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Navigating Information Technology Horizons[SM]

Dell Drives Server Technology Race with Intel Dual-Core for Small Enterprises

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Management Summary

In sports, two separate measuring sticks judge success. The first is success on the field, measured by the number of wins and championships. The second is success at the box office where how much money the team earns is the bottom line. There are two different methods to build a successful team. The first is by drafting young prospects and training them in the organizational philosophy for teamwork. The second is to acquire free agents on the open market with a proven record of success. In baseball, large market teams, such as the New York Yankees or the Boston Red Sox, with an abundance of money, can go out and buy whichever players they feel have the specific skills necessary to overcome any perceived weakness that management feels is preventing the team from experiencing success. Unfortunately, small market teams, such as the Kansas City Royals or the Pittsburgh Pirates, do not enjoy the same resources as their large market brethren. They must build from within, developing new talent with remarkable skill sets.

In the non-athletic business community, we see a similar divergence of riches. Corporations in the Fortune 500 with data centers on each continent can afford to implement the most sophisticated Information Technology (IT) solutions. Their mission-critical applications are supported by IT systems with the highest levels of reliability, availability, and serviceability (RAS), regardless of the technology required. If a mainframe is required to deliver the required quality of service, then a mainframe is acquired. If a high-end RISC server is deemed appropriate, then it is purchased. These enterprises can afford whatever resources are necessary to maximize the bottom line, profitability. Unfortunately, small enterprises do not always have the same level of resources at their disposal. They must suffice with commodity systems, relying upon the IT reseller community to integrate the necessary applications required to drive their businesses. The IT resellers, in turn, must depend upon system vendors such as Dell, HP, and IBM to put together the commodity components into entry- and mid-range systems with the same RAS functionality as proprietary systems. Dell, however, is one company that also continues to work directly with many smaller businesses to deploy configured systems.

No enterprise is doing that better than Dell. Working with companies such as Intel for microprocessor support and EMC for storage components, Dell continues to deliver today's technology with RAS functionality for less. Now, Dell is expanding their normal M.O. with the introduction of the *PowerEdge SC430* with Intel's *Pentium D* microprocessor, tomorrow's technology today. To see how the SC430 can improve your bottom line, please read on.

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Small Enterprise Computing Requirements

The typical small enterprise[1] office has multiple mono- and dual-processor "servers", with a separate server implemented for each office function: web access, file and print services, remote access, along with back-office applications and productivity tools. **These represent the mission-critical application set for the small or medium-sized busine**ss. In most cases, each server has its own internal or directly-connected disk storage, although in some cases, a small enterprise may have installed an iSCSI SAN[2] with a SATA disk array (to take advantage of the economic advantages of a shared storage resource). In terms of processor performance, each of these servers is usually over-provisioned, typically with about 30% utilization efficiency during normal processing periods. Unfortunately, IT management is forced to provision for peak loads to ensure that service levels can be achieved. Combined with the power requirements, maintenance charges, and the administrative complexity required to manage this proliferation of servers, the total cost of ownership (TCO) becomes very high for a relatively inexpensive box.

In order to lower cost, reduce complexity, and simplify the operation of the system network, the IT manager looks for an opportunity to consolidate the systems activity onto a single server with enough compute power and storage to service all of the enterprise requirements. Obviously, this will require a higher level of both processing power and communication throughput than is possessed by any of the existing servers in the infrastructure. There are a variety of solutions available for the high-end data center, with multi-processor configurations starting at four-way and extending to 32-way systems as well as both proprietary RISC systems and 64-bit commodity servers. The RISC systems are usually configured with high-

performance dual-core processors such as the IBM *POWER5* or Sun *SPARC,* which can double the processing capability in the same physical space. The high-end commodity systems are typically configured with *Xeon* or *Itanium* processors from Intel or the dual-core *Opteron* chips from AMD. We are also beginning to see systems configured with PCI Express[3] I/O slots in order to support the higher throughput required by 4Gbps Fibre Channel and InfiniBand, along with other high-speed protocols. Unfortunately, these systems normally are priced well beyond the budget of a small enterprise.

The entry-level of the server range has already seen an increase in performance capability through the implementation of technology designed to increase the processor efficiency in the *Pentium*-class microprocessor. Intel has implemented two new technologies. The first, *Hyper-Threading*, is a technology designed to permit multiple execution streams to be completed simultaneously in a single-core processor. Intel has implemented this capability in the *Pentium 4* processor. The second new advancement for Pentium is the implementation of dual-core technology within the *Pentium D* family of 32/64 bit processors (*EM64T*), similar to that found in the high-end solutions. This will enable small enterprises to reduce server count, simplify the architecture, and lower the TCO.

The Dell Model

Dell has been, and remains, a leader in the manufacture and distribution of scaleable servers to the entire enterprise community. They have especially taken notice of the requirements of the small enterprise for an entry-level server (i.e., low cost) to provide not only performance, but also reliability and availability as well. In addition, they also provide a full range of enterprise services to aid the small enterprises in deployment, installation, and training. Dell also provides an optional systems management tool - *Microsoft Operation Manager 2005 for Dell PowerEdge* - to assist in bringing simplified, consolidated monitoring capabilities to the small enterprise.

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[1] The term "SMB" covers a wide range of enterprises – with definitions covering businesses from ten employees up to a thousand. For our purposes here, we will restrict our view to the entry level of the SMB space, small enterprises with between ten and a hundred employees, but perhaps more importantly, between three and ten application servers, including PCs being used as servers, despite their lack of resiliency.

[2] See **The Clipper Group Explorer** dated April 13, 2005, entitled *iSCSI SANs – Panacea or Placebo?* and available at http://www.clipper.com/research/TCG2005020.pdf.

[3] 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.

Dell has taken great care to address the total platform, not just the microprocessor, by including some of the resiliency features of the high-end servers at the entry level. For example, Dell's existing product set includes the *PowerEdge SC420* server, with a Pentium 4 processor, an 800MHz front-side bus, and a pair of PCI Express slots for high-performance I/O, up to four times that of previous PCI technology. The included Pentium 4 processor provides compatibility for all 32-bit legacy applications, as well as capability for 64-bit programming.

The SC420 can also be configured with up to 4GB of ECC DDR2 memory for greater bandwidth and to correct single bit errors, and with up to 1MB of L2 cache, making it a scaleable, entry system. The SC420 also comes with software-RAID technology and on-line diagnostics for reliability. These are all features designed to keep your enterprise up and running and is a significant advantage over the PC being used as a server.

The PowerEdge SC430

Now, Dell provides small- and medium-sized enterprises with the ultimate in scaleable entry-level servers with their replacement for their SC420, the *PowerEdge SC430*. Configurable with either a dual core[4] Pentium D at up to 3.2 GHz, a Pentium 4 at up to 3.0GHz, or a Celeron D at 2.53GHz, the SC430 delivers performance configured to the needs of the enterprise in a compact, easy to service chassis. Furthermore, it provides an ideal consolidation platform when configured with the dual core Pentium D. A dual-core processor can provide immediate advantages for the enterprise looking to acquire systems that support multitasking computing power and improve the throughput of multithreaded applications. Using industry standard benchmarks to measure performance[5], the Pentium D processor shows a 12% improvement over the SC420 in the *NetBench* test for file/print performance and a 10% web-server performance improvement using *WebBench* – **on the same server, at the same time –**

demonstrating the multi-tasking capabilities of the dual core design.

With up to 600GB of SCSI storage, the SC430 has twice the internal SCSI capacity of the existing SC420, validating its use as a file server. The SC430 can be configured with a pair of lower cost 250GB SATA drives, matching the capacity of the SC420. The default is a 40GB SATA drive.

In terms of I/O performance, the SC430 has a full complement of PCI Express functionality, with an embedded Gigabit NIC and three PCI Express slots, for x1, x4, and x8 functionality. It also has two 32-bit PCI slots for compatibility with legacy controllers.

As with the rest of the PowerEdge family, the SC430 is supported by a full complement of Windows Servers from Microsoft, and Linux from Red Hat and Novell, and with OS-based RAID options. In addition, the SC430 has the same service and support that is required for a business-critical server installation.

Conclusion

In order to satisfy a perceived need in their customer base, Dell has taken the unusual step, for them, of delivering the first dual core Pentium D solution for the small enterprise community. While providing a single-CPU, dual-core solution may not indicate a total commitment to dual core. In reality, it plays to the strength of Dell's model by focusing on a volume space and making relevant technology affordable instead of a niche. Clearly, the high volume, entry level is an ideal place to test the validity of this architecture and Dell has said that this will be the first of many announcements as Dell delivers dual core technology across its entire product line in the future.

With a platform designed to improve productivity and provide the basis for server consolidation, Dell would appear to demand consideration for your next server acquisition.

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[4] A dual-core processor consists of two complete execution cores in one physical processor, both running at the same frequency. Both cores share the same packaging and the same interface with the chipset/memory. This offers a way of delivering more capabilities while balancing power requirements.

[5] Based upon results presented by Dell.

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