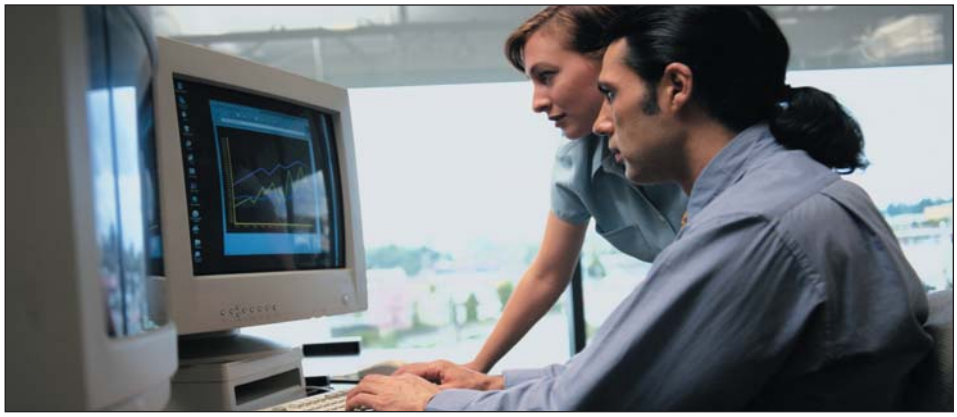
Solutions Brief

SGI® Data Center Storage Solution



Improving Performance and Reducing Costs and Complexities of the Geospatial Intelligence Workflow

Solution Highlights

- **Lowest CAPEX and OPEX:** Commodity compute and low-cost storage keep acquisition costs low. High density (40.3TB/square foot) minimizes requirements for floor space, power, and cooling
- **Leading performance:** Efficient, single-tier storage model minimizes data movement. High-performance InfiniBand connections combine with an optimized port configuration to eliminate bottlenecks and maximize throughput between compute and storage nodes
- **Flexibility:** The open-source and industry-standard Linux® foundation with a choice of storage head nodes tailors the solution for a broad range of workflows and environments
- **Simplicity:** A single file system and global address space eliminate complex virtualization schemes; one multi-protocol network simplifies administration
- **Reliability:** RAID and mirroring of controller cache maximizes reliability with no performance penalties

Geospatial Intelligence Data Management: The Challenge

Higher resolution satellites, multi-modal sensors, unmanned aerial/underwater vehicles and other input sources are driving an explosion in data available for geospatial intelligence. IT departments must routinely deal with terabytes (TBs) and now petabytes (PBs) of storage. To extract actionable intelligence, government and military intelligence organizations must collect and process these massive amounts of raw data from a wide variety of sources. Once a new intelligence need is identified, the challenge of rapidly collecting, processing, distributing, and providing enhanced analysis of the information is daunting.

Additionally, data center consolidation and process centralization have greatly increased the challenges surrounding data storage. As the size of data sets has skyrocketed, the complexity of network-attached storage (NAS) solutions has also increased. Over time, NAS has come to mean performance problems and management headaches. Combined with today's facility restrictions—floor space, power, and cooling—these NAS trends have made it increasingly difficult for data centers to provide scalable, reliable data foundations.

The SGI Solution

SGI® Data Center Storage Solutions provide the entire compute and storage infrastructure required throughout the Intelligence workflow.

- **New Intelligence Needs:** The unique architecture of the SGI solutions enables rapid searches through vast amounts of data, producing more accurate and near real-time response to queries
- **Data Collection:** SGI Data Center Storage solutions deliver a high-performance, service-oriented architecture that includes a 4 GB/s Infiniband interconnect to deliver low latency and high bandwidth, dramatically improving data collection capabilities
- **Data Processing:** The bandwidth of the Infiniband interconnect delivers a five-fold improvement in throughput, and the

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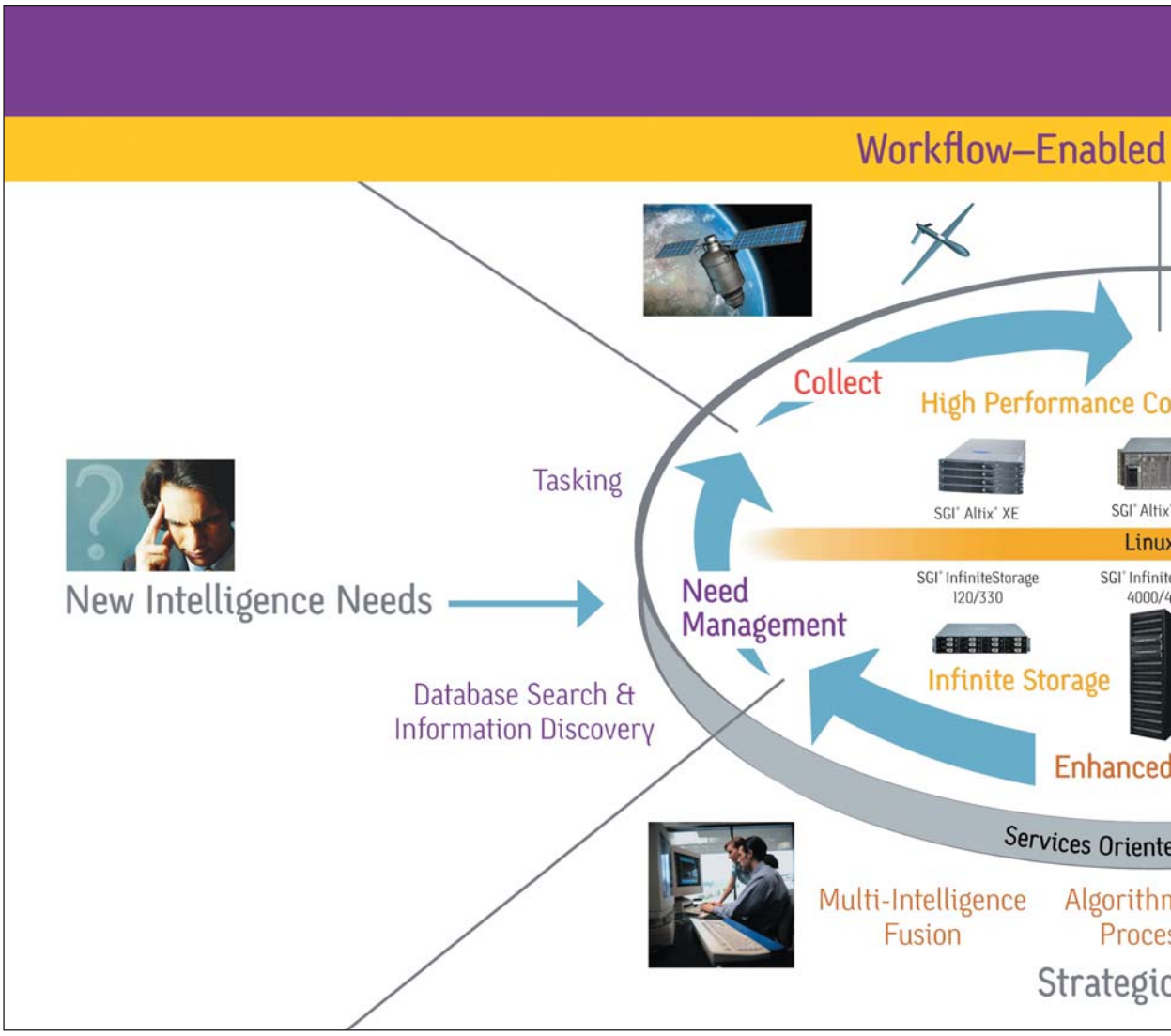
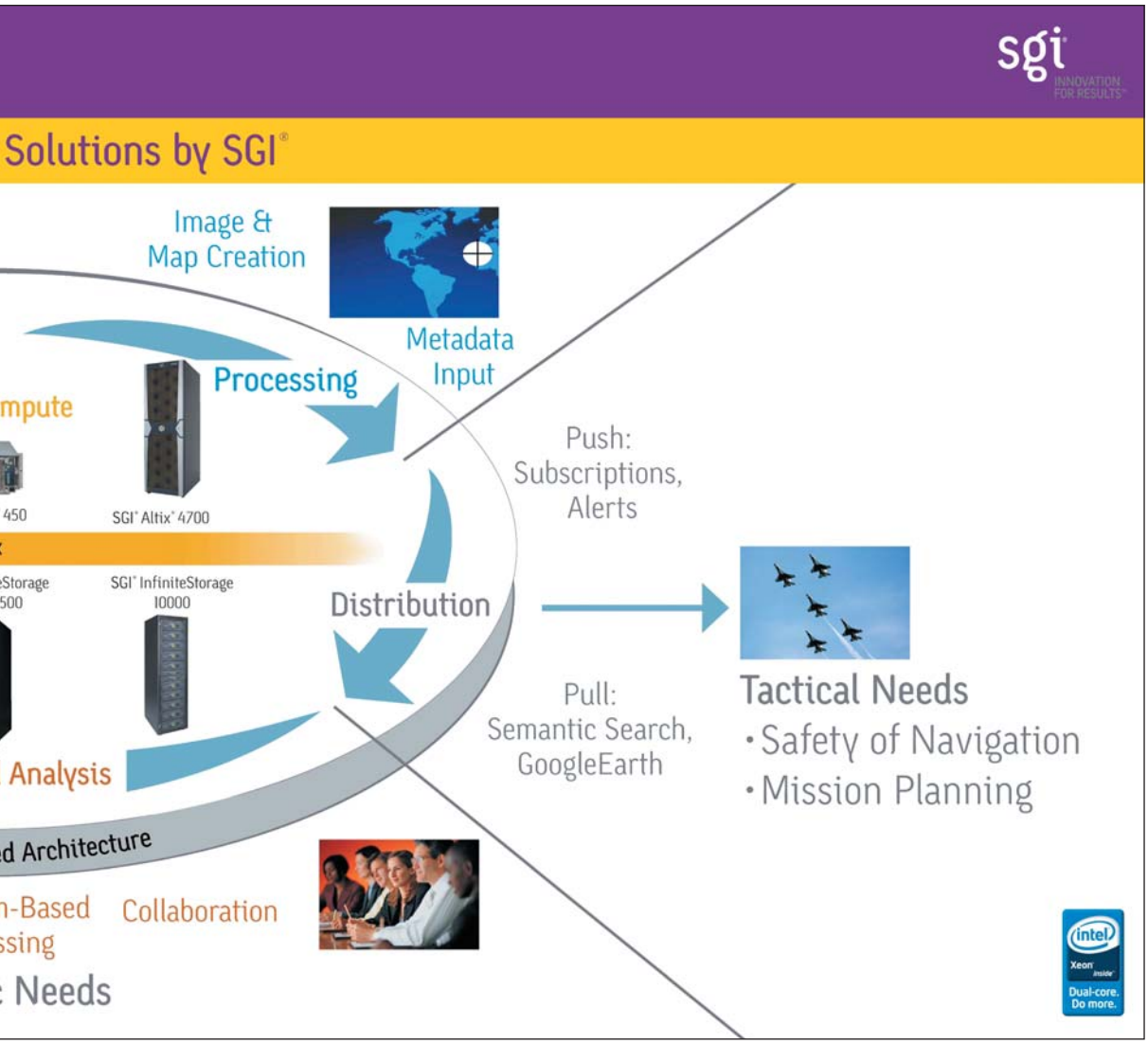


computational power of SGI Altix® and Altix XE servers enables more sophisticated processing techniques than any competing solution on the market

- **Data Distribution:** SGI Data Center Storage solutions are designed to excel in bandwidth-intensive, large-block applications. With this high-performance, service-oriented architecture, all varieties of geospatial products are generated, customized, and delivered at unparalleled speeds
- **Enhanced Analysis:** When the most sophisticated analysis is required, the SGI infrastructure enables more complete and accurate understanding of the information. Massive amounts of data can be rapidly moved and coalesced into a usable form, promoting more efficient analyses in a collaborative environment, instead of producing a compilation of individual pieces worked in isolation. Where competing solutions would hit the computational wall, SGI Data Center Storage solutions deliver the performance and flexibility to identify multiple relationships within large quantities of information. These capabilities enable breakthrough insights into inference-based social network analyses, for example

Leading Performance

The unique SGI storage architecture maximizes performance with a tightly integrated SGI® Altix® NAS or database server, and a data flow that minimizes movement with a wide, single-tier data model. Reduced access times, combined with support for a single file system spanning up to 9-million TBs of storage, allow teams to work with large data sets in their entirety, without subdividing or copying data to another location. Eliminating data movement, while facilitating data sharing, introduces unprecedented levels of interactivity and real-time analysis for collaborative teams.



SGI Data Center Storage solutions represent a leap forward in data storage and access, allowing IT teams to eliminate complexity and give intelligence analysts much easier access to very large data sets at any stage in their workflow. The same innovations that regain simplicity also drive down both acquisition and operation costs.

Unmatched Density

The unmatched density of the SGI InfiniteStorage 10000 subsystem eases the space crunch in the data center. Storing a PB requires only four racks compared to more than a dozen racks with any other vendor's solution. The 40.3TB/square foot density gives data centers the ability to reclaim floor space in existing facilities, making SGI Data Center Storage solutions budget friendly. Proportional reductions in power and cooling requirements translate into additional savings over the life of the solution.

A Single-Tier Storage Solution

Compared to storage solutions that rely on Gigabit Ethernet connections, SGI Data Center Storage solutions deliver five-times better throughput (more than 500MB/sec per channel) using 4GB/s InfiniBand and a simplified read-write implementation of NFS. The combination of performance and density make the SGI Data Center Solution a viable platform for single-tier storage solutions. With storage costs that are roughly equivalent to tape, the SGI solution eliminates the need to rely on secondary storage to lower cost/GB.

The single-tier storage approach contributes further performance gains to the overall data model. Data can be stored once, and accessed without any further data movement requirements. This minimizes the traffic on the storage network and reduces access time.

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Open, Flexible Design

The SGI family of feature-rich, high-performance Altix and Altix XE servers and storage arrays running open source Linux are uniquely suited for the demanding and continuous 24/7 operations of the daily intelligence cycle. A choice of storage heads—SGI Altix 450 with dual-core Intel® Itanium® processors or SGI Altix XE with dual-core Intel® Xeon® processors — allows integration options and means that the SGI solution fits into a broad range of homogeneous and heterogeneous storage environments.

With a choice of compute power and storage subsystems, each SGI Data Center Storage solution can support diverse workflow requirements for an entire organization and protect data management investments over the duration of the data lifecycle. The building blocks for each system can be selected to support either database management applications or general-purpose storage.

Simplicity for Administration and Users

The SGI Data Center Storage solution uniquely supports a single file system across the maximum allowable storage. The global address space removes restrictions between applications and target storage subsystems, making applications more portable and the storage resources more easily managed. Very large data sets can be easily stored and accessed in their entirety, eliminating the need to deal with data subsets or complex virtual addressing schemes.

Through the life of the solution, monitoring and other administrative functions are also simplified. A single NAS head node gives a unified, single-screen view of storage. To expand storage, plug-and-play drives make it easy to upgrade to capacity when higher-density drives become available, and enclosures can be added on to any existing storage nodes allowing teams to start small and grow storage as needed.

Built-in Data Protection

Other than personnel, an organization's data is typically its most valued resource. By building in protection at multiple points in the solution architecture, SGI Data Center Storage solutions ensure that data is safe and that access is not disrupted. RAID subsystems support full mirroring capability without impacting performance. This means that controller failures are transparent to users and applications, and that users can enjoy the maximum performance possible at all times. Hardware redundancies are also exploited to allow users to configure the levels of protection required for their environments.

Changing the Intelligence Data Center Storage Model

The combination of advances introduced with the SGI Data Center Storage solutions—density, performance, flexibility, affordability, and simplicity—allow data center teams to evolve to a new NAS model. The single file system and affordable, high-performance capabilities eliminate the need for multiple storage tiers and complex data backup and movement processes. The single-tier approach and increased density greatly simplify all day-to-day monitoring and management tasks. At last, IT teams can keep up with user demands for storage and access while reducing complexity in the data center. With SGI Decision Support Center solutions, intelligence analysts can deliver more complete, more accurate and near real-time decision support.

Corporate Office
1200 Crittenden Lane
Mountain View, CA 94043
(650) 960-1980
www.sgi.com

North America +1 800.800.7441
Latin America +55 11.5185.2860
Europe +44 118.912.7500
Japan +81 3.5488.1811
Asia Pacific +1 650.933.3000

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