

IBM's Offering for a Smart, Private Cloud Sits on a Strong Foundation

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Management Summary

Electrical power – it surrounds us wherever we go. In our homes, we have a seemingly endless supply of electricity. Every electrical outlet represents another dynamic source of energy to power our many devices. A new air conditioner – plug it in. A new TV – plug it in. A new microwave oven – plug it in. Moreover, we are constantly on a quest for more – an *Xbox* here, a surround sound system there. Of course, there are limits to the amount of electricity that you can put on any one circuit in your home before the circuit breaker trips and everything on that circuit stops. That is why we have multiple circuits; it enables us to plug in even more devices until we reach the limit of energy being supplied to us. Unfortunately, we do not have a dedicated power source for our homes; it is more like a 1940's telephone party line: we must share it with all of our neighbors. If all of your neighbors turn on their air conditioners, TVs, and microwaves at the same time on a hot, sultry summer afternoon, you run the risk of a shortage of power to your street, possibly resulting in a brownout or blackout. You also run the risk of power failure from the heavens, as lightning strikes or high winds can put a damper on your power. Moreover, if someone trips the wrong circuit at Niagara Falls, an entire region can be thrown into darkness. Now, if you had an emergency generator wired into your house circuit panel, you could continue to run all of your appliances. If that is a little too expensive, you might install a portable generator to keep your important resources running, at least for a while.

The availability of a sufficient supply of electricity also is of major concern for every enterprise data center faced with increasing demands for self-service from an increasingly mobile workforce and customers. For the data center, that concern is on two levels.

- 1. The data center staff needs to ensure that they have enough power, or energy, to run the IT infrastructure and deliver services rapidly.**
- 2. They also have to ensure that the infrastructure itself has enough resources to be able to power an ever-expanding collection of users: customers, partners, and internal staff.**

The staff must be concerned about the availability of sufficient resources: compute power, storage, and networking to support peak loads, not just an “average” steady-state condition.

Many data centers have sufficient resources on-hand, but because of poor utilization, they cannot access them fully. To improve resource utilization, and improve the total cost of ownership (TCO) of the infrastructure, many data centers have consolidated and virtualized their resources.

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For some, this may not be enough! Some data centers also look “skyward”, not to the heavens, but to the “clouds”, with cloud computing providing outsourced resources from *public clouds*, such as those established by Amazon and Google, among many others. **Still others, who may be more concerned about security and meeting service level agreements (SLAs), look to *private clouds* implemented within their own firewall to have control over security, access control, high availability (HA), and disaster recovery (DR).**

Large enterprises have an assortment of private cloud offerings available to them from any number of vendors. For the smaller data center, often at an *SMB* or *SME*¹, however, there are fewer right-sized, right-priced, suitable, yet reliable solutions. **When determining the “right” solution for it, the smaller enterprise must remember that the infrastructure inside your cloud does matter.** Downsizing the infrastructure designed for a larger enterprise is not a good option; the smaller enterprise must *right-size* all of their resources. **If the smaller enterprise is going to put all of its cloud “eggs” into one basket, they need to be sure of the stability of the vendor and of the resource set.** One of the solutions with a superior infrastructure, based upon its own open systems offerings², is from IBM, with its *BladeCenter Foundation for Cloud (BCFC)* and its *SmartCloud Entry*³ solution. To learn more about BCFC and SmartCloud Entry, and how it can right-size application and cloud delivery for the mid-sized data center, please read on.

¹ Often these 100-to-1000 employee firms are called “SMBs” (Small-to-Medium Businesses) or “SMEs” (Small-to-Medium Enterprises). These tend to smaller than the largest enterprises but much bigger than a typical small business. The number of employees may be an archaic indicator (as it is the volumes of data and transactions that tend to be the metric of a mid-sized data center), so don’t take this quantification too exactly. When we say “smaller enterprise”, we are referring to the businesses and government agencies that are in this very large “middle”.

² Open systems, in this case, refers to servers running an “x86” architecture, like those built with Intel’s *Xeon* and AMD’s *Opteron* processors.

³ IBM has several SmartCloud offerings, for x86 and for other platforms. For x86, IBM offers *SmartCloud Entry* (also known as *IBM Starter Kit for Cloud x86 Edition*), which includes many management tools, such as *System Director*, in a common, integrated solution for managing the underlying virtualized infrastructure. This can be ordered as a complete, new stack or the necessary components can be added to existing System x infrastructure.

Exhibit 1 – Key Smaller Enterprise IT Pain Points

- **Availability** – Minimizes downtime, which affects business revenue.
- **Utilization** – Eliminates waste in system resources improving enterprise ROI.
- **TCO** – A smart private cloud reduces high, continuing costs such as maintenance, enabling reinvestment in the IT.
- **Improved Flexibility** – Enables better response to changes in production, capacity planning.
- **Simplified Management** – Reduces complexity.
- **Time to Deployment** – Reduces lead-time to productivity.

A Gathering Cloud in the Data Center

All enterprises, but especially the smaller ones, have learned the bitter lessons of failing to utilize the resources within their information technology (IT) infrastructure properly. When you are getting less than 20% utilization from most of your server, storage, and networking resources, it is time to change the IT paradigm within the data center, and beyond. It is critical for the data center to be able to accelerate the business process and improve time to market, as well as to get more efficient use of their processing capability – for delivering applications and data to a growing collection of users and uses – in order to lower the TCO for the IT infrastructure. Additionally, with the amount of data being stored tending to double every 18-to-24 months, it also is a good time to increase storage efficiencies. **This all comes down to “right-sizing” IT infrastructure and making it more usable and easier to manage in order to remove complexity.** For a more complete list of the “pain points” affecting the smaller enterprise, see Exhibit 1, above.

Following the lead of big “cloud delivery” players such as Amazon and Google, larger enterprises are looking for a robust, multi-tenant⁴, virtual infrastructure that can offer faster access to innovation, and maximum economies of scale. The same is true for smaller enterprises, although it can’t be too complicated or costly. Ease of installation, provisioning, and management are key. **A proper Cloud implementation takes the next**

⁴ A “multi-tenant” infrastructure enables separate and protected slices of server, storage, and networking that are provisioned to run one or more applications.

step beyond virtualization. It is about a better way to allocate and manage virtual server partitions and storage.

For example, most enterprises are consolidating and virtualizing applications for flexibility and efficiency. They also are gathering and preserving more *structured data*, such as from databases; *semi-structured data*, like PDFs, docs, and spreadsheets; and *digital content* (objects) as well, such as videos, photos, music, and surveillance. For many, these are being sent off “somewhere” to one or more of these clouds. We are not talking about thousands of objects, but possibly millions or even billions, equaling up to many petabytes of information per enterprise. *Where can the data center base their application set? Where can (and should) the data center store all of this data?*

Most data centers already have taken steps toward achieving higher efficiency, i.e., seeking utilization rates of at least 50%, with hopes for 75%, across all of their IT resources. **To achieve these higher efficiencies, the typical data center has proceeded down the two-lane highway of consolidation and virtualization. For many smaller enterprises, getting there hasn't been that easy (or that successful), and for good reason. The complexities and costs have been high and they lacked enough data center skills to put together all of the pieces.**

In recent years, many IT organizations have seen a new architectural “hope” rising before them: *Cloud Infrastructure*. Building upon the benefits of consolidation and virtualization, good cloud infrastructure can simplify resource deployment and utilization even further, providing a home for some or all of the burgeoning data growth and/or a place to develop, test, and run some of an enterprise's many applications. **Done properly, good cloud infrastructure can enable the staff to build more efficient enterprise processes and, possibly, also help to lower the total cost of ownership (TCO) of the IT infrastructure, as well.** The challenge, of course, is doing it properly.

Cloud Spotting

The answer tends to involve at least two steps.

- First, there needs to be an easy way to provision and deliver virtual machines (VMs), which are appropriately-sized server slices or shares, in which applications are run). The same is true for the storage and networking

bandwidth associated with the VMs and the applications.

- Second, the ease and self-provisioning of the cloud infrastructure needs be baked into the new delivery vehicle.

These are related, of course.

Some enterprises have chosen the path of outsourcing to a *public cloud* (one shared with many others), while others either desire or have deployed a *private cloud*, to gain the benefits of the public cloud while also improving security, access control, availability of services, flexibility in provisioning, and, in general, higher qualities of service for deploying IT resources.⁵

In addition, the enterprise also needs to attain a higher level of scalability from their infrastructure. You must plan for growth in services demanded, numbers of users and frequency of use, more complex and involved application workloads, with more interaction with operational and archival data. Having a solution that provides for high availability and disaster recovery also is important to many, especially for mission-critical applications and data. **Cloud infrastructure presents a good vehicle for accomplishing these higher quality-of-service goals, as well.**

Private Cloud vs. Public Cloud

Cloud providers, both public and private (i.e., in-house), usually need to deliver both application services and information rapidly to constantly growing demands from users. They need to deliver these efficiently and flexibly, in order to lower the TCO and make the cloud an economic success, while still providing all of the IT resources when and where they are needed. **Good cloud infrastructure allows enterprises to manage their applications services and data as a resource, and to provision and deliver these as clouded resources. Unfortunately, this is something that is hard for many smaller enterprises to do with their available data center staff.**

The opportunities are many for solving IT problems with public cloud solutions. Unfortunately, many of the low-cost public cloud providers do not offer the range of service levels and security required by most enterprises, and usually contracted via SLAs. The bottom line is that pub-

⁵ See the issue of *Clipper Notes* dated January 25, 2012, entitled *Moving to a Private Cloud? Infrastructure Matters*, available at <http://www.clipper.com/research/TCG20120xx.pdf>. In that bulletin, we discussed the importance of infrastructure in delivering the services levels required by a private cloud.

lic clouds usually do not deliver the SLAs that are needed for mission- and business-critical applications and data. **Enterprises must look to their own private cloud(s) to avoid the storm caused by outages and security failures, and to satisfy these requirements. Smaller enterprises need most of these, as well, just on a smaller scale and with less complexity.**

An enterprise's private cloud can exist within the walls of the enterprise (physically in one place) or can be extended across several-to-many locations (including multiple data centers, a data center and many branch offices, etc.). The key point here is that the private cloud almost always sits behind the enterprise's secure firewall, which may encompass more than one location. This often is done not just to be cloud-like but also to bring the applications and data closer to its users, in a secure and protected manner.

Many enterprises desiring a private cloud want to share the cloud resources between the enterprise data center and regional branch offices, typically requiring access to more and more enterprise data. In a private cloud, services must be constantly, and securely, available.

Because a public cloud is sharable, cloud services and storage must have a charge back mechanism for the enterprises using it. A private cloud, on the other hand, may not need to charge resource time back to the various internal departments.⁶

It's About Having The Right Infrastructure

With the right hardware infrastructure, a cloud should really lower your TCO and improve your return on investment (ROI) for that infrastructure. **However, many smaller enterprises that recognize the advantages of a cloud fear the complexities involved. They seek a simpler solution that will reduce complexity and risk, while still providing better resource utilization.** Some vendors providing cloud infrastructure have taken this message to heart and developed management tools that will provide ease-of-use to the IT staff, especially to the staff in the smaller enterprise that may not have the time or expertise required to deploy and manage a private cloud manually. This is why help often is needed for smaller enterprises.

⁶ The point here is that it takes more than a little sophistication to do charge back in a meaningful way.

IBM's BladeCenter Foundation for Cloud

One of those vendors is IBM, especially with its development of SmartCloud configurations to sit on top of its *BladeCenter Foundation for Cloud (BCFC)* offerings. **BCFC is comprehensive virtualization solution designed to deliver consolidation and virtualization, in order to improve the availability, efficiency, and utilization of IT resources.** This is the foundation on which "the cloud" sits. The cloud is a subscription (allocation, provisioning, delivery, and management overlay) that rides on the consolidated and virtualized resources that lies beneath it. (More on this later.) Together, they stand as one solution, but one part (SmartCloud Entry) sits atop the other (BCFC). (See the rightmost stack in Exhibit 2, at the top of the next page.)

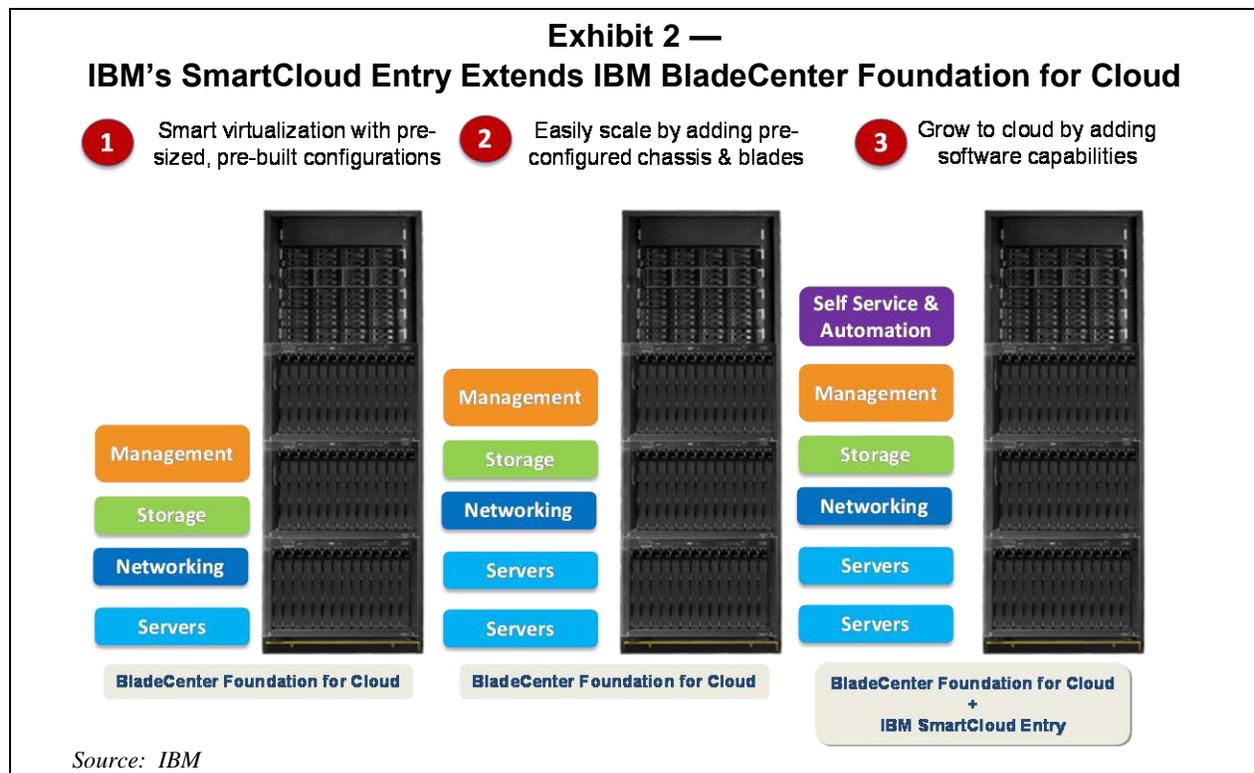
BCFC comes as a comprehensive, converged platform with "out-of-the-box" manageability via an included *IBM System Director*, to reduce complexity and infrastructure costs through standardization. It enables a fast, complete virtualized platform installation, designed to deploy a high-performance, reliable, scalable data center resource easily. As a result, the enterprise can experience a short time-to-value with a lowered IT cost. It reduces both the complexity and risk of deployment while enabling improved networking. **BCFC enables the IT staff to change the paradigm of data center operations.**⁷

With the IBM *BladeCenter H⁸* chassis and IBM *BladeCenter HS22V* x86 blades at its core, BCFC can virtualize all of the enterprise applications. With the included *IBM DS3524* disk array⁹, BCFC can deliver high-performance, cost-optimized storage with high bandwidth. In addition, BCFC comes with converged FCoE (Fibre Channel over Ethernet) networking for 10GbE and 8Gb Fibre Channel communications, with a variety of options from BNT, Emulex, and QLogic. IBM also can provide all of the professional services required for a smooth start-up.

⁷ See **The Clipper Group Navigator** entitled *IBM Simplifies the Enterprise Data Center with Flexibility, Performance and Convergence*, dated March 1, 2011, at <http://www.clipper.com/research/TCG2011010.pdf>.

⁸ See **The Clipper Group Navigator** entitled *IBM Increases Blade Performance, Lowers Cost – Eliminating the Fight, Enabling the Switch(es)*, dated January 29, 2007, at <http://www.clipper.com/research/TCG2007010.pdf>.

⁹ See **The Clipper Group Navigator** entitled *Delivering Enterprise Features for the Mid-Range – IBM Introduces DS3500 with TPC MRE*, dated June 7, 2010, at <http://www.clipper.com/research/TCG2010027.pdf>.



The richness of IBM's System x offerings is a great solution for the larger enterprise with the human IT resources to customize the stack. *But what about the smaller enterprise? How does it acquire the right stack for consolidation and virtualization?*

For the smaller enterprise, IBM has introduced the *IBM SmartCloud Entry* for the simplified deployment of an affordable, feature rich cloud. (This is the upper part of the stack represented in Exhibit 2, above, which is labeled "Self Service & Automation" and shown in purple.) It complements and completes IBM's BCFC, and delivers an easy-to-use, feature-rich cloud environment. Thus, BCFC provides a fully integrated foundation to transform the data center at smaller enterprises. If you already have the BCFC (the lower part of the stack) then you can add the SmartCloud Entry software to complete your cloud delivery solution. For those who do not have the BCFC, the entire consolidation, virtualization, and cloud environment solution can be ordered as a single, affordable stack, in a range of sizes targeted at smaller enterprises. (See the three BCFC sizings in Exhibit 3, at the top of the next page.)

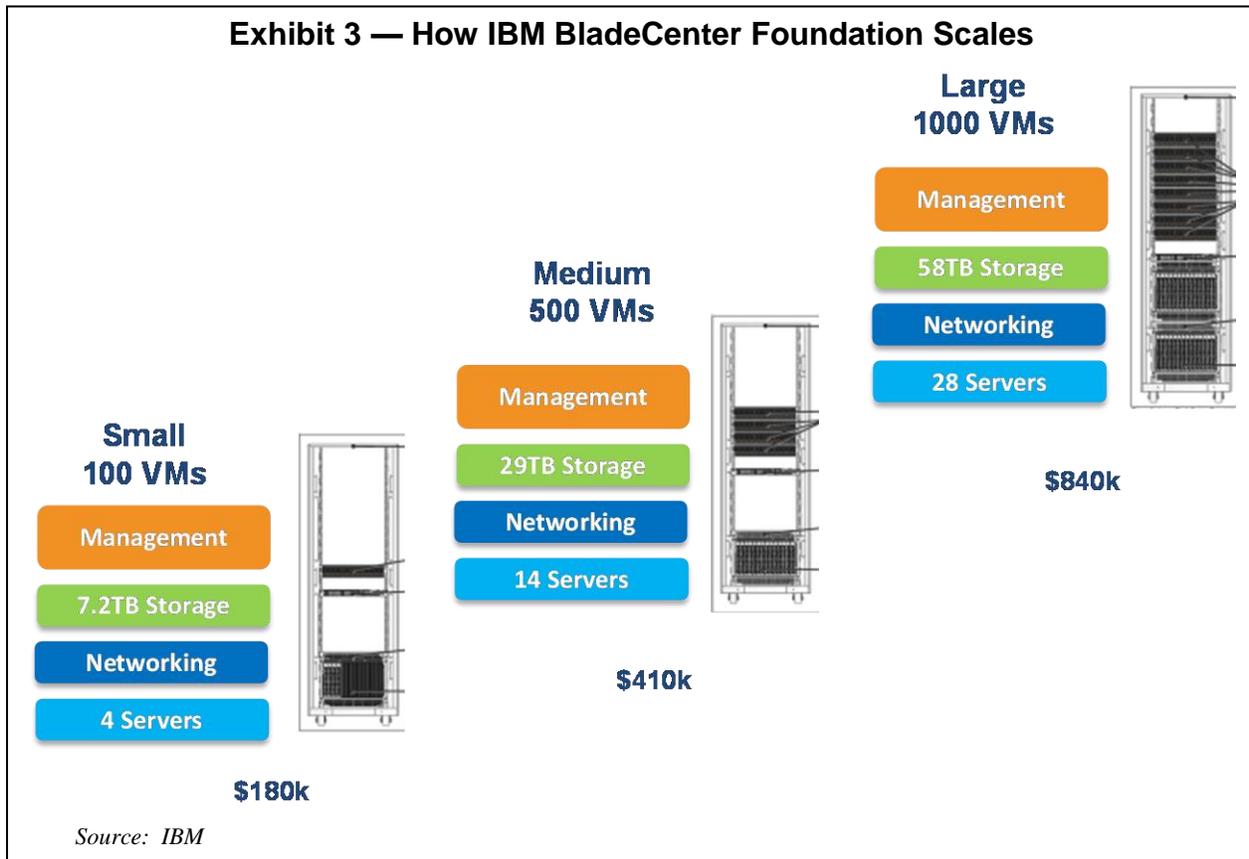
System x and BladeCenter Inside BCFC

With IBM System x¹⁰ and IBM BladeCenter with x86 systems as a base, combined with IBM's DS3500 storage arrays¹¹, IBM provides the smaller enterprise with the kind of robust systems that are required for cloud computing. As stated earlier, infrastructure does matter (a lot) in the deployment and delivery of a consolidated and virtualized environment for the smaller enterprise (or branch office). **IBM's BCFC environment provides a superior environment with a comprehensive, converged solution that combines network, servers, storage, management, and services required to evolve into the next level, a robust, virtualized cloud environment.** While remaining an open (x86) system, IBM's System x provides these extra capabilities to the data center.¹²

¹⁰ See [The Clipper Group Navigator](http://www.clipper.com/research/TCG2010010.pdf) entitled *IBM Introduces More-Efficient x86 Servers - Improving, Virtualization, Energy, Lowering TCO* dated March 26, 2010, at <http://www.clipper.com/research/TCG2010010.pdf>.

¹¹ See [The Clipper Group Navigator](http://www.clipper.com/research/TCG2010027.pdf) *Delivering Enterprise Features for the Mid-Range – IBM Introduces DS3500* with TPC MRE dated June 7, 2010, at <http://www.clipper.com/research/TCG2010027.pdf>.

¹² See [The Clipper Group Navigator](http://www.clipper.com/research/TCG2010009.pdf) entitled *IBM x86 Processor Infrastructure – Creating an Enterprise-Class x86 Server* dated March 9, 2010, at <http://www.clipper.com/research/TCG2010009.pdf>.



- **IBM X-Architecture technology (eX5)** – eX5 has a number of features to boost performance and minimize licensing costs; among them, decoupling memory from the processor and enabling the enterprise to add memory, and VMs, as needed without having to add more processors.
- **Max5** – Max5 is an innovative technology that enables a Gen 5 System x server to connect to an external 1U memory chassis. It enables System x to decouple server memory from system processors and allows the server to optimize performance with up to two times the memory capacity of competing servers.
- **FlexNode Capability** – providing unprecedented flexibility to the data center, enabling it to transform a single four-socket eX5 system dynamically into two distinct two-socket systems, and also reverse the process, dynamically. This enables the data center to optimize changing application performance needs.
- **Light Path Diagnostics and Predictive Failure Analysis** – helping the IT staff to avoid interruptions on mission-critical workloads.
- **eXFlash SSD technology** – eXFlash provides maximum internal storage performance for System x Gen 5 servers with solid-state disk technology and a new high-speed controller,

replacing IOPS-limiting hard disk drives (HDDs).

To these System x capabilities, IBM adds security and governance, platform optimization, a single management interface for servers, storage, and networking, and image management to improve service delivery. IBM improves data center flexibility by supporting multiple hypervisors, *VMware* and *PowerVM*¹³ today, with *Hyper-V* and *KVM* to follow.

VMware is managed through the *IBM Virtualization Manager*, which is an extension to *IBM System Director*. *Virtualization Manager* integrates with and complements *VMware VirtualCenter*. This simplifies management of *VMware*-based virtual server environments. It enables the administrator to discover, visualize, and manage both physical and virtual systems from a single console. The benefits of *Virtualization Manager* are highlighted in Exhibit 4, at the top of the next page.

With all of these capabilities, *BCFC* constitutes the necessary foundation for modern-day computing (i.e., application and data delivery), all

¹³ There is a *SmartCloud Entry* solution for *Power Systems*; however, this bulletin focuses on *IBM's x86-based SmartCloud Entry* offerings.

Exhibit 4 — Benefits of IBM Virtualization Manager

- Provides a single console to manage both physical and virtual systems;
- Easy to install and use;
- Proactive virtual machine (VM) migration based upon predictive alerting to help avoid downtime;
- Drives VMware's *VMotion*, using physical hardware status information;
- Helps increase serviceability by migrating VMs to a standby server during a service window.

Source: IBM

in a complete and neat package. **Remember that a good foundation is the necessary first step.**

IBM's SmartCloud Entry Solution

The feature-rich BCFC stack enables IBM to deliver an integrated foundation upon which to add SmartCloud Entry (for easy-to-use cloud provisioning and management). **This allows the smaller enterprise to deploy a private cloud with standard cloud services for metering, billing, scheduling, and service orchestration in a multi-tenant environment.** It addresses the pain points of the smaller, less sophisticated data center (as shown in Exhibit 1, on page 2), creating a shared environment that simplifies the management of data center resources through a self-service portal.

SmartCloud Entry delivers leadership performance, easy-to-use scalability, and extreme reliability, all while reducing complexity with a simplified management capability. All of these features are prerequisites for a successful cloud deployment in an environment demanding good response and availability. **IBM's SmartCloud Entry is a high-value solution for the smaller enterprise, providing a lot more IT for a lot less money (than building it from the pieces or buying it from another vendor), resulting in a lower TCO.** By employing standard components, IBM can configure an entry-level BCFC system with four compute blades for about \$180K, at list (as shown in Exhibit 3, on page 5), not including the SmartCloud Entry Software Stack; this may be different for each configuration. However, the SmartCloud Entry stack should only add about \$1900 to each server. A medium-sized configuration with 14 compute blades goes for about \$410K, at list, while a large-

er configuration with 28 capacity blades costs around \$840K, at list.

Conclusion

In deploying a cloud, the smaller enterprise needs to assure itself that it has more than just pieces needed for success, it needs a complete stack, like the one shown in Exhibit 2, on page 5. It needs a simplified, integrated solution that provides virtualization, self-service, metering, image control, high performance, reliability, and scalability, along with self-service functionality for all in the user community and ease of management, in order to minimize the amount of administrator involvement required. Even more importantly, the IT staff needs a stable hardware infrastructure to ensure the reliability that will be expected from their user community. **With IBM's BCFC, you have the pieces and the framework for non-disruptive growth. By adding SmartCloud Entry, the smaller enterprise gets just that (a smart cloud solution for the smaller enterprise), without having to buy too much (i.e., a solution scaled for a larger enterprise).**

With a complete stack that includes IBM's System x servers, DS3500 storage arrays, and a variety of certified, trusted network switches and controllers, the smaller enterprise data center gets more than just another loaded rack. SmartCloud Entry adds just the right amount of cloud provisioning and management for the smaller enterprise. It makes virtualization easier.

In addition, IBM BladeCenter systems have a proven virtualization and cloud solution infrastructure, including IBM Cloud Software and *VMware Director*. If needed, IBM's professional services are available to ensure that the cloud deployment is fast, efficient, and successful. IBM is helping to change the economics of business infrastructure.

If you are looking to deploy a cloud for the first time, IBM can provide all of the services that a smaller enterprise needs with their SmartCloud Entry. **Don't forget, infrastructure really does matter!** Take a close look at what's under the hood (in the stack of the BCFC and SmartCloud Entry) and be sure to read the operators manual (because the cloud is about getting to where you want to go without too much trouble)! IBM seems to have done this well. Check it out!



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