SGI® Altix® ICE: Setting a New Standard in Reliable High Performance Computing

SGI introduces SGI Altix ICE, a high density integrated blade platform that offers a revolutionary new approach to scale-out high performance computing (HPC). SGI Altix ICE provides breakthrough scalability, manageability, reliability, and price/performance without the compromises inherent in many traditional HPC systems. SGI Altix ICE sets a new standard in reliability, featuring innovations in a number of key areas

Reliability in Scale-Out Environments

Reliability can be an area for concern when venturing into larger scale clusters. Compute nodes and other components inevitably malfunction over time, and cluster installations often lack sufficient redundancy to deal robustly with component failures. The networks tying the cluster nodes together can also suffer from reliability issues that grow exponentially as clusters scale. The complexity of scale-out cluster environments, with their multiplying points of failure, can lead to further reliability problems in large-scale deployments.

SGI Altix ICE Reliability Innovations

SGI Altix ICE, with its focus on component integration and other innovative features, achieves a new standard of reliability for scale-out configurations.

Cable-Free Blade Enclosures

The SGI Altix ICE individual rack unit (IRU) enclosure, with 16 two-socket blades and up to 128 cores, is entirely cable-free. Instead of cables, it makes use of an onboard InfiniBand interconnect across a backplane. A 3D torus network topology further serves to limit the number of cable connections between enclosures in a scale out environment. For example, a 128 socket/512 core installation, consisting of a single rack of four blade IRUs, requires just 24 cables. In addition to the cable-free InfiniBand backplane, all switches are integrated into the enclosure, eliminating external switches entirely from the system.

Traditional cluster cabling

SGI Altix ICE cable-free blade enclosures

The SGI Altix ICE approach to interconnect design and implementation stands in sharp contrast to the cable chaos endemic to many cluster systems. This clean and lean design markedly increases both the reliability and the serviceability of the overall system.

Diskless Compute Blades

The SGI Altix ICE blade has no onboard disk, instead using diskless booting at the IRU level. This innovation offers a number of benefits. It increases blade reliability by eliminating a key failure point. It increases density by reducing the blade footprint. It lowers the cost of powering the blade, as well as reducing the cost of the blade component itself.

Redundant, Hot-Swappable System Components

To enhance reliability and maximize uptime, SGI Altix ICE includes redundant, hot-swappable power supplies and blowers. Each enclosure includes (7+1) 1625W 12VDC output front-end power supplies and (7+1) 175mm blowers. This design ensures operational continuity of critical system function in the event of component failure.

High-Efficiency Power Architecture

The SGI Altix ICE platform leverages SGI field-proven power and cooling technology innovations, first developed for the SGI ® Altix® line of supercomputers. This high efficiency power/cooling architecture reduces heat dissipation and associated temperature increase within the system. By so doing, it decreases the likelihood of a common cause of system failure – unsustainable temperatures in crowded data centers.

Optimal Thermal Design

A common issue with blade-based architectures is the crowding of I/O options across the backplane or mid-plane of the enclosure. The result is often a complex series of baffles and airflow management structures that require small fans or blowers. SGI has greatly improved over other blade-based designs by placing the I/O switches to the sides of the enclosure, enabling large perforations in the backplane. This enables air to flow straight through the compute blade, increasing volume and enabled the utilization of larger, more efficient, and less noisy blowers. The resulting thermal design permits more efficient and consistent cooling across all components, increasing reliability and overall efficiency.

Fully Buffered DIMMs

The SGI Altix ICE compute nodes employ Fully Buffered DDR2 DIMM (FB-DIMM) memory, which enhances reliability and performance. Memory data reliability is ensured with enhanced error-correcting codes to allow every node to independently detect and correct errors.

High Reliability Interconnect

The SGI Altix ICE system leverages SGI extensive expertise in high-speed signal integrity, gained from years of experience in building systems to meet customers' most demanding requirements for performance and availability. The platform uses a dual InfiniBand backplane that provides redundancy to minimize system downtime but also leverages InfiniBand features such as data re-transmission to overcome packet drops and further enhance overall reliability. This streamlined approach to interconnect design and implementation stands in sharp contrast to the cable chaos endemic to many traditional cluster systems. This clean and lean design markedly increases both the reliability and the serviceability of the overall system.

Bottom Line Advantage: SGI Altix ICE Brings a New Standard of Reliability to High Performance Computing

With 25+ years of experience in designing HPC systems, SGI is an industry leader in building scalable, reliable systems to address customers most challenging compute problems. Now, SGI delivers that design innovation in the SGI Altix ICE platform, with advanced scalability coupled with a deep and wide focus on eliminating and reducing HPC system failure points, raises the reliability bar to a new level.

About SGI

SGI is a leader in high-performance computing. SGI delivers a complete range of high-performance server and storage solutions along with industry-leading professional services and support that enable its customers to overcome the challenges of complex data-intensive workflows and accelerate breakthrough discoveries, innovation, and information transformation.

SGI helps customers solve their computing challenges, whether it's enhancing the quality of life through drug research, designing and manufacturing safer and more efficient cars and airplanes, studying global climate, providing technologies for homeland security and defense, or helping enterprise manage large data. With offices worldwide, the company is headquartered in Sunnyvale, California, and can be found on the Web at www.sgi.com.

Corporate Office
SGI
1140 East Arques Avenue
Sunnyvale, CA 94085-4602
650.960.1980

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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