

## **HP Enables Adaptability For The Enterprise Application Server**

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### **Management Summary**

The role of the head coach of a professional athletic team is similar to that of the CEO of any major enterprise: he has direct reports, individual contributors, and critics in all shapes and sizes. The manager has the responsibility to win the championship of whatever league he is in, and he must do that with the resources that the owners provide. In sports, those resources are finely tuned athletes with specific skill sets and a limited life span to take advantage of them. Athletes suffer injuries; they get old. When they lose their skills, younger athletes, eager to prove themselves, replace them. Sometimes, however, the skills of the newer athletes do not match those of the stars that they replace. Sometimes the manager needs to find multiple resources to fill different roles within the team. A baseball team may have a great pitcher or two, but they need a complete staff of 10 or 11 pitchers in order to win. What does the manager do? Does he force the replacements into a role for which they are not suited or does he adapt the roles to the skills of the athletes, the resource? Perhaps, the manager looks for additional resources - additional players with complementary skills that he can plug in to different roles.

The Information Technology (IT) staff of any major enterprise is just like that team, except that the resources the IT staff is playing with are electronic and not human. They are application servers and not relief pitchers. It is a world where the IT staff is constantly faced with resolving IT problems created by mergers and acquisitions. The staff must provide solutions for the everyday problems of server consolidation and threats to the mission-critical applications that require innovative backup and restore capabilities to ensure server availability for those applications that are the lifeblood of the enterprise. Some of those situations require the multi-processor resources provided by a scale-up solution; others require the flexibility provided by servers with the capability to perform best in a scale-out environment. Some involve high levels of transaction processing; others are more concerned with high-performance processing and high-speed calculations. The shrewd CIO will be sure to put the right resources into the hands of the IT staff to resolve any situation. The key is to be sure to align your enterprise with a server supplier who can deliver alternative solutions.

A perfect example of a technology provider with options to keep your enterprise adaptable is Hewlett-Packard. HP can provide open systems solutions for your application server needs based on the three commodity processor brands: *Itanium 2*, *Opteron*, and *Xeon EM64T*. To see how HP can provide your enterprise with the right solution, please read on.

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## Today's Operating Environment

With the ever-increasing number of corporate acquisitions and mergers occurring throughout the enterprise world, we see an increasing propagation of single-purpose application servers within the data center. Most of these servers are of an older vintage, acquired during the technology spree of the late 1990's, in preparation for Y2K. Many of them are becoming obsolete with vendors bringing proprietary architectures to end of life, moving their product lines to commodity-based servers. Maintenance costs are rising, seemingly out of control. Moreover, many of these systems lack the capability to network within a storage area environment and have become small compute islands within the enterprise - unfortunately, small and inefficient islands. These servers are underutilized. Except for some rare peak periods, they are using only 30-50% of their processor power, at best. Unfortunately, each requires administrative support, takes up valuable space within the data center, and draws an inordinate amount of power, not to mention the energy expended to cool the facility with all of these servers idling away. This wrecks havoc with a CIO's budget.

Another facet has to do with the size and number of databases within the data center. Because of mergers between multi-billion dollar enterprises such as Coors and Molson's, and the natural growth of businesses in a positive economy, some enterprise databases have become unwieldy. Online transaction processing (OLTP) and data warehouse applications inquiries can no longer be contained within a 32-bit architecture efficiently. The IT staff needs to transition the servers to 64-bit technology so that these mission critical applications can do their jobs in a more expeditious fashion.

In response to these issues, **the data center staff needs to be able to transition the IT environment of the enterprise to one in which the servers are based upon an adherence to standards.** This will enable the enterprise to adapt the architecture of the data center for changes in the technology. That first change may need to be a new architectural paradigm in the data center. The CIO must address how to make order out of chaos.

One aspect involves the ability to combine

diverse small applications together on a single processor in a fashion that, through virtualization, they can share the processor cycles of a single CPU. With the industry, in fact, constantly building faster microprocessors, transitioning from 32-bit to 64-bit CPUs, and developing virtualization software such as *VMware for Windows*, this is not a problem. VMware, for example, creates a virtual layer above the CPU so that multiple operating systems and applications can each access an independent set of virtual hardware resources.

Another aspect of consolidation is the combining of multiple servers performing different function onto a single scale-up SMP platform. This enables total cost of ownership (TCO) savings from partitioning the processors into discrete nodes. This enables multiple operating systems to take advantage of a common set of resources and a different set of economies of scale, through multi-processing and high-availability functionality.

A third aspect has to deal with taking advantage of CPU characteristics to maximize the throughput for high performance computing applications. In many cases, high-performance applications can be best served by networking together many dual- or quad-processor nodes in a scale-out architecture.

## Technology's Response

No single server can adequately address all of the processing requirements that are thrust upon the data center management team. In fact, no single microprocessor can optimize the delivery of the processing requirements that the CIO calls for.

Today there are two commodity architectures for the server environment in enterprise data centers. Those are the *x86 architecture* (under the *Xeon* brand) and the *Itanium architecture* from Intel and the *x86 architecture* (under the *Opteron*<sup>1</sup> brand) from AMD. The use of the Itanium 2 64-bit processor is a recent innovation from Intel and HP. Designed with features to take advantage of the requirements of an OLTP environment, it is optimized for high performance 64-bit

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<sup>1</sup> This analysis does not include lesser servers based up desktop-class processors, such as Intel's *Pentium* and AMD's *Athlon*.

### Exhibit 1 –Opteron/Xeon EM64T Additional Features

Opteron Features	Xeon EM64T Features
<ul style="list-style-type: none"> <li>• <b>Memory Controller:</b> on-board with the processor, enabling the controller to run at full processor speed;</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Additional Registers:</b> eight each general purpose and SSE;</li> </ul>
<ul style="list-style-type: none"> <li>• <b>HyperTransport Link:</b> low latency connections between the processors and between processor and I/O;</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Double Precision Integer Support;</b> and</li> </ul>
<ul style="list-style-type: none"> <li>• <b>Improved Performance:</b> capability for maximum 32-bit performance and excellent 64-bit performance;</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Extended Memory Addressability:</b> for 64-bit pointers and registers.</li> </ul>

Source: HP

computing while still maintaining compatibility with 32-bit Windows, Linux, and HP-UX applications. The server industry has chosen to concentrate their efforts with this micro-processor in the development of several high-end, scale-up, transaction-oriented servers, such as the *Integrity* family from HP.

Because of the need to maintain top-notch performance on the large base of 32-bit Windows and Linux applications, AMD's introduction of the 64-bit Opteron microprocessor with optimized 32-bit support was quite successful. AMD provided Opteron with some unique characteristics, such as an embedded memory controller, to improve the throughput in high-performance computing environments, such as financial applications and high-end film and video editing. (See Exhibit 1, above.) HP has included Opteron in their *ProLiant* family, to provide the basis for a high-end, multi-node, scale-out, high-performance solution. This is especially true where continuity with 32-bit application performance is important in order to transition the enterprise to a 64-bit environment.

In response to the success of Opteron, Intel revised their microprocessor positioning. They have now announced a new Xeon processor with extended memory characteristics to support 64-bit addressing. Codenamed *Nocona*, the new *Xeon EM64T* is the next generation of Intel architecture for improved system performance. In addition to 64-bit addressing, *Nocona* provides a rich set of new high-speed features, such as Hyperthreading, making it ideal for web services and high-performance

computing, in addition to file, print and workgroup services.

### HP's Solution Set

In addition to announcing a full set of ProLiant servers with the Xeon EM64T microprocessor, HP has also just recently announced a new set of *Integrity* Itanium 2-based servers<sup>2</sup> using the *mx2* dual-processor module. Engineered by HP, this new module enables two Itanium 2 CPUs to use the same socket as a standard Itanium 2 processor.

HP's *Nocona*-based models join the Opteron-based servers in the ProLiant Family, announced earlier this year<sup>3</sup>, giving HP three solutions from which to choose when addressing enterprise OLTP and high-performance applications.

### ProLiant Xeon EM64T Servers

HP has now introduced *Generation 4 (G4)* of the ProLiant family: the rack-mounted *DL360* (1U) and *DL380* (2U) at the low-end and the *ML350* and *ML370* in the mid-range. HP is also introducing a new Xeon EM64T dual-processor blade. The new blade, the *BL20p*, is a G3. In addition to the new Xeon chip, these new ProLiant models will exhibit

<sup>2</sup> See *The Clipper Group Navigator* dated July 29, 2003, entitled *HP Takes First (Super-sized) Step Toward Product Line Consolidation (Simplification)* at <http://www.clipper.com/research/TCG2003034.pdf>.

<sup>3</sup> See *The Clipper Group Navigator* dated March 12, 2004, entitled *HP Doubles Their x86 Offering Adding Opteron to the ProLiant Family*, available at <http://www.clipper.com/research/TCG2004021.pdf>.

improved availability and flexibility features:

- Duplex backplanes;
- Redundant fans;
- Integrated Lights out (iLO) option;
- New embedded Smart Array technology; and
- Power management.

### ***Integrity mx2 Models***

In May, HP announced new scalability for the mid-range and high-end of the Integrity family, giving them a unique value-add over other vendors of Itanium servers. With the availability of the *mx2* dual processor module engineered by HP, they extended the range of the *rx4640* to 8 processors, the *rx7620* to 16 processors and the *rx8620* to 32 processors. *Superdome* gained even more flexibility with a new limit of 128 Itanium-2 CPUs. Specific characteristics of HP's *mx2* processor are shown in Exhibit 2, below.

### ***ProLiant Opteron Models***

Earlier this year, HP added the *DL145* and the *DL585* to the ProLiant family, with the *DL145* positioned as a two-way node and the *DL585* as a four-way node in scale-out architectures. Optimized for high-performance computing in a 1U rack-mounted format, the *DL145* is configurable with one or two Opteron CPUs running at 1.6, 1.8, or 2.2 GHz, providing multiple performance levels and multiple price points. The *DL585*, in a 4U format, can be configured with up to 4

processors at the same performance levels as the *DL145*. With high bandwidth and low latency, the *DL585* is ideal for high-performance cluster computing, employing AMD's *HyperTransport* technology, and access to up to 64GB of memory.

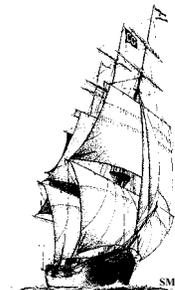
### ***Cross-Platform Management***

In addition to the new platforms that enable the enterprise to put the right technology in the right place at the right time, HP has also enriched the server-surround environment. They did this with a set of tools to be used regardless of the platform for implementation. These include *SmartStart Scripting Tools*, *Systems Insight Manager*, and new *Lights-Out* technology to minimize travel time in case of a system event. In addition, *Performance Management Pack 3.0* is tightly integrated with *Insight Manager* to provide performance analysis.

### **Conclusion**

The data center today faces myriad problems with no one panacea to cure all. Hewlett-Packard has put together an extensive set of server platforms based upon the widest commodity offerings - Xeon EM64T, Itanium 2, and Opteron. This enables the CIO to select the proper technology to fit the architecture, whether it is a scale-up SMP requirement or a scale-out high performance computing application. Moreover, with value-added cross-platform applications such as *Insight Manager*, HP can deliver rapid deployment and performance management for the enterprise ProLiant servers. In addition, they can provide the data center with workload and partition management for their Integrity platforms. All from a single management interface.

Whatever your compute requirements, be they scale-up OLTP solutions or scale-out mission-critical high-performance computing applications, HP has the open systems platforms needed for your data center.



#### **Exhibit 2 – MX2 Processor Characteristics**

- Two Itanium 2 Processors;
- L1 cache integrated into each CPU;
- Large 32MB unified L4 cache;
- Binary compatibility with single Itanium 2 processors;
- Fully compatible with zx1 and sx1000 chipsets;
- Uses the same version of Windows Server 2003, Linux, and HP-UX 11i v2.

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