White Paper

# Powering the Real-time Enterprise
# SGI Brings High-performance to Enterprise Markets

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## 1.0 Management Summary

To compete internationally, enterprises need IT infrastructures that grow dynamically in pace with business requirements. They need applications that support real-time processes, manage information without delay, and communicate seamlessly with customers, suppliers, and partners. SGI® Altix® servers guarantee that such solutions deliver on these promises.

SGI Altix platforms combine the advantages of the open Linux® operating system with a unique global shared memory architecture called NUMAflex™. SGI Altix servers greatly simplify application development and deployment, streamline system management, and deliver breakthrough performance and scalability while ensuring business continuance. Altix gives enterprise customers a platform that expands on demand and significantly reduces total cost of ownership (TCO).

## 2.0 Stringent Regulations and Competitive Pressures: The Enterprise Market Today

Global competition and a raft of new market requirements are forcing enterprises, and IT departments in particular, to work harder and smarter than ever before. Time-to-market, cost control, and product reliability are crucial sources of competitive advantage. With data volumes growing exponentially and decision windows shrinking, forward-thinking organizations are scrambling to implement a "real-time enterprise" strategy today.

In a real-time enterprise, data is transformed into knowledge on the fly, and knowledge is delivered to those who need it precisely when they need it. The real-time enterprise means business processes are brought to bear on problems immediately and managers at all levels have up-to-date information at their fingertips on which to base informed decisions. Real-time enterprises also drive IT costs down. By consolidating, integrating, and optimizing IT infrastructure to enable real-time responsiveness, IT managers can also reduce the total cost of owning and administering datacenter resources.

More than ever before, businesses are choosing open, scalable solutions to power their IT infrastructure. Standards-based software and hardware platforms boost productivity, ensure flexibility, drive innovation, slash TCO, and maximize return on investment (ROI) – even in the face of growing and changing market requirements.

## 3.0 Open and in High Demand: The Linux Operating System

More and more enterprises around the globe are turning to Linux as an operating system that meets the needs of enterprise customers. Linux offers a broad range of functions and deliverables with low licensing, operating, and servicing costs: Rapid ROI and low TCO are guaranteed. The openness of the Linux platform enables companies to consolidate existing IT resources more effectively and implement new technologies with greater ease. Customers can thus cut costs, reduce the risks associated with consolidation and migration, and adapt their IT strategies flexibly to new business requirements.

In order to enjoy these advantages, users are increasingly turning away from expensive, proprietary UNIX® environments. The international open source community has instigated numerous projects aimed at facilitating the use of Linux on multi-processor systems in live environments. According to a study by the Gartner Group market research firm, 60% of large enterprises with 500 or more employees will have migrated 80% of their UNIX OS-based applications to Linux by 2008[1].

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>
> *Gartner Group: "Predicts 2004: Server Platforms and Storage," November 24, 2003*

### SAP Backs Linux

Leading technology providers such as SAP stress that the open-source solution is a fantastic opportunity for customers to increase flexibility and reduce TCO: SAP users have reported significant direct and indirect savings in their IT operations when compared with non-open source operating systems[2]. Furthermore, Linux empowers users to develop new business processes at any time and respond flexibly to new market requirements. Thanks to long-standing partnerships with all the major hardware, software, and consulting vendors, SAP can ensure that Linux runs SAP applications reliably and with optimum performance, whatever the system environment.

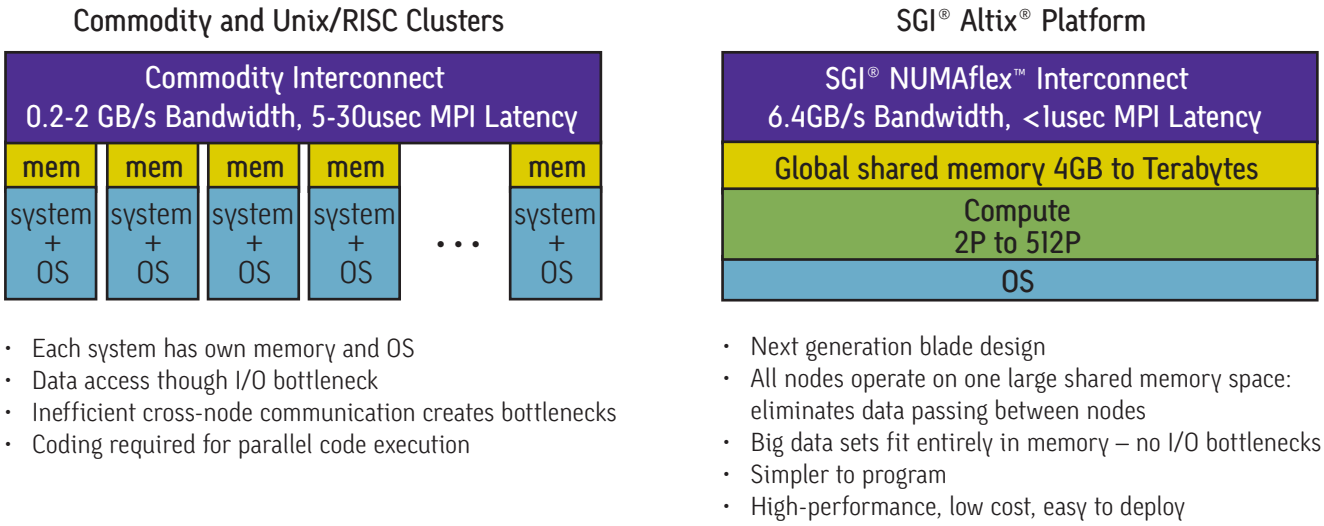
## 4.0 Award-winning, Powerful: The SGI Altix Family of Servers

SGI Altix servers support the Linux operating system, uniquely combining the advantages of a separate architecture with those of open source technology. They give users the world's first Linux cluster with the global shared memory capabilities of a high-performance computer. To continue improving scalability and performance under Linux, SGI works closely with the open source community. Altix systems have consistently set new scalability records and thereby helped companies to boost their ROI.

[1] Gartner Group: "Predicts 2004: Server Platforms and Storage," November 24, 2003

[2] SAP Solution Brief: "SAP Enterprise Applications on Linux – Confidently Run Your SAP Solutions on Linux"

## SGI® NUMAflex™ Shared Memory Blade Architecture




- Each system has own memory and OS
- Data access though I/O bottleneck
- Inefficient cross-node communication creates bottlenecks
- Coding required for parallel code execution

- Next generation blade design
- All nodes operate on one large shared memory space: eliminates data passing between nodes
- Big data sets fit entirely in memory – no I/O bottlenecks
- Simpler to program
- High-performance, low cost, easy to deploy

**Graphic: figure of global shared memory arch. vs. conventional cluster**

**Head Start with Global Shared Memory**

The SGI Altix 4700 server combines innovative blade technologies and industry-standard components with its award-winning NUMAflex™ system architecture, the industry's most powerful, scalable system architecture with globally shared memory. Global shared memory is a pioneering concept developed by SGI, in which the system memory is shared globally, that is, across all nodes. In contrast to conventional clusters, the data records do not have to be split into smaller fragments in order for the individual processors to handle them: All the processors in the whole environment use one globally addressable memory space, allowing them to work on problems at the same time.

The high-performance SGI NUMAflex™ interconnect and the associated global shared memory architecture offer users numerous advantages. Since information is transferred up to 200 times faster than with conventional cluster systems, even highly-complex calculation problems can be resolved in record time. With global shared memory, SGI Altix servers offer a high degree of performance, functionality, scalability, and operability. They enable timely access to complex data records, while remaining simple to develop, manage, and service. As such, Altix servers help users to reduce TCO considerably.

**Developed for Data-intensive Environments**

SGI Altix servers were designed with users of high-performance computing (HPC) and databases in mind, who need to carry out complex tasks in data-intensive enterprise environments. Traditionally anchored in the technical-scientific arena, SGI's hardware platforms are ideal for the enterprise market: The challenges of the global enterprise market are no problem for servers that support a broad range of tasks, such as global weather forecasts and mission-critical applications for the defense sector.

### 5.0 Groundbreaking, Seminal: The Partnership with SAP

SGI shares many visions and goals with SAP, the world's leading enterprise software provider, first and foremost the commitment to open-source technology. SGI Altix has been certified by SAP, which means companies can also enjoy the benefits of the Linux OS-based, highly scalable and productive Altix server family when running SAP applications. At the same time, SGI became a member of the SAP LinuxLab, where developers from SAP, SGI, and other SAP partners work together to ensure Linux offers enterprise customers optimal performance and functionality.

SGI supports all SAP solutions certified by the SAP LinuxLab for use on Intel® Itanium® 2 processors with Linux. Its unique system architecture means that the Altix platform can be extended as required, without switching systems, enabling it to run even the most advanced and demanding SAP system landscapes in a short space of time.

**mySAP ERP Ahead of the Pack**

This aspect becomes all the more significant if we consider that many SAP R/3 users are planning to change over to mySAP ERP and the SAP NetWeaver technology platform. The German-speaking SAP User Group (DSAG), an independent organization representing the interests of all SAP users in Germany, Austria, and Switzerland, surveyed its members about current investment in IT and came to the clear conclusion: mySAP ERP is ahead of the pack. Of the approximately 46 percent of companies surveyed planning to upgrade in 2006, 89 percent wish to invest in mySAP ERP. They want to create more flexible IT landscapes, develop business processes simply and dynamically, get standard and customer-specific applications to interact better, implement more efficient business processes, and reduce TCO[3].

SGI Altix is a hardware platform that considerably simplifies and accelerates the switch to mySAP ERP™ and SAP NetWeaver™. It provides customers with an IT infrastructure that exploits the optimization potential of SAP applications and workflows, reduces IT expenditure, and allows IT resources to be extended dynamically.

To accommodate the growing demand from SAP users for extensible and flexible computing platforms, SGI has teamed up with REALTECH AG. A leading SAP technology consulting firm, REALTECH acts as a certified SAP migration partner for the SGI platform. The firm helps enterprise customers to migrate SAP environments as simply as possible from older, proprietary UNIX and mainframe platforms to SGI server solutions.

**SAP Migration Project at MTU**

MTU Aero Engines, Germany's leading manufacturer of engine modules and components as well as complete aero engines, also wants to profit from a Linux-based platform. The company is migrating its mySAP Supply Chain Management (SCM) system landscape from a proprietary platform to SGI Altix servers, with a view to boosting ROI, reducing TCO, and exploiting the benefits of high-performance, productive computing technology.

### 6.0 Field-tested and Versatile: Databases

SGI Altix platforms are suitable for managing different databases that run on Linux, for example Oracle.

The University of Masaryk in Brno is the Czech Republic's second-largest university. It deploys SGI Altix and Oracle® Database 10g to manage the "Masaryk University Information System" (IS MU), a Web-based information system that supports the university's administrative, teaching, and research activities and registers over one million transactions every day.

Among numerous contenders, SGI Altix came out ahead, because its server family demonstrates the best levels of performance and availability, incurs the lowest acquisition and operating costs, and offers the option of expanding the IS MU if necessary. The number of daily transactions, for instance, is set to rise above ten million in the near future.

"SGI was definitely faster than any other system for running Oracle," says Michal Brandejs, Director of the Computer Systems Unit at the University's Faculty of Informatics. "This is because of the Altix system's unique architecture. Our OLTP application generates extremely high concurrent data access which can be handled only by a large shared-memory system."

The Robert Bosch Hospital in Stuttgart, a foundation hospital that is part of the Robert Bosch Foundation, also runs its Oracle database on Altix servers. The highly scalable, mature Linux infrastructure enables the Oracle database, which the hospital uses for a health information system with over 30 million files, to perform at its best.

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Michal Brandejs, Director of the Computer Systems Unit at the Faculty of Informatics, Masaryk University, Brno/Czech Republic

**MaxDB Optimization**

SGI Altix systems are also deployed to validate and optimize SAP's own database, MaxDB, for best use of NUMA architectures, high-cardinality multi-CPU and large memory systems. MaxDB has been used for many years to support all sizes of installations of the mySAP™ Business Suite family of business solutions. It has also been used for demanding SQL applications requiring an enterprise-class DBMS because of the number of users on the system, the transactional workload, the size of the database and availability and consistency aspects.

SGI Altix was also listed among top performers in the benchmark report of the Transaction Processing Performance Council (TPC) for use with IBM DB2 and SuSE Linux Enterprise Server 9 (SLES9). The TPC-H benchmark examines system performance and the price/performance ratio, for instance, when large databases are used.

### 7.0 Saving Time, Money, and Space: The SGI InfiniteStorage Solutions

But it does not stop at HPC: With SGI InfiniteStorage, SGI offers a complete range of storage solutions that are tailor-made for data-intensive environments. It recently launched the new mass-memory subsystem SGI InfiniteStorage 10000, which enables customers to counteract growing complexity and bottlenecks

[3] DSAG online survey on IT investment 2006, February 2006, www.dsag.de

while benefiting from high-performance data storage. The product is ideal for enterprise users who need substantial amounts of online storage, store more terabytes per footprint, and want to access archived data more quickly at a price per terabyte that is comparable to a tape-based robotic solution.

**Memory Management Included**

SGI offers a data lifecycle management system for managing petabytes of data (SGI® InfiniteStorage Data Migration Facility). The cost and complexity of managing this amount of data can be staggering - consuming a larger and larger percentage of IT capital and personnel budgets while doing little to reduce the mounting risk of data loss. SGI DMF eliminates these problems by automating data migration for the highest possible capacity utilization, providing much faster access to data than manual data migration.

Additionally, the SGI InfiniteStorage clustered filesystem CXFS™ is a solution that provides a previously unknown level of data access in data-intensive environments, accelerates the data flow, and considerably reduces costs. The clustered file system enables different computer system to access the same shared filesystem by concurrent reads and writes.

## 8.0 SGI Altix Servers: Advantages at a Glance

Like all state-of-the-art servers, the SGI Altix 4700 platform is based on innovative blade technologies, but offers enterprise customers three unique advantages:

1. **Scaling ease**
   When a new blade is plugged in, its memory and processors get incorporated within a single operating system.
2. **Lower cost**
   Memory-only blade option (disruptive technology). The memory can be scaled independently, without the customer having to buy unnecessary processors. (More significantly, it lowers the application costs, particularly those charged by processor count.)
3. **Largest proven single-memory capacity**
   One hundred 0.5TB and forty 1TB memory systems already installed; the largest installed is 13TB (w/ caveat) and 4TB (w/o caveat).

## 9.0 High-value and Market-driven: Final Conclusions

The commitment to the open-source movement, the unique global shared memory architecture, and partnerships with leading technology providers such as SAP ensure that the SGI Altix server solutions offer optimal hardware platforms for enterprise customers. The key advantages of the Altix systems are increased when used with Linux: Both technologies allow enterprises to adapt their IT resources flexibly to changing business requirements and reduce the risks associated with consolidation and migration. The low licensing, development, and servicing costs make for a rapid ROI and low TCO. With NUMAflex, SGI Altix platforms consequently generate considerable value in businesses.

Thanks to its close partnership with SAP, SGI is able to cope with the growing demand from SAP users for highly scalable, Linux-based server solutions – particularly in light of increasing demand for mySAP ERP and SAP NetWeaver. SAP also sees the Linux operating system as an advanced alternative to conventional platforms for enterprise customers. It opens up new options and enables Linux-based systems to fulfill the requirements of even the largest companies regarding performance and availability.

## 10.0 Silicon Graphics (SGI)

SGI is the world's leading provider of products, services and solutions for high-performance computing (HPC), high-performance visualization (HPV), and complex data management that enable its technical and creative customers to gain strategic and competitive advantages in their core businesses. Whether being used to design and build safer cars and airplanes, discover new medications and techniques for brain surgery, tap new energy sources, predict the weather, enable the transition from analog to digital broadcasting, or provide mission-critical support for government defense, SGI systems and expertise are empowering a world of innovation and discovery. The company is headquartered in Mountain View, California. www.sgi.com



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