SINGTEL DATA CENTERS DELIVER **FASTER RESULTS** TO CUSTOMERS

For a telecom provider with unmatched reach throughout the Asia Pacific region, AMD Opteron™ processor-based servers drastically reduce the time it takes to analyze data, while ensuring a smooth transition to 64-bit applications when needed.

THE CHALLENGE

- Achieve greater throughput and higher systems performance for growing customer base
- Speed up firewall log analysis to respond more effectively to security threats and get reports to customers faster
- Accelerate Web trend log analysis and get reports to customers faster
- Increase server density to maximize available space

THE SOLUTION

- Installed 2-way HP ProLiant DLI45 rack-mount servers using AMD Opteron™ processors
- Implemented 4-way HP ProLiant DL585 servers as VERITAS NetBackup servers
- Deployed WebTrends Firewall Suite on HP ProLiant DLI45 servers for faster firewall report generation

THE IMPACT

- Drastic improvement in analysis and reporting on multiple gigabytes of firewall log data
- IU servers provide much higher server density than predecessors
- Faster Web log analysis and reporting helps customers enhance competitive advantage
- New servers have much more headroom for growth and future applications

SingTel:
A Telecom Leader

SingTel is one of Asia's leading communications groups with operations and investments around the world. Serving both the corporate and consumer markets, it is committed to bringing the best of global communications to customers in the Asia Pacific and beyond.

With significant operations in Singapore and Australia (through wholly owned subsidiary SingTel Optus), the group provides a comprehensive portfolio of services that includes voice and data services over fixed, wireless, and Internet platforms.

To serve the needs of multi-national corporations, SingTel has a network of 35 offices in I7 countries and territories throughout Asia Pacific, Europe, and the United States. These offices enable SingTel to deliver reliable, quality network solutions to its customers, either on its own or jointly with local partners.

The group also has major investments in Bangladesh, India, Indonesia, the Philippines, and Thailand. Together with its regional partners, SingTel is Asia's largest multi-market mobile operator, serving over 65 million customers in seven markets.

SingTel employs more than I9,000 people worldwide and had a turnover of S$I2.6 billion (US$7.64 billion) and net profit after tax of S$3.27 billion (US$I.98 billion) for the year ended 3I March 2005.

SingTel also offers a comprehensive suite of managed hosting services branded EXPAN. With one of the most extensive networks of world-class data centers spanning across I4 countries in Asia Pacific, the U.S., and the U.K., EXPAN supports e-businesses and enterprise customers with complex and unique solutions for mission-critical applications and disaster recovery in a highly secure and resilient hosting environment.

EXPAN: Services and Reach

EXPAN services include the provision of co-location, bandwidth, IT-related operations, and IT disaster recovery via backup, workroom, and storage facilities. In EXPAN's data centers, customers can enjoy 24x7 network monitoring, systems administration, and maintenance, security services, data storage, and administration, performance monitoring, and fault management, problem resolution, and technical support. EXPAN is available from a network of 50 data centers spanning across 14 countries in Asia Pacific, the U.S., and the U.K. SingTel has its own data centers in Australia, Hong Kong, Japan, Korea, Singapore, and Taiwan. SingTel also offers hosting services through marketing alliances with partners in China, India, Indonesia, Malaysia, the Philippines, Thailand, the U.S., and the U.K.

Striking the Right Balance

Nobody knows better than Chiam Hock Seng, deputy director of product development for SingTel EXPAN, that fast server and application performance are absolute requirements for success in the managed hosting business.

At the same time, in a region known for high energy costs and scant office space, EXPAN has to provide this extraordinary level of performance as economically as possible. "In the Asia Pacific region, price is always a big issue," says Mr. Chiam. "The challenge is to provide customers with just the right balance of performance, scalability, reliability, and cost."

Flexibility in the hosting market is largely a function of rack space consumed, so packing as much server power and functionality into as small a space as possible is important. That's why when EXPAN decided to replace its 32-bit x86 servers, it looked for a solution that could run its legacy 32-bit applications at lightning speed. EXPAN deploys IU-high, two-way HP ProLiant DLI45 and 4U HP ProLiant DL585 rack-mount servers based on AMD Opteron™ 200 Series processors.

"We deployed the HP servers because we needed [the AMD] Opteron [processor's] full backward compatibility with standard 32-bit x86 applications," says Mr. Chiam. "As you know, 32-bit applications are still very much around. But we also wanted to be able to run the new 64-bit versions of applications on the same server without a complicated upgrade when it's time for an upgrade."

Mr. Chiam was impressed by the advanced memory architecture of the AMD Opteron processor. "Processor speed is one thing, but we also looked at memory, scalability, and reliability," says Mr. Chiam. "We were impressed with [the AMD] Opteron [processor's] Direct Connect Architecture."

It didn't take long for the AMD Opteron processor to prove itself. "We put the [AMD] Opteron [processor]-based servers on several applications, both for application upgrades and new services," Mr. Chiam says. "We could see they were very powerful and capable of growth."

The Challenge:
Keeping Up with Customer Demands

One challenge that EXPAN has to face is maintaining world-class security for its multi-national customers. Every day its extensive security infrastructure produces an enormous amount of log data. Previously, it took a few days to analyze that data, which is unacceptable in an environment where attacks are bound to come fast and furiously. To respond to attacks effectively, the log analysis had to speed up significantly.

Solution:
AMD Opteron™ Processors for Today and Tomorrow

The only real solution was to find a platform that could run today's 32-bit applications much faster than EXPAN's current hardware, and run 64-bit applications without requiring a complicated transition, all in a compact configuration.

"[The] AMD Opteron [processor] came into the picture at just the right time for us. We knew it was time to give it a try," says Mr. Chiam. The AMD Opteron processor proved capable of running 32-bit applications with outstanding performance gains. The AMD Opteron processor is a dramatic leap forward in compatibility, performance, investment protection, and low total cost of ownership.

AMD Opteron Processor Put to the Test

EXPAN put the AMD Opteron processor to the test by installing dual-processor HP ProLiant DLI45 rack-mount servers. The ProLiant DLI45 systems feature on-board memory controllers running at the speed of the processor, up to I6GB of 2-way interleaved PC2700 memory, an embedded dual-channel Gigabit Ethernet interface, a I33MHz PCI-X I/O expansion slot, and support for two ATA or SCSI drives, all in a single IU-high configuration. The IU size, low power consumption, and support for dual processors provided SingTel with the high-performance, low-density solution it was looking for.

EXPAN backed up its ProLiant DLI45s with 4U HP ProLiant DL585 servers, which feature up to four AMD Opteron processors, eight PCI-X expansion slots, a dual-port Gigabit Ethernet NIC, a Smart Array 5i Plus controller with battery-backed write cache enabler, and four drive bays.

On the ProLiant DLI45 servers, EXPAN runs a variety of applications, including firewall management software and BMC Patrol for Microsoft Windows® Servers, which are used to monitor the performance of its servers and applications.

All the data center applications showed significant performance improvements with the AMD Opteron processor, but probably the most significant—and the most important performance enhancement for EXPAN's users—was the dramatic reduction in the time it took to generate monthly firewall reports. EXPAN data centers provide a secure hosting environment where customers can host their application and network systems, and access data center resources that can be scaled to their business needs.

"We need the fast processing speed of the HP server and [the AMD] Opteron [processor] to get these reports to our customers quickly," says Mr. Chiam. EXPAN's customers find this information invaluable for helping them maintain and enhance their competitive advantage.

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EXPAN's HP servers have plenty of room for growth. "Most of the time these servers show very low CPU utilization," says Mr. Chiam. "When new applications come out, they get bigger, they consume more resources, and naturally you need bigger and better hardware. With these HP servers, we'll be ready for them."

EXPAN plans to recommend servers running the AMD Opteron processor to its customers as well. "Based on what we have observed, we can tell our customers that we are happy with [the AMD] Opteron [processor]… With the success achieved with AMD Opteron processors." Mr. Chiam concludes, "SingTel is looking forward to testing the dual-core AMD Opteron processors for even greater performance and throughput."

Thanks to the AMD Opteron™ processor, SingTel has cut the time it takes to analyze and report on firewall log data.

The deployment of HP servers based on the AMD Opteron processor has provided EXPAN with an excellent ratio of performance to cost of operations, plenty of room for growth, and a smooth transition to 64-bit computing when it's time to upgrade. The power, scalability, and reliability of the AMD Opteron processor have allowed EXPAN to provide its customers with enhanced application performance and world-class security. And the ability to provide timely firewall log information will help its customers enhance their competitive advantage. Servers based on the AMD Opteron processor let EXPAN strike just the right balance for its customers.

AMD Opteron™ Processor Design Breaks Traditional Bottlenecks

The AMD Opteron™ processor was engineered to do much more than run 64-bit software at high speed. The processor's design overcomes many of the performance bottlenecks inherent in competing CPUs, resulting in faster system response time, much speedier calculations, and quicker interaction between components.

Direct Connect Architecture reduces performance bottlenecks typical of competing front-side bus architectures by linking processors, memory controller, and I/O directly to the CPU. With an uninterrupted path between memory and CPU, for example, data is manipulated much more quickly. The AMD Opteron processor's integrated memory controller further boosts application performance by reducing memory latency. Interaction between the CPU and other components, such as the graphics subsystem, is also quickened.

Another advantage of the AMD Opteron processor is HyperTransport™ technology, a bandwidth booster that provides a high-speed link to accelerate I/O, improve scalability, and reduce latency. As a result, data throughput is increased by as much as 70 percent. HyperTransport technology also lowers the number of buses in a system, which helps reduce bottlenecks and improve efficiency of memory use.

Built on AMD64 x86-compliant architecture, the AMD Opteron processor runs both 32-bit and 64-bit x86 applications natively.

Solving the immediate performance and density issues was not the only challenge. A new crop of high-performance 64-bit applications was being introduced by a variety of vendors, including the major database developers. These new applications could address many times more memory than the 4GB limit of the 32-bit architecture. Access to more memory space would result in lightning-quick application performance. It was clear that end users would eventually expect data centers to support those applications. Yet 32-bit server applications were still very much in the mainstream and would have to be supported as well.

Other 64-bit server solutions could support both 32-bit and 64-bit applications, but they ran 32-bit applications in an emulation mode that bogged down performance. Newer servers based on the latest 32-bit processors could run existing applications very quickly, but could not handle 64-bit versions.

IT experts knew it would not be cost-efficient to do a major 32-bit upgrade now, only to have to upgrade again when migrating to 64-bit software. It was also clear that the new platform would have to provide plenty of scalability for future growth and future applications that would undoubtedly demand more server power and memory.

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