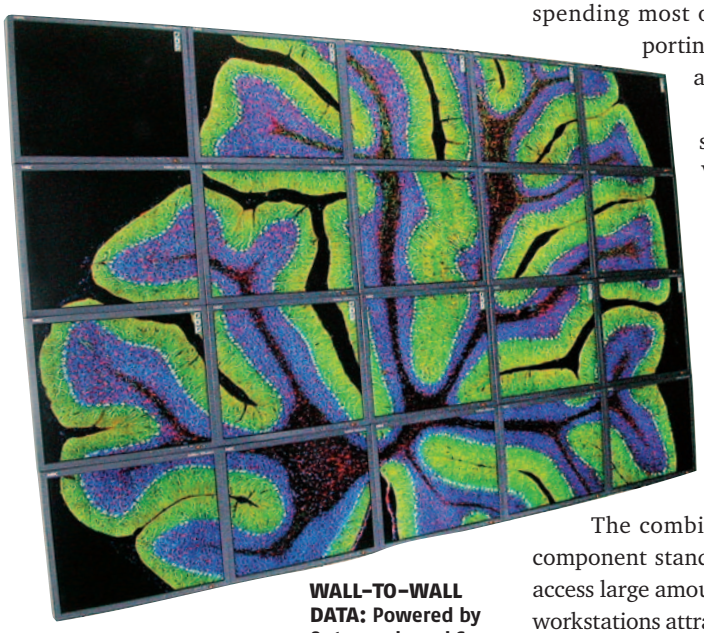
# New Breed of Workstations Can Take On Bigger Tasks

**SCIENTIFIC COMPUTING** • 64-bit processors, more memory provide boost for handling 3-D volumes, huge data sets

By Salvatore Salamone

A NEW BREED OF SCIENTIFIC workstations is leading to a shift in how life scientists use such systems.

Unlike traditional workstations that for the most part have been built on proprietary technology, the new machines are based on commodity processors and widely used operating systems. Vendors including Apple, Dell, HP, IBM, SGI, and Sun Microsystems have recently introduced single- and dual-processor systems based on 64-bit Itanium, Opteron, or PowerPC G5 chips and running Linux, Windows, or Mac OS X operating systems. These machines offer very high computational power and the ability to access much more memory than their 32-bit counterparts. This makes them suitable to run many data analysis, visualization, and computationally intense applications such as molecular-modeling routines.



**WALL-TO-WALL DATA: Powered by Opteron-based Sun workstations, UC San Diego's BioWall displays very high-resolution data.**

As vendors have taken a more open-systems approach, their workstations come with standardized components such as graphics accelerator cards and operating systems with a familiar user interface. This "commodification" allows researchers to focus on their work, rather than spending most of their time developing and porting software or deciding which add-on hardware to buy.

"This trend turns the workstation into a tool," says Juan Vega, senior manager, Dell Precision Worldwide Marketing. "Just as a carpenter focuses on [his] work and not on chisel design, we have people telling us, 'Provide a system for our applications, and don't make us pick a graphics card.'"

## New Systems, New Applications

The combination of high performance, component standardization, and the ability to access large amounts of memory makes the new workstations attractive for many computationally intensive scientific applications.

That's the case with a University of California at San Diego project called the BioWall. "We chose [Opteron-based] Sun Java workstations because of their performance, ability to handle large amounts of memory per node, stability, and compatibility with QuadroFX graphics," says David Lee, UCSD's BioWall application engineer.

The BioWall uses 20 high-resolution flat-panel displays mounted on a wall in a pattern of five across and four high. The BioWall is being used to display very high-resolution data sets generated by electron and multi-photon light microscopes at the National Center for Microscopy and Imaging Research. The data associated with the images range from several gigabytes for a 2-D picture to several hundred gigabytes for 3-D data sets. Researchers use the system regularly in collaborative meetings.

"The resolution and size of the BioWall gives them a very large digital port-hole into their data," Lee says. He notes that the benefits of this high-resolution tiled display can be illustrated in two specific applications: exploring large 2-D brain maps produced by a multi-photon light microscope, and viewing large 3-D volumes from a transmission electron microscope.

Taking a different approach is startup Orion Multisystems, which recently announced its first products: 12-node and 96-node Linux clusters in a workstation form factor. Within the life sciences, Orion sees the systems being used in two basic scenarios. One, a single scientist or group could use the cluster to speed up computational work that might previously have been done on a standalone PC. Two, researchers could use the Orion hardware for applications development, building and testing applications on a real Linux cluster before submitting them to their organization's production cluster. ●