



Opinion

What IBM's Announcement of the New zEnterprise, Unified Resource Manager, and zBX Really Means

Executive Summary

Separate IBM's newest mainframe announcement into two parts:

1. The new z Enterprise mainframe; and,
2. A new hybrid (an integrated mainframe/blade environment).

When IBM up-revs its mainframe system environment, the company's messaging usually focuses on the percentage increase in capacity of the new server, an increase in cycle speed (and performance), and an energy utilization statement. And this year's announcement provides such data, including a 60% capacity increase using the same amount of energy as the z10. And IBM is also reporting a 40% jump in performance due to the new, super-fast 5.2 GHz quad z core processor.

But, on the other hand, this year's z announcement is a bit atypical because of major increases in processing performance thanks to a significant amount of software tuning and optimization. This tuning has resulted in large performance increases for traditional z/OS workloads (these may run 40% faster); a huge increase in performance for CPU-intensive workloads (up to 30% faster due to compiler improvements as well as gains from the processor enhancements); and significantly increased database processing performance (as dedicated "workload optimizers" yield 5 to 10X improvement in complex query performance).

The "query performance" point (above) is particularly worth stressing because it positions the zEnterprise as a premier business analytics server. With the faster single thread processor in the industry, with greatly expanded memory, and with tight linkage to DB2 databases, this new mainframe should be a formidable competitor in the business intelligence and in business analytics market segments.

In addition to software tuning, IBM's z processor has also been improved and can now perform floating point and single-thread processing in ranges that compete head-to-head with dedicated application servers.

IBM's zEnterprise, on its own, is compelling for existing IBM customers who need more performance and capacity. But, to us, the *hybrid* z/blade announcement is the heart of this announcement. IBM's new hybrid is an integrated System z tightly coupled with a IBM zEnterprise BladeCenter Extension (zBX) blade environment that enables mainframe-class management and governance to be extended to attached blade servers. By doing this, IBM has been able to:

- *Tremendously reduce information systems operational management costs (by as much as 62%);*

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- *Significantly reduce risk by improving the security and availability of blade servers by extending mainframe governance and management to blades;*
- *Greatly improve mainframe/blade data processing performance (using optimizers); and, much, much more.*

In this *Opinion*, *Clabby Analytics* shares its view of IBM's zEnterprise as well as the new hybrid /blade environment.

We believe that this new hybrid environment has the potential to completely change the computing industry by standardizing management and governance across heterogeneous systems — a move that should enable IT (information technology) managers to focus on service management and on optimizing business process flows instead of focusing on the manual management of physical and virtual systems.

But changing the industry using a mainframe as a core governing system will not be easy. We expect that IBM will meet considerable resistance from distributed-systems-biased CIO's and IT managers who don't understand the mainframe environment. And we also expect considerable resistance and a lot of FUD (fear, uncertainty, and doubt) from IBM's competitors because no other competitor has anything even remotely close to the z/blade combo that IBM has architected.

Despite this resistance, we believe that due to the compelling operational and business benefits that this architecture delivers as well as certain organizational advantages that this architecture can help create, IBM's z/blade combo architecture will be well received by enterprises looking to overcome organizational difficulties while lowering their IT costs.

The New zEnterprise

The new z Enterprise specifications are impressive. They include:

- The world's fastest single threaded processor (a 5.2 GHz superscalar processor);
- Up to 96 Cores (1 to 80 configurable for client use, the others used for system activities);
- Up to 3 TB RAIM memory (this new "redundant array of independent memory" acts like RAID [redundant array of independent disks] — ensuring that the system can tolerate any failure in the memory system without customer or operational impact);
- 1.5MB L2 Cache per core, 24MB L3 Cache per processor chip (significantly more cache than previous generations — allowing more and more data to be processed in close proximity to the processor). And also note that these are in addition to 192MB L4 cache at the MCM/book level. This much memory this close to the processor will make the zEnterprise a very impressive business analytics server.
- Over 100 new instructions (these new instruction sets allow developers to write commands that can directly exploit z processors for greater performance).
- Cryptographic enhancements (adding to the mainframes already established lead in commercial systems security); and,
- Optional water cooling (note that water is about 4,000 times more efficient at conducting heat away from servers than air).

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Massive Memory Changes the Personality of the z

Of these specs, the memory expansion is an extremely important change. For years *Clabby Analytics* has been writing about how important very large memory (VLM) is when it comes to processing vast amounts of data. We have emphasized that the more memory that can be placed in close proximity to the processor, the faster large amounts of data can be processed. By allowing 1.5 MB of level 2 cache per core — and 24 MB level 3 cache per processor — IBM's zEnterprise now allows vast amounts of memory to reside close to the market's fastest processor where it can be processed at record speeds. And by making up to 3 TB of RAIM available in main memory, IBM further extends the amount of memory it can address — adding even more power to its memory capacity/memory management story.

When the computing world centered on 32-bit processors, the addressable memory limit was only a few gigabytes. When it moved to 64-bits, the addressable memory expanded to petabytes (this is a huge increase). With the ability to address up to 3TB of memory, it is easy to see why we think the z will become the industry's premier business analytics machine.

It is also important to note that with its increased processing and expanded memory capabilities, the number of virtual machines that can run on a zEnterprise can now be expanded to the tens-of-thousands (potentially up to 100,000 when combined with attached blades).

Further, given IBM's advanced virtualization infrastructure and its best-in-the-industry heterogeneous virtualization management capability, *the new zEnterprise is now positioned as the premier Linux consolidation environment in the industry.*

The Hybrid

To better understand IBM's hybrid z/blade environment, prospective buyers should evaluate the zEnterprise and IBM's zBX from three angles: 1) hardware; 2) integration/management software; and, 3) packaging.

First, it is important to note that IBM's hybrid z/blade environment will initially incorporate select IBM POWER7 blades and Smart Analytics Optimizer (both available later this year), followed by IBM System x blades (next year). Other "specialty blades" may be introduced over time — but, for now, IBM's hybrid z/blade environment is primarily focused on POWER7 and x.

Now, why would anybody want this type of hybrid configuration? From a systems point-of-view this new hybrid environment introduces tighter integration between bladed servers and the mainframe. By closely coupling these two types of systems, IT managers can expect to see reduced management costs coupled with record performance as blades access and interact with back-end mainframe DB2 databases.

The operative words in the paragraph above are "tighter integration" (tighter than can be achieved between distributed systems and a mainframe in a typical distributed computing configuration). This tight integration is manifest in:

- ***Management*** — what IBM has done is essentially extend z governance (the security and resiliency features) as well as z management (physical and logical systems management) to tightly coupled blade servers. This is hugely important because it

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provides a common and consistent mechanism for managing a z and connected blade servers using the industry's most advanced management environment;

- *Virtualization* — the zBX blade environment comes with an installed hypervisor that works in tandem with IBM's best-in-the-industry virtualization infrastructure/-management environment. By coupling these two environment IT managers and administrators can now shift their attention to workload management and workload balancing rather than focusing primarily on managing virtual server sprawl;
- *Governance/Security* — Mainframes have been around for five decades, and offer the most advanced governance and security capabilities in the industry. For instance, from a security perspective, mainframes offer EAL Level 5 security (the only commercially available server platform to do so). By extending mainframe governance across hybrid zEnterprise systems, IBM is now able to improve the security environment for blades. For IT executives concerned about security and risk management, this unifies systems security across the board
- *Energy Management* — advanced mainframe energy management tools can now work in tandem with blade energy managers, allowing IT managers and administrators to create a common view of energy usage, and allowing those managers and administrators to balance energy allocation;
- *Networks* — manifest in a 10GB Ethernet connection directly from the blade environment to the mainframe, as well as a secondary management network. (Early adopters are finding that when they use this tightly-coupled network environment they are able to eliminate additional routers and firewalls — and the management and performance overhead that these devices represent. As a result, the connections between blades and mainframes become easier to manage — and decreased latency due to the elimination of these devices also results in higher performance); and in
- *Optimizers* — by exploiting the hardware relationship between z and tightly coupled blades, IBM has now created a “smart analytics optimizer” and a “smart analytics system” (packaged as the System 9600) that streamlines DB2 queries in order to deliver “orders-of-magnitude faster query response times with consistent predictability, and reduced ownership costs”. IBM does this by leveraging IBM DBMS and high-performance DW query software, based on advanced data-in-memory technologies (while also leveraging z manageability for business intelligence applications).

A Closer Look at the Hybrid z/Blade Management Environment

Of all of the features/functions listed above, *Clabby Analytics* is most impressed with the combined z/blade *management* environment. By combining z management with blade management, IBM now has the ability to offer its customers:

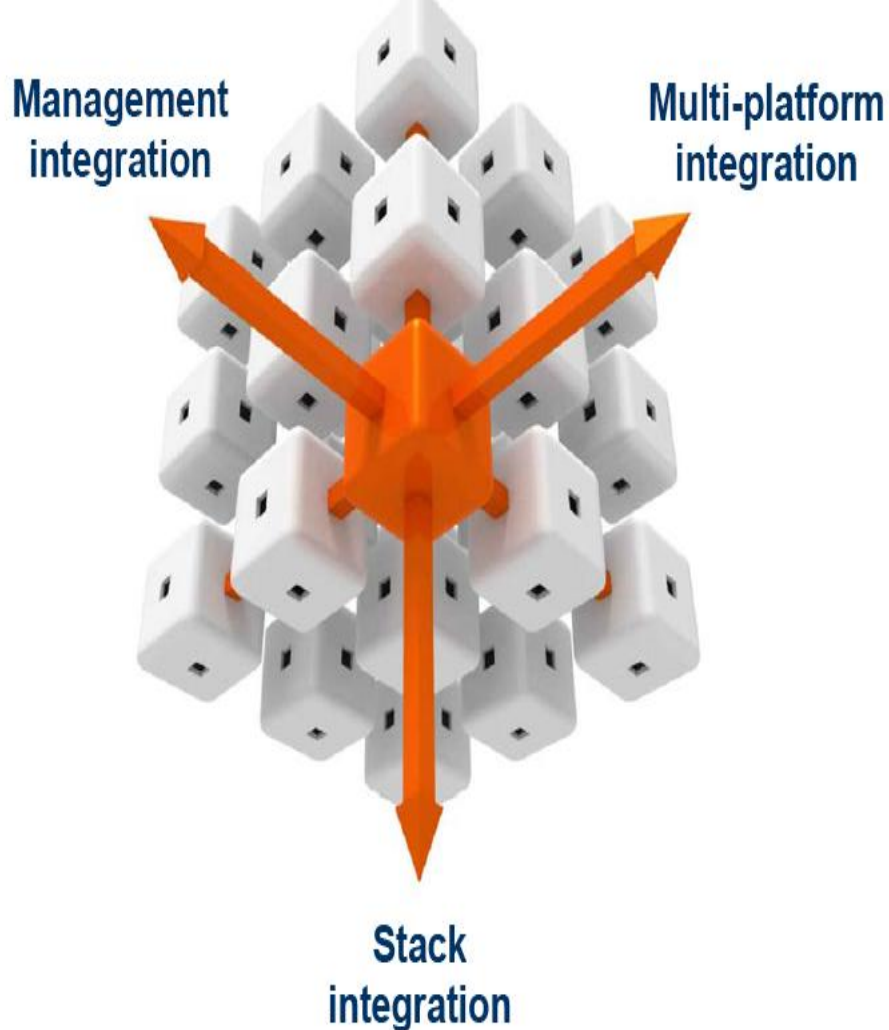
1. a comprehensive, integrated management environment;
2. a multi-platform integration environment; and,
3. infrastructure stack integration (see Figure 1).

By integrating disparate, heterogeneous systems and their related infrastructure stacks — and by heavily automating the management of those systems and stacks — IBM can now shift the focus in information systems management away from managing physical and logical servers toward the management of workloads. And this is important because:

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By some estimates, over 50% of most IT budgets are consumed in IT management. Enterprises are spending billions upon billions of dollars each year using people (human labor) to manage and tune systems, storage, networks, applications, and databases. IBM's new zEnterprise environment, combined with Tivoli, Systems Director, and the new Unified Resource Manager have the potential to lower IT management costs by 62%. What these products enable enterprises to do is to automate IT management functions — taking a lot of labor (the need for people to “touch” the system) out of the cost equation.

Figure 1 — The Benefit of a Common Management Environment



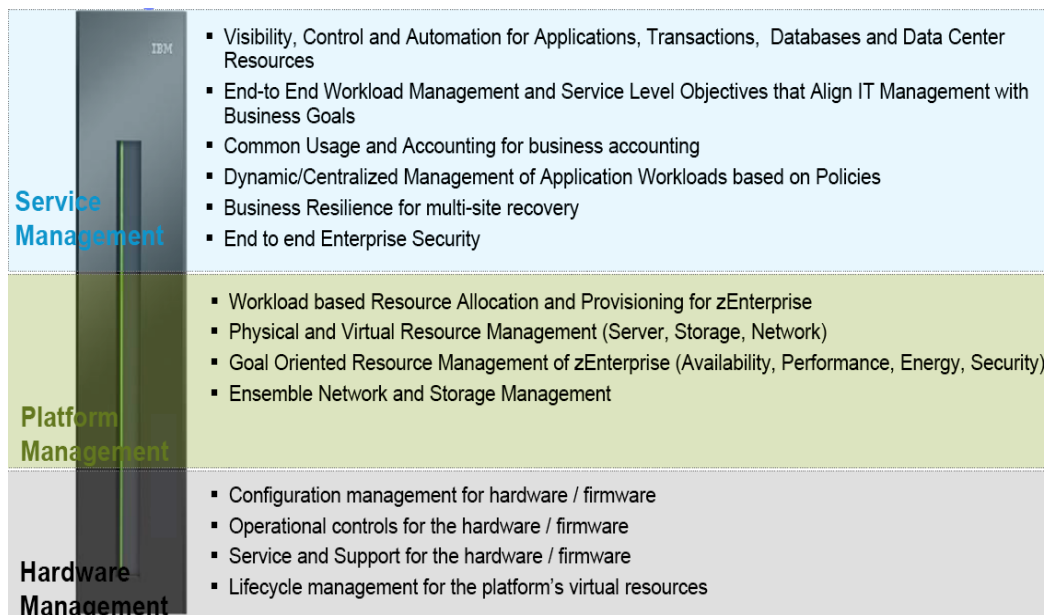
Source: IBM — July, 2010

A Even Closer Look at the Combined z/Blade Management Environment: How Tivoli, Systems Director and the Unified Resource Manager Work Together

Clabby Analytics has written extensively about IBM's Tivoli and Systems Director products over the years (our reports on these products are available for free at www.clabbyanalytics.com in the archive section). This section describes how Tivoli, Systems Director, and IBM's new Unified Resource Manager are interrelated (Figure 2).

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Figure 2 — How Tivoli, Systems Director, and Unified Resource Manager Interrelate



Source: IBM — July, 2010

In short, Tivoli provides an advanced management environment for workload provisioning and for process flow management (Tivoli software provides many, many other functions — but these two are the most germane to the discussion about the relationship between IBM's zEnterprise and tightly coupled zBX blades). And Systems Director is largely responsible for the management of physical and logical systems (a new *Clabby Analytics* report published this month explains how System Director VMControl has been designed to manage virtual machines across System z, Power Systems, and System x environments). IBM's new Unified Resource Manager augments IBM's System Director by providing additional virtual machine management capability as well as by providing automated firmware management facilities.

What is the Unified Resource Manager?

The Unified Resource Manager (also known as “zManager”) is a low-level management environment that focuses on:

- Hypervisor management and creation of virtual networks;
- Operational controls, service and support for hardware/firmware;
- Network management of private and secure data and support networks;
- Energy monitoring and management;
- Workload awareness and platform performance management; and,
- Virtualization management — by providing a single view of virtualization across the platform.

Each of these points bears closer scrutiny.

- A hypervisor is a piece of code that manages the relationship of an operating environment (or a group of operating environments) with an underlying processor.

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Using a hypervisor, IT managers can set up tens, hundreds or thousands of “virtual machines” (logical operating systems images) that can interact with the processors in a given system. Hypervisors have the net effect of helping to increase systems utilization by allowing unused computer cycles to be used by these virtual machines. IBM's zManager has the ability to manage multiple hypervisors — and the ability to create virtual networks — making it possible for enterprises to better utilize their systems platforms.

- zManager also provides operational controls, service and support for hardware/firmware updates. Firmware is the low-level code that drives the functions of various electronic devices (for instance, a calculator's mathematical capabilities can be found in the firmware that drives the calculator's processor). Firmware updates are important because they usually improve the functionality of a given device — or correct exposures (such as security exposures).
 - But updating firmware is laborious (finding patches, updating, quality assurance and testing, etc.), and risky (a new function could create a new security exposure or cripple the hardware or a software program that isn't used to dealing with a new firmware patch — and so on). zManager automates this process and provides operational controls, service, and support functions for administering firmware updates.
- zManager also provides the ability to perform network management functions to assist in the management of private data. As mentioned previously, using zManager can take a lot of network devices (hubs, bridges, and routers) out of a given mainframe/blade configuration. And by doing so, zManager can also help improve performance because applications don't need to clear through as many firewalls and network devices.
- zManager can also be used to gather energy utilization data within a given z/blade environment. This data can be used to help reduce energy costs by helping IT managers understand which systems are using energy and how that energy is being used. Knowing this kind of information is particularly important when it comes to workload balancing because workloads can be moved off of unused resources — enabling those unused resources to be shut down. Enterprises may be able to save vast amounts of energy by taking advantage of the zManager's cross platform energy management facilities.
- Further, zManager introduces the concept of low-level “workload awareness” to IT managers. Using a wizard-driven interface, zManager can report on resource availability, providing a single, consolidated and consistent view of underlying resources. It can monitor resource use within the context of a business workload. And it can be used to help define workloads and associated performance policies.
- Finally, from an operational perspective, zManager can perform auto-discovery and configuration support for new resources. It can also be used to perform cross platform hardware problem detection, reporting and it has call home support facilities. And, it can be used for physical hardware configuration, backup and restore functions.

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Summary Observations

According to a recent IBM survey of 1,541 CEOs, general managers and senior public sector leaders, “*complexity*” is the number one issue facing business and government leaders today. Interweaved, interconnected economies; sophisticated buying behaviors; new, advanced technologies, the information explosion, and complex business process flows between the business and its supply chain partners (as well as between a business and its customers) are all contributing to this belief that managing businesses and governments is becoming too complex.

IBM's zEnterprise combined with several IBM management products including the Unified Resource Manager (zManager), Systems Director, and Tivoli — and with the attachment of a zBX — can create an environment that overcomes complexity by providing a standardized infrastructure that can be managed in a common and consistent manner.

But this zEnterprise/Tivoli/Systems Director/Unified Resource Manager/zBX environment also delivers a tremendous amount of cost reduction value (which is also very important to CEOs). It can be used to significantly lower management costs by automating physical and virtual systems management tasks. It can be used to balance workloads (an activity that enterprises are becoming very familiar with as they build cloud environments). It can be used to lower energy costs. It can be used to drastically improve performance (especially for data-intensive tasks), thus improving return-on-investment. It can be used to manage risk (by establishing a common security umbrella for underlying information systems).

This architecture is, in short, a game changer.

Still, despite all of these advantages, IBM is going to have to work hard to convince the market to move to this new architecture. IT managers, for the most part, do not understand what a mainframe is and how it operates. A mainframe is a highly optimized general workload processor — not a single, dedicated application server environment (like many distributed IT managers are used to deploying). A mainframe is a highly virtualized, inherently resilient environment (unlike the x86 servers that distributed IT managers are used to deploying). A mainframe costs more than an x86 server from an acquisition point-of-view — but when compared from a total-cost-of-ownership perspective, mainframes cost less to operate than complex networks of inefficient distributed servers that are comparatively immature in governance and management.

IBM will need to overcome a lot of mainframe ignorance and bias as it brings its new zEnterprise/blade environment to market. But the argument to move to this architecture is so compelling that, ultimately, enterprises that are building next generation cloud environments as well as enterprises looking to reduce clutter, server sprawl, and complexity will be inextricably drawn to this architecture.

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