IBM's BladeCenter Family —
The Right Choice for the SMB or Enterprise

Analyst: David Reine

Management Summary

When any parent goes shopping for a birthday or holiday gift for a creative child, one of the first toys they will look at is *Lego*. These little bricks can be snapped together in an instant to form whatever shape a child's mind can imagine. Available in starter kits for just a few dollars for the youngest hands, these bricks can be combined with other, more advanced sets to build more complicated structures as the child grows into his teenage years. The Lego brick became popular four decades ago, and those bricks sold in 1963 still interlock with kits made in 2007. In addition to the basic brick building blocks, there are motors, gears, sensors, and mini-figures, an entire infrastructure of components to combine; reshaping designs to meet an evolving imagination. Further, the Lego Company does not stand still; they continue to create new kits with new elements, with those elements compatible with bricks from their parent's youth. Other toy manufacturers have copied the lego concept, introducing scalable toys that fit together in a virtual plethora of ways, to provide hours of enjoyment. This concept has also been adapted to the real world, the enterprise data center, in an attempt to simplify a complex IT environment.

The data center has become home to a heterogeneous set of mission-critical application and infrastructure servers, supported by any number of communications and storage devices, inter-connected by a tangled web of I/O cables and power cords, creating a complex, administrative nightmare. The IT staff is attempting to manage multiple environments where mission-critical legacy applications run under UNIX, print and file services utilize Windows, and other back-office services take advantage of the low-cost and availability of Linux applications. In fact, the data center has become home to an architecture where each new application generates the requirement for a new server, regardless of the fact that none of the servers already wasting thousands of kilowatts of energy are running anywhere near full capability. In fact many (most?) of the servers in the data center utilize less than 20% of their processing capacity. About five years ago, technology can riding into the enterprise data center on a scalable white horse named "Blade". IT vendors all used variations of this theme to introduce *BladeCenter*, *BladeSystem*, *BladeFrame*, etc. One theme was common: **you can consolidate, simplify, and virtualize the enterprise data center**. *However, what about the small- and medium-sized business - the SMB?*

No one had an economical solution that would enable the SMB to blade a smaller environment, and enable it to grow with Lego-like simplicity. Now, IBM has. With the introduction of *BladeCenter S*, IBM has put down a smaller framework with a scalable infrastructure. To learn more about blades and BladeCenter S, please read on.

The SMB Data Center

The SMB data center faces many of the same pains as the enterprise data center:

- Inefficient utilization of server processing resources;
- Excessive server sprawl;
- Costly administrative overhead; and – most significantly–
- Insufficient energy to run *and* cool the data center.

Taken from the view of the CxO, **the data center must reduce the total cost of ownership (TCO) of the IT infrastructure.**

Your enterprise is under attack from the complexity of out-of-control server proliferation that has resulted in server installations running at utilization rates well under 20%. The IT staff has deployed over-provisioned platforms, with direct-attached storage devices (DAS), to run one specific application after another. They consume too much valuable floor space and waste too much of the energy required to both run the platforms and, at the same time, the air conditioning necessary to cool the data center. Server proliferation is also a major factor in the administrative complexity that burdens your data center staff. Server sprawl forces you to increase the staff necessary to manage your network of server and DAS connections. All of these factors are damaging the bottom line. **The data center must find a way to simplify the deployment, maintenance, and management of mission-critical and business-critical applications**.

Increased traffic from expanding Internet usage is increasing the need for processing capacity and high-performance communication. The IT Director has learned to cope with the acquisition costs associated with the increased workload, but is having budgeting issues with the recurring costs associated with these acquisitions, i.e., hardware maintenance, floor space, administration, and energy, to name a few. **These are the greatest constraints to growth.** IT consumes over 75% of the energy in an average office.[1] With the recent increase in utility rates, depending upon where your data center is located, it can cost more to run your IT

infrastructure for one year than it did to purchase it. You do not have to belong to the eco-sub-culture to see the advantage of improving the utilization of the IT environment within the SMB data center. These expenses affect the TCO of the IT infrastructure and reduce the profitability of the enterprise, big or small. Limitations in electrical power are even influencing the ability of the enterprise to respond to mission-critical demands, especially when the local public utility tells you that they cannot supply your data center with the electricity needed to be competitive, regardless of the cost per kilowatt-hour.

The obsolete servers in your environment (systems more than one generation old) typically use single-threaded commodity processors from Intel or AMD. Traditionally, they measure performance as a function of CPU clock speed. A 2GHz *Xeon* server is better than a 1GHz Xeon, and a 3GHz Xeon is better than a 2GHz model. Unfortunately, the higher the clock speed, the more energy is required, often upwards of 120 to 150 watts for the CPU alone, and thus generates more heat. **With the total cost of energy rising, the cost of powering and cooling an SMB data center can become prohibitive**. The existing performance-centric chip design philosophy no longer matched the needs of an evolving data center requirement for reduced infrastructure costs.

The data center staff needs to find a way to change the server paradigm in order to reduce the wasted resources, both electrical and personnel. They need to find ways to minimize the number of servers and storage devices dotting the enterprise communication landscape, and better utilize those resources that remain. **Consolidation is one method that has already been accepted within the confines of the enterprise data center and is now moving into the SMB arena, *virtualizing* more of the mission-critical applications on fewer, more performant systems, especially those constructed around the new blade architectures. Implementing these programs enables the SMB data center to change from a *scale-out* environment to a *scale-in* architecture.**

IBM has developed a full set of blade chassis with an *Open Fabric* approach to enable the mission-critical application environment to interoperate seamlessly with the enterprise data

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[1] See the March 31, 2007, issue of Clipper Notes entitled *Reducing Cost and Improving Performance – Consolidating the Smaller Data Center*, which is available at http://www.clipper.com/research/TCG2007049.pdf.

and storage networks. **IBM's *BladeCenter*[2] (BC) alleviates the IT sprawl that has overtaken the data center**. With a single interface, the IT staff can minimize the number of interfaces and complex tools that have been putting a burden on their personnel and driving up management costs.

The IBM BladeCenter Family

Over the past five years, IBM has obviously devoted a lot of thought and R&D into the implementation of a compatible family of blade servers to meet the challenges presented by the rampant proliferation of servers in the data center and the availability of energy to run and cool the data center. Heterogeneous server growth has led to complex management issues, not only of the IT network, but of the energy infrastructure as well.

IBM responded to these challenges with the introduction of four modular, easy-to-deploy blade offerings, based upon open standards for a flexible business foundation, including: *BladeCenter E*, *BladeCenter H*[3], *BladeCenter T*[4], and *BladeCenter HT*. All of them utilize the latest technologies to:

- Increase the performance capability of each blade;
- Provide a robust and reliable environment to ensure no-single-point-of-failure;
- Use less power to run a consolidated environment;
- Implement a multi-core architecture to maintain, or reduce generated heat; and
- Enable the broadest and most reliable networking and storage I/O with BladeCenter Open Fabric, an integrated server I/O portfolio that offers the most open, high-performance and comprehensive interconnects, and management tools.

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[2] See **The Clipper Group Navigator** dated November 20, 2003, entitled *IBM BladeCenter 2003 – Update on Promises Made and an Eye to the Horizon*, available at http://www.clipper.com/research/TCG2003063.pdf.
[3] See **The Clipper Group Navigator** dated February 8, 2006, entitled *IBM BladeCenter H Improves Performance and Reduces Cost*, available at http://www.clipper.com/research/TCG2006008.pdf.
[4] See **The Clipper Group Navigator** dated September 17, 2004, entitled *Changing the Paradigm for Telecomm Offerings – IBM Delivers Next Generation Network Solution*, available at http://www.clipper.com/research/TCG2004076.pdf.

> ### Exhibit 1 – BladeCenter Chassis
> - **BladeCenter E** – The original design, best option for the enterprise to conserve energy with the highest density;
> - **BladeCenter S** – Newest model, designed for ease of use in a small, distributed office;
> - **BladeCenter H** – Designed for increased performance while maintaining compatibility with the original design;
> - **BladeCenter T** – A NEBS-compliant "ruggedized" implementation, designed for the rich functionality required in the telecommunications industry; and
> - **BladeCenter HT** – Designed to support end-to-end NGN (next generation networking) applications for high-performance, telecommunication needs.

See *Exhibit 1*, above, for a full description of IBM's BladeCenter chassis offering.

With the pending availability of *BladeCenter S*, IBM is adding a fifth compatible Blade chassis. Each chassis supports a wide variety of server blades, based upon x86 technology from both Intel and AMD, as well as a full set of blades based upon IBM's own *POWER* architecture to enable access to the large library of *AIX* applications available. This enables the data center to execute a diverse workload from a single architecture, simplifying systems management and increasing enterprise flexibility, while driving down the IT TCO. In addition, they also offer a wide selection of networking options for Ethernet and Fibre Channel connections.

In order to assist the IT staff in deploying the most energy-efficient solutions, IBM has developed a *Power Configurator* for both *System x* and BC. This tool enables any enterprise to maximize their resource investment. Furthermore, with IBM Power Executive the IT staff can control energy costs on an on-going basis. By monitoring real power consumption and trends, the enterprise can save energy, moving power to where it is needed through a power virtualization capability.

In the data center, while it is quite clear that one size does not fit all, all of the blade formats to date have been geared to an enterprise class configuration. With the introduction of BC-S, IBM is now shifting their attention to the SMB, providing a more compact, lower cost solution to support small office environments.

IBM BladeCenter S

BC-S addresses the needs of SMBs around the globe. Specifically it delivers an integrated business-in-a-box foundation with configurable, shared storage in a compact 7U package, for a standard 19" rack. While BC-E or BC-H will support up to 14 blades, BC-S is right-sized to six blades, of any type, and up to twelve sharable SAS drives. In addition, it supports two Ethernet switches and two management interfaces.

BC-S supports all of the server blades that are available for the BladeCenter family. This includes the *HS21* Intel quad-core 80W Xeon blades, the *LS21* and *LS41* AMD Opteron blades, the *JS21 POWER* blades, and the *QS20 Cell* blade. In addition, BC-S also supports the *HC10* Intel workstation blade, to provide the data center with all of the benefits of a desktop or hosted-client. BC-S also supports a full set of communications blades so that you can tailor BladeCenter to your existing Ethernet or Fibre Channel infrastructure requirements. This includes blades from Brocade, Cisco, Nortel, and Qlogic, all members of the *BladeCenter Alliance Program*[5], as well as IBM's own 1Gb Ethernet, iSCSI, and SAS blades.

Right-sizing the blade chassis enables IBM to reduce the energy consumption of BC-S, as well as reducing the cost. Since BC-S will not be available until 4Q07, IBM has not yet announced pricing; however, IBM has inferred it will be around $5K for the chassis, one switch, and one server blade. This should reduce the acquisition and management cost by around 40%. Perhaps IBM is trying to change their image from "Big Blue" to "Big Green".

BC-S also supports IBM's DS3200 disk array for convenient and flexible storage. Easy to setup and deploy, the DS3200 supports up to 48 SATA drives for 14.8TB of additional data, with a high-performance SAS interface providing up to 3Gbps throughput. In addition, IBM has also announced the availability of its next generation local storage – a 16GB solid-state drive with four times the availability of standard drives configured with RAID-1. With no moving parts to fail, this drive consumes 87% less power and generates less heat than conventional drives. It operates like a standard disk drive, and installs in a standard drive bay.

With an office-friendly 110v power requirement, BC-S is simple to deploy in just three steps: unpack it, plug it in, and run the installation wizard with "select and click" configurability. Using the *Advanced Management Module* with Open Fabric Manager, the IT staff can manage, control, and install the chassis from a single point, pre-configuring LAN and SAN connections and automating blade failover.

Conclusion

An XL T-shirt will fit just about anyone, but not very well. One size of anything will not necessarily do the job right. It may; even a broken clock is correct twice a day, but it is better to acquire a product sized to fit your needs.

The blade architecture is right-sized to fit the SMB enterprise. With Lego-like efficiency, the data center can configure a BladeCenter S in a snap, to deploy an energy-efficient system. What's more, the SMB with plans for growth can easily adapt to new environments, protecting enterprise investment. The BC-S components are compatible with all other members of the BladeCenter family. The enterprise can start small and grow, into a BC-E or other IBM blade chassis. With an eco-friendly architecture, any SMB can control today's energy consumption, ensuring that the business can continue to grow, while maintaining expenditures within the constraints of an already tight budget.

Whether you are consolidating a small data center or expanding into a new branch office, BladeCenter enables the SMB to make the right choice, not only from IBM, but also from a host of over 90 companies that have chosen to develop products compatible with the Blade-Center architecture. The SMB now has the same opportunities as the larger enterprise to migrate to a bladed environment. If you are looking to consolidate and economize in your data center or a small office environment, take a look at BladeCenter S, it may be the building block that you have been seeking.

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[5] IBM has established BladeCenter with an open specification, enabling all members of Blade.org to accelerate the development of new solutions to increase end-user choice.

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➢ *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.)*

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