

The Data Center Opens Up

A growing number of organizations are using the Fujitsu Group's innovative PRIMEQUEST servers—with their open, mainframe-class performance and reliability—to transform enterprise computing operations

Businesses today operate in a changing and unpredictable landscape—and IT departments have had to scramble to keep up. In response, they often add more and more servers that must be managed and coordinated. They also rely on expensive and complex mainframes to ensure high availability and keep vital data flowing to the business. And they frequently have to modify systems to support new business initiatives or fluctuations in workloads—no easy task when dealing with a varied array of systems. The result, overall, has been growing complexity, costs, and difficulty in delivering the agility needed by the business.

To help IT departments meet those challenges, the Fujitsu Group launched a groundbreaking new line of servers in 2005. Based on Intel® Itanium® 2 processors, the PRIMEQUEST™ family of servers brings industry-standard computing to high-end data center operations. "That represents a big change, because with PRIMEQUEST servers, companies have new options for addressing today's pressing enterprise computing challenges," says Akira Kabemoto, senior vice president of the Server System Unit at Fujitsu Limited. "They can bring the benefits of open computing to the data center, and at the same time streamline systems management and maintain the reliability and scalability needed for enterprise computing."

Since the initial release of PRIMEQUEST servers, dozens of organizations have been putting them to work and exploring ways to move beyond the traditional mainframe-based approach to the data center. For example, EDS, the Plano, Texas-based global technology services company, is incorporating Fujitsu Group computing platforms—including PRIMEQUEST—into its solutions for enterprise customers. "As we continue to deploy our modernization strategy, we are using the Fujitsu Group's PRIMEQUEST Intel Itanium-based servers as our certified platform for re-hosting applications," says Ray Cline, vice president of Infrastructure Portfolio Development at EDS. "Based on

pilots for some very large applications, the performance exceeds expectations and delivers the performance results EDS and our clients expect."

Cost-effective, mission-critical

"The PRIMEQUEST family of servers is opening a new era in the effort to align enterprise computing and the needs of the business," says Richard McCormack, senior vice president of Marketing at Fujitsu Computer Systems Corporation. In fact, he explains, the PRIMEQUEST family is part of a larger vision: TRIOLE™—the Fujitsu Group's process for creating industrialized IT infrastructures and services. Servers, storage, and all other hardware components are integrated with automation and virtualization

achieving high performance," says Judson Althoff, vice president of Platform Alliances at Oracle, which uses PRIMEQUEST servers for quality assurance testing and support purposes. "For example, customers can build enterprise grids on Oracle 10g using PRIMEQUEST servers running Windows or Linux, which gives them high quality of service, fast performance, high reliability, scalability on demand, and easier management."

The open, industry-standard approach also brings agility to IT. Toyota Motor Corporation believes that it is important not to be locked into proprietary systems. Increased flexibility of a system and choice of open products are key factors because Toyota is continuously expanding its global business. Under this strategy, Toyota selected the

"The combination of Oracle and Fujitsu Group PRIMEQUEST servers lets companies operate cost-effectively by taking advantage of industry-standard solutions while achieving high performance."

—Judson Althoff, vice president, Platform Alliances, Oracle

software in the process. Virtualization separates business applications and data from dedicated IT resources, and pools resources for flexible and efficient usage. Automation provides infrastructures that adjust automatically to changes in operations and the environment through self-monitoring and self-rectifying technologies. "These core technologies bring enhanced agility, efficiency, and continuity to the business," McCormack says.

PRIMEQUEST servers, with their use of Intel processors and the Linux and Microsoft Windows Server 2003 operating systems, allow companies to enjoy the cost advantages of industry-standard technology, take advantage of the Intel ecosystem of technology and application vendors, and leverage Windows and Linux skills in the data center.

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Fujitsu Group's open, industry-standard system with Linux for development purposes.

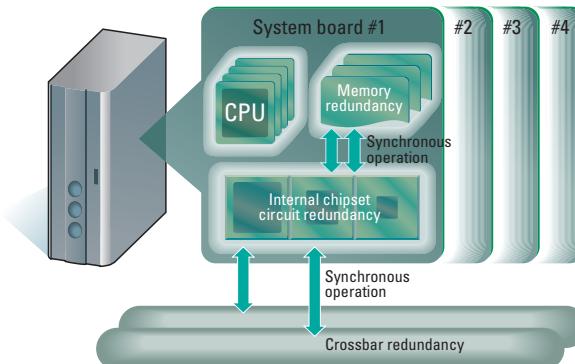
PRIMEQUEST servers couple openness and flexibility with power, making them suitable for some of the most demanding mission-critical applications traditionally handled by mainframes. In terms of performance, for example, PRIMEQUEST servers and Oracle were used to set a world record in the two-tier SAP® Sales and Distribution (SD) Standard Application Benchmark for the fastest performance on Linux. PRIMEQUEST servers also achieved a world record for servers up to 32 cores in the Standard Performance Evaluation Corporation (SPEC®) Java Business Benchmark 2005 (SPECjbb®2005), with performance of 322,719 business operations per second*—indicating that PRIMEQUEST can provide a high-performance platform for implementing service-oriented software architectures for business applications.

*Certification Number 2006Q23 — The two-tier SAP SD Standard Application Benchmark performed on April 18, 2006, by Fujitsu Siemens Computers, was certified on May 11, 2006, with the following data: Number of benchmark users & comp.: 5,000 SAP SD Benchmark users. Average dialog response time: 1.97 seconds. Throughput: Fully processed order line items/hour: 501,000. Dialog steps/hour: 1,503,000. SAPS: 25,050. Average DB request time (dia/upd): 0.014 sec / 0.036 sec. CPU utilization of central server: 99%. Operating system central server: Novell SuSE Linux, Enterprise Server 9 RDBMS: Oracle9i Database, SAP ECC Release 5.0. Configuration: Central server: Fujitsu PRIMEQUEST 480, 32 processors / 32 cores / 32 threads, Intel Itanium 2, 1.6 GHz, 32 KB L1 cache, 9 MB L3 cache, 256 GB main memory.

Continuity, efficiency, and agility for the business

The PRIMEQUEST family incorporates a number of technologies designed to ensure the reliability needed for mission-critical systems. For example, PRIMEQUEST servers use System Mirror technology that allows memory modules and crossbar interconnects to operate in duplex mode and isolates faulty components without stopping the system. This System Mirror—a first for servers based on the Intel Itanium architecture—duplicates all CPU instructions and handles both sets of instructions in a fully synchronized mode, detecting faults in peripherals by identifying inconsistencies across both sets. Because this "fault proofing" is performed at the hardware level, the operating system and applications are not affected and can operate continuously. In addition, there is no delay needed to isolate a fault or to allow for system failover. The result is fewer faults and a level of downtime that is half that of conventional server systems.

PRIMEQUEST servers also have a Flexible I/O (FIO) feature that allows on-demand redirection of I/O resources to specific processing resources. In traditional servers, I/O units and system boards are bundled, which means that when application or load requirements fluctuate, the system boards cannot always use the full potential of the available I/O units, leading to wasted resources. With PRIMEQUEST, the Fujitsu Group has enabled flexible combinations of system and I/O units that can constantly match changing system loads and partition



PRIMEQUEST's System Mirror function allows memory modules and crossbar interconnects to operate in duplex mode. The system duplicates all CPU instructions and processes both sets of instructions in a fully synchronized mode, enabling it to detect faults in peripherals by comparing tasks across both mirrors.

configurations, making it easier to optimize the use of system resources. This flexibility also improves system availability, reduces maintenance downtime, and shortens the time it takes to recover from a failed system board by 90 percent compared with conventional servers.

Finally, PRIMEQUEST delivers reliability and streamlines administration with built-in management boards that support autonomous operation and the consolidated management of the entire PRIMEQUEST system, including hardware, software, and partitions. With a PC and Web browser, administrators can use the management boards to perform a wide range of activities, including server configuration, usage monitoring, fault monitoring, partitioning, server management, power control and scheduling, and configuration monitoring. The management boards also give users a predictive monitoring function that constantly tracks the status of the system to automatically identify and isolate any components that show signs of problems—before those

problems develop into a fatal fault.

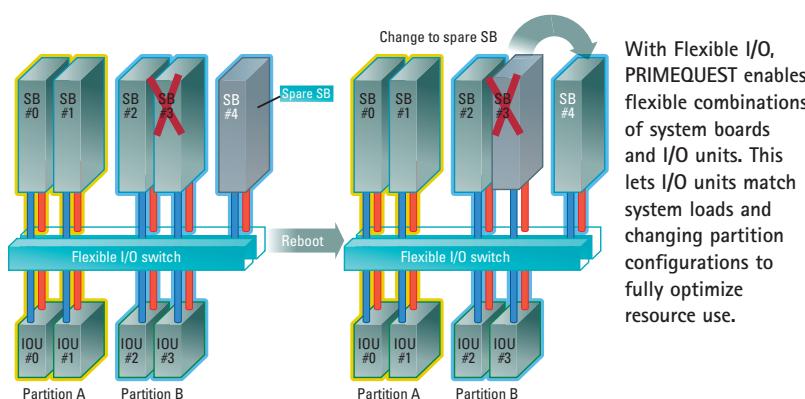
Overall, the standard features of PRIMEQUEST servers provide a 99.99 percent system availability rate—and that can be increased to "five nines" when they are run in clusters of two or more servers.

Tailored for consolidation

Drawing on that power and flexibility, the Fujitsu Group has optimized the PRIMEQUEST family to support server consolidation—an increasingly important trend in the data center as companies work to streamline and rationalize fragmented IT landscapes.

A growing number of organizations have been using PRIMEQUEST for such efforts. For example, the Shibaura Institute of Technology in Japan is using PRIMEQUEST to enable consolidation and meet its need to support mission-critical systems. The institute—which is known for advanced robotics studies—serves some 8,000 students and staff with its systems, and it has been expanding the computer-based services it provides to them. The institute's systems not only support the library and administrative education-management processes, but also provide everything from automatic attendance-tracking using IC cards to class information, which students can see on monitors around the institute, via a portal, or by using their mobile phones.

Such services increased the amount of data that must be managed, and the institute increased its number of servers to handle the workload. As a result, it was concerned about systems going



Resources

PRIMEQUEST servers

- www.fujitsu.com/primequest
- www.fujitsu-siemens.com/primequest
- www.computers.us.fujitsu.com/primequest

TRIOLE

- www.fujitsu.com/triole
- www.fujitsu-siemens.com/triole
- www.computers.us.fujitsu.com/triole

Oracle and Fujitsu

- uc.fujitsu.com/oracle
- www.fujitsu-siemens.com/oracle
- us.fujitsu.com/computers/oracle
- solutions.oracle.com Enter "Fujitsu"

down during admissions periods, final tests, and other busy times of the year. In addition, the institute has several departments, which meant having to maintain multiple systems.

The Shibaura Institute addressed these issues by consolidating several databases onto Oracle 10g running on PRIMEQUEST servers, and moving applications to blade servers. As a result, maintenance is streamlined, and system engineers can focus on new projects rather than routine tasks. The institute plans to expand the services it provides to students, and PRIMEQUEST offers the scalability the institute needs for such efforts—as well as the reliability required for its consolidated, mission-critical systems. "We know the Fujitsu Group's reliability because we had used a Fujitsu Group mainframe," says Tatsuro Yamazaki, director of the Center for Science Information at Shibaura Institute of Technology. "We chose PRIMEQUEST because it is as robust as mainframe-class computers, and we can expect it to provide stable operations."

PRIMEQUEST supports consolidation with the ability to easily scale up and scale out cost-effectively. Sungae Hospital in Korea, for example, is consolidating 14 servers

onto one PRIMEQUEST system, helping to cut system-management costs while increasing capacity and reliability.

Individual PRIMEQUEST servers can be expanded to include up to 64 processor cores in a single cabinet. New resources can be brought online without disrupting previously configured resources. PRIMEQUEST servers can also be run in clusters using the Fujitsu Group's PRIMECLUSTER™ technology, a high-availability environment that supports Oracle Database 10g including Oracle Real Application Clusters.

The servers also bring ease of management and flexibility to consolidation efforts, with robust partitioning capabilities that let companies configure a large number of isolated partitions, with each partition running its own operating system and applications. In effect, each partition is a fully independent "server" within the system, which means companies can run Linux and Windows simultaneously on the same machine. What's more, with PRIMEQUEST's separation of I/O resources and system boards, additional I/O resources can be added without affecting processor and memory configurations. That flexibility lets companies scale up and scale out applications within the server, and easily rearrange disks and peripherals connected to each partition.

Overall, PRIMEQUEST servers are designed to provide power and cost-effectiveness both today and tomorrow. To that end, the Fujitsu Group works with key partners—including Intel and Oracle—to ensure that PRIMEQUEST development continues to meet the needs of enterprise computing. "PRIMEQUEST and the TRIOLE process are designed to help companies transform and streamline their data centers," says Dr. Bernd Kosch, vice president of Alliances at Fujitsu Siemens Computers. "We will continue to explore new ways to reduce IT operating costs while enhancing the data center's ability to support business-critical computing and adapt to the ever-changing needs of the business." •



Japan's Shibaura Institute of Technology has used PRIMEQUEST servers to consolidate mission-critical applications and provide reliable service to some 8,000 students and staff.