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**IBM @server zSeries:
Enabling Business Transformation
through a Simplified IT Infrastructure**

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So if your IT infrastructure has become a complex set of disparate and inefficient "silo'ed" applications operating across an endless sea of servers ... then you owe it to yourself to ask serious questions like: "Where will you deploy the next application?" or "Where will you physically put the next server?" or "Is there a simpler way to manage this?"

Introduction

April 7, 2004 marked the 40th anniversary of the System/360™. What began as a computing revolution in 1964 has evolved with relentless innovation, continuous refinement, time-tested core competencies and proven technologies, resulting in today's IBM @server® zSeries® advantage: world-class servers that have been designed from the very beginning to address critical business requirements today, defining the gold standard of computing in the server marketplace.

High on that list of critical business requirements is the need for IT infrastructures to better support business integration and transformation efforts, as more and more enterprises seek to leverage today's on demand business model. At the heart of these integration and transformation efforts are often the simplification and streamlining of core and strategic business processes.

Viewed in the broadest sense, infrastructure simplification represents an optimized view and evolutionary approach – or the next logical step beyond basic server consolidation – for companies on the road to becoming a truly on demand business. From an IT perspective, it can serve as a roadmap for building one's on demand operating environment, where the objectives include leveraging existing assets, enabling business process integration, reducing costs, increasing efficiency, and moving to better synchronize the design of IT infrastructures with the design of the business processes – which, by the way, should be modular with ultimate flexibility built to accommodate change and based on open and industry standards as much as possible.

So if your IT infrastructure has become a complex set of disparate, server-specific "silo'ed" applications operating across an endless sea of servers – transaction processing servers, database servers, tiered application servers, data gateways, human resource servers, accounting servers, manufacturing servers, engineering servers, e-mail servers, Web servers, etc. . . ., then you owe it to yourself to ask serious questions like: "Where will you deploy the next application?" or "Where will you physically put the next server?" or "Is there a simpler way to manage this?" Business and IT complexities can be compounded with each new business process, along with the applications and the associated servers that get added into the mix. And ultimately, you'll need a simplification strategy to manage the growing complexity. As we explore this topic further, we'll illustrate that it is

Highlights

Infrastructure Simplification is fundamentally about sharing between servers. It's about sharing data, sharing applications, and sharing operational controls – helping a business look across its entire computing capabilities to determine the best directions and strategy for overall, integrated workflow. And it's precisely these capabilities that make zSeries a natural choice to address Infrastructure Simplification requirements.

precisely the core competencies built throughout 40 years of mainframe computing innovations that make zSeries such an integral server platform choice when designing your company's infrastructure simplification strategy and data center landscape.

zSeries integration capabilities: it's all about sharing!

Infrastructure Simplification is fundamentally about optimizing resource sharing among servers. It's about sharing data, sharing applications, and sharing operational controls. Additionally, it builds on open and industry standards. The IBM @server zSeries, along with its set of highly advanced operating systems, provide standard format, protocols, and programming interfaces that enable the sharing among applications on the mainframe as well as other computing servers, such as IBM @server BladeCenter™, pSeries® and iSeries™ products.

Sharing is intended to help reduce redundancy that often comes about from multiple copies of duplicate data on multiple servers. Sharing can also improve privacy management by enabling better control and enforcing privacy regulations against data sources. It can help simplify disaster recovery scenarios, because fewer servers are being deployed and less data needs to be protected during periodic (i.e., daily, weekly,) back-up operations when it is shared rather than existing as multiple copies. But most of all, infrastructure simplification helps a business look across its entire computing capabilities to determine the best directions and strategy for overall, integrated workflow – and in doing so, helps to better leverage existing assets and drive higher ROI on IT investments.

What's the role of the mainframe in Infrastructure Simplification? Well, where does the bulk of an enterprise's critical data reside? Most often, it is on the mainframe. Indeed, today's IBM mainframe, the zSeries server, has become a widely accepted platform for hosting key, mission-critical applications. Over 95% of the 2003 Fortune Global 500 largest corporations use mainframes. Over 80% of corporate data resides and/or originates on mainframes, and two-thirds of business transactions for US retail banking continue to run directly on mainframes. (Source: ITG August 2003 and December 2002, respectively).

While the cost of basic calculations has fallen – as evidenced by Moore’s Law – the infrastructure necessary to provide the compute power, flexibility, availability, and security to drive a successful on demand business has grown dramatically. Modern Information Technology infrastructures consist of multiple hardware architectures, a variety of software operating environments, complex internal and external networking, and a host of applications that must interoperate in order to provide end-to-end service to customers and internal users alike.

Responding to opportunities and competitive challenge can mean adding new applications to the portfolio of a business. Some are added to support new lines of business, others for internal use, some to allow communication with other businesses – both suppliers and customers – and others are brought on-line to comply with industry or government regulations. As the need for providing increased IT service grows, so does the infrastructure needed to support it. Infrastructures need to be adequately provisioned to handle peaks that can be predicted, like seasonal increases in transaction volume, as well as those that may catch the IT department by surprise. New servers are acquired. Middleware, application software, and operating software are acquired. The network grows in size and complexity, and skilled staff is needed to maintain all of it.

As the need to provide higher levels of service rises, budgets are tending to move in the opposite direction. IT executives are constantly challenged to provide more service with smaller budgets. In many cases, simplification of the infrastructure can help provide the best of both worlds: higher levels of service along with reduced complexity, lower cost of operation and better return on IT investments.

Leveraging zSeries technology to reduce complexity

IBM zSeries servers offer capabilities that can help reduce the size and the complexity of a modern on demand business IT infrastructure. The ability to “scale up,” or add processor power for additional workloads, is a traditional mainframe strength. Today’s zSeries server is available with up to 32 processors in a single frame. They need not be configured at their maximum, but rather can provide growth as needed in the future. Customers can order a zSeries server configured with less than the maximum amount of processor power, and upgrade it “on

demand” using a customer-initiated procedure to add processing power when it’s needed to support new applications or increased activity for existing applications, without waiting for a service representative to call. Processing power can also be used – and paid for – when it’s needed and turned off when it’s no longer needed. This is particularly useful in cases of seasonal peaks or disaster recovery situations.

Adding processing power and centralizing applications represents one strategy to help control the size, cost, and complexity of an infrastructure. This approach can also provide a highly effective way to maximize control while minimizing server sprawl – in essence, reducing the number of single-application servers operating in distributed environments. A number of single-application servers can typically be deployed to support business processes in both production and supporting test environments. Hot stand-by failover servers, quality assurance servers, backup servers, training, development, and test servers are just some of the types of resources required to support a given application. A zSeries server can help reduce the numbers of those servers by its ability to “scale out.” The term “scale out” describes how the virtualization technology of the zSeries server lets users define and provision virtual servers that have all of the characteristics of distributed servers, except they do not require dedicated hardware. They coexist, in total isolation, sharing the resources of the zSeries server. From a simplification perspective, the implications of this technology are formidable. A zSeries server can share resources among hundreds – even thousands – of virtual servers. This means that the need for massive amounts of server hardware can be significantly reduced. When the amount of server hardware is reduced, so is the need for power, cooling, floor space, and UPS capacity.

zSeries servers can also share applications and data among virtual servers, which can help provide savings in software licensing as well as reducing the complexity and staffing required to maintain the shared applications and data. The network required to provide inter-server communication can be reduced in size and complexity through a zSeries innovation called HiperSockets™, which is often described as an “in memory TCP/IP network” or even a “network within a box.” Since HiperSockets technology uses memory as its transport media, it provides several advantages over an external network. The need for networking hardware (cabling, routers, and switches) is reduced. The latency associated with

a physical external network is reduced, since HiperSockets technology is an “in memory” implementation. Additionally, security is improved since the inter-server communication takes place within the zSeries server. An eavesdropping device like a “sniffer” can’t be attached to HiperSockets.

Managing the infrastructure to meet business goals

When new workloads are added to a zSeries server, they are not simply “thrown into the mix” as with the typical distributed models. Usually a workload is distinguished by its importance to the business. Some workloads, like those associated with customer ordering and fulfillment tend to have a higher degree of importance than applications used internally. Making resources available to mission critical applications when they need them is a priority for zSeries hardware and software designers.

zSeries servers running z/OS® can take advantage of its Workload Manager (WLM) function, and zSeries servers running a centralized workload across multiple virtual servers with z/VM® can take advantage of the VM Resource Manager. The overall mission of these advanced workload management technologies is to use established policy and business priorities to direct resources to key applications when needed. These policies are set by the user based upon the needs of the individual business. These time-tested workload management features provide zSeries with the capability to effectively operate at average utilization levels exceeding 70% and sustained peak utilization levels of 100% without degradation to high-priority workloads. The higher degree of workload integration represents a key zSeries advantage, whereas single application servers often run at average utilization levels below 25% – representing a significant amount of unused resources across many individual servers

Reducing complexity helps reduce cost

Usually when something is made simpler it is also less costly. Reducing cost is one of the compelling reasons to simplify an infrastructure. As noted earlier in this document, the costs of hardware, middleware, and operational software can be reduced. Other savings are possible in simplified environments.

Using Linux® on zSeries servers can help to reduce costs. By reducing the number of operating systems and servers in an infrastructure, personnel skills can be optimized. Skills being used to support complex distributed infrastructures can be re-directed in simplified environments and applied to building the business applications that will keep a company competitive in the future. There are a variety of economical alternatives to Microsoft® Windows® and UNIX® based applications that run on Linux on zSeries that provide equal or superior function and performance, and can be centralized on a single server. Since code can be shared among many virtual servers, changes, upgrades, and maintenance are done in a single location, making maintenance easier and reducing the possibility of error introduced by replication.

For businesses that provide IT services on a cost recovery basis, it is possible to pass savings along. zSeries virtualization technology provides the ability to track the consumption of resource by each individual virtual server. Processor resource, memory, I/O load, and network traffic for each server are tracked. This information can be used to provide charging for IT services based on resource consumed, instead of the total cost of a combined group of dedicated servers, software, networking, and labor burden as is usually the case where resources are dedicated instead of shared.

zSeries is quickly becoming recognized as the cornerstone for infrastructure simplification strategies, because it is designed to provide superior integration, manageability and scalability – all while helping to lower your overall computing costs. Customers may very well find the mainframe to be their most valuable computing asset in an on demand world.

The business case for zSeries server consolidation

zSeries is quickly becoming recognized as the cornerstone for infrastructure simplification strategies. Why? Because it is designed to provide superior integration, manageability, availability and scalability – all while helping to lower your overall computing costs. With the capabilities of a self-managing, multi-system server that can direct resources when and where they are needed, zSeries has the flexibility to help consolidate and run Java™, Linux, classic mainframe and UNIX workloads. And it is designed to do it side by side with heritage workloads – connected directly to the Internet for reliable, resilient, continuous, security-rich, and affordable on demand enterprise computing.

The ability of a zSeries system to assume workloads from a variety of heterogeneous environments provides a new, highly viable avenue for server consolidation and infrastructure simplification – particularly because of its

comprehensive support for the largely popular Linux environment. As Linux is increasingly used as an alternative platform for UNIX and Windows workloads, zSeries architecture is well-positioned to consolidate those workloads with its advantageous economies of scale and flexible software pricing model. And more recently, with the zSeries Application Assist Processor (zAAP) available on IBM @server zSeries 890 (z890) and zSeries 990 (z990) servers, users can deploy and integrate new Java technology-based workloads on the very same platform as heritage applications and core-business databases in a highly cost-effective manner.

zSeries servers can be strategically leveraged at the heart of your infrastructure simplification strategy, as they offer a number of infrastructure simplification “sweet spots” that are not particularly well-suited to UNIX and Windows computing platforms:

- *High performance transaction processing*
- *Ideally suited for I/O-intensive applications*
- *Large-scale database serving*
- *Parallel Sysplex® clusters for single-view data sharing*
- *Enhances existing zSeries product investments with Linux applications*
- *Consolidates infrastructure servers on available zSeries logical partitions (LPARs) or virtual servers*
- *Supports large numbers of virtual servers with zSeries virtualization technology*
- *Effective for consolidation of low- to moderately-loaded servers*
- *Effective for consolidation of servers that peak at different times*
- *Enables a single server to handle multiple applications (Web serving, e-mail, domain name serving, DHCP, consolidating applications from other platforms)*
- *Effective for high-speed interconnectivity of virtual servers via HiperSockets technology*
- *Effective for systems and workload management with virtualization management functions*
- *Supports key enabling technologies (Java, Linux, Grid and SAN) that can make infrastructure simplification a reality.*

Traditional server farms employ discrete servers that can consume incremental expenses – hardware and maintenance, floor space, power and cooling, additional support staff and per-server (engine) software fees. They can require miles of cables and can require days to deploy a new server. They rely on spares and re-boots for high availability.

With an IBM @server zSeries server, you can help reduce costs without unnecessarily sacrificing all-important server autonomy. You can trade in your cables for virtual, security-rich, high-speed, inter-server connectivity and you can deploy new server instances on demand in minutes rather than days. Best of all, zSeries architecture is specifically designed for high availability and it offers world-class disaster recovery services for local and distributed sites that have withstood the test of time.

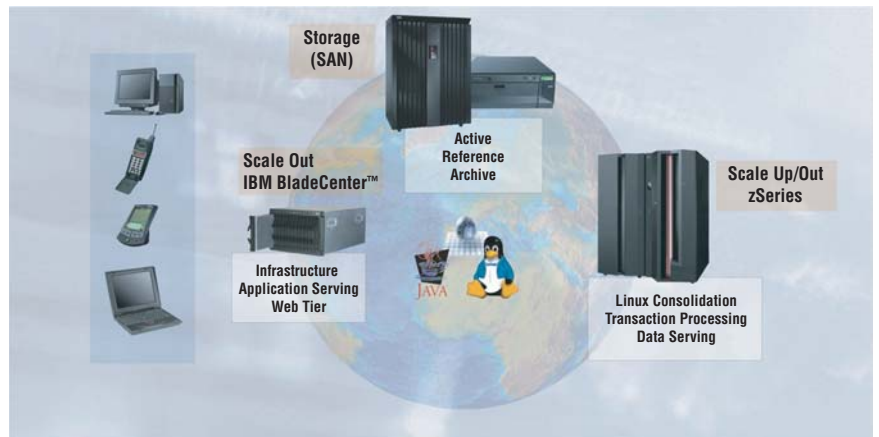


Figure 2: Key Components for an Infrastructure Simplification Strategy

Conclusion

More and more businesses are turning – or should we say, returning – to mainframes like IBM @server zSeries because of their rock-solid reliability, highly advanced scalability and integration capabilities, as well as their attractive cost efficiencies. Consolidation is the first step toward application integration: a way to integrate your business processes and the supporting applications. Infrastructure simplification represents the next logical step beyond server consolidation on the road to building the operating environment to support your on demand business. Today's zSeries capabilities of scaling-up, scaling-out and integrating your business have been 40 years in the making, and zSeries has always been focused on building environments that can integrate a diverse mix of business applications with a shared view of corporate data – keeping the business running.

Left unchecked with a myriad of servers, storage subsystems and networking technology, IT infrastructures can easily become a collection of inefficient “business silos.” And that's where an IT simplification strategy built around zSeries hardware and software technologies can be a roadmap that better positions your IT infrastructure to become one that's more flexible and responsive to marketplace changes and new business requirements.

If the on demand business model represents the ultimate business destination, then infrastructure simplification is indeed a critical step for companies on that journey. Built around scale-up and scale-out server and storage components – including key enabling technologies such as Java, Linux, Grid and integration middleware – infrastructure simplification is the strategic answer to why companies looking for a competitive advantage should stay current with new hardware and software technologies. Advanced virtualization and workload management capabilities that help make infrastructure simplification and “on demand” a reality have a strong heritage in mainframe computing, and recent zSeries announcements take these capabilities to new heights for a broader range of companies than ever before.

As more and more enterprises move away from “business-silo” IT architectures toward more dynamic work-flow style IT architectures, it will be imperative that you build the IT infrastructure that best supports your business transformation goals. Choose an IT architecture based firmly on IBM @server zSeries products for your highly visible, mission-critical and strategic business applications. Combined with IBM TotalStorage[®] solutions, IBM @server offerings and a growing portfolio of IBM software products, tools and services, zSeries can help bring advanced technologies, business flexibility and infrastructure management to your enterprise – and in doing so may very well be your most valuable computing asset in an on demand world.



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Software Communications
Route 100
Somers, NY 10589
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