



Second Generation *BladeSystem* Gives HP Blades an “Edge”

Analyst: David Reine

Management Summary

As the years go by, we see continual advancements in the areas of size, power requirements, and cost in every form of consumer electronics. Are you old enough to remember the first “portable” radios? Advertised as “lightweight”, they were about the size of a lunchbox and required a handle to carry a unit that weighed upwards of three pounds. They were manufactured using vacuum tubes by companies such as Motorola and RCA and cost anywhere from \$25 to \$50 – in 1950. This is equivalent to over \$350 today, and did not include the six “C” or “D” cell non-rechargeable batteries required to power the unit. This technology soon faded because of the bulk and cost and was replaced by “transistor” radios. Weighing less than half a pound and able to fit inside a jacket pocket, these radios, popularized by “hi-tech” companies such as Sony, were powered by a single 9-volt battery and cost less than \$20 in the early ‘60’s. In fact, prices fell to under \$10 once radios manufactured in Hong Kong reached our shores. Over the years, we have seen the transistor replaced by the Sony *Walkman* and now the *iPod* as our entertainment comes in ever-smaller packaging and makes use of less costly, rechargeable power sources.

A similar story is also taking shape in the data center as the compute resources required to drive the twenty-first century enterprise increase, along with the energy to run them and the cost of data center floor space. Since the introduction of mainframe computers in the 1950’s, we have seen a steady movement to reduce the physical size of data center engines – from mini-computers in the ‘70s, to open systems in the ‘80s, and to rack-mounted “pizza boxes” in the ‘90’s. As we proceed through the first decade of this century, blade technology has assumed the lead position in the search for a high-performance computing technology that can lower the total cost of ownership (TCO) for the enterprise.

Smaller is better, but so is *smarter*. It is not just about size and power (i.e., throughput capacity) but also about flexibility and power consumption (this time, we’re talking about electricity and cooling). With its recent announcements, Hewlett Packard (HP) is currently on its second generation of their *BladeSystem* technology, designed to consolidate the heterogeneous platforms proliferating the data center, to virtualize the mission-critical applications driving the enterprise, and to reduce the TCO for enterprise IT. To find out how HP’s *BladeSystem c-Class* servers can improve your data center performance, while lowering costs, please read on.

IN THIS ISSUE

- Today’s Data Center Environment 2
- The Maturation of Blade Architecture... 2
- The HP BladeSystem c-Class 3
- Conclusion 4

Today's Data Center Environment

Today's enterprise IT staff faces a formidable problem as they transition from an era of cost cutting to stay afloat, to a period of expansion and growth. How can the next generation data center maximize performance *and* reduce the costs of running a mission-critical application set in an enterprise populated with a heterogeneous mix of under-utilized servers running both *Windows* and *Linux* applications, while, at the same time, the cost of energy rises at a precipitous rate? The average x86 server is now estimated to operate at a processor utilization rate of only about 15% and the data center staff has no good way to dynamically (or automatically) deploy new applications or services, or re-provision their tower and rack-mounted servers to take advantage of unused resources. Unfortunately, those underutilized platforms do not consume *only* 15% of the power required to run them and to cool the data center from the heat they generate. In most cases, their power supplies consume 100% of their rated energy requirement – **wasting up to 85% of their electricity and a significant portion of your IT budget!** In response, many IT organizations have adopted a strategy of consolidating multiple servers onto fewer platforms (often at up to 10:1) in order to improve business processes. This can be accomplished by virtualizing the environment to run open systems applications over shared processing resources. By consolidating servers and sharing the workload, the processing power of a single CPU can be utilized to achieve a variety of objectives.

- Significantly improve server utilization;
- Reduce the number of servers required;
- Reduce the kW required to power the data center;
- Reduce the energy required to cool the data center, lowering utility overhead; and
- Reduce the management costs to administer excess, over-provisioned platforms, improving productivity.

Once the decision has been reached to re-architect the enterprise IT environment, the CIO and data center staff must agree upon an appropriate computing environment. Do you want to install a scale-up platform, typically running a UNIX environment with very high memory scalability, or do you go with a scale-out architecture, typically deployed on 2-way and 4-way, *Windows* and *Linux* platforms? Scale-out solutions are now available for both rack-mounted

and blade architectures.

The Maturation of Blade Architecture

The blade market has been sized at a couple of billion with a growth rate of almost 10% a year, a clear indication that blades are making significant inroads on the rack-mount business.¹ Acquisition pricing is also coming down on a price/performance basis as new generation Intel *Xeon 5000* blades provide better performance and energy savings. Blade vendors need look no further than consumer giant Gillette for marketing strategy. Gillette “gives” away their razors (i.e., sells them cheaply) in order to sell *their* blades. Discounts on racks and chassis and buyback programs could be imminent as vendors attempt to gain a blade foothold in the data center.

Blades provide the simplest path for the IT staff to do more with less. Recent advancements in both processor and I/O technology, enabling 10Gb Ethernet bandwidth and 4Gb Fibre Channel (FC) SAN I/O, along with high speed switch technology, lend themselves to the capacity on demand scalability available in blade architectures. Streamlined blade designs enable the enterprise to reduce both capital expenditures and operating expenses, with a blade environment typically using 30% less power than comparable rack-mounted servers due to centralized I/O and power resources. It also provides flexibility, allowing the sharing of bandwidth between blades. This enables a denser installation and a cooler data center environment. Blades simplify the implementation, deployment, maintenance, and modular growth of the IT network, at the same time improving administrative productivity. Blades also enable the enterprise to manage server provisioning better, while improving business continuity at a price significantly lower than that of a fault tolerant platform.

Blade architecture allows the enterprise to consolidate the entire data center environment, not just server processing. This includes sharing I/O and storage resources – enabling the enterprise to solve real business problems. Hewlett Packard (HP) initially offered a blade architecture with the *BladeSystem p-Class*. Improvements in micro-processor technology and server-surround architecture have led to the introduction of a second generation of blade servers, the *BladeSystem c-*

¹ Remember that each of the new processors may be ten times as powerful as the ones that are being consolidated. If the “horsepower” of the new servers were the metric of growth, the rate would be many times larger.

Class.

The HP BladeSystem c-Class

The HP BladeSystem c-Class represents an entire portfolio of hardware, software, and services offerings, including a c-Class chassis, c-Class blades, virtualization technology, a new energy efficient environment and more. The *BladeSystem c7000* enclosure provides an ideal infrastructure to consolidate server, storage, networking, and power, to provide unified control, flexibility, and simplified management for any enterprise data center. Pre-wired and pre-configured, the c7000 enclosure simplifies the rollout of new blades into a plug-and-play process, assisted by the inclusion of HP's *Onboard Administrator*, an interactive 2 inch management screen borrowed from HP's printer division. Common networking, storage, and power enable the virtualization of all blade resources.

Designed for a minimum of a five-year life span, the BladeSystem c7000 includes the HP *Virtual Connect* architecture to solve complex networking challenges, new HP *Thermal Logic* technology to enable the data center to minimize energy use, and employs HP's *Insight Control Management* to simplify blade management from a single console. The c7000 also supports a very fast mid-plane with a 5 Tb/sec aggregate I/O backplane, including options of 1 to 10 Gb/sec Ethernet, 4 Gb/sec Fibre Channel, and 20 Gb/sec InfiniBand. This ensures the data center years of headroom, protecting the investment made in HP's BladeSystem technology.

HP has initially announced the availability of two new blades, the *ProLiant BL460c* and the *ProLiant BL480c*, with support for up to 16 BL460c or 8 BL480c servers in a 10U enclosure. The BL460c matches the features of the *ProLiant DL360*, while the *BL480c* duplicates those of the *ProLiant DL380*. Both servers employ Intel's new 64-bit dual-core *Xeon 5100* processor, formerly named *Woodcrest*, with built-in virtualization technology and 4MB of L2 *Advanced Transfer Cache*. Each blade supports two 2MB cache pools; however, if one core is idle, the other core can use all 4MB. These blade servers also take advantage of cross-platform developments from within HP, such as the integration of a dual-port, embedded 4 Gb/sec Fibre Channel (FC) interface from Qlogic or Emulex and an embedded Smart Array Controller with an optional 256MB write-cache. This lowers the cost of SAN connectivity and simplifies installation by reducing cable count. Both blade servers also

include the *integrated Lights-Out (iLO 2) Standard Blade Edition* to provide all of the capabilities required for administrative or management tasks from a remote console.

ProLiant BL460c Server

The BL460c is available with a choice of several different processors (up to two dual-core Intel *Xeon 5100* processors) at either 65W or 80W of dissipated power each, with the 5110 running at 1.6GHz, with a 1066MHz Front Side Bus (FSB), and the 5160 performing at 3.0GHz with a 1333 MHz FSB for a higher workload per processor. It can support up to:

- 32GB of fully buffered PC2-5300 DDR2 memory in eight DIMM slots;
- Two small form factor hot-plug SATA or SAS disks;
- Two integrated multifunction NICs; and
- Two mezzanine slots for additional Ethernet, FC, or InfiniBand ports.

A single 42U rack will support up to 64 BL460c blades.

ProLiant BL480c Server

The BL480c is available with a choice of several different processors such as the dual-core Intel *Xeon 5100* thru *5150* processors) at 65W of dissipated power for the 5110 thru 5150 and 80W for the 5160 performing at 3.0GHz, with a 1333MHz FSB. The BL480c can support up to:

- 48GB of the same fully-buffered PC2-5300 DDR2 memory in twelve DIMM slots;
- Four, small form factor, hot-plug SATA or SAS disks;
- Four integrated Gig-E NICs (two of which are multifunction NICs); and
- Three mezzanine slots for additional Ethernet, FC, or InfiniBand ports.

This represents a functional capability significantly greater than competitive blades, especially when considering that a single 42U BladeSystem rack will support up to 64 BL460c and 32 BL480c blades.

While HP did not announce the availability of any AMD *Opteron* or Intel *Itanium 2 (Integrity)* blade solutions for the BladeSystem c Class, both products do appear on HP's roadmap for delivery in 2H06 (dual- and quad-processor *Opteron*) and 1H07 (*Itanium 2*). Storage blades are on-tap for the second half of 2006.

The significance of this announcement, however, is not just with the optimization of the blade server; it is with the optimization of the entire BladeSystem technology. HP has created a scalable, modular infrastructure to support an energy-efficient adaptive infrastructure in a lights-out environment. The HP *Virtual Connect* architecture allows the data center to configure BladeSystem resources once, reconfiguring them dynamically as application demands change increasing administrative productivity up to a factor of ten. HP's *Thermal Logic* technology employs intelligent sensors to lower power and cooling requirements to a level less than that of a standard 1U server. It enables modularly adjustments to conserve energy dynamically and reduce the expenses that increase TCO. Thermal Logic manages power consumption at the enclosure and rack level to stay within existing power and cooling budgets.

HP has developed an *Active Cool Fan* environment to improve airflow by 30% and cut energy use by up to a 50 percent reduction in fan power and up to a 30 percent reduction in airflow - to get the same performance levels, when compared to typical 1U rack-mount servers. The management system can control the fan speed of up to 10 fans, to direct maximum airflow to where it's needed most.

In addition, HP has deployed *Insight Control* management, an integrated suite of software tools implemented to simplify the provisioning and management of the BladeSystem environment. HP *Insight Control Data Center Edition* software unifies and automates the management of physical and virtual resources for server, storage, networking, and power and cooling, enabling the simplified migration of a virtual machine from one blade to another. It improves the device to administrator ratio from 20:1 to 200:1, when compared to tower/rack-mount systems. HP *Control Tower*² works in conjunction with the Insight Control software to simplify the deployment and monitoring of Linux applications in a blade environment.

This management is facilitated through HP's *Onboard Administrator* for enclosure management. Using words and graphics on a 2-inch interactive LCD and a remote browser-based interface, rather than flashing lights, the data center can set up, control, monitor, and troubleshoot the c-Class infrastructure in front of the rack or via a web browser.

² Based upon RLX Control Tower, recently acquired by HP.

Conclusion

With improved performance, built-in virtualization, management simplification, and energy conservation to run and cool the data center, the enterprise can improve its TCO picture with blades. There no longer is an excuse to defer the consolidation process. The enterprise can invest the savings realized from installing a blade environment in new applications, new service offerings, and the implementation of new business processes to improve productivity and the quality of service, thus improving customer satisfaction, a goal of any enterprise.

"Which blade offering?" may be the better question. Quite clearly, HP has put a lot of thought and cross-corporate technology into their second iteration of a better blade architecture. HP has done their homework and taken advantage of the latest industry advancements, from Intel's newly announced Xeon 5000 sequences of processors to SAS disks³, HP has assembled the best that the technology industry can offer today. Packaged with their own innovations, they have put together a solution worth trying. As with all high-performance or OLTP environments, actual performance will vary with the application set installed. That said, HP's BladeSystem c-Class might be just what your enterprise needs.



³ See **The Clipper Group Explorer** dated January 4, 2006, entitled *Breaking the I/O Paradigm - SAS Enters the Nearline Storage Race*, and available at <http://www.clipper.com/research/TCG2006002.pdf>.

About The Clipper Group, Inc.

The Clipper Group, Inc., is an independent consulting firm specializing in acquisition decisions and strategic advice regarding complex, enterprise-class information technologies. Our team of industry professionals averages more than 25 years of real-world experience. A team of staff consultants augments our capabilities, with significant experience across a broad spectrum of applications and environments.

- ***The Clipper Group can be reached at 781-235-0085 and found on the web at www.clipper.com.***

About the Author

David Reine is Director, Enterprise Systems for The Clipper Group. Mr. Reine specializes in enterprise servers, storage, and software, strategic business solutions, and trends in open systems architectures. He joined The Clipper Group after three decades in server and storage product marketing and program management for Groupe Bull, Zenith Data Systems, and Honeywell Information Systems. Mr. Reine earned a Bachelor of Arts degree from Tufts University, and an MBA from Northeastern University.

- ***Reach David Reine via e-mail at dave.reine@clipper.com or at 781-235-0085 Ext. 123. (Please dial “123” when you hear the automated attendant.)***

Regarding Trademarks and Service Marks

The Clipper Group Navigator, The Clipper Group Explorer, The Clipper Group Observer, The Clipper Group Captain's Log, The Clipper Group Voyager, and “*clipper.com*” are trademarks of The Clipper Group, Inc., and the clipper ship drawings, “*Navigating Information Technology Horizons*”, and “*teraproductivity*” are service marks of The Clipper Group, Inc. The Clipper Group, Inc., reserves all rights regarding its trademarks and service marks. All other trademarks, etc., belong to their respective owners.

Disclosure

Officers and/or employees of The Clipper Group may own as individuals, directly or indirectly, shares in one or more companies discussed in this bulletin. Company policy prohibits any officer or employee from holding more than one percent of the outstanding shares of any company covered by The Clipper Group. The Clipper Group, Inc., has no such equity holdings.

Regarding the Information in this Issue

The Clipper Group believes the information included in this report to be accurate. Data has been received from a variety of sources, which we believe to be reliable, including manufacturers, distributors, or users of the products discussed herein. The Clipper Group, Inc., cannot be held responsible for any consequential damages resulting from the application of information or opinions contained in this report.