Dell Delivers Improved PowerEdge 6800s
with Latest Intel Technology

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Management Summary

As the dog days of summer fade away in the rear-view mirror, we can take a step back and review an unusual three months of weather where many parts of the country experienced extremely hot temperatures, matched only by the heights that gasoline prices achieved at the pump that have been well in excess of $3.00/gal across the country. Despite that, vacation season took the American family out on the highway, heading toward the seashore or the mountains, whichever suited our holiday desires. Unfortunately, the increase in travel also placed additional strain on the supply, and cost, of gasoline, as the demand for more fuel, and increasing world tensions, drove the cost of energy ever higher. The arrival of Labor Day only serves to emphasize how expensive energy has become. Who could have imaged the joy of *only* having to pay $2.80/gal to get to work?

This past summer also brought something even more unusual to the data center – a series of announcements from microprocessor developers and server manufacturers that has been unprecedented in its scope. Intel alone delivered 23 new processors in less than 100 days, some of them not only on schedule, *but early!*, and all intended to reduce the total cost of server ownership (TCO) by reducing the amount of energy required to drive the server and cool the data center from the generated heat. The competition from AMD has obviously had a most beneficial effect within the bowels of Intel. Their latest announcement, the new dual-core Intel *Xeon Processor 7100 Series*, formerly called *Tulsa*, has entered the fray with eight new models to compete with AMD's latest offerings in the *Opteron* family, designed to provide high-end price/performance for the quad-socket (and above) server space. The availability of a new CPU, however, no matter how innovative, is of little use to the data center by itself. The enterprise data center requires a server solution that takes advantage of the new technology and surrounds it with innovations of its own to deliver even more value to the enterprise through improved reliability, availability, and serviceability (RAS) to meet higher enterprise SLAs.

Dell has done just that by taking this new family of microprocessors from Intel and packaging them in revised *PowerEdge 6800* and */6850* server platforms with outstanding RAS to increase the return on investment that enterprises have been making in Dell products, and to lower the TCO for their data centers. By combining expanded server functionality with innovative microprocessor design, Dell has enabled the enterprise data center to improve performance and lower costs, at the same time. If you would like to take advantage also, please read on.

Enterprise Data Center Costs

Every enterprise CIO goes to sleep at night wondering if his/her data center will be able to handle the ever-increasing workloads being placed upon it by an increasingly voracious blend of employees, partners, and customers, all demanding instant response for ever more complex requests. One major question revolves around the need to handle peak demands while trying not to over-provision an initial deployment. The data center needs to be able to improve the return on investment (ROI) with a scalable IT infrastructure, while at the same time, lowering the TCO of *all* IT resources, from acquisition costs, to operating expenses such as data center staffing, and the energy required to run and cool the data center.

Key issues facing the data center in every enterprise focus around *server utilization, growth, physical and logical consolidation of enterprise resources, and energy cost*. Existing IT infrastructures consist of a plethora of aging, underutilized mono- and dual-processor nodes. Most of these platforms execute a single application and use less than 15% to 20% of available CPU cycles, clearly not realizing the best ROI possible. **This has to be improved!** The advent of virtualization enables the data center to consolidate applications, and platforms, on a single new server, improving the utilization ratio from 20% to upwards of 80%, with a carefully planned consolidation of applications within a single server environment. Virtualization enables multiple applications, in fact, multiple operating environments, to share the same resources, memory, disk, and I/O. This enables the data center to facilitate additional demands being made on IT resources from acquisitions and expansion, adding new users to a once rigid architecture.

In addition, today's typical IT network consists entirely of older, single-core CPUs that simply run too hot. The availability of new energy-efficient, dual-core servers enables the data center to lower its operating costs, replacing older servers and their expensive maintenance contracts, with new technology carrying new hardware warranties. Reducing energy requirements for running and cooling the data center efficiently is of paramount importance. With the cost of energy rising to previously unheard of limits, it becomes necessary for every data center to increase the performance per watt in order to reduce the recurring costs of data center operation. With one eye on the bottom line and the other on the horizon, the CIO must protect the enterprise's investment with a scalable platform, capable of adding, and upgrading, processors and memory without the aid of a forklift. By eliminating the maintenance contract with its annual raises, the CIO can also take back control of that escalating portion of the data center's operating expenses.

Once the CIO makes the decision to replace an older, inefficient architecture, the question on the table becomes *with what to replace it?* Before determining whose logo to acquire, the CIO must first determine which of the open systems architectures, Intel, AMD, or others, to deploy. We do not have space here to analyze all of the options, so let's take a look at the latest, the newest *Xeon MP* from Intel, the dual-core *Xeon Processor 7100 Series.*

Intel Innovation

In response to the urgings of their biggest clients, and in reaction to the competitive pressures from AMD, IBM, and Sun, Intel has taken a giant leap forward this summer with the introduction of 23 new processors across their product line. The latest announcement has enabled Intel to move back into the forefront of the open systems quad-socket server competition with eight new members of their high-end Xeon family, known internally as *Tulsa*, but officially announced as the Xeon Processor 7100 Series Family. Developed using Intel's 65nm architecture, the 7100 Series is available in speeds ranging from 2.5GHz up to 3.4GHz and with power requirements ranging from a standard 150-watt usage down to an energy efficient 95-watt implementation to provide outstanding power-saving capability to the data center. Designed for scalable performance from 4 to 32 sockets, with four threads per socket, the Xeon 7100 is socket-compatible with the previous generation of Intel microprocessors, the Xeon 7000 (known internally as *Paxville*). The 7100 Series supports up to 128GB of DDR2-400 memory, with lower power consumption than required by DDR1-333 DIMMs, and PCI-Express I/O for improved performance and RAS functionality with hot-plug compatibility. Memory management is provided by Intel's *E8501 Netburst* architecture with advanced redundancy and error checking, memory sparing via reserved DIMMs, mirroring, and hot-plug memory to continue processing without interruption. The Xeon 7100 Series is probably the last implementation using Netburst, as Intel transitions to the new Core architecture.

The Xeon 7100s have many new features (see Exhibit 1, on the next page) to reduce downtime and improve TCO, as well as retaining Intel's *EM64T* technology to protect enterprise investment in 32-bit and 64-bit applications. The 7100 family has up to twice the performance of the *7000*, with a front side bus of either 667 MHz ("N" series processors) or 800MHz ("M" series processors) and system throughput of up to 128GB/s. Based upon industry-standard benchmarks, the 7100s are 60% faster than the 7000 for business process applications such as ERP and CRM, and 70% faster in a transactional processing environment. Coincident with Intel's announcement of the Xeon Processor 7100 Series, Dell has announced a repackaged *PowerEdge 68x0* family to deliver this new technology to a variety of compute environments.

Dell Delivers Expanded RAS

Dell has repackaged their enterprise-level *Power-Edge (PE) 6800* family[1] of servers with a second generation of dual-core chip technology from Intel. Using the Xeon processor 7100 Series with an 800MHz

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[1] See **The Clipper Group Navigator** dated November 1, 2005, entitled *Dell Completes PowerEdge Dual-Core Upgrade – Integrates MS/SQL 2005 with Xeon MP*, available at http://www.clipper.com/research/TCG2005071.pdf.

Exhibit 1 – Xeon 7100 Features

- **Dual-Core architecture** – with 16MB of shared, on-die L3 cache;
- **HyperThreading Technology** – supporting two threads for each core, four threads for each processor;
- **Intel Virtualization Technology** – enables higher levels of consolidation and facilitates migration with integrated interfaces for virtual environments;
- **Intel CacheSafe Technology** – improves system availability in the event of a L3 cache error with automatic detection and disabling of cache lines;
- **Improved Processor Power Efficiency** – with up to 2.8x performance/watt of the Xeon 7000, reducing energy consumption and heat generation;
- Retains **Socket Compatibility** with Xeon 7000.

Source: Intel

FSB, Dell has improved the configurability, performance, and price/ performance of its scalable, quad-socket servers, with two form factors - rack-mount and tower - to meet the needs of any-sized data center. The *PE 6800* is available as a tower or 6U rack-mount, while the *PE 6850* is deliverable as a 4U rack-mount platform. Both are available with Microsoft *Windows Server 2003* (*Standard* or *Enterprise Edition*) or *Red Hat Linux Enterprise v4*, *Enterprise Server*, factory installed, with many other operating environments validated. The PE 68x0 family is also available with the single-core Xeon MP and older Paxville dual-core Xeon processors.

The PE 68x0 servers are driven by up to four dual-core Xeon 7100 CPUs running at up to 3.4GHz with 2MB of internal L2 cache, and up to 16MB of L3 cache. They support up to 64GB of memory, offering **increased memory scalability and lower latency** while **consuming less power**. The PowerEdge 68x0 family supports an advanced variety of memory features such as **Memory RAID**, **mirroring,** and **hot-plug** DDR2-400 ECC SDRAM memory to improve availability by withstanding errors that might otherwise bring the system down.

With four sockets, both of these HPC configurations are highly scalable, supporting up to eight Xeon cores or 16 compute threads, using Intel's *HyperThreading Technology*. By maintaining compatibility with the previous release of the PE 68x0, using Intel's Xeon 7000, Dell is able to **improve performance** for existing 32-bit applications while continuing to support the migration to a 64-bit environment through Intel's EM64T technology. The PE 6800 supports up to ten 3.5" Ultra320 hot-plug SCSI drives, while the PE 6850 supports five 3.5" hot-plug SCSI or hot-plug SAS drives or eight 2.5" hot-plug SAS drives. Serial-Attached SCSI (SAS)[2] drives represent the next generation of performance and reliability for busi-

ness-critical applications. All disk configurations are supported by a variety of RAID options to improve availability. There is also an embedded dual channel Ultra320 SCSI controller and redundant integrated NICs, along with seven PCI slots, of which four are high-speed *PCI Express*[3,4]. 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 an 800 MHz front side bus, the PowerEdge 68x0 can help you realize performance improvements in the SPECjbb benchmark of up to 123% as compared to the previous generation of dual-core processors (Paxville).

The PE 6800 and 6850 include an integrated *Intelligent Platform Management Interface* (*IPMI*) with an optional remote management controller for robust remote server management. In addition to the latest platform technology, Dell also has a complete set of IT infrastructure services[5] to complement your IT staff. These include design, deployment, and training services, as well as a full set of enterprise support services.

Conclusion

The long-standing relationship between Dell and Intel has never been more in evidence than in the continued improvements that have been made to the high-end of Dell's PowerEdge server family. Both the PE6800 and the PE6850 take advantage of every new feature available in Intel's Xeon 7100 microprocessor set. **The PowerEdge 68x0 family improves business-critical performance in the data center while at the same time lowering price/performance/watt through improvements made in power consumption.**

These quad-processor servers enable the enterprise to consolidate their IT resources into a single host, improving server utilization and reducing administrative overhead. They provide a platform offering high availability and performance to enable the scalable enterprise of all sizes to grow, with plenty of headroom for expanding access or additional application development.

In an environment where microprocessor lifecycles are measured in months as opposed to years, it is critical that the enterprise choose wisely before investing in new technology. However, in order to stay competitive, every enterprise must put a stake in the ground and move forward when a new product appears that satisfy today's, and tomorrow's identifiable needs. The Dell PowerEdge with Intel Xeon 7100s has the performance and economy to do just that.

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[2] See **The Clipper Group Explorer** dated January 4, 2006, entitled *Breaking the I/O Paradigm – SAS Enters the Nearline Storage Race*, available at http://www.clipper.com/research/TCG2006002.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.

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

[5] See **The Clipper Group Navigator** dated July 18, 2006, entitled *Dell Provides New Servers with Premium Services*, available at http://www.clipper.com/research/TCG2006061.pdf.

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