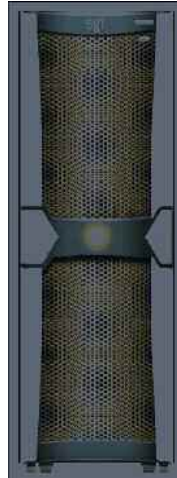sgi®

SGI® Altix® 4700 Servers and Supercomputers
Revolutionary Platform Delivers New Levels of Performance and Flexibility with a Functional Blade Design

Base System and Options

Resource	Quantity	Features and Options
Compute Blades	Minimum 16	Bandwidth Compute Blade (Best Memory Bandwidth) 1.66GHz/6 MB or 1.66GHz/9 MB; 667MHz FSB One socket per blade; Two to 48GB DDR-2 RAM/blade
	Minimum 8	Density Compute Blade, (Best Compute Density) 1.6 GHz/6 MB or 1.6 GHz/9 MB, 533MHz FSB Two sockets per blade;Two to 48 DDR-2 RAM/blade
Memory Blade	As needed	DDR-2 memory sets: 2GB (4 x 512MB); 4GB (4 x 1GB); and 8GB (4 x 2GB); 2 to 48 GB per blade
Base I/O Blade	One min. per SSI or partition	Up to two SAS drives Two low profile PCI-X slots SAS, Gigabit Ethernet, 1394, and USB capable
PCI-X Expansion Blade	As needed	One full 64-bit/133 MHz 3.3V PCI-X slot, hot plug Two full 64-bit/133 MHz 3.3V PCI-X slots (100MHz bus if both populated), hot plug capable
PCI-Express I/O and Graphics Expansion Blade	As needed	Two full PCI-Express slots One PCI-Express slot per channel Up to 90W/card for 2 graphics pipes or 150W/card 1 pipe
PCI-X + PCI-Express I/O and Gfx Exp. Blade	As needed	Two 64-bit/133 MHz 3.3V PCI-X slots Two full 16x PCI-Express Slots Supports up to 150W/card for two graphics pipes (no PCI-X)
SGI® RASC™ Blade	As needed	Two high performance Xilinx Virtex 4 LX200 FGPA chips 10 QDR SRAM or SDRAM DIMMs per blade Two SGI® NUMAlink ports
Operating System	One	SUSE® LINUX Enterprise Server 9 Red Hat® Enterprise Linux® 4

Key Selling Points:

- Modular 'functional blade' design for superior performance density and 'plug and solve' configurability
- Designed for future upgrade, expansion and integration of next-generation HPC technologies
- Scalable system size for simplified programming, low-cost administration and excellent sustained performance for cluster or shared memory applications
- Step into Multi-paradigm computing—taking HPC beyond the Limits of Moore's Law
- Standards-based platform and blade form factor reduces costs while delivering uncompromised performance on Linux

Feature	Benefit
Modular, functional blade design Interchangeable compute, memory, I/O and special purpose blades	• Unlimited flexibility and fine-grained control over system configuration • Improved performance density • Optimize for any workload
Designed to be compatible with future technology Socket compatible with future Itanium 2 Processors, including dual core CPUs	• Designed with investment protection in mind • Expand on demand • Easily upgrade or service individual components
Scalable System Size Scales to 512P system size and as much as 60TB globally addressable memory	• Superior sustained performance for any programming model or workload • Breakthrough potential for data-intensive applications • Simplified programming and easy, low-cost administration
NUMAlink 4 interconnect, MPI support 6.4 GB/s bandwidth, <1 microsecond latency SGI Message Passing Toolkit	• Industry-leading cluster application efficiency to hundreds of processors or more • Scale out to hundreds or thousands of CPU cores while retaining global memory address
SGI RAS Roadmap Fault prevention, detection, recovery	• Linux performance and choice without compromised reliability • Maximum uptime, higher utilization
Standards-based design Commodity CPU's, memory, I/O	• Leading price-performance versus high-end RISC/Unix servers • SGI-level quality at affordable cost
Certified on Industry-standard SUSE LINUX or Red Hat Linux OS SGI supplied and supported	• Easier system bring-up • One-stop support

Customer Profile

- Has complex workloads and/or large-scale jobs
- System serves several users
- Scalable, 64-bit Linux OS is a priority
- Values the advantages and potential of large shared memory system
- Often does some or a great deal of development work
- Is aware of the quality of SGI products and services

Key Applications (scalable, perform well at 16-32P+):

- **All:** In-house developed codes (especially scaling>16P)
- **Manufacturing:** FLUENT, LS-DYNA®, PAM-CRASH, PAM-FLOW,Power-FLOW, RADIOSS, STAR-CD™, CRAFT CFD®
- **Sciences:** Amber, HTC-BLAST, CASTEP, Gaussian®, Charmm, Dmol3, GAMESS, NWChem, NAMD, HMMR
- **Energy:** ECLIPSE, Focus, GeoDepth
- **Government:** GOTS for CFD, weather, custom codes

Tier-1 Competition – IBM® POWER™ and Itanium® Servers

Competitive Positioning:
- At least 30 times more globally addressable memory - provides significant performance and productivity benefits, as well as the potential for breakthrough applications
- Interchangeable compute, memory, I/O and special purpose blades for 'plug and solve' configuration flexibility
- Blade-to-NUMAlink™ architecture for perfect system right-sizing
- Based on industry standard CPU's, memory and I/O, which reduces cost while delivering uncompromised performance on Linux® OS

Value Proposition:
Flexibility, Standards Based, Big Memory

Tier-2 Competition – x86 Clusters

Competitive Positioning:
- Up to 512P under one OS for simplified software development, workload management and system administration
- NUMAlink interconnect provides industry-leading bandwidth and latency for superior performance on cluster applications
- Versatility to support capability and throughput workloads, running both cluster and shared memory applications efficiently
- Intel® Itanium® 2 Processor has the floating-point performance, cache, memory management, RAS and other resources required for demanding HPC workloads

Value Proposition:
Configuration Flexibility, Ease of Administration, Runs Cluster + Shared Memory Applications

SGI Altix 4700 Bx2 Tier-1 Competitors

Competitor	Features[1]	Competitor Positioning[1]	SGI Strengths
HP Integrity Superdome	• 2 to 64P (up to 128P with mx2) Intel Itanium 2 1.1 (with mx2), 1.6GHz • 1TB RAM	A high-end enterprise computing solution that continues to demonstrate its leading performance, operating system flexibility, and simplified management architecture, as well as best-in-class solution deployment.	The HP Integrity Superdome server only scales to 64P and 1TB of memory on Linux OS (mx2 dual processor module does not support Linux) and provides approximately 60% less performance per square foot that the Altix 4700 server.[2] SGI Altix 4700 servers offer full scalability on Linux, with 2 to 512 processors in a single system image and up to 60TB of globally addressable memory for dramatic application performance improvements.
HP Integrity BL60p	• 1 to 2 Intel Itanium 2 1.6GHz • 8GB RAM	Offers dramatically improved application deployment, resource utilization, capacity management, reliability and security—all for a low total cost of ownership	BL60P blade server only comes with one processor option, 1.6GHz Itanium 2 Processor with a maximum of 3MB of cache, which limits its performance and flexibility, and is only available with the proprietary HP-UX operating system. Based on the Linux OS and industry standard CPUs, memory and I/O, the SGI Altix 4700 platform limit customer lock-in. It is offered with eight standardized blade options including two alternate compute blades—one optimized for maximum performance and another optimized for cost-effective compute density-- as well as multiple processor options.
IBM® eServer® p5 590	• 8- to 32-way POWER5 1.65GHz • 1TB RAM • 9.3TB HDD	Uses fifth-generation 64-bit IBM POWER5™ processors in up to 32-way symmetric multiprocessing (SMP) configurations to provide the power, flexibility, scalability and security needed for mission-critical applications at a very affordable price.	A p5-590 server running Linux OS scales to only 24 processors in an SMP system under heavy workloads and cannot utilize many of IBM's adapters and devices. SGI Altix 4700 server delivers unparalleled Linux OS functionality, flexibility and real world HPC applications performance across a wide range of configurations options and supports up to 512 processors under one instance of Linux OS.
IBM eServer™ p5 595	• 16- to 64-way POWER5 1.65, 1.9 GHz • 2TB RAM • 14TBHDD	Uses fifth-generation 64-bit IBM POWER5 processors in up to 64-way symmetric multiprocessing configurations. p5-595 is IBM's most powerful UNIX®/Linux® system with the power, flexibility, scalability and security needed to run mission-critical enterprise applications.	The p5-595 server provides approximately 35% less performance per square foot than the Altix 4700 server as well as limited configuration flexibility and Linux scalability. SGI Altix 4700 server is a complete Linux HPC solution with interchangeable compute, memory, I/O and special purpose blades for 'plug and solve' configuration flexibility and perfect system right-sizing.
IBM eServer™ p5 575	• 8- or 16-way POWER5 1.5, 1.9 GHz • 256GB RAM • 2.9TB HDD	High-powered building blocks designed for the most demanding HPC and BI applications. Innovative packaging helps minimize space requirements, reduce environmental demands and simplify system management	The p5-575 server's shared memory only scales to 16P and 256GB of memory, limiting its ability to run larger applications requiring sizeable shared memory. Its dense packaging requires a considerable amount of power, resulting in two times the heat dissipation of the Altix 4700 server. SGI Altix 4700 server provides superior HPC solutions and applications performance; utilizing highly scalable resources and 60TB globally shared memory. It offers high density and a responsible power profile.

SGI Altix 4700 Bx2 Tier-2 Competitors

Competitor	Features[1]	Competitor Positioning[1]	SGI Strengths
HP ProLiant DL585	• 2 - 4P AMD Opteron™ 2.2 – 2.8GHz single core/1.8 – 2.4GHz dual core • 128GB RAM • 1.2TB HDD	Delivers the highest 32-bit performance of any 4-processor server as well as 64-bit capabilities, enabling customers to deploy a common 4-processor platform for their high performance 32-bit and future 64-bit computing requirements.	The DL585 has a maximum of eight 64-bit PCI-X slots, 4 processors, and 64GB of shared memory per server. Its small node size means that it has more nodes and more fabric to manage that the Altix 4700 sever, resulting in increased management complexity and costs. Altix 4700 server offers an extremely flexible, functional blade architecture that scales up to 60TB of globally shared memory and 512P per node, for maximum resource utilization and reduced software costs.
Sun Fire™ X4200	• 1 – 4P AMD Opteron™ 2.2 – 2.8GHz single core/2 – 2.4GHz dual-core • 16GB RAM • 292GB HDD	This two-way x64 server is the fastest single-socket server available, and it's the most cost-effective solution in its class. The Sun Fire X2100 server is easy to scale, easy on the budget, and gives you a choice of operating systems - Solaris OS, Linux, and Windows.	The Sun Fire X4200 provides limited I/O and memory scalability, with management and compute nodes that only scale to four processors (8 cores). The Altix 4700 server offers easy expansion of memory, I/O or visualization capabilities, independent of the compute blade node, enabling customers to adjust system configurations easily. An exceptionally large SSI reduces system management complexities.
Cray® XD1™	• 1 – 4P AMD Opteron (200 series)) • 96GB RAM • 1.5TB HDD	Combines breakthrough interconnect, management and reconfigurable computing technologies to meet users' demands for exceptional performance, reliability and usability.	The Cray XD1 server is a limited and inflexible HPC solution with upgrades that only come in 12 processor increments. Altix 4700 server is a versatile solution for shared or distributed memory applications of any scale. SGI NUMAlink is a superior interconnect to Cray's RapidArray™ interconnect, with better MPI latency and 60% more unidirectional bandwidth per link.[3]

1 Sources: www.ibm.com, www.hp.com, and www.sun.com as of November 2005
2 Based on GFlops per square foot. Data source `www.hpc.om as of November 2005.
3 Source: "SGI NUMAlink: Industry Leading Interconnect Technology," March 2005

NOTE: The contents of this document are subject to change without notice. To ask questions about and/or provide feedback on this document, please contact Louise Westoby (louisew@sgi.com)