THE BENEFITS OF MULTI-CORE SERVERS

For the enterprise customer seeking to achieve substantial performance benefits while simplifying IT structure, multi-core processor servers can yield significant gains. Such servers offer excellent application performance, controlled energy use, and the ability to virtualize applications, and the reduction of recurring software and warranty fees.

And multi-core processors, particularly soon to be available quad-core processors, hold much promise. In fact, a 2007 eWeek online article noted that multi-core processors were one of the ten things that would change the enterprise forever.¹

An October 2006 article in Baseline Magazine placed multi-core processors as one of a handful of technologies that “could lead to a doubling of productivity within the next five years.”²

So what makes multi-core servers so enticing? One factor is the potential for cost reductions. Seventy percent of the total lifetime cost of a server goes to management and operational costs, including power and cooling costs; just 30 percent to the expense of the actual hardware, said IDC analyst John Humphreys in a 2006 CIO Insight article.³ Since a multi-core server can support many more applications, companies can consolidate many servers into a fewer number of more powerful systems thus cutting the long-term management and maintenance costs of the eliminated servers.

For these reasons, companies have been quick to adopt multi-core servers. In 2006, the number of Windows-based multi-core systems purchased grew by 1,200 percent over 2005, according to IDC.⁴ Similarly, Linux-based multi-core systems grew 500 percent in 2006.

DELIVERING THE REQUIRED POWER
Quad-core technology uses four separate logical processing units on a single processor that shares memory, I/O, and caching. Users can dedicate individual cores to different applications, providing a natural platform for consolidation. The processor can simultaneously handle multiple threads that can help reduce latency when more than one thread per application or more than one application is running.

This metric and others like it that give a user some indication of the power consumption of a server are becoming more important to organizations. Noting this, the industry has responded in a number of ways. For instance, a Dell-supported group called The Green Grid (http://www.thegreengrid.org) promotes energy efficiency through conferences and publications.

One factor that promotes energy efficiency is that the quad-core processors operate at lower frequencies as compared to previous generation CPUs. One common misconception is that because they operate at a lower frequency, systems that use them are slower.

This is not the case. More processor cores provide greater performance at a lower speed because there are more cores processing information at the same time. Thus, a PowerEdge with a Quad-Core Intel Xeon E5310 at 1.6GHz is 10% faster than a Dual-Core Intel Xeon 5160 at 3.0Ghz.⁵ AMD has repeatedly stated publicly that the same will be true for their Quad-Core Opteron processors.

In fact, although the clock speed of multi-core processors is lower than their predecessors, today’s Quad-Core servers deliver three to five times the performance of similar cost systems that were offered just 12 to 18 months ago.⁶ Thus, most applications perform faster with quad-core processors.

CUSTOMER EXPECTATIONS
Dell plans to offer its PowerEdge SC1435, 2970, and 6950 servers with Quad-Core AMD Opteron processors as soon as they become available. The revised servers are expected to be easy to validate and deploy, since the new Quad-Core AMD Opteron processors share the same micro-architecture, power envelope and software compatibility as their previous Dual-Core processors. And with more processing cores, the systems will be better able to reap the benefits of working with multi-threaded software, which is now commonplace.

So what else can purchasers of Dell’s new quad-core offerings expect? For starters, users will also see improved performance from virtualization software, measured by an increase in the number of virtual machines that a given server can run. It’s also easier to program. “Using AMD-V(irtualization), software vendors can simplify the code needed for virtualization,” explained Margaret Lewis, AMD director of commercial independent software marketing.

And don’t forget that since now most software is licensed by socket instead of by the core, licensing costs are likely to decrease. Licensing costs may also drop if more users...
can be supported per licensed system. In addition, fewer licenses may be needed for software that is licensed per server or per processor socket if there are a smaller number of servers or sockets needed after moving to Quad-Core.

Servers like the Dell PowerEdge 6950 will accommodate AMD Quad-Core processors as they become available.

THE EASE OF SWITCHING TO DELL QUAD-CORE

Dell and its partners are working hard to ensure that an organization’s move to quad-core will be fast and seamless. There will be no need to recertify applications. Both the 2200 and 8200 series Quad-Core AMD Opteron processors are backwards compatible with their prior dual-core generations. Thus, software certified on those dual-core platforms is also compatible with quad-core processors.

Enterprise IT concerned that quad-core processors will run slower because of their lower frequencies can rest easy. More processor cores offer greater performance at a lower speed because there are more cores processing information at the same time.

Also, for those concerned that Dual-Core is still considered the preferred processor for high performance computing applications environments, that opinion should change as quad-core processors become more widely available and systems using them are optimized for these applications.

In fact, there are significant benefits to upgrading to a quad-core environment, not the least of which is improved performance while maintaining the same hardware footprint. Additionally, a performance-related refresh is particularly suitable for customers operating demanding applications such as database, back-office business applications, and engineering.

The IT decision maker will also see the wisdom in a socket-reduction refresh for multi-processor environments, especially now that price and performance have become more important on two-socket systems than ever before.

Lastly, the many organizations facing limitations in many key areas—including data center space, energy consumption costs, power and cooling infrastructure limitations—might do well to consider a full consolidation refresh. Qua-core servers can enable the organization to use a smaller number of faster processors to achieve the same performance. In the process, this will lower TCO and avoid costly data center expansion by consolidating applications from a larger number of older Single- or Dual-Core servers onto fewer, denser, more powerful quad-core servers, while at the same time optimizing energy use. Specifically, engineers have improved on the AMD PowerNow technology, which can increase or reduce the amount of power to the processor depending on the demand, according to a February report from eWeek.

In the final analysis, the prudent IT purchaser needs to run through a series of need-based evaluations to determine the organization’s need for a quad-core upgrade:

- Are you interested in cutting square footage used by servers?
- Do you want to trim energy usage?
- Do you wish to reduce management complexity?
- Are you interested in pursuing virtualization?
- Do you spend too much on software licenses?
- Are maintenance costs for old servers getting out of line?
- Do you have unused capacity?

If these factors are a consideration, it’s important to know that quad-core gives you the most performance so you can support more user load per server. Your enterprise will be able to do more with less physical systems using quad-core, especially if you run Virtualization. In addition, quad-core allows you the option of either receiving more performance while using the same power, or deploying fewer physical systems to reduce the overall power costs.

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1 Source: 10 Things that will Change the Enterprise Forever, eWeek, June 2007 http://www.eweek.com/slideshow/0,1206,a=207558,00.asp
2 Source: 5 to Watch as Baseline Turns 5, Baseline Magazine, October 2006 http://www.baselinemag.com/article2/0,1540,2024563,00.asp
3 Source: The Greening of the CIO, CIO Insight, July 11, 2006 http://www.cioinsight.com/print_article2/0,1217,a=182963,00.asp
4 Source: IDC Quarterly Server Tracker, 4Q06
6 Source: IDC, ibid