



Product Evaluation Case Study

Quad-Core Intel® Xeon® processor 5300 series®
Healthcare



Intel® Technology Reaches for the Heart

Intel® Quad-Core technology at the heart of Bangkok Hospital servers creates breakthrough results without raising the heat

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| Company: | Established in 1972, Bangkok Hospital Medical Center (BMC) is one of Thailand's largest Hospitals providing tertiary healthcare. The Hospital has more than 400 full-time and consultant physicians and 600 nurses. |
| Product evaluated: | Quad-Core Intel® Xeon®1 processor 5300 series |
| Challenge: | Improve server speed and performance without significantly increasing costs. |
| Results: | Improved speed and reliability of server applications with little increase in electrical usage or heat dissipation. |
| Impact: | Better performance from servers with cost savings from reduced electricity bills and cooling costs. |
| Next steps: | Possible replacement of 30 existing servers with servers based on Quad-Core Intel Xeon processors. |


“Quad-core servers offer the opportunity to increase server speed, reduce server space and reduce power consumption.”

Khun Monpra-On
TTC Director
Bangkok Hospital

Challenge: Improve server speed and reliability without increasing cost

Bangkok Hospital Medical Center (BMC) is the flagship of the Bangkok Hospital Group, which comprises 18 hospitals across the region. BMC is committed to providing medical services of the highest standards by employing the best practices and technology in medicine. This has driven the Hospital to continuously invest in the latest technology, medical expertise and supporting facilities, making BMC one of the premier medical institutions in Southeast Asia.

BMC has over 1,500 PCs deployed across the Hospital with IT support provided by over 40 full-time personnel. The Hospital has 30 servers that provide the backbone for three critical applications – TrakHealth*, a web-based electronic patient record system; PeopleSoft HR*; and PeopleSoft FD*, a human resource application. BMC staff depends on these applications and servers to support their operational and routine work.



The Hospital intends to replace all 30 servers by the end of 2007 for two main reasons: Improving server reliability has become critical as server-related failure is a leading cause of downtime at the Hospital; enhancing server performance is also crucial as BMC hopes to achieve round-the-clock, real-time views of critical system information. Besides the above reasons, further requirements of a new server deployment at the Hospital are easy migration of existing applications as well as adequate management of operational costs via lower electrical consumption and heat dissipation.

Bearing these challenges in mind, BMC with help from Intel technical specialists, decided to evaluate Intel Quad-Core technology.

Technology evaluation: Quad-Core Intel Xeon Processor

The main goals of the BMC-Intel team, was to evaluate Intel Quad-Core technology for reliability, speed, electrical consumption and heat dissipation.

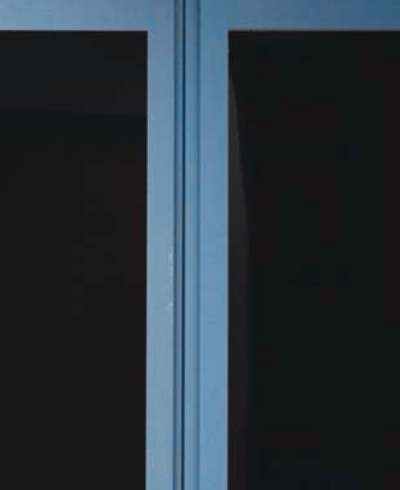
The team set up a test environment that consisted of two Hewlett-Packard* ProLiant ML530 G2 Servers running on the Quad-Core Intel Xeon processor 5300 series. Dell* PCs were used as clients, running four benchmarking applications that measured speed, reliability, electrical consumption as well as heat dissipation.

The test exceeded the expectations of Khun Monpra-On, TTC Director at BMC. "We immediately experienced faster speed-to-run jobs after migrating critical applications to the Intel Xeon servers," she said. Furthermore, the Hospital's critical applications ran on the Quad-Core Intel Xeon processors without requiring any code changes.

Results: Breakthrough performance with doubled efficiency

The results of the evaluation demonstrated to the team how Quad-Core Intel Xeon processors meet the needs of BMC. In particular, the 40% improvement in application performance over single or dual-core processors most impressed Khun Monpra-On.

"The 8 MB on-die L2 cache, full-speed front side bus and Fully Buffered DIMM (FBDIMM) helped us run our applications faster and improved the overall performance of our applications – I see the key strength of Quad-Core Intel Xeon processors as speed," she said.



The breakthrough performance of Quad-Core Intel Xeon processors is achieved by:

- Maximizing the improved efficiency of L2 cache-to-core data transfers
- The increased throughput of fast, dedicated front-side buses
- Utilizing the wide dynamic execution engine that computes four instructions per clock

When coupled with other platform-level innovations—including FBDIMM technology and accelerated I/O capability – Intel Quad-Core Xeon processors boost server utilization while providing adequate headroom for unpredictable server workloads and escalating computing needs. This delivers better performance on applications, regardless of how well threaded they are – enhancing the reliability of the Hospital’s four critical applications. Ultimately, the high-performance of servers based on Intel Quad-Core Xeon processors promises to future-proof the Hospital against the growing needs of a digital healthcare, even supporting virtualization if required.

Besides delivering speed, TTC Director Khun Monpra-On also noted that the reduced server space and power consumption of Quad-Core Intel Xeon processors helped address their need to lower operational costs.

Intel Quad-Core technology uses four separate logical processing units on a single processor, sharing memory, I/O and caching. The result is a processor that consumes as much power, or less power than, a single or dual-core processor – only with more processing performance. Because the power consumption per core is reduced, performance per watt is increased, reducing heat dissipation and cooling challenges. The greater performance per square foot also enables denser data center deployments.

“Quad-core servers offer the opportunity to increase server speed, reduce server space and reduce power consumption,” said Khun Monpra-On.

Impact: Lower heat, reduced bills

Many IT departments are struggling with rising power costs, inadequate cooling systems and a strong need to contain the footprint of datacenters.

With performance three times to five times greater than single core-based systems – at similar power requirements – the Quad-Core Intel Xeon processor proves itself ideal for BMC.

Reduced electricity costs are significant, given that for every USD\$1 of new server spent in 2005, USD\$0.48 was spent on power and cooling. This was a sharp increase from 2000, when the ratio was USD\$1.00:0.21. The ratio is expected to rise to USD\$1.00:0.71 by 2010 .

TTC Director Khun Monpra-On expects that deploying servers based on the Quad-Core Intel Xeon processor would result in BMC experiencing cost savings from reduced electricity bills and cooling costs, as a result of performance per watt improvements.

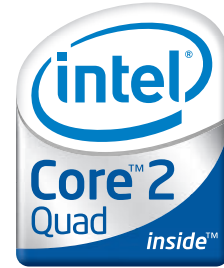
Besides managing electricity costs, server space is maximized at datacenters, saving costly expenditure on real-estate, an expensive reality in Bangkok.

Future: Intel Quad-Core technology could form the heart of servers

The test deployment of servers based on the Quad-Core Intel Xeon processor 5300 series proved the ability of Intel Quad-Core technology to more than meet the needs of BMC.

As a viable platform to replace the Hospital's current servers, Intel Quad-Core technology would ultimately benefit the Hospital's vision of investing in the latest medical technology to provide the best healthcare possible for its patients.

Find a business solution that is right for your Hospital or healthcare system. Contact your local Intel® representative or visit the Intel® Digital Health Web site at www.intel.com/healthcare.



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