Dell Completes PowerEdge Dual-Core Upgrade — Integrates MS/SQL 2005 with Xeon MP

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Management Summary

We do not need a calendar to tell us that the holiday season is upon us. There is frost on the pumpkins and Halloween goblins on the street; Thanksgiving cannot be far away. With Thanksgiving, we can look forward to family gatherings, catching up on gossip, watching football games, and lots of good food. The holiday meal, however, does not just appear miraculously on the table. There is significant planning and preparation that goes into setting a table for 15 to 20 people or more, not the least of which is determining who will bring what for the banquet. There is the obligatory turkey, of course, but there are also many other traditional dishes to be assigned, among them: salad, sweet potatoes, corn bread, cranberry sauce, and, of course, apple and pumpkin pies for dessert. As host, you negotiate particular dishes with various individuals – some on rotation, others by default. However, there are many ways for the guests to prepare their assignments. Take the apple pie, for example: it can be baked from scratch, using freshly picked apples, a home made crust, and mom's secret recipe for spices; or you can go to the supermarket and buy a ready-to-fill crust and already prepared ingredients; you can even buy a frozen apple pie that was made days or weeks before and heat it up after dinner; or you can go to the best bakery in town and reserve a freshly baked pie for Thanksgiving morning. The pie decision comes down to priorities: cost, quality, convenience. The least expensive solution might be the most time-consuming; the best tasting pie might be the most expensive; getting to the bakery might not be convenient. However, **what if the best tasting pie with the freshest ingredients was the most convenient to acquire and was the least expensive?** That is what you would call a no-brainer. Give me two.

In the information technology (IT) arena, we have been presented with a no-brainer solution for an integrated data base environment that is as good as Mom's apple pie and will help to lower the total cost of ownership (TCO) for any sized data center, whether Fortune 500 enterprise-level or a small-to-medium sized business. Recently, Dell has worked with Intel to deliver the latest in dual-core architecture for two-socket *PowerEdge* servers. Now, with the introduction of dual-core *Xeon* processors *MP* (*Paxville*), Dell brings the same improvements in throughput performance and cost reduction to the quad-processor arena. Moreover, Dell has also been working with Microsoft to integrate *MS/SQL Server 2005* into that same PowerEdge platform, along with Dell-EMC disk storage platforms and *PowerVault* tape automation products. If you would like to put the "freshest ingredients" with the lowest TCO into your IT infrastructure, please read on.

The Data Center Database Landscape

Data Centers around the globe are all suffering from the same maladies:

1. A glut of information requiring structure and management;

2. An inadequate IT infrastructure to provide the responsiveness, server utilization, and reliability that a 21st century business demands; and

3. Rising costs exploding around them.

These enterprises are looking to the IT industry for simplified, integrated database solutions, not simply platforms that come with "some assembly required". They are looking for a vendor to stand up and take responsibility for the total solution, not to become engaged in a finger-pointing exercise, where five or six component[1] providers are trying to affix blame somewhere else. The data center staff is seeking improved performance and availability in order to deliver to management, partners, and customers the information that they need, when and where they need it. Moreover, this solution must fit within the budget constraints imposed upon them by enterprise management.

Simplification starts with the very fabric of an open systems infrastructure: the servers and the application interface between them and the data center staff. There are a variety of applications at work in any enterprise: mission-critical OLTP as well as decision support, compute intensive, and I/O intensive. It is important to the TCO of that enterprise that there is a single operating environment, a single image interface between the servers and that staff, no matter where the installation is. The interface must be the same in a remote office as it is in the "glass house", everywhere that the application is required. This does not mean that one-size-fits-all. In order to improve the TCO, the servers and applications have to be configured, sized, and priced to match the intended environment. You do not need a data center version of an application in a remote or branch office. Further you cannot afford to have too many servers installed. The

complexity of Windows server networks is caused by the proliferation of one- and two-way platforms throughout the enterprise. Reducing the number of those platforms will lower the TCO of your IT network.

Within that simplification, database management may be best opportunity for you to also improve IT performance, increase data security, and reduce costs. With a growing need for application scalability and continual access to enterprise data, an investment in an upgrade to an enterprise's database management facilities, both hardware and software, could provide a large and immediate ROI. Recent break-throughs in commodity microprocessor architecture have delivered dual-core processors to entry- and mid-range applications within the enterprise. With the implementation of scale-out environments, enterprises have been installing mono- and dual-socket servers, standalone or clustered, and doubling the IT performance without disturbing the data center footprint or energy expenditure. With the recent announcement by Dell of the availability of quad-socket PowerEdge servers driven by Intel's new dual-core *Xeon MP* microprocessor, along with the availability of Microsoft's newly released database software, *SQL Server 2005*, you can now implement an integrated, enterprise-level database solution with more features, functionality, and performance than ever before.

Performance is a measurable key factor. The average enterprise server is operating at about 30% of its full CPU capability. With the advent of dual-core processors and sophisticated virtualization techniques, utilization has climbed to 70%-80%, and performance measurements have been rising as well. In evaluating transactional performance for servers, the *TPC-C* benchmark from the Transaction Processing Performance Council is the cookbook to which CIOs most often refer. TPC-C has two significant measuring sticks: *raw performance* - measured in *tpmC* units and *price/performance* - measuring the relative power of the platform based upon the number of microprocessors installed. Many data processing professionals discount the raw performance value because they do not have the money, or the need, to acquire these scale-up systems at the very highest level. The current raw performance leader is an IBM

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[1] This includes server, storage, operating system, system management, database management system, horizontal applications (such as ERP), and services.

eServer p5 595 with 64 dual-core *POWER* processors running *DB2* at a cost in excess of $16M. Multiple cores and sophisticated virtualization techniques contribute to the improved performance, but not without a heady price. This server has a relative price/performance value in excess of $5 per tpmC. If we look at the top eleven systems in the price-performance category[2], we notice that the top four and eight of the eleven use Microsoft SQL Server. Furthermore, we note that the #1 system for price-performance is a mono-processor Dell PowerEdge 2800[3] with a dual-core Xeon processor, running SQL Server 2005 (Standard Edition). This is the only system in the TPC spreadsheet with a price-performance under $1.00. It is also worthy to mention that systems #2 and #3 on the list are also PowerEdge 2800 servers, however, they are running single-core with SQL Server 2000. All three systems have a configured list price under $40,000 and **the upgrade to dual-core and SQL Server 2005 improves the price-performance by 40%.**

The PowerEdge Xeon MP Solution

Once again, Dell has beaten their competitors to the punch with the availability of Intel's dual-core Xeon processor MP, its sixth generation of MP processors, designed for enterprise computing in a 90-nanometer package. It provides two execution cores in one physical processor, effectively allowing the server to do more computations in less time. This processor is used by any four-way x64 server, such as Dell's versatile *PowerEdge (PE) 6800*, a 6U rack-able tower, and the *PE 6850*, a 4U rack-mounted server. More performant four-way servers are in ever-increasing demand in order to respond to the increasing need for the mining of information in support of knowledge-based decision making, web infrastructure, mission-critical application servers, and high-performance computing.

The new dual-core PowerEdge 68x0 provides increased scalability and reliability

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[2] There is a tie at #10.

[3] See **The Clipper Group Navigator** dated September 28, 2005, entitled *Dual-Core Xeon Arrives – Dell Leads the Charge - Again* at http://www.clipper.com/research/TCG2005059.pdf.

> ## Exhibit 1 –Xeon MP RAS Features
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> - **Advanced Machine Check Architecture** for advanced error-handling;
> - **Data Bus Error Checking and Repair** supporting ECC and transaction retry;
> - **Cache ECC Coverage** to detect and correct soft errors in a memory cell;
> - **Lockstep Support** so that the same program can be run on two processors;
> - **Memory Single Device Error Correction** enables the system to correct all memory errors if a single DRAM device fails;
> - **Memory Retry on Double-bit Error Detect** to correct single-bit errors and retry the read for double-bit errors;
> - **Memory Spares** to allow a failed memory device to be replaced;
> - **Partitioning** to divide a large computing system into smaller partitions enabling the execution of different operating systems.

features for the most widely deployed 64-bit x86 environments (see Exhibit 1, above), helping to protect the investment made in existing applications and infrastructure. By remaining consistent with the past, the Xeon MP is able to provide improved performance for existing 32-bit applications while enabling the migration to 64-bit applications in support of future enterprise strategy via Intel's *Extended Memory 64 Technology* (*EM64T*). In addition, all Dell PowerEdge 6800 and 6850 servers share a common bidirectional system image – a single image across both server platforms as well as across single- and dual-core processors – helping customers to significantly reduce management costs over time. Xeon MP enables both the reduction in energy costs and increase in server density through Intel's *Demand Based Switching Technology* with *Enhanced Intel SpeedStep* Technology which reduces energy costs when processor utilization is low, reducing the TCO of the enterprise IT server network. Moreover, with *HyperThreading Technology*, each core can function as two logical processors providing for better performance in multi-

threaded applications. This provides the server with the capability to process four software threads per processor, 16 threads per server, simultaneously, using resources that would otherwise be sitting idle. This is twice the capability of the AMD dual-core *Opteron* solution.

The PowerEdge 68x0 servers are driven by up to four dual-core Xeon MP CPUs running at 3.0GHz with 2MB of internal L2 cache associated with each core, and 8MB of L3 cache. They are supported with up to 64GB of DDR2-400, ECC, SDRAM memory, which offers increased memory scalability and lower latency while consuming less power. There is also an embedded dual channel Ultra320 SCSI controller and seven PCI slots, of which four are high-speed *PCI Express*[4,5]. The 6800 can drive up to 3.6TB of internal storage while the 6850 supports up to 1.5TB in a 4U drawer. Combined with a 667 MHz front side bus, the PowerEdge 68x0 can deliver up over 50%[6] more performance than its predecessor running with the single-core version of Xeon at 3.33GHz/8MB processor.

The unique value of the PowerEdge family extends beyond the outstanding price/performance available with the platform, however. Because of the unique design of Intel's dual-core CPU, the data center can further reduce the TCO through improved performance/watt, saving on energy costs, both in powering the server and cooling the data center. The PowerEdge 68x0 also comes with *OpenManage*, which is an ease-of-use tool set to aid in the configuration, installation, and management of the PowerEdge family, as well as a complete set of professional services to offload server requirements from your data center staff. This includes a full set of SQL Server 2005 planning, sizing, migration, installation, training and support services.

SQL Server 2005

Microsoft's SQL Server is the de facto

standard for database processing in the Windows environment, with a commanding share of database installations. That should come as no surprise due to the significant integration that Microsoft incorporates between the Windows operating system and its horizontal application solutions. Dell, however, takes that integration one step further, integrating SQL Server 2005 on a preconfigured CD for your PowerEdge server, along with Dell/EMC DAS and SAN disk arrays and *PowerVault* tapes, *Microsoft Operations Manager* (*MOM*) and *SMS 2003* systems management, and services and support.

SQL 2005 is a significant upgrade from SQL Server 2000 with increased scalability, availability, and security features for enterprise data and analytical applications while making them easier to develop, deploy, and manage. Optimized for the HyperThreading found in the new Xeon MP CPU and PCI Express adaptors available in the PowerEdge family, SQL Server 2005 comes in four versions: *Express*, *Workgroup*, *Standard*, and *Enterprise*. The PowerEdge 68x0, with four sockets, requires either the Standard or the Enterprise edition. Express is limited to single socket platforms while Workgroup works with two-socket servers. All of the versions work with single or dual-core processors.

In terms of scalability, Microsoft now offers the same *unlimited memory* capability in Standard Edition that previously it only offered in Enterprise Edition. Furthermore, Standard Edition is now available at $6K/processor, rather than $20K/processor for the Enterprise Edition[7]. Both the Standard and Enterprise Editions support 64-bit processors with a virtually unlimited database size, however, only the Enterprise Edition supports partitioning of large-scale databases and parallel processing of indexing operations. They both have support for a variety of high-availability features, including database mirroring, failover clustering, and the ability to do online system changes. Both editions also have outstanding manageability features, such as automatic tuning, an express manager for ease-of-use, and a database-tuning advisor

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[4] See **The Clipper Group Captain's Log** dated June 28, 2005, entitled *PCI Express Will Change Paradigm for Server Functionality and Deployment* and available at http://www.clipper.com/research/TCG2005040.pdf.

[5] The PCI Express slots in the PowerEdge 6850 are hot-swap.

[6] Based upon the SPEC CPU benchmark suite.

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[7] Standard Edition is available for up to four processors. There is an additional per seat charge, starting at $1859 for 5 concurrent users.

to suggest possible enhancements to your database architecture to improve performance. In terms of security, SQL Server 2005 is well positioned with advanced auditing, authentication and authorization, data encryption and key management, a best practices analyzer, and integration with Microsoft's *Baseline Security Analyzer* to check for common security vulnerabilities.

Another key feature which will impact your bottom line directly is the way the different versions are priced. All versions are priced according to the number of microprocessors supported by the platform. This is very important because, with the advent of multi-core CPUs, some application providers are charging for their solutions based upon the number of cores that the platform supports. With charging based upon the number of processors, or sockets, Microsoft is providing to the data center the same database processing capability at half the price as SQL Server 2000. For example, a four-socket version of SQL Server 2000 running on a single-core PowerEdge 6800 with four sockets costs $80,000. SQL Server 2005 for a dual-core PowerEdge 2800, with two sockets and four cores, costs $40,000. Effectively, this provides similar processing capability, i.e., four cores, for half the price. The price for a fully configured PowerEdge 68x0 with dual-core Xeon processors MP is $80,000. This is the same price as SQL 2000 running on a single-core version of the 68x0, except that on the older system the data center only had the use of four threads while SQL 20005 on the dual-core PowerEdge 68x0 gives the mission-critical application set access to 16 threads, enabling a significant increase in server utilization and, thus, a much better ROI for the enterprise.

Dell also provides a full set of support services for SQL Server 2005, including:

- *Planning* – for assessment of the design of the database infrastructure and migration from other platforms and databases;

- *Implementation* – for the installation of SQL Server 2005, upgrade from SQL 7.00/2000, and training; and

- *Maintenance* – for enterprise support to assist in running applications at peak per-

formance and in tuning complex SQL Server 2005 solutions.

Conclusion

If all that you are looking to do is remove complexity from the data center, then there is nothing simpler that acquiring an entire database server solution from a single vendor. This would include a server, database software, storage, management software, and services. If cost is a concern, then bids must be issued and attention paid not only to the list price for these components, but to the total cost of ownership issues as well, items such as investment protection, performance, energy consumption, and labor. Further, you must accept the responsibility for putting it all together. If quality is the main concern, then you may have to limit the search to companies with a state-of-the-art solution. No matter what you are building – an apple pie or a sophisticated database server – it all comes down to the same factors: simplicity, quality, and cost.

Dell has addressed these issues and packaged them together in a turnkey solution that is easy to use do to their attention to detail and a thorough integration of all the solution components, and you get to use it right away. **Dell, in fact, is the only server vendor that can provide a total solution for a Windows environment.**

With a state-of-the-art platform utilizing the latest technologies, dual-core Xeon MP and SQL Server 2005, Dell has removed the complexity from the decision-making process. Utilizing improved value through industry leading price/performance and cost reductions based upon partnerships with the leading component suppliers, Dell has broken new ground for the enterprise data center. If your data center staff is looking to improve performance and reduce cost and complexity in a Windows environment, look at the Dell PowerEdge platform with Microsoft's SQL Server 2005. It may turn your quandary into a piece of cake.
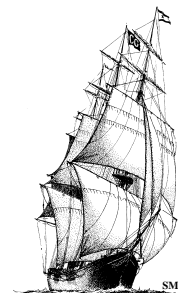
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