SGI® Pixel Fusion Server Technology

Overcoming Data Overload to Extract Insights and Enable Effective Real-time Decision Making

Technology Highlights

- Combine real-time information from numerous input sources into a single cohesive framework for collaborative decision-making
- Conveniently arrange information across high-resolution multiple-screen displays
- Organize images, movies, 3D models, video streams, and computer displays inside a 3D visual information landscape
- Freely move about the visual landscape, smoothly transitioning from big-picture overviews to close-up high-resolution detail views of a single information source
- Manipulate the position, orientation, size, or transparency of any pixel source—interactively arranging information the way you want to see it
- Control entire desktops or individual applications from a heterogeneous mix of computer systems using a single mouse and keyboard
- Control camera position and visual sources within the 3D landscape interactively via GUI or from custom applications via network command protocol

Mouse and keyboard access to multiple live computer desktops is preserved within this 4K x 2K resolution virtual landscape where remote displays are fused at the pixel level with images, video, and 3D models. Clockwise from lower left: helicopter .obj model, Microsoft® PowerPoint® presentation and Google™ Picasa™ photo viewer via network feeds, F/A-18 cockpit camera movie playback from disk, agi Satellite Toolkit running on Windows® XP-based server, Google Earth western hemisphere on a Windows 2000 server, a high-resolution image of Baghdad (center), fused against a horizontal backdrop of Google Earth map of Iraq.

Too Much Data—Not Enough Information

Decision makers require the right information to decisively and effectively manage and lead operations, research, missions, and any large-scale collaborative effort. Typically, getting data is not the problem today. Decision makers are overwhelmed with too much data and not enough meaningful insights about the data.

SGI® Professional Services have developed a ground-breaking tool for mission-critical analyses. SGI pixel fusion server technology, the foundation for SGI decision support center solutions, allows teams of experts to gain control over large, multidimensional fields of data. By exploiting the pixel—the base element for any visualization—SGI pixel fusion servers enable:

- **Ingestion of data**—Information can be gathered from multiple and diverse sources
- **Fusion of data**—Information is visually merged in a 3D environment
- **Visualization of data**—Collaborative workflows and contextual analyses are enhanced
- **Distribution of data**—Multiple visual streams and output channels allow teams to share data in formats and on displays that are best suited to the task at hand

Giving Decision Makers the Ability to Focus on Discovery

The SGI pixel fusion server enables next-generation collaborative decision making. Multi-disciplinary inputs can be merged into a cohesive framework so that teams of experts can interact using a common, visual language, quickly iron out points of contention, and rapidly discover solutions to even the most challenging problems. With access to all of the relevant information, and an intuitive environment for studying the options available, the best decisions can be made for real-time mission-critical tasks relating to command and control (C2), oil and gas exploration and production, manufacturing, scientific research, education, and a broad range of other collaborative work focused on discovery and problem solving.

Automating Data Flow

Powerful middleware within the SGI pixel fusion server provides data management and flow control for data ingestion, fusion, and distribution. This foundational technology acts as a server, processor, and router of pixel data on the network, and also includes image generation capabilities to merge pixel streams with 3D geometry within a flexible virtual landscape.

Real-time Ingestion of Large, Complex Data Streams

For large-scale projects, data sets are not only massive—terabytes of data in many instances—but they are complex. Multidimensional, multimedia data comes from different applications, different systems, and different devices. The SGI pixel fusion server allows teams to focus on discovery instead of the complexities of data flow. Now all available data can be evaluated in the decision-making process, without requiring the decision makers to become experts in the movement, management, access, and rendering of the diverse data types.

Using the pixel as a basic, universal data element, the SGI pixel fusion server can manage incoming data streams from multiple sources including:

- Networked VNC servers (PCs, Macs, and Linux workstations)
- Video signal sources (SDI, HD-SDI, DVI, RGB, composite, and S-Video)
- Movie and image files (MPEG1, MPEG2, AVI, DVD, JPEG, JPEG2000, TIFF, and more)
- 3D Models (obj, dxf, flt, etc)

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Fusing Diverse Data Streams into a Single Workspace

With data coming in from all desired sources, an SGI pixel fusion server channels each pixel stream source through an independently controllable "viewer" window. Users have unlimited control of the scale, position, and orientation of sources in the 3D information landscape. This allows for traditional tiled layouts, picture-in-picture formats, and transparent overlays for visual comparison. It also enables positioning of pixel sources in 3D context with models and map images for a truly unique and correlated perspective. Source positions may be dynamically "driven" via network command protocol or interactively manipulated via graphical user interface directly within the 3D landscape. By merging independent and disparate pixel streams, users can immerse themselves in the content of interest while maintaining control of live applications embedded within each stream.

Synchronizing Output Streams

Workgroups can use SGI pixel fusion server technology to output the desired combination of data streams to the display devices that best fit the team and workflow for the task or decision of the moment. SGI pixel fusion servers can render a single 3D information landscape across multiple display devices at resolutions of up to 4K x 2K, and can similarly create output streams suited to whatever display devices are available. When driving multiple display devices, output streams are synchronized. For multiple projectors, images are edge-blended and edge-butted for seamless display.

Content Control without Data Overload

With a single, intuitive graphical user interface, the SGI pixel fusion server provides control of the content and the source devices (including remote systems and devices). Switches and routers are automatically controlled to give real-time access to a large number of sources connected over LANs or WANs. Additional control features of the SGI pixel fusion server allow users to:

- Add new source streams and bind them to viewer windows
- Manipulate camera and source window properties (position, orientation, scale, transparency, borders)
- Customize the look and feel of the display
- Take advantage of predefined organization structures (templates) that simplify manipulating sets of sources as groups
- Deploy scripted control interface functions (simple ASCII text files providing the same control functions as those available within the GUI plus additional higher level functionality) to allow rapid transition between pre-defined layouts
- Create a custom control application (via socket-based command protocol) to directly manipulate objects and sources within the virtual landscape

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