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Limited Edition

IBM Software for System z

FOR
DUMMIES[®]

Learn:

- About IBM's flagship solution in the enterprise systems category
- How System z delivers a private cloud infrastructure
- How to provide ultimate security, ensuring the integrity of critical data



Lawrence Miller

***IBM Software
for System z***

FOR

DUMMIES®

LIMITED EDITION

by Lawrence Miller



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Introduction

In today's globally competitive marketplaces and increasingly volatile economic business environment, forward-thinking organizations drive revenue growth by delivering a more personalized experience to their newly empowered customers — when, where, and how each customer desires. They capture and analyze data to transform it into actionable insight. They use technology to bridge islands of computing and link processes to improve business agility. And they accelerate time-to-market by using proven, modern applications — all while managing costs, complexity, and quality.

These companies rely on critical information — financial data, customer data, enterprise resource data — as well as core business processes and the new services that redefine the customer experience. To transform the management of critical information and processes, these organizations rely on *enterprise systems* — the software, servers, and storage at the core of an enterprise IT infrastructure.

About This Book

IBM Software for System z For Dummies, Limited Edition, showcases IBM software for the System z, IBM's flagship solution in the enterprise systems category. You discover how IBM software for System z delivers a private *cloud* infrastructure at enterprise scale; how these solutions ensure critical *data* is always available across the enterprise, making it accessible in new ways so actionable insights can be derived from operational analytics; and how these solutions provide ultimate *security*, ensuring the integrity of critical data while mitigating risk and providing assured compliance.

How This Book Is Organized

This book contains volumes of information conveniently distilled into six short chapters chock full of just the information you need! Here's a look at what to expect.

Chapter 1: What Is IBM System z? You begin with a journey through the evolution of mainframes and find out about the systems, software, and technologies that make System z tick.

Chapter 2: Understanding System z and the Smarter Planet. In this chapter, I tell you about the Smarter Planet and how System z brings business and IT value to organizations.

Chapter 3: Reaping the Benefits of a Private Cloud. Here, you discover how System z helps organizations deploy a robust, highly available private cloud infrastructure.

Chapter 4: Unlocking the Real Value of Critical Data. Next, you explore some of today's biggest data challenges and how IBM software solutions for System z help organizations mine their data for maximum value and information to make real-time decisions.

Chapter 5: Creating Ultimate Security. In this chapter, you discover how System z helps enterprises build secure systems and comply with the myriad of regulatory requirements.

Chapter 6: Ten Industry Perspectives on System z. Finally, I end with a Part of Tens chapter that identifies unique challenges in several industries and how System z software helps solve them!

Icons Used in This Book

Throughout this book, you'll occasionally see special icons to call attention to important information. You won't find any cute little emoticons, but you'll definitely want to take note.



This icon points out information that may well be worth committing to your nonvolatile memory, your gray matter, or your noggin — along with anniversaries and birthdays!



You don't need this information to get the gist of the topic, but if you seek to become a worthy opponent for IBM's Watson on Jeopardy!, then perk up! This icon explains the jargon beneath the jargon.



This icon points out helpful suggestions and useful nuggets of information.

Chapter 1

What Is IBM System z?

.....

In This Chapter

- ▶ Characterizing enterprise systems by capability
 - ▶ Touring the history of mainframe technologies
 - ▶ Leveraging the past to improve the future of technology
-

Major enterprises in all major industry sectors continue to rely on enterprise systems (including mainframes) for their most critical business applications and functions. In this chapter, you discover how IBM pioneered mainframe technology and continues to deliver value and innovation in the enterprise systems category with its flagship enterprise system — *System z*.

Enterprise Systems Defined

The enterprise systems category is commonly described as being comprised of high-end servers with an acquisition cost of more than \$250,000, typically deployed only in large enterprises. As the long-time leader in the enterprise systems category, IBM doesn't limit the enterprise systems conversation to the cost of the system or the size of the organization. Instead, IBM focuses on the capabilities of the system: *Enterprise systems* are the servers, storage, and software at the core of an enterprise IT infrastructure that deliver a private cloud infrastructure at enterprise scale, with flexible service delivery models that provide dynamic efficiency for resource and workload management.

Enterprise systems make sure critical data is always available across the enterprise, making it accessible in new ways so actionable insights can be derived from advanced and

operational analytics. They also provide ultimate security, ensuring the integrity of critical data while mitigating risk and providing assured compliance.

IBM System z is IBM's flagship offering in the enterprise systems category. System z is a family of IBM mainframe servers that began with the System/360 in 1964 (discussed in the following section) with zEnterprise EC12 being the latest System z series model. System z is comprised of hardware, technological innovations, operating systems, and software designed for critical enterprise applications and processes.

The Evolution of Enterprise Systems

The introduction of the IBM zEnterprise System EC12 is the most recent addition to a long line of System z family — commonly known as mainframe computers — spanning more than 45 years (see Figure 1-1).



A *mainframe* is a large computer that other computers can be connected to so they share the facilities the mainframe provides. The term usually refers to hardware only, namely, main storage, execution circuitry, and peripheral units.

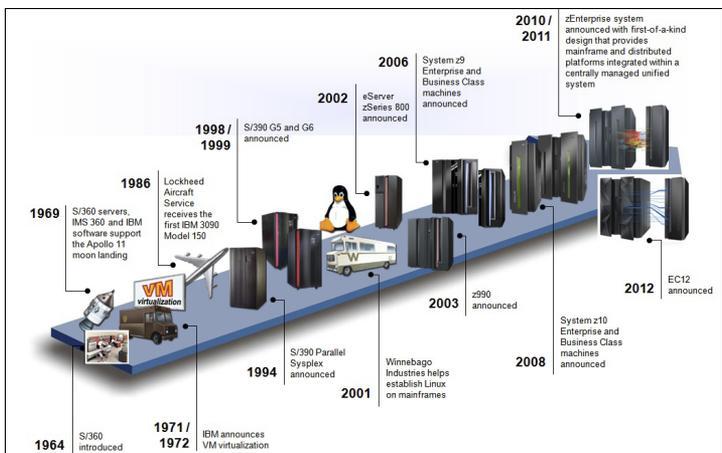


Figure 1-1: 45+ years of IBM mainframe innovation.



When IBM designed the original mainframe in 1964, it told its customers they would never have to change a line of code. That promise is still true today and remains a major value proposition for IBM customers.

System/360 (S/360)

In April 1964, IBM introduced the System/360 (S/360) as a “new generation of electronic computing equipment.” The S/360 enabled companies to integrate all their data processing applications into a single management information system. Virtually unlimited storage and instant retrieval capabilities provided management with up-to-the-minute decision-making information.

The built-in communications capability of S/360 allowed the user to greatly increase the scope of computer usefulness. Up to 248 data transmission terminals could communicate with the computer simultaneously — even when it was busy on a batch-processing job.

The S/360 also ended the distinction between commercial and scientific computers. Each S/360 processing unit had the ability to process work through small binary, decimal, or floating-point arithmetic centers. The same S/360 configuration could handle commercial work, scientific work, or a combination of the two, with equal effectiveness.

System/390 (S/390)

In September 1990, IBM announced System/390 (S/390) — the company’s most comprehensive rollout of products, features, and functions in more than a quarter of a century. With the S/390, IBM stuck with “big iron” but reinvented it from the inside — infusing it with an entirely new technology core, reducing its price, and building support for open standards and operating environments like Linux. Encompassing a family of 18 new IBM Enterprise System/9000 processors, S/390 drew on such technologies as high-speed fiber optic channels with IBM’s new ESCON (Enterprise Systems Connection) architecture, ultra-dense circuits and circuit packaging for higher performance, integrated encryption/decryption for sensitive data, extended supercomputing capabilities, and twice the previously available processor memory.

eServer zSeries 900

In October 2000 IBM unveiled the eServer zSeries 900 — the first mainframe built from scratch with e-business as its primary function. The reinvented mainframe was built to handle the largely unpredictable demands of e-business, allowing thousands of servers to operate within one box. The first in a new class of e-business servers, the z900 running z/OS — the z900's flagship operating system — was designed for

- ✔ High-speed connectivity to the network and to data storage systems
- ✔ Scalability in the face of unpredictable spikes in workload or traffic
- ✔ Near zero downtime when clustered

In May 2003, IBM rolled out the eServer zSeries 990 — the most powerful and scalable IBM mainframe in the half-century history of mainframes. The eServer zSeries 990 features

- ✔ Up to 9,000 MIPS (million instructions per second) on 32 processors — double the processors and almost triple the system capacity of the z900
- ✔ 450 million e-business transactions a day (a clustered z990 can handle up to 13 billion transactions a day — exceeding the average weekly volume on the New York Stock Exchange)
- ✔ Up to 512 I/O channels, double the number of its predecessor
- ✔ Four times the memory of the z900 (256GB compared to 64GB)

zEnterprise System

Introduced in July 2010, the IBM zEnterprise System (zEnterprise) is the latest line of IBM mainframes — now an enterprise systems category solution. The zEnterprise system offers a revolutionary system design that addresses the complexity and inefficiency in today's multi-architecture data centers. The zEnterprise extends the mainframe's strengths and capabilities — such as security, fault tolerance, efficiency, virtualization, and

dynamic resource allocation — to other systems and workloads running on AIX on POWER7, Linux on System x, and Microsoft Windows — fundamentally changing the way data centers can be managed.

The zEnterprise along with the software is a workload-optimized, multi-architecture computer system capable of hosting many workloads integrated together and efficiently managed as one single entity. It's designed to deploy and intelligently manage workloads across both mainframe and distributed technologies with the same tools, techniques, and a single management interface. The zEnterprise includes the components described in this section.

Central processing complex (CPC)

The central processing complex (CPC) is part of the zEnterprise and includes two server models from which to choose:

- ✔ **zEnterprise EC12 (zEC12):** The zEC12 is the premier high-end server and the flagship of the IBM systems portfolio. It contains 96 of the world's fastest, most powerful micro-processors running at 5.5 GHz and is capable of executing more than 75,000 MIPS. With up to 120 configurable processors, the zEC12 can scale to over 750,000 MIPS of compute capacity in a single footprint.
- ✔ **zEnterprise 114 (z114):** The z114 is designed as an entry-level mainframe server and on-ramp for any growing business looking to exploit mainframe technologies. The z114 offers a more granular cost structure and significant improvements in packaging, performance, and total system scalability over prior generations.

IBM zEnterprise BladeCenter Extension (zBX)

The zBX has integrated optimizers and/or select IBM blades. It's an infrastructure that hosts and integrates optimizers and blade servers. This feature enables application integration with System z transaction processing, messaging, and data serving capabilities over a private high-speed internal network that connects it to the zEC12 and/or z114 (see the preceding section). This reduces the need for networking hardware and provides inherently high security with exclusive management capabilities enabled by the Unified Resource Manager.

IBM Unified Resource Manager

The IBM Unified Resource Manager integrates multi-architecture platform resources as a single virtualized system and provides unified and integrated management across the zEnterprise System with the same tools, techniques, and resources for consistent, automated, and reliable service delivery.

The Unified Resource Manager can auto-discover new server, network, and storage resources, load the virtualization environments, and prepare system resources for use. It can identify system bottlenecks or failures among disparate systems, and if a failure occurs, it can dynamically reallocate system resources to keep applications running smoothly. It can dramatically simplify operations across the various application environments. The Unified Resource Manager also provides energy monitoring and management, goal-oriented resource management, increased security, virtual networking, and information management, all integrated into a single easy-to-use interface — dramatically simplifying operations across multiple application environments.

IBM software for System z

In the late 1960s, IBM introduced both Customer Information Control System (CICS) and Information Management System (IMS):

✓ CICS was originally developed by IBM for the U.S. public utilities industry but was quickly expanded to address the needs of numerous other industries. Today, CICS runs on 80 percent of the mainframes installed worldwide and comprises a family of application servers and connectors that provide industrial-strength, online transaction management, and connectivity for mission-critical applications. CICS has been extended to enable clients to develop, deliver, and operate in the cloud in order to help build private cloud environments that can support a high volume of customer transactions. These include the following:

- **CICS Transaction Server:** A transaction processing solution that provides powerful support in a Service-Oriented Architecture (SOA).

- **CICS Transaction Gateway:** Enables rapid deployment of existing CICS applications into a SOA — while keeping your business logic intact.
- **CICS Explorer:** The new face of CICS, a point of integration for operations and development.
- **CICS Tools:** Improves resource utilization and enhance functionality and efficiency of your CICS systems.

✓ **IMS** was jointly designed by IBM, Rockwell, and Caterpillar to support NASA's Saturn V and Apollo space programs. Today, IMS is the premier transaction and hierarchical database manager for critical online applications and runs on 90 percent of the Fortune 500's enterprise systems. The IMS 12 solution manages the largest base of mission-critical applications in the world, and the largest base of critical operational data.

Several other key IBM software products were introduced as seen in the timeline in Figure 1-2 (although this list isn't all-inclusive of IBM software solutions).

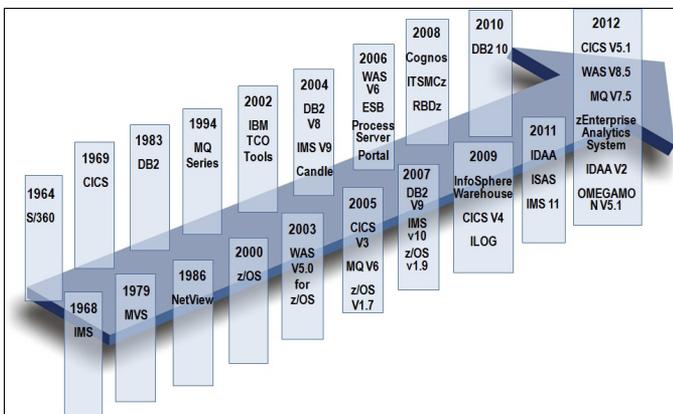


Figure 1-2: 45+ years of IBM mainframe software innovation.

Significant milestones in this timeline include the following:

- ✓ **z/OS:** Introduced in 2000, z/OS is IBM's highly secure, scalable, high-performance enterprise OS built for continuous, high-volume operation on enterprise systems.

z/OS is a 64-bit OS that's also capable of operating in 24- and 31-bit modes. Backward compatibility is central to the design philosophy of z/OS, and z/OS retains much of the functionality and can run many of the programs that originated in the 1960s for the S/360.

- ✔ **z/VSE (Virtual Storage Extended):** The modern incarnation of the original DOS/360 (Disk Operating System) mainframe OS announced by IBM in 1964. z/VSE originally released in 1990 is built on a heritage of ongoing refinement and innovation that spans more than four decades. It is designed to protect and leverage customer investments in VSE information assets.
- ✔ **z/VM:** In October 2000, IBM announced z/VM, which enables customers to exploit IBM virtualization technology on System z to virtualize processors, communications, storage, networking, and I/O resources. The z/VM hypervisor is designed to help customers extend the business value of mainframe technology across the enterprise by integrating applications and data while providing exceptional levels of availability, security, and operational ease.

Other IBM software solutions include the following:

- ✔ **Enterprise COBOL for z/OS and Enterprise PL/I for z/OS:** Source code compilers that let new and existing code exploit the hardware advances in each system
- ✔ **DB2:** A relational database management system introduced in 1983
- ✔ **WebSphere MQ:** Message-oriented middleware, originally introduced as MQ Series in 1994
- ✔ **WebSphere Application Server:** Application and integration middleware introduced in 2003
- ✔ **IBM Rational Application Developer for System z:** A development environment, originally introduced in 2004
- ✔ **IBM Rational Team Concert for System z:** Integrates source control, work item, and build management, originally introduced in 2009
- ✔ **ISAS:** IBM Smart Analytics System, a foundation for end-to-end analytics solutions, announced in 2011

Something Old, Something New, Nothing's Borrowed, It's All IBM Blue

Interestingly, many of the innovations originally designed for the S/360 (see the earlier section in this chapter, “System/360 [S/360]”) more than 45 years ago remain as foundational elements of today’s zEnterprise — albeit with some significant enhancements.

For example, storage protection is a feature that was designed into the S/360 and continues to be the foundation for reliability and security in the zEnterprise. This feature prevents users or processes of another program from accessing and updating memory that their program doesn’t own.

As the mainframe continued to evolve, the concept of specialty processors was introduced. One such processor is the System Assist Processor (SAP). The SAP is standard on IBM System z servers and is a dedicated I/O (input/output) processor to help improve efficiencies and reduce the overhead of I/O processing of every IBM System z logical partition, regardless of the operating system. For very high I/O intensive workloads, additional SAPs can be installed.

Virtualization is one of the hottest and most disruptive technology trends of the past decade. Yet the basic concept of virtualization originated more than 45 years ago within IBM mainframe computers. The ability to run multiple operating systems on a single computer was first introduced by IBM in 1967 as a product called CP/67. CP/67 was the result of a joint research project between IBM and Cambridge University. It became a commercial product in 1972 and was incorporated into the design of the System/370.

Virtualization remains a key technology in z/OS and z/VSE today (see the section “IBM software for System z” for more info). Over the years, IBM has improved the efficiency of communications between the OS (operating system) and VM (virtual machine). For example, certain instructions within the

virtual environment are delivered via hardware, significantly increasing the performance of the *guest* operating system. The result is that while many other popular virtual solutions today boast up to 50 or 60 VMs can run on a single x86 physical host, IBM has customers running thousands of VMs under z/VM on System z.



The term *guest* commonly refers to the virtual machine(s) running on a physical host when referring to virtual environments.

For the past 45+ years, the mainframe has served as the backbone of large-scale computing. It has both adapted to new requirements and adopted and exploited new technology. It is being used today in ways that were literally unimaginable back in the era of the S/360. So to the extent that the past is prologue, it's fair to say when it comes to the "mainframe," you ain't seen nothin' yet!



For a complete history of IBM's mainframe systems, visit the Mainframe Reference Room at www-03.ibm.com/ibm/history/exhibits/mainframe/mainframe_room.html.

Chapter 2

Understanding System z and the Smarter Planet

In This Chapter

- ▶ Comprehending your role in a Smarter Planet
 - ▶ Aligning strategies with the three pillars of Smarter Computing
 - ▶ Uncovering business and IT value in System z
-

You're living in a time of turbulent change that puts pressure on businesses of all sizes and across all industries. The world is also changing in other fundamental ways: It's becoming smaller, flatter, and smarter.

As a result, leaders across all types of enterprises are faced with new challenges in order to remain successful. Those organizations that address these challenges are best positioned to outperform in the “Decade of Smart.”



Go to www.youtube.com/watch?v=uLvPsZVaIfk to watch the IBM “Decade of Smart” video.

In this chapter, you discover the pivotal role of System z in building a *Smarter Planet*, IBM's vision for a more instrumented, interconnected, and intelligent world.

Building a Smarter Planet

Data is captured today like never before. It reveals everything from large and systemic patterns — of global markets, workflows, national infrastructures, and natural systems — to the

location, temperature, security, and condition of every item in a global supply chain.

A Smarter Planet infuses that intelligence into the systems and processes that make the world work — into things no one would recognize as computers: cars, appliances, roadways, power grids, clothes, even natural systems such as agriculture and waterways.

What does it take to build a Smarter Planet? Companies, cities, and the world are complex systems — indeed, systems of systems. Advancing these systems to be more instrumented, interconnected, and intelligent requires a profound shift in management and governance toward far more collaborative approaches (see Figure 2-1).

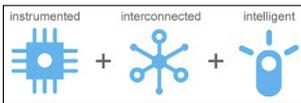


Figure 2-1: A Smarter Planet is instrumented, interconnected, and intelligent.

To outperform on a Smarter Planet, enterprises face six imperatives:

- ✔ **Turn information into insights.** Organizations are overwhelmed with data. On a Smarter Planet, the most successful organizations can turn this data into valuable insights. With advanced and operational analytics, you can open new opportunities for business optimization by enabling rapid, informed, and confident decisions and actions.
- ✔ **Drive enterprise operations' effectiveness and efficiency.** In a slow growth environment, organizations must do more with less. To succeed, your organization must drive continuous and sustainable operational improvements to lower costs and reduce complexity.
- ✔ **Increase agility.** On a Smarter Planet, change is the only constant. The most responsive and agile firms — supported with innovative business models and processes — will be positioned to lead their industries and surpass their competition.

- ✔ **Connect and empower people.** Innovation comes from collaboration. Firms that embrace the power of social technologies will unleash the productivity and innovation throughout the entire value chain — from employees to partners to suppliers to customers.
- ✔ **Enable business service and product innovation.** Manufacturers are faced with heightened expectations for smarter products, smarter services and more innovative capabilities — all while creating more personalized experiences across the entire product and service life cycle.
- ✔ **Manage risk, security, and compliance.** On a Smarter Planet, a range of risks exists: security, credit, market, operational, environmental, and compliance . . . to name a few. With the right process and system improvements, leaders can identify, assess, and monitor these risks to mitigate and prevent them.

Successful companies use computing to create formidable opportunities for growth and innovation despite facing challenges that include tremendous demands for service, inflexible infrastructures, flat budgets, as well as incomplete and unreliable data. To tackle these challenges and overcome these constraints, successful companies must embrace a new approach to their IT infrastructure — Smarter Computing.



With optimized systems, an organization's total cost per workload can be reduced by up to 55 percent, delivering greater performance and improved IT economics.

Smarter Computing provides an IT infrastructure that enables a Smarter Planet. Through Smarter Computing, enterprises can leverage all the data, optimize systems for workloads, and manage their IT systems with flexibility and agility in a cloud infrastructure for dramatically improved economics and performance. Smarter Computing is built on three pillars (see Figure 2-2):

- ✔ **Cloud ready to improve efficiency and speed time to market:** IT leaders are funding their most pioneering visions by tapping the surplus created by managing critical information and business processes more efficiently by using virtualization and cloud technologies.

- ✔ **Data ready to deliver more actionable insight:** IT leaders are sourcing and curating more varied data from a wider array of structured and unstructured sources, and they're extracting greater value from data by applying analytics to a broader spectrum of critical business processes at more critical points of decision or action.
- ✔ **Security ready to facilitate compliance, reduce risk, and protect data:** The explosion of data and new client engagement models make existing data security models and privacy practices obsolete. IT leaders are transitioning to more-sophisticated techniques and technologies to safeguard sensitive information and business processes.

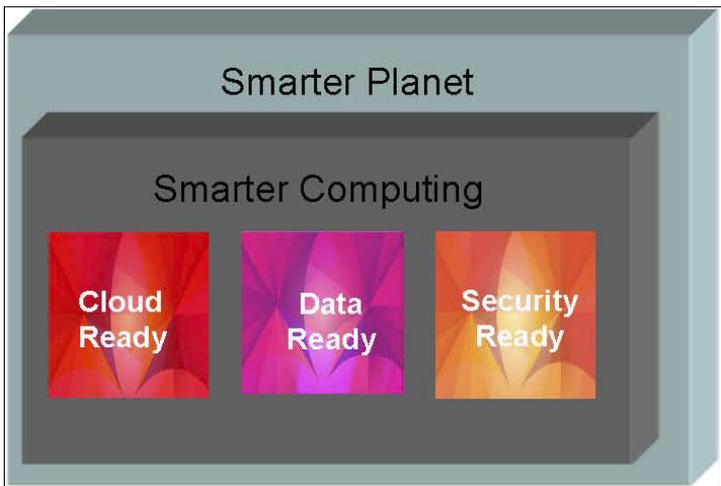


Figure 2-2: Three pillars of Smarter Computing for a Smarter Planet.

System z is uniquely positioned to help enterprises address the challenges of Smarter Computing and succeed on a Smarter Planet. System z solutions include

- ✔ **Smarter Computing:** System z is the foundation for organizations to lower their costs by using optimized systems, extending existing applications, embracing (private) cloud computing, and managing large amounts of data.
- ✔ **Business Analytics and Optimization:** With DB2 Analytics Accelerator, zEnterprise Analytics System 9700/9710,

Cognos, and SPSS predictive analytics software, IBM software provides the most advanced analytics capabilities for predictive and real-time analytics, enabling enterprises to make informed decisions based on factual analysis of data and to act on those decisions.

- ✔ **Business Agility:** With transaction processing solutions that accommodate web services and mobile applications, enterprises are able to reuse applications that provide information anytime and anywhere. By building a SOA-based (service-oriented architecture) infrastructure, organizations can be responsive to business needs without having to rewrite applications.
- ✔ **Modern Development and Testing:** Using Rational's suite of modern application development tools, developers can create applications for multiple platforms (including System z), thereby increasing productivity and promoting team collaboration which ultimately creates more innovative solutions.
- ✔ **Social Business:** Social business is emerging as one of the key vehicles to enhance productivity and innovation across organizations. Collaborative tools, social websites, and smartphone applications can be integrated with data from System z.
- ✔ **Security and Resilience:** With built-in advanced security features and 99.999 percent reliability, System z ensures risk and compliance issues are addressed and your systems are always available.



According to a recent survey, 89 percent of CEOs say they want better insight into their data with business intelligence and analytics.

Recognizing the Business Value of System z

The demands of customers, partners, employees, and a fast-moving market are stretching the limits of today's enterprise data centers. Add to these demands the challenges of data center management and integration, and it's clear a new approach is needed. Smarter Computing systems — systems

that raise the bar on efficiency, performance, and cost savings while lowering management complexity — are the answer.



System z is the platform of choice for 96 of the world's top 100 banks.

IBM System z offers a revolutionary design that addresses the complexity and inefficiency in today's multi-architecture data centers. System z extends the strengths and capabilities of enterprise systems — such as ultimate security, fault tolerance, efficiency, virtualization, and dynamic resource allocation — to other systems and workloads running AIX on POWER7, Microsoft Windows, or Linux on System x, and fundamentally changes the way data centers can be managed.



The zEnterprise System — the latest in the System z family of IBM solutions — includes a central processing complex (CPC) — either the zEnterprise EC12 (zEC12) or the zEnterprise 114 (z114), the IBM zEnterprise BladeCenter Extension (zBX) with its integrated optimizers and/or select IBM blades, and the zEnterprise Unified Resource Manager. Refer to Chapter 1 to find out more about zEnterprise.

System z delivers both business and IT value for organizations including

✔ **Business value**

- Delivers ongoing savings to maximize the efficiency of IT service delivery in support of current and future business operations
- Supports critical IT services for continuous business operations and protection of corporate assets
- Provides an environment for value creation designed for the rapid and efficient enablement of new business services

✔ **IT value**

- Delivers ongoing savings to optimize workload deployment and drive efficiency through maximizing resource utilization
- Supports critical IT services for maximum protection of data and applications while enabling user access globally 24/7

- Provides an environment for value creation for the flexible development and delivery of new IT services while driving further efficiency gains

System z directly correlates to several key initiatives that were outlined in a 2011 CIO study. CIOs expect IT technology to impact their industries and organizations over the next 3 to 5 years in the following ways:

- ✔ Change client interaction processes — 76 percent
- ✔ Change internal collaboration processes — 71 percent
- ✔ Provide better business insights — 71 percent
- ✔ Increase overall operational efficiency — 74 percent

Transaction processing on System z enables processing of mixed language application workloads, extensive data communication services, unparalleled connectivity and scalability, and builds the foundation for a service-oriented architecture (SOA).

CIOs are continually looking for ways to cut maintenance costs and improve overall productivity. Enterprise modernization helps organizations cost effectively and incrementally evolve core IT systems toward modern architectures and technologies for Smarter Computing. As a result, organizations can leverage their existing investments, reduce maintenance costs and efforts, and free resources to deliver new business requirements and create new, innovative capabilities that enable companies to compete.



IBM zEnterprise delivers value in key business initiatives including

- ✔ Cloud computing and mobile commerce
- ✔ Data warehousing and business analytics
- ✔ Enterprise Modernization
- ✔ Integrated service management
- ✔ Security
- ✔ Business process management (BPM)
- ✔ Social Business

Chapter 3

Reaping the Benefits of a Private Cloud

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In This Chapter

- ▶ Uncovering the three stages of private cloud deployment
 - ▶ Recognizing the key capabilities of a private cloud infrastructure
 - ▶ Discovering System z software solutions for the cloud
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As enterprises continue to embrace the era of Smarter Computing, they strive to achieve the benefits of cloud computing. With System z and IBM SmartCloud technologies, companies can increase business value by building and rapidly scaling cloud environments with unparalleled time-to-market, integration, and management.

In this chapter, you discover how enterprises accelerate time-to-market with unprecedented choice, security, and portability of applications and how they're gaining immediate access to business solutions, combined with deep industry insights, business process skills, and analytics.

Recognizing Enterprise Cloud Strategies and Benefits

Escalating business requirements continue to drive organizations to pursue ways to take costs out of their existing computing infrastructure and shorten deployment of services to business units. Businesses are increasingly turning to enterprise private clouds using self-service resource provisioning, which automatically scales to handle workload demands.

Today, the evolution of cloud computing is at a critical inflection point. Enterprises are moving from “sandbox” projects for cloud deployments to full-scale production environments of critical applications. Numerous market forecasts project that 60 percent of CIOs plan to use cloud, up from 33 percent just two years ago.

You can integrate a cloud strategy into an organization in many ways and through multiple entry points. Many enterprises start by building an efficient virtualized infrastructure and then build on that with simplified administration and automation. For others, a full cloud deployment with the highest levels of orchestration is the right strategy.

The three stages of cloud for enterprises are

- 1. Integrate:** Companies start with the goal to streamline, simplify, and drive down costs by building a more efficient infrastructure. In this phase, organizations consolidate and virtualize their servers, storage, and networks and implement robust systems management tools all designed to reduce operating costs and capital expenditures. While virtualization and consolidation on their own don't equate to cloud, they're core requirements for cloud delivery.
- 2. Automate:** Automation enables companies to build on an integrated foundation improving speed and dexterity while reducing cycle times. At this stage, companies can simplify administrative tasks through self-service provisioning and also automate IT service deployment. Dynamic resource management and automation features of System z help maximize IT staff productivity. Companies spend less time managing systems and more time working on services that add real business value. This frees up critical financial and skills resources from routine tasks, which can then be reallocated to investment projects delivering higher value products and services.
- 3. Orchestrate:** Orchestration drives seamless management of heterogeneous servers, storage, and networks by bringing diverse resources under a single point of control in a cloud, which helps guarantee specific service levels and improves reliability, availability, and security of service. Orchestration also ensures

that the right automation and prioritization decisions are made when different groups are competing for the same network bandwidth, data, and/or other computing resources.

Enterprises are experiencing a fundamental shift in the services they're asked to deliver. Enterprise process automation, which has formed the core of IT expenditure in recent years, is rapidly maturing and investment is redirected to new areas of client engagement. A recent Corporate Executive Board study noted that up to 70 percent of potential value from IT will now be delivered from collaboration, direct customer interface, and analytics applications. In order for this transformation to succeed, CIOs must continue to manage the growth in their core enterprise services while creating and delivering new services.

However, today up to 70 percent of IT budgets are spent on managing systems instead of developing innovative new services. Cost efficiencies from cloud computing are key to driving efficiency in existing operations in order to fund new initiatives. System z is especially appropriate for enabling private clouds that deliver consistently high service levels at a global enterprise scale. They enable the most efficient utilization of server and storage assets and maximize staff productivity. They're using those savings to fuel innovation across lines of business with new services that are redefining their customer experience.

Key capabilities of System z for cloud include

- ✔ **Fully virtualized private cloud infrastructure:** System z features a “shared everything” infrastructure with a centrally managed virtual pool of server and storage resources, enabling private clouds that lower costs by maximizing resource utilization and staff productivity.
- ✔ **Secure, resilient, and scalable cloud infrastructure:** System z features virtualization technologies that provide unmatched scale and highest qualities of service and security that are necessary for deployment of critical services in a private cloud.
- ✔ **Automated and prioritized resource provisioning:** System z features dynamic workload and systems management across all key IT resources within a private

cloud on a single physical system for maximizing return on assets.

- ✔ **Safeguard application quality and continuous improvement:** System z delivers on the demand for rapid evolution of new and enhanced capabilities that align with business priorities.
- ✔ **Respond dynamically to business demands:** System z enables key resources to be added permanently or temporarily on demand to ensure that IT can respond to the fluctuating demands of the business through automated provisioning and dynamic allocation of IT resources.
- ✔ **Contain storage costs and optimize performance:** Cloud agile storage features enterprise class capabilities such as storage tiering and storage virtualization to optimize performance and cost efficiencies to effectively manage exponential data growth.
- ✔ **Promote financial efficiency for asset management:** System z is packaged for financial efficiency by optimizing cash flow through a “lease, refresh, and scale up” approach to asset management and service delivery.



System z can deliver significant value to enterprises as they strive for greater efficiency. These proven capabilities and benefits include the following:

- ✔ Lower cost and increase flexibility for critical services with a total cost of acquisition that is 79 percent less when deploying a private cloud on System z versus a leading public cloud implementation.
- ✔ Consolidate virtualized workloads from distributed servers to System z which can increase labor productivity by up to 70 percent through efficient resource utilization.
- ✔ Enhance the customer experience with more than 10 times the application and service availability over commodity x86 environments.
- ✔ Achieve economics of cloud computing with reduced device and administrative costs of up to 75 percent and increased storage capacity by up to 50 percent.
- ✔ Improve performance with IBM System Storage Easy Tier by up to three times with only 3 percent of your data on solid-state storage.

Deploying Private Clouds with System Z

IBM System z is an ideal platform for deploying private clouds built with robust virtualization, security, qualities of service, scalability, and manageability. System z servers are designed to run hundreds or thousands of independent workloads concurrently on a single system to maximize efficiency with cloud computing. It provides unmatched security and resiliency to allow for the flexible deployment of business critical services, and it delivers cloud efficiencies at scale with the ability to support up to thousands of workloads and tens of thousands of users in a single private cloud.

System z allows you to manage infrastructure elements and workloads dynamically. This capability increases businesses' agility by allowing them to activate and retire resources as needed and to move workloads for more efficiency while seamlessly integrating into traditional computing environments.

IBM zEnterprise — the latest series in the System z family of solutions — is the industry's only heterogeneous cloud solution, enabling customers to build solutions optimized for the right platform. It delivers robust capabilities managed through a single point of control, providing a private enterprise cloud with efficiency at scale.



The zEnterprise EC12 delivers the world's most efficient virtualization, designed to support over 13,000 virtual machines per server and over 100,000 virtual machines in a cluster.

IBM Processor Resource/System Manager (PR/SM) technology and IBM z/VM virtualization is delivered through a “shared everything” methodology. This enables the physical resources of the system to be allocated to up to thousands of virtual servers — each of which is isolated from the others yet shares physical resources based on business priorities and usage requirements. IBM System z is designed to run consistently at 90 percent and higher utilization. With IBM z/VM Resource Manager and IBM Tivoli Workload Automation capabilities, the virtual resource pool and the workloads deployed are managed from a central point, enabling reductions in

administrative and operational overhead. This results in dramatic cost savings along with improved staff productivity.

IBM System z is designed to run hundreds of interconnected processes concurrently within a single system with uncompromised end-user service level delivery. With unmatched scalability and PR/SM virtualization, IBM System z runs the largest and most complex applications that span multiple lines of business. Together with WebSphere middleware and the cloud-style capabilities of the CICS Transaction Server, System z enables application consolidation and integration. IBM z/OS Workload Manager and IBM zEnterprise Unified Resource Manager capabilities enable IBM System z and heterogeneous resources to be dynamically provisioned across multiple workloads. This happens in real-time in order to maintain end user service levels where minimum response times are prioritized by business goals and priorities. A single point of control for all resources and workloads delivers lower costs and staff productivity gains.



More than 7000 applications are supported on z/OS and Linux for System z.

IBM System z provides scalable and dynamic provisioning of resources across a hybrid virtual resource pool for flexible deployment of new and existing services. The IBM zEnterprise offering is the world's most scalable single-system image platform. It's fully virtualized with dynamic allocation of resources across multiple workloads. New resources can be added permanently or temporarily with Capacity-on-Demand and On/Off-Capacity-on-Demand. These capabilities can be triggered automatically and with no interruption to service. The IBM Rational Continuous Integration Solution for System z offering enables cross-platform applications to be built and tested. IBM Tivoli Workload Scheduler for z/OS software controls and schedules workloads across mainframe and distributed systems. This creates a highly efficient and dynamic heterogeneous virtualized infrastructure ideally suited to a private enterprise cloud.

By infusing enterprise private clouds with security, centralized manageability, scalability, and multi-tenancy, IBM System z provides businesses with increased agility to move quickly in highly competitive environments. By activating and retiring

resources as needed, organizations can manage infrastructure elements in a dynamic way and move workloads for more efficiency — all while seamlessly integrating into traditional computing environments.



A private cloud on zEnterprise can lower server total cost of acquisition (TCA) by up to 84 percent.

IBM Software Solutions for Cloud Computing

IBM Software Solutions for Cloud Computing include a wide array of enterprise offerings that include

- ✓ Smart Analytics Cloud for System z
- ✓ zEnterprise Starter Edition for Cloud
- ✓ Tivoli Integrated Service Management solutions

Smart Analytics Cloud for System z

Smart Analytics Cloud for System z is a solution that enables delivery of business intelligence and analytics from a private cloud, securely located behind the corporate firewall. This offering leverages IBM hardware, software, and services to offer a complete solution.

The Smart Analytics Cloud is optimized for large organizations that want to make business intelligence a competitive advantage for their enterprise. This solution is intended to support a large base of users across the lines of business and must therefore be scalable with support for enterprise SLAs (service-level agreements). In order to best meet the needs of large enterprises, the SmartAnalytics Cloud offering is based on a System z foundation. The service benefits from the massive scale, unchallenged virtualization leadership, and trusted qualities for reliability, availability, and security that System z is uniquely qualified to deliver.

The business intelligence (BI) and analytic functions are provided by Cognos BI, which offers a broad range of intelligence services and capabilities designed to enable knowledge dissemination across a diverse user install base within and across lines of business.

zEnterprise Starter Edition for Cloud

IBM zEnterprise Starter Edition for Cloud is an entry-level, cloud offering for deploying an Infrastructure as a Service (IaaS) cloud delivery model for Linux on System z environments. It enables the provisioning of Linux on System z images under z/VM using Tivoli Provisioning Manager. The offering includes provisioning software and implementation services.

IBM zEnterprise Starter Edition for Cloud extends Linux on System z infrastructure into a highly available and secure private cloud. It features basic server image management and service level monitoring, deployment of standardized server images specific to a business's needs, and a highly automated and consistent deployment.



For mid/large-scale cloud deployments, the Starter Edition offers the following features:

- ✓ Advanced automation and optional monitoring which dramatically speeds new service provisioning (measured in minutes) thereby reducing data center operations costs
- ✓ High RAS (reliability, availability, and serviceability) and efficient virtualization to ensure multi-tenancy cloud deployments, which are continuously available
- ✓ A very secure platform (EAL 5) protecting customer and corporate data in a shared cloud infrastructure
- ✓ Instant cloud capacity growth on-demand with a pay-as-you-grow model
- ✓ Predefined, bottom-line priced virtualization infrastructure
- ✓ Provisioning software installed and configured on-premise and ready for production in days

Tivoli Integrated Service Management solutions

IBM Tivoli Integrated Service Management solutions help you see and understand your business infrastructure in real-time. This capability enables organizations to transform and adapt while limiting risk and cost to achieve agility, efficiency, and standardized best practices.

IBM Tivoli Integrated Service Management solutions for cloud and data center management include the following:

- ✔ **Storage Management:** The Tivoli Storage Manager Suite for Unified Recovery helps organizations of all sizes meet a wide range of data management challenges across complex, distributed infrastructures.
- ✔ **Application Performance Management (APM):** APM provides enhanced visibility specifically into application performance — giving organizations the power to understand both when and why performance has degraded and the information needed to improve matters in a business-prioritized manner.
- ✔ **Network Management:** IBM Netcool Network Management and Service Assurance includes real-time network discovery, network monitoring, event management, network device and configuration discovery, and change management.
- ✔ **Provisioning and Orchestration:** IBM SmartCloud Provisioning combines infrastructure and platform capabilities to deliver resilient, automated workload deployment, image life cycle management and high-scale, low-touch provisioning across heterogeneous platforms. IBM Service Delivery Manager and SmartCloud Continuous Delivery provide advanced cloud orchestration for comprehensive service management and delivery.
- ✔ **Scheduling and Systems Automation:** IBM Process Automation solutions govern, track, and manage processes across the businesses to achieve higher efficiencies. The IBM Tivoli Workload Automation and System Automation families include products covering any platform, for companies of any degree of innovation and growth. They provide greater visibility, better control, and higher

availability by managing complex workloads, unifying heterogeneous applications, reducing the duration of service disruptions, and improving resource efficiencies through a single point of control across an end-to-end dynamic infrastructure.

- ✓ **IT Service Management:** IBM's IT Service Management provides a single platform to manage service and IT asset processes across the entire scope of the enterprise. This helps customers to move from manual silos to automated, cross-functional processes. Businesses can discover and track usage of assets in a System z environment, manage changes in infrastructure, and automate handling of service requests, incidents, and problems to reduce cost and minimize service disruptions.

Chapter 4

Unlocking the Real Value of Critical Data

In This Chapter

- ▶ Summing up enterprise data challenges
 - ▶ Diving into analytics solutions
 - ▶ Improving business processes with BPM
-

Digital data is everywhere and growing at a stunning pace. While many organizations struggle just to have their data secure and available to their users, successful enterprises are turning to enterprise systems to deliver real-time decision-making capabilities and unlock the true value of their data with business analytics and business process management (BPM) solutions.

In this chapter, you discover the challenges of big data for enterprises and how business analytics and BPM solutions for System z can help.

Understanding Data Challenges

Companies embracing Smarter Computing are unlocking the value of data to leverage insights from new sources of information in order to gain competitive advantage. Adoption of analytics has rapidly evolved from a business initiative to a business imperative, with companies that implement analytics being 260 percent more likely to be top performers.

Analytics have changed — from a focus on enterprise data — to include big data, with 80 percent of data growth coming

from new unstructured data sources, such as images, videos, social media, and documents. Analytics have also evolved from advancing projects in single organizations to transforming entire industries, such as healthcare, retail and financial services.



In IBM's latest 2011 CIO study, 83 percent of respondents ranked analytics as a high priority in their visionary plans and viewed business analytics and optimization as fundamental to their business success.

Companies adopting analytics are turning information into insights that drive business outcomes. They're driving business transformation with strategic information plans and common policies that enable data to be linked across their lines of business. Their data plans include foundational elements of information governance for their existing enterprise applications, as well as new, high-value analytics initiatives to unlock insights and reveal new business opportunities. Analytics are key to growing, retaining, and satisfying customers and maximizing every client interaction to generate insights and increase customer loyalty. Analytics are being used to transform enterprise financial processes and increase operational efficiency, improving visibility and control over financial performance and increasing productivity. They're also being used to mitigate risk, for example, to detect fraudulent behavior and suspicious claims in real-time in order to minimize losses.



Organizations have the following key data challenges:

- ✔ The growing volume, variety, and velocity of data are driving demand for scalable enterprise server and storage platforms. Enterprise systems ensure data is always available to critical applications and processes, accessible in new ways across lines of business, and delivered in real-time for operational analytics.
- ✔ The accelerating demand for actionable insights across lines of business, and for all users in the company, is driving demand for enterprise systems that are optimized for both trusted information delivery of operational data and for new analytics capabilities on that data.

- ✔ The growth of embedded, real-time analytics on operational data is compelling increased levels of infrastructure resiliency. According to an Emerson Network Power study, for example, the average cost of data center downtime is \$5,600 per minute.

Addressing Data Challenges with System z

Businesses are creating IT infrastructures built on System z to align their organization around data, to anticipate and shape business outcomes, and to act at the point of impact to optimize results.

Key capabilities of System z for data include

- ✔ **Embedding operational analytics into business transactions:** System z enables new operational analytics capabilities deriving actionable insights from analytics embedded into transactional processes in real-time.
- ✔ **Delivering highest scale for enterprise data and applications:** System z delivers highest scale for enterprise transactional applications, linking critical data, and inter-connecting processes across multiple lines of business.
- ✔ **Consistently accessing across enterprise data:** System z enables data to be made available consistently across enterprise applications, enable it to be accessed from any device at any time from any location, and enable it to be linked and leveraged across lines of business.
- ✔ **Ensuring continuous availability for enterprise applications.** System z ensures continuous availability for mission-critical business services by utilizing concurrent system maintenance and upgrades to avoid downtime, and they offer advanced resiliency features and redundant hardware components built in as standard.
- ✔ **Protecting business against risk of disasters:** System z helps businesses reduce costs and risks to business reputation caused by unplanned downtime and data center disasters.

These capabilities of System z can deliver significant value to businesses as they strive for greater competitive advantage. Some of the results that can be achieved include the following:

- ✔ Delivery of highest qualities of service and scalability for enterprise applications, with SAP Banking software scaling to 150 million accounts with more than 59 million postings per hour
- ✔ Ability to embed analytics on operational data, enabling new business insights to thousands of enterprise users with 43 percent faster response times versus x86 platforms
- ✔ Maximizing availability of business services through an application availability design point of 99.999 percent
- ✔ Continuous availability for enterprise applications and protection against risk from disasters with zero enterprise data loss and under one hour recovery time between two sites and multisite mirroring of data

Exploring Operational Analytics

Organizations today are beginning to recognize the strategic value of the data locked within their businesses but currently not available to key decision makers across the enterprise. Organizations are reconsidering their current strategy from a tools and deployment perspective to support new requirements for high performance, availability, reliability, and security.

IBM System z is optimized to integrate analytics processes with transactional applications running queries directly on operational data. System z is also optimized for collocating scalable data consolidation solutions with high-performance analytics.

IBM Software for System z data warehousing and business analytics solutions (discussed in the following sections) include

- ✔ DB2 for z/OS
- ✔ IBM DB2 Analytics Accelerator
- ✔ IBM zEnterprise Analytics System

- ✓ Cognos on z/OS
- ✓ IBM SPSS

DB2 for z/OS

IBM System z and IBM DB2 for z/OS environments are optimized for scalability and performance, displaying linear response times and consistently high throughput from one terabyte to 50 terabytes. These environments provide a scalable platform for enterprise applications such as SAP Banking software that scales to 150 million accounts with more than 59 million postings per hour.

The latest version of DB2 delivers greater value to organizations by reducing System z CPU usage. DB2 reduces its CPU usage by optimizing processor times and memory access, leveraging the latest processor improvements, larger amounts of memory, and z/OS enhancements.



IBM's internal testing and early customer results have revealed that — depending on the specific workload — customers could achieve out-of-the-box DB2 CPU savings of up to 5 to 10 percent for traditional workloads and up to 20 percent for specific workloads when compared to the same workloads running on DB2 version 9.

Business resiliency is a key component of the value proposition of DB2 for z/OS and the System z platform. Uniquely integrated technology allows DB2 for z/OS and System z to keep your business up and running when things go wrong or when you need to make changes.

The latest version of DB2 also supports up to five to ten times more concurrent active users in a single DB2 subsystem than in DB2 version 9, allowing customers to scale-up or scale-out simply, and with less system management. Schema evolution or data definition on demand, as well as query performance manageability enhancements, support improved availability and performance manageability.

IBM DB2 for z/OS systems manage analytics by query type with complex queries running on the IBM DB2 Analytics Accelerator tool under the control of IBM DB2 software. This

combination of IBM software creates an integrated, high-performance analytics system based on real-time operational data.



IBM System z with IBM DB2 for z/OS and IBM SPSS software is the first system to integrate IBM SPSS analytics scoring within the scope of an online transaction. This capability provides real-time analytics against operational data to facilitate fast action, such as for fraud detection and loan approval.

IBM DB2 Analytics Accelerator

The IBM DB2 Analytics Accelerator is a workload optimized appliance add-on for System z that enables the integration of business insights into operational processes to drive winning strategies. DB2 Analytics Accelerator marries System z Quality of Service (QoS) and IBM Netezza Data Warehouse Appliance technologies, to accelerate complex queries in a highly available and secure environment. The DB2 Analytics Accelerator's superior scalability and performance with rapid appliance deployment provides an ideal solution for complex analysis.

DB2 Analytics Accelerator integrates into DB2 for z/OS data warehouse environments, forming a high-performance analytic query appliance powered by IBM Netezza technology. The total solution is an integration of IBM hardware, software, storage, and advanced technologies focused on business analytics that combine to

- ✔ Give IBM System z customers a high-performance analytic capability
- ✔ Extract business insight from information assets
- ✔ Help users provide the right answers to the right questions at the right time

DB2 Analytics Accelerator extends System z qualities of service of manageability, security, and availability to analytic applications, working seamlessly with IBM System z.

The DB2 Analytics Accelerator solution provides

- ✔ Extreme performance for complex business analysis
 - Helps deliver analytic information to decision makers faster through breakthrough technologies
 - Helps enable decision makers to perform business analysis to help analyze trends, better predict outcomes, and help produce better business results
- ✔ Database performance appliance
 - Provides high-speed query performance coupled with the ease of installation of an appliance
 - Integrates with Netezza technology to make it easy to get the software up and running on Netezza hardware
 - Capitalizes on the hardware and software accelerators in Netezza hardware, dramatically accelerating DB2 query responses
 - Helps substantially reduce operational costs by removing the need for complex query tuning
 - Allows for rapid addition of new applications that can help drive greater business value
 - Reduces costs by leveraging the price/performance of multiple system technologies combined into an integrated and optimized IBM solution
- ✔ Demonstrated operational characteristics
 - Extends the qualities of service in security and availability of System z, enabling operational business analytics to deliver analytics to key business processes by extending the attributes of DB2 into the Netezza data
 - Leverages the solid leading-edge technologies of the zEnterprise Analytics Optimizer V1 with Netezza technology to create the next evolution of DB2 query acceleration — the new DB2 Analytics Accelerator for z/OS

Powerful new features and capabilities in zEnterprise Analytics System and IDAA

The new zEnterprise Analytics Systems 9700 and 9710 create a hybrid system by blending MPP (Massively Parallel Processing) and SMP (System Modification Program) technologies. This system merges fit-for-purpose and mixed workload capabilities into a single system that enables both transaction-oriented applications with analytics on a single platform for operational business analytics.

New for this release are embedded analytics that can be deployed within the application or the database, providing maximum flexibility in operational analytics and new data integration capabilities with complete metadata management and lineage.

The new IBM DB2 Analytics Accelerator V3 can speed response times for analytics queries by up to 2,000 times, providing faster business insights and results.

With the new Accelerator feature “High Performance Storage Savers” organizations can have the performance of the Accelerator, while removing the cost of storage of historical data on the zEnterprise, reducing the need to store data on disk drives in the mainframe by 95 percent.

Another new Accelerator feature, the Incremental Update, can propagate data changes for high-speed use as they occur, enabling current information to be made available for right-time decisions and accelerating the reporting on operational data.

With the new additions, System z clients have access to their current and historical data enabling decisions in seconds instead of hours. This can help provide banks or retailers, for example, the information they need to upsell customers with tailored, real-time offers or identify fraud at the time of purchase.

The DB2 Analytics Accelerator for z/OS offers a query accelerator solution that consists of

➤ **New IBM software — DB2 Analytics Accelerator for z/OS:** This software is built with three major components:

- **DB2 Analytics Accelerator/Server Kit:** This software runs on the IBM Netezza 1000.
- **DB2 Analytics Accelerator/Stored Procedures:** These procedures are stored for loading and managing the data from the System z environment.

- **DB2 Analytics Accelerator Studio:** This client resident, Eclipse-based GUI is used by database administrators for data mart definitions and other administration tasks.

- ✓ **An IBM System Netezza 1000:** Provides a solution that combines massively parallel processing with hardware I/O accelerators.

The total DB2 Analytics Accelerator Solution is designed to help mitigate database administration costs while speeding up the performance of typical data warehouse or OLAP-specific (online analytical processing) workloads by an order-of-magnitude when compared to traditional database-only access. The DB2 Analytics Accelerator Solution uses the DB2 optimizer to direct queries to an optimal environment for execution. It does this without requiring any modification to the DB2 applications.



DB2 query times by IBM customers that previously ranged from 25 seconds to 90 minutes now take 8 seconds or less with DB2 Analytics Accelerator.

IBM zEnterprise Analytics System

The IBM zEnterprise Analytics System is an integrated platform that provides broad analytics capabilities on a powerful warehouse foundation with IBM server and storage. Deeply integrated and optimized, IBM zEnterprise Analytics System provides a single point of support for end-to-end analytics solutions.

Foundation

At the core of the IBM zEnterprise Analytics System is a powerful warehouse and storage optimization engine that not only manages the data store but also is essential for speeding system deployment and enabling advanced analytics.

Each configuration can be augmented at anytime to meet new requirements by simply adding new analytic capability or data and user capacity building block components. Moreover, because all these components use the same foundation, the system is easy to maintain, preserves existing investments, and delivers results in days rather than months.

Business intelligence

The IBM zEnterprise Analytics System business intelligence (BI) capability delivers a full range of reporting, analysis, and dashboarding to enable decision makers to quickly gain new insights and take actions to drive better business outcomes. Deep integration and optimization provides a business intelligence capability that hits the ground running and grows and adapts as your analytic requirements change.

IBM zEnterprise Analytics System BI capabilities features include

- ✓ A single consistent view of the business
- ✓ A full range of decision-making capabilities
- ✓ Easily accessible whenever, and whenever needed
- ✓ Preinstalled and preconfigured solution tuned for optimal performance
- ✓ Rapid time to value and return-on-investment, with the flexibility to grow with the business

The IBM zEnterprise Analytics System puts the power of business intelligence software into the hands of the business leaders who demand an easy-to-use solution with fast time-to-value. With the system, decision makers can access a consistent view of information throughout the business and multiple data sources, uncover and share new insights, and make better decisions to drive the business forward.

Data mining and text analytics

Powerful, yet simple, text analytics and data mining capabilities available with the IBM zEnterprise Analytics System enable integrated analytics of both structured and unstructured data. Standard data mining models (clustering, associations, classification, and prediction) are supported and can be developed via drag-and-drop in the Design Studio. The data mining models can be executed in the production environment to provide real-time scoring of data records. Additionally, rich presentation components are provided to enable visual analysis of data mining results.

The predictive analytics and pattern analysis capabilities can help you

- ✔ Detect fraud
- ✔ Reduce customer churn
- ✔ Segment your customers
- ✔ Simplify market basket analysis

The in-database data mining capabilities integrate with existing systems to provide scalable, high-performing, predictive, and pattern analysis without moving your data into proprietary data mining platforms.

With IBM zEnterprise Analytics System, decision makers can organize and mine all your valuable information to uncover new opportunities, perform customer behavioral analysis, or assess potential risk.

Multidimensional analytics — cubing services

IBM zEnterprise Analytics System provides high performance cubing services to give decision makers a multidimensional view of data stored in a relational database allowing you to analyze product and customer information to improve profitability and customer satisfaction.

You can easily create, edit, import, export, and deploy cube models over the relational warehouse schema to perform deeper multidimensional analysis across multiple business variables and large data sets.

Cubing services also provide optimization techniques to dramatically improve the performance of OLAP queries. In doing so, it simplifies the delivery of business analytics and optimization results and puts more power into the hands of decision makers to analyze data and generate business insight.

Cognos

IBM Cognos software on IBM System z servers embeds business analytics processes into transactional applications on operational data for high performance, low cost, and real-time insight. Cognos delivers the full range of BI capabilities to support how people think and work.

With the ability to interact, search, and assemble all perspectives of your business, Cognos provides a limitless BI workspace. It expands traditional BI capabilities with

- ✔ **Reports:** BI software helps ensure that users are equipped with the reports they need to make fact-based decisions in a system that's simpler, faster, and easier to manage. From professional report authors who design one-too-many reports for the enterprise, to business users who need to create their own ad hoc queries or customize existing reports, IBM reporting capabilities fit the needs of users throughout your organization.
- ✔ **Analysis:** With the analysis capabilities of IBM business intelligence software, users can explore information and different perspectives easily and intuitively to make sure they're making the right decisions. General business users can easily view, assemble, and analyze the information required to make better decisions, while business and financial analysts can take advantage of more advanced, predictive, or what-if analysis capabilities.
- ✔ **Scorecards:** Scorecards enable your organization to capture corporate strategy and communicate that strategy at the operational level. Executives and managers can define quantifiable goals and targets and track performance for business units, operating subsidiaries, and geographic regions to quickly identify the areas that need attention.
- ✔ **Dashboards:** With dashboards, users can access, interact, and personalize content in a way that supports the unique way they make decisions. Security-rich access to historic, current, and projected data means that users can quickly move from insight to action.
- ✔ **Statistics:** Statistics capabilities help you incorporate statistical results with core business reporting, reducing the time it takes to analyze data and prepare business presentations based on that analysis.
- ✔ **Mobile business intelligence:** Mobile business intelligence capabilities make it possible for your mobile workforce to interact with information like never before by delivering relevant business intelligence wherever they are. Users interact with trusted business intelligence through a rich and visual experience whether offline or online. A flexible platform ensures mobile decision making is simple, reliable, and safe.

- ✔ **Real-time monitoring:** Real-time monitoring capabilities provide your employees on the frontline with a rich view of operational KPIs (key performance indicators) and measures, as they happen to support up-to-the-moment decision making.
- ✔ **Collaboration:** Collaboration capabilities help individuals, key stakeholders, workgroups, and teams align their strategic objectives, build stronger relationships, learn from history, and make the most effective use of resources for important decision making.
- ✔ **Planning and budgets:** Get the right information to the right people in the form they need it to plan, budget and forecast. Planning and budgeting capabilities support a wide range of requirements, from high-performance, on-demand customer and profitability analysis and flexible modeling to enterprise contribution for a broad range of users.

IBM SPSS

Predictive analytics software helps organizations use data in their daily decision making to substantially improve outcomes. IBM SPSS enables organizations in business, government, and academia to capture information about people's attitudes and opinions, predict the outcomes of interactions before they occur, and act on their insights by embedding analytic results into business processes.

The IBM SPSS portfolio consists of four product families:

- ✔ **Statistics:** Advanced statistical analysis modules help you understand data, identify trends, and produce accurate forecasts; consists of IBM SPSS Statistics and its modules
- ✔ **Modeling:** Discover patterns and trends in your structured and unstructured data; includes IBM SPSS Modeler Professional for data mining and IBM SPSS Modeler Premium for text analytics
- ✔ **Data Collection:** Get an accurate view of people's attitudes, preferences, and opinions with IBM SPSS Data Collection.
- ✔ **Deployment:** Automatically deliver high-volume, optimized decisions to your front-line systems and decision makers; includes IBM SPSS Collaboration and Deployment Services and IBM SPSS Decision Management

Managing Business Processes

The challenges of today's enterprise workloads emphasize the need for optimized business processes and systems. Business process management (BPM) software for z/OS can enable operational efficiencies across those workloads by providing greater visibility and collocating the process server with the business-critical applications involved in the processes.

Software solutions such as the IBM Business Process Manager Advanced for z/OS are creating a fundamental shift within IT organizations from managing applications and systems to managing business processes. This shift is being enabled by IT and driven by enterprise systems technologies, such as IBM Customer Information Control System (CICS) and IBM Information Management System (IMS).

BPM on System z combines process automation with user interactions by linking key applications and assets involved in the processes. Process integrity is the result of transactional integrity, reliability, consistency, and predictability. Executing processes in a very robust System z operating environment is key to enabling consistent and secure transaction processing. BPM links, extends, and improves process flow through existing COBOL (Common Business Oriented Language) applications, provides integrated steps from one process to the next, and removes inefficiencies such as unnecessary human interactions. Process integrity enables tighter integration with CICS and IMS, leveraging z resource recovery services, supporting two-phase commit protocols for transaction integrity to ensure no transaction is ever lost, micro-flows within transactions, and compensation logic. BPM helps orchestrate the various tasks, actors, and services that comprise the end-to-end business of the organization.

BPM further enables collaboration between IT and line-of-business (LOB) objectives and shares process models across platforms, leveraging available System z assets and providing ways to be more agile and responsive to business needs. Business-friendly tools simplify complex process and rule definitions, providing graphical implementations for business processes that foster collaboration among all of the key stakeholders.

The BPM processes and rules should be in a format that's both understandable and reviewable. The rules that have been driving applications for years are now accessible to business personnel. Business rules are maintained separately from the applications. This makes it easy to incorporate changes in the business logic layer while having zero effect on the application layer. A central repository enables consistent enforcement of rules across the enterprise and reuse of proven rules wherever needed. With a central repository, verifying conformity with regulatory standards is much easier. The externalization of the business rules not only helps to bridge the business-IT divide but also improves business governance by making the rules visible, auditable, and clear to senior management and external auditors.

Being able to visualize and manage business processes on System z makes them more accessible to the rest of the company. BPM provides a simple and customizable user interface to both IT and business users that aggregates business processes and associated business services and applications. This easy-to-use interface allows changes to be made to the underlying IT infrastructure and can ultimately improve those services.

Bringing it all Together with System z

IBM System z is designed with the scalability required to run and link multiple transactional applications, processes, and databases across enterprise lines of business. For example, with zHPF, HyperPAV (Hyper Parallel Access Volumes), and MSS (Multiple Subchannel Sets) technologies combined with DS8000 storage, z/OS can address over 60 petabytes of storage from a single operating system instance with high performance and continuous availability.

Scalability for transaction processing is also supported by storage optimization through cooperative caching between IBM System Storage DS8000 and IBM z/OS technologies.

IBM WebSphere Application Server on System z and CICS Transaction Server are optimized for high-volume transactions and continuous availability. System z can transfer data

from noncontiguous sections of the disk in a single I/O operation, optimize caching by pre-fetching data in parallel, and exploit dynamic optimizations to achieve optimal throughput and minimal latency. Additionally, System z is optimized to allow applications and middleware to provide cache hints through the entire stack.

System z is designed for highly available transaction processing on shared databases, with non-disruptive growth of DB2 database capacity and protection against database node failure. Continuous availability of applications is assured by avoiding planned downtime with concurrent maintenance for all critical hardware components — system clock, service processor, power supplies, processor/memory sparing, operating systems, firmware, and more. Capacity-on-Demand enables large enterprises to immediately react to changing business needs by adding processor and memory resources while applications are in operation. System z and IBM DB2 for z/OS environments enable database clustering for non-disruptive growth of database capacity and protection of database node failure.

System z and IBM storage offerings are designed to achieve maximum levels of application availability by meeting the highest recovery point and recovery time objectives (RPO/ RTO) with an integrated, multisite disaster recovery solution. System z provides a highly available single-system environment with no single points of failure, and mean time between failure (MTBF) measured in years or decades.

IBM Parallel Sysplex technology also provides a coupled configuration with a design point in a multi-server implementation for application availability of up to 99.999 percent for highly efficient transaction processing and shared data capability.



IBM Parallel Sysplex technology combines parallel processing and the ability to read/write data shared across multiple systems with full data integrity. IBM Geographically Dispersed Parallel Sysplex (IBM GDPS) technology/Peer to Peer Remote Copy (PPRC) provides a two-site data protection, application availability, and highly automated disaster recovery solution for IBM z/OS, IBM z/VM, and Linux for System z environments. GDPS/PPRC and TPC-R (IBM TotalStorage Productivity Center for Replication) capabilities can also provide near-continuous disk availability using IBM HyperSwap technology.

System z is also designed for high performance at distance with IBM High Performance FICON for System z (zHPF) technologies for multisite workloads and disaster recovery. System z also features instrumentation for optimal path selection for multi-path devices, instrumentation for identifying SAN (storage area network) congestion, automatic identification of failing SAN components, first failure data collection for quick resolution of problems, and comprehensive instrumentation for capacity planning, performance management, and problem determination.

IBM Smarter Storage offerings alongside System z servers create an ideal enterprise infrastructure to manage vast quantities of data at low cost. IBM enterprise storage products, including IBM System Storage DS8870 and IBM Virtualization Engine TS7700, have been designed and optimized for operating with IBM System z servers.

Instrumentation provided by the DS8870 and FICON enable the system to be self-tuning and self-optimizing via client-specified workload management. IBM System z I/O priorities are also dynamically assigned to meet pre-defined workload goals. In addition, I/O bandwidth can be dynamically managed via Dynamic CHPID (Channel Path Identifier) Management and I/O parallelism is provided via HyperPAV technology. Integration points such as IBM High Performance FICON for System z (zHPF), IBM z/OS Distributed Data Backup, and I/O priority queuing capabilities ensure faster access to data and extend the IBM System z server's high qualities of services to include data and storage. Advanced storage functions such as IBM Easy Tier and thin-provisioning minimize the volume and cost of data to be stored.

IBM storage is also optimized to execute DB2 queries that aren't accelerated by the DB2 Analytics Accelerator. Storage optimization occurs via the list pre-fetch optimizer capability and IBM High Performance FICON for System z (zHPF).

Chapter 5

Creating Ultimate Security

In This Chapter

- ▶ Designing secure systems in the IBM Security Framework
- ▶ Delivering ultimate security with System z technology

Businesses that are embracing Smarter Computing are redefining their customer experience in order to capture new markets and drive top-line growth. But engaging clients in new ways requires new thinking and new approaches to security. A recent Data Breach Investigations Report noted that 94 percent of all data compromised involved servers. According to Computer Weekly, the cost of data loss has increased by 68 percent over the past 5 years.

In fact, leveraging the explosion of data and enabling new client services is making traditional data security models and privacy practices obsolete. More sophisticated threats and higher risk is driving the need for more responsive, context aware approaches to data security management.

In this chapter, you discover how the IBM Security Framework helps enterprises plan to address these challenges, providing maximum security for enterprise data and applications, ensuring integrity of infrastructure, and meeting the highest standards for risk management and compliance mandates.

Building Secure Systems

As enterprises redefine their customer experience, they must evaluate how the delivery of new services affects the following:

- ✔ **Security Governance:** The rules that an organization creates to provide strategic direction on security; security governance includes
 - Creating and enforcing policies and processes
 - Defining the risks to be addressed
 - Identifying organizational resources
 - Assigning compliance responsibility
 - Monitoring the success or failure of the enterprise security program
- ✔ **Risk management:** The process of analyzing the organization's exposure to risk, current and future threats, and determining how to best handle such exposure
- ✔ **Compliance:** Being in, and proving that, the current state of IT security meets all established organizational guidelines, specifications, and government legislation in a cost-effective manner

This requires the development of an enterprise security plan that is appropriate for their scale and for the complexity of their organization. System z can play a key role in this security plan through a broad set of security capabilities built in across all elements of the System z solution.

System z delivers capabilities that address multiple security domains:

- ✔ **Protect the integrity of data.** System z ensures privacy and isolation of sensitive data and the integrity of critical data delivered to applications across the enterprise, and manages the encryption of data over its life cycle whether it's at rest or in motion.
- ✔ **Protect against application vulnerabilities.** System z utilizes agreed rules and policies across lines of business to deliver applications that are built with secure development principles. System z also protects existing applications by detecting code vulnerabilities, especially as they integrate with new services.
- ✔ **Strengthen fidelity and accountability of users.** System z helps identify users and manage their access control and authorization, establishing a unique, trusted identity

across a federated environment and providing accountability for all user activities.

- ✔ **Safeguard integrity of infrastructure.** System z protects the critical infrastructure assets and resources of the enterprise, ensuring secure isolation of virtualized workloads and protecting against security breaches that may affect the reputation of the business.
- ✔ **Manage compliance and mitigate risk.** System z provides a comprehensive enterprise security model that's designed to address regulatory mandates and enable best practices for enterprise governance, risk, and compliance management.



To grow, retain, and satisfy clients, enterprises require a centralized security approach for the organization. Businesses that embrace System z for their IT infrastructure can take advantage of the following:

- ✔ Leadership in securing virtualized workloads with the world's only commercial platform with Evaluation Assurance Level (EAL) 5 security classification
- ✔ Technology that underpins the financial sector with 96 out of the top 100 worldwide banks (based on asset size) using enterprise systems from IBM to secure sensitive financial information
- ✔ Secure development principles with continuous integration and automated, isolated testing to reduce the cost of fixing a security defect by up to 100 times by finding vulnerabilities early in the development cycle
- ✔ Lower user security administrative costs by up to 52 percent
- ✔ Automated and customizable audit reporting and compliance capabilities to deliver up to 70 percent in security audit savings
- ✔ Creating new services based on trusted identities with high assurance digital signatures to satisfy new industry requirements for industry-standardized cryptography
- ✔ Ensuring data security and integrity with encryption of data at rest, in the network and in the cloud

Delivering Ultimate Security with System z

IBM System z delivers leadership security capabilities — designed into all elements of the system — to safeguard the integrity of the enterprise infrastructure as a platform for core business processes and operations. IBM System z is the world's only general-purpose commercial platform to have achieved EAL 5 Common Criteria certification.



Common Criteria certification is an international standard for ensuring that a computer system meets specific security assurance requirements. Assurance levels are number EAL 1 through EAL 7 with EAL 1 being the lowest certification level and EAL 7 being the highest.

IBM zEnterprise features dedicated cryptographic processors that are tamper proof and ensure a high level of transaction throughput while maintaining transaction integrity. IBM HiperSockets technology provides secure high-speed communications between partitions without requiring network encryption. IBM z/VM and IBM System z Processor Resource/Systems Manager (IBM PR/SM), IBM Security zSecure Manager, and IBM RACF (Resource Access Control Facility) technologies work together to

- ✓ Secure and isolate logical partitions, virtual machines, and data
- ✓ Ensure that workloads are isolated
- ✓ Support secure consolidated workloads to improve return on assets

System z provides the foundation for a central data repository for large enterprises and provides comprehensive data protection capabilities to protect integrity of information. Encryption is the primary approach to protecting enterprise data in System z environments, and it's built in across all elements of the system to protect data at rest and in motion. System z encryption components include

- ✓ **IBM System Storage:** Enables encryption of data at every tier — solid-state, disk, and tape — to minimize security exposures

- ✔ **IBM DS8700 storage:** Provides full disk encryption
- ✔ **IBM TS7700 technology:** Enables encryption when replicating between multiple sites
- ✔ **IBM DB2 and IBM InfoSphere Guardium software:** Has encryption built in to database and data warehouse software to provide database row- and column-level encryption
- ✔ **IBM Encryption Facility for z/OS solution:** Applies mainframe encryption capabilities to encrypt sensitive information shared with partners, suppliers and customers, even those without a mainframe
- ✔ **System z encryption key management:** Manages encryption keys over the lifetime of data, wherever it sits, ensuring that sensitive information is always protected but available to those who are authorized to access it



Built-in encryption helps deliver immense scale of up to 17,500 SSL (Secure Sockets Layer) handshakes per second to meet the most rigorous business application requirements.



Enterprise class IBM Systems Storage provides full disk encryption for active data, encryption for offsite replication of virtual tape and drive level tape encryption with centralized key management.

System z provides a secure deployment environment for critical applications, protects them from threats, and detects and fixes application vulnerabilities. System z integrates security across servers, storage and software to create an integrated, security-rich infrastructure to manage identities and access control. The System z portfolio has a comprehensive set of identity and access management products to help clients effectively manage user identities across the enterprise and the access of these users to specified applications and resources, including

- ✔ **IBM Resource Access Control Facility (IBM RACF):** Provides central access management and identity propagation to provide granular security access
 - ✔ **IBM DB2:** Has multilevel security for access control at the row level
- IBM CICS, IMS, and WebSphere Application Server support two-phase commit protocols.

- ✔ **IBM Tivoli Identity Manager:** Provides centralized security provisioning and role-based access control to prevent misuse of authority, lower security administration costs, and provide consistent security
- ✔ **IBM zEnterprise integrated public key infrastructure (PKI):** Enables clients to bring digital certificate authority capabilities in-house

System z enables improved governance, risk management, and compliance by providing a centralized approach to ownership and accountability. Meeting regulatory mandates and reducing risk depends on security best practices. System z has security built in across all system elements for comprehensive protection of data, applications, infrastructure, and users. In addition to leadership capabilities in all aspects of security, IBM QRadar security information and event monitoring and IBM Security zSecure technology provide automated and customizable audit reporting and compliance dashboards for key regulations to dramatically reduce the time to complete audits and generate up to a 70 percent reduction in audit costs.

System z has the highest security rating or classification for any commercially available server on the market.

IBM Security zSecure Suite

IBM Security zSecure Suite V1.13.1 allows you to utilize your mainframe as the ultimate security server by helping you effectively administer your mainframe security server, monitor for threats with real-time alerts, enforce policy compliance, audit usage, and configurations, and automate compliance management and audit reporting.

The new suite offers the following:

- ✔ Enhances the security intelligence of mainframes by integrating with QRadar SIEM and extending integration with DB2 for compliance reporting and support of security best practices
- ✔ Improves usability and cost effectiveness of mainframe security administration including extended cleanup capabilities
- ✔ Updates current product support and integration with products and applications, including IBM CICS, IBM DB2, and Microsoft .NET for IBM.

Chapter 6

Ten Industry Perspectives on System z

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In This Chapter

- ▶ Transforming industries from banking to telecommunications
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Critical information systems can help transform industries with diverse challenges from banking and healthcare, to government and retail. In this chapter, you discover the unique challenges of ten (okay, eight) industries and see how critical information systems can play a pivotal role in addressing those challenges.

Banking

In today's post-crisis economy, banks are faced with a number of key challenges. Turbulent conditions remain, and banks face increasing oversight and regulations together with a lack of customer trust. Competition is intensifying as global banks fight for market share in emerging market segments, while growth slows in mature marketplaces. However, opportunities also exist in the marketplace, such as client demand for new types of offerings and services.

As banks address these challenges, they must do so with the knowledge that they have to simultaneously manage their huge growth in data. They must manage the growing number of transactions that come with expansion into new market segments and as they drive greater wallet-share per client. High-end systems are already a key part of their infrastructure, with 96 out of the top 100 banks utilizing them at the core of their infrastructure. System z will be a key part of their strategy as they transform the business.



To be successful in the new economy, banks must take a three-pronged approach:

1. Increase flexibility and streamline operations to locate efficiencies across the business. System z helps create a more efficient infrastructure by optimizing workload deployment, extending trusted mission-critical business applications, reducing the cost of existing operations, and freeing resources to fund growth and new services.
2. Create a more customer-focused enterprise with better understanding of the preferences of their clients. System z helps them drive an enriched customer experience by linking data across business units and providing information-based insight to core processes and new client-centric services.
3. Optimize risk management, communicating key insights throughout the business to help teams make better business decisions. System z helps them create a centralized security management system that represents the enterprise security, governance, risk management, and compliance model for the organization.

By leveraging System z, banks can build an operational foundation that enables them to better manage business risk and streamline operations, while embracing change and creating a customer-centric organization that drives future growth across mature and new market segments.

Reduce time-to-market with System z

A large public bank has experienced a decade of rapid expansion in Thailand's dynamic consumer and business lending market. The bank needed to learn more about its customers and become more responsive to their needs by streamlining the process of developing and bringing new products and services to market. Compliance with Thailand's increasingly complex regulatory

environment was another strategic challenge.

The process for altering the bank's business rules — those pertaining to loan processing and those resulting from regulatory changes or a new product or service introduction — was largely manual, requiring the support of the entire IT team and, quite often, outside vendors.

For instance, the bank launches several new initiatives each month, either in response to changes dictated by Thailand's central bank or in conjunction with a new customer offering. Manually developing new business rules to manage such initiatives not only resulted in numerous errors but also typically took two to three months, compromising the bank's competitiveness. In order to deliver a consistent and personalized customer experience across its network of bank branches, ATMs, and online banking sites, and in order to increase its operational agility and reduce its risk exposure, the bank needed to modernize its business rules management systems and eliminate data silos that had resulted from a non-integrated IT infrastructure.

Though the rules and technologies may be more complex than ever, banking remains a customer service and risk management business. That core business reality animates the bank's challenges and its use of advanced collaborative capabilities to gain deeper customer insights, anticipate their needs, and share their financial information throughout the institution. The bank captures customer data, such as loan requirements and credit patterns, through its online banking site and 450 branches. That customer intelligence is stored in a central repository and is integrated across all business units, automatically populating distinct banking

applications with the most current, accurate and complete customer profiles available. The bank then assigns credit risk to each profile, using internal policies, business logic and rules to improve risk scoring and shorten loan-processing time.

These profiles also drive the development of one new credit-related promotion per month, a process accelerated by the same business rules management automation that makes it easy for the bank's risk managers to continually update underwriting rules to reduce the number of non-performing loans.

Being able to access, share, and rapidly act on current customer data is mandatory for a bank to succeed. Working with IBM Global Technology Services, the bank adopted an IBM service-oriented architecture (SOA) as the foundation for integrating its applications and customer information management. The bank's SOA infrastructure, comprised of IBM System i, System p, System x, and System z hardware, provides uncomplicated, business transaction-oriented access to its financial services applications, allowing it to incorporate new customer insights into the development of new financial products and services. The SOA helped the bank eliminate data silos and make customer data accessible across the organization.

Energy

Today, new pressures and unprecedented changes create a transformation mandate for energy and utility companies. They must address issues such as the cost of fossil fuels, their environmental impact, the growth in renewable generation, and the effect of new entrants and disruptive technologies in the marketplace. They must manage aging assets with increased expectations on reliability, pressure for operational efficiency and workforce productivity, and a client base that increasingly demands greater energy management and conservation. These challenges are transforming the entire industry — a transformation for which many are unprepared.

In the coming years, utilities will require much greater flexibility and responsiveness. Action is needed in the near-term to position them for what is to come. The path toward a dynamic, optimized, and orchestrated utility network has clearly defined steps that must be taken. The journey begins with infrastructure improvements that lay the groundwork for grid transformation and then builds on those investments to maximize the use of information to create insight.



System z plays a vital role in a two-step process:

- 1. Energy and utility organizations must transform customer operations.**

System z can help improve the efficiency of core operations to reduce costs, provide a tailored service to clients to help reduce energy usage, and provide the ability to promote additional products and services to new and existing clients.

- 2. Transform the utility network and improve generation performance.**

System z can help create a more intelligent energy supply chain that more closely aligns demand and supply, anticipates the impact of external factors such as localized weather conditions, and offers greater efficiency, improved service, and less waste.

Florida county government builds a highly scalable private cloud analytics platform

One of Florida's largest counties provides a wide range of public services for its 3 million citizens and more than 38 million visitors each year. These services include police, fire, water and sewers, garbage collection, parks, libraries, and hospitals to name a few.

The county administration saw an opportunity to open up government with a large-scale analytics platform that allowed both internal users and citizens to access a wealth of public information via the Web. The county deployed IBM Cognos Business

Intelligence and WebSphere Application Server in a Linux environment on its existing IBM System z mainframe platform. Employees and citizens can access reports using a standard web browser.

The solution provides 24/7 access to analytics for key services such as courts, jails and the fire department. The System z architecture enables the county to operate a private cloud infrastructure, where new virtual Linux environments can be provisioned almost instantly whenever a new requirement arises.

Government

The pressure on governments today is immense. Increased globalization, ongoing global economic pressures, rising environmental concerns over global warming, and increasing international security threats require governments to focus on challenges on the world stage. Increased expectations to deliver on missions and services, aging populations, adoption of technology, and pressure for transparency and accountability provide huge challenges on the domestic front.

As governments look to address these challenges, they must make increasingly difficult choices to improve standards of living, foster economic health, and encourage new growth and social progress, all while ensuring security and public safety. However, this drive for societal growth comes at a time when many governments are forced to institute stringent austerity measures to control debt, meet ongoing and new threats to security, and deal with a lack of public and private investment in new projects to stimulate growth.



In order to overcome these inhibitors, governments are looking at the following actions where the strengths of System z can be exploited:

- ✔ **Driving efficient use of resources for new and existing services:** System z helps create a more efficient infrastructure through optimizing workload deployment to reduce the cost of existing operations; modernize existing, proven applications; and leverage new delivery channels, such as mobile. Resources can then be allocated to fund growth and new services. This enables governments to provide citizen services more efficiently and cost-effectively and gives them an opportunity to minimize fraud.
- ✔ **Strengthening security to promote public safety:** System z can help governmental departments maintain control of sensitive data while driving real-time analysis of data from multiple sources. They can then use this information to detect potential security threats, reduce crime by identifying trouble areas in advance, take preventive actions, and allocate law enforcement resources more effectively.
- ✔ **Creating infrastructure projects to stimulate growth and long-term societal benefits:** System z can form the foundation for transformative government initiatives and projects, such as smarter cities, smarter water management, and smarter traffic control.

Major Florida hospital boosts IT fitness with System z and DB2

A major Florida hospital that's part of one of the largest hospital systems in the United States, has seven campuses in the Metro Orlando area that currently admit more than 3.5 million patients annually. In addition to these campuses, the hospital's ancillary businesses include nursing homes, extended care facilities, home health services, and urgent-care facilities.

In any given 24-hour period, the hospital runs approximately 5 million transactions on its IBM System z mainframe. These operations encompass accounting, receivables, materials, payroll, and patient registration. As the hospital's computing needs have grown, IT staff has back-loaded many years of data to meet new initiatives. This wealth of data

drives the need for a comprehensive data warehousing strategy — and the hospital looks to IBM System z for the consistent uptime, scalability, and recoverability to meet its changing business requirements.

The hospital has been working with data mining scenarios since the mid-1990s and has a history of performing data mining on System z. “System z is a very agile platform for us,” says a senior database administrator at the hospital. “We have now taken it further into full-scale data warehousing, where System z gives us the performance and availability we need today.”

Because the hospital has a need to perform clinical research in diabetes and related kidney disease, its IT staff has engaged with several business partners to create a clinical dimensional data warehouse to house the research. The effort is so extensive that it’s bringing 20 years’ worth of archive data online to create the foundation of clinical data, and the hospital expects the database to be heavily used by researchers and clinicians. Finding a cost-effective way to ensure continuous availability of all critical data and still maintain

superior performance requires a high degree of accuracy and agility from the IT infrastructure.

To support the effort, the hospital’s commitment to the System z platform led its IT staff to leverage IBM DB2 for z/OS Value Unit Edition (VUE) as the data warehousing solution. This would allow the organization to better meet evolving business requirements for scalability and performance within an overall data warehousing strategy. These requirements also include enhancing direct access storage devices (disks) and analytic capabilities to expand the reliability of the system for timely access to critical research information.

Going forward, the hospital is interested in adding IBM Cognos BI on System z for Business Analytics as well as IBM DB2 Analytics Accelerator for z/OS. As it moves forward with new ways of taking advantage of its system, the hospital continues to derive cost, performance and reliability benefits from a data warehousing solution that leverages the combination of System z and IBM DB2 for z/OS VUE.

Healthcare

With both the cost and demand for health services increasing, the healthcare industry is compelled to transform to be fit for purpose. An aging population, changing lifestyles, medical advances, and increased incidence of chronic and infectious diseases are all creating greater demand for medical services. Empowered consumers are expecting better value, quality,

and outcomes, while thinly stretched resources, new players and treatments, and a shift to centers of excellence all drive a fundamental shift in the way services are delivered.

Most healthcare organizations realize their business models are aligned with the tenets of the legacy system. They recognize they now must reconsider the consequences of their value proposition and its impact on the health and economic vitality of their institution and the individuals, communities and nations they serve. Leaders in the industry are aggressively pushing innovation into the core of their business and service models, not to achieve incremental change but to fundamentally change their way of thinking about the services they deliver.



In order to do this, healthcare organizations are focusing on System z and the three areas that can help in these transformations:

- ✔ **Create sustainable healthcare systems.** System z can drive efficiencies across the organization, helping reduce the cost of back-office operations. They can also enable the protection of sensitive patient data and health records, encouraging proactive management of regulatory compliance requirements.
- ✔ **Collaborate to improve quality and outcomes and personalize care.** System z can act as a central information repository and delivery hub. They can provide real-time delivery of insight for improving patient care through the delivery of up-to-date, evidence-based healthcare.
- ✔ **Increase consumer access and value.** System z provides a central operational engine for the organization. This ensures that healthcare professionals have access to relevant and timely information at the point of interaction with the client — wherever that interaction occurs.

Industrial

Industrial organizations are facing stiff competition in an increasingly globalized marketplace. Economic uncertainty, lower demand, shorter product lifecycles, uncertain supply

chains, and the drive for sustainable products are further reducing product revenue opportunities.

Successful industrial organizations need

- ✔ To better identify product needs and requirements
- ✔ A more efficient supply chain — one that enables them to bring new products to market quickly
- ✔ To find new ways to reduce operational overhead to deliver more profitability to the business

But with limited insight and metrics, many are unable to find the “sweet spots” of new revenue and cost savings for the organization.

System z can help these organizations respond to rapidly changing business conditions and capture growth in the marketplace. These systems help industrial manufacturers create innovative products and services by helping them gain greater insight from the data they collect. By analyzing information from across the enterprise, organizations are better able to predict future product requirements.

These systems also help enhance supply chain planning and production operations by ensuring back-office operations and supply chain management are delivered in the most efficient way possible. They can reduce the cost of core operations and free up IT resources to focus on identifying new business opportunities.

Insurance

Pressure on the insurance industry is coming from all directions. Economic uncertainty, increasingly price-conscious clients and a highly competitive marketplace are major challenges. The industry is also being scrutinized and operating in an environment of stringent regulation and strict requirements to improve risk management.

In mature market segments, as margins are being squeezed, organizations need to drive efficiencies to create revenue and profit opportunities for themselves and their channel. In

growth market segments, organizations need to differentiate themselves from competitors to gain new clients and to expand the services they provide.



System z can help combat these challenges in key ways:

- ✔ Insurers can increase flexibility and streamline operations to drive efficiencies across core back-office operations. This can help reduce costs, improve staff productivity, and free up budget and resources to enable insurers to focus on developing new services and improving the customer experience.
- ✔ Insurers can optimize enterprise risk management by exploiting System z. With enterprise-scale systems in place, they can gain insight into all risk types across the enterprise, improve underwriting and actuarial efficiency, optimize capital allocation, and ensure compliance with directives, such as the European Union's Solvency II.
- ✔ They can help create a customer-focused enterprise by linking data from across lines of business as a source of information. With an efficient, unified, and secure system, they can finally gain the insight they need to enhance customer service, create more personalized and targeted offerings, and enable their channels to be more successful.

Finnish insurance institution improves service delivery for citizens

Finland's primary social insurance institution provides a wide portfolio of benefits covering everything from pensions, disability, health insurance and rehabilitation to unemployment insurance, small-child care and family allowances, maternity grants, student benefits, general housing allowances, conscripts' allowances, and special assistance for immigrants.

Like most social service agencies, this insurance agency faces the constant challenge of providing high levels of service to its constituents in a constrained resource environment. As the agency turned increasingly toward the online delivery of information and services and customer quality expectations have continued to rise, the agency recognized the

need to steadily invest in improving the performance and efficiency of its service delivery infrastructure. An example of this commitment was its 2011 decision to upgrade the two IBM System z mainframes at the core of its infrastructure to a pair of IBM zEnterprise 196 mainframes running the IBM z/OS environment.

To complement its investment while further improving its systems' performance and cost-effectiveness, the agency sought to upgrade its database processing capabilities. The institution's specific goals were to reduce overall CPU usage, improve response time, and reduce storage requirements, which together would help the company more effectively execute its mission of serving citizens.

It had been a decade since the agency first selected IBM DB2 software, on the strength of its security, to store highly sensitive information. The agency saw the opportunity to build on its success by upgrading its database platform to an IBM DB2 10 for z/OS solution. The upgrade project, executed almost entirely by internal staff, required just three months from installation to production. The agency uses the enhanced DB2 solution to support its existing distributed IBM WebSphere Application Server software environments, which represent roughly one million daily transactions, as well as IBM CICS Transaction Server software and batch-processing workloads, representing about 9 million daily transactions.

As the agency continued to expand its base of distributed applications, it also wanted to gain a better understanding of how different segments of the transaction affected response time. This required the ability to monitor transactions from the customer level to the DB2 processing. To achieve this, the agency implemented the IBM Tivoli OMEGAMON XE for DB2 Performance Expert on z/OS tool. By using the Extended Insight Dashboard feature, the institution monitored how much of the overall processing time and workload were spent at the customer, network, and database processing portions of the transaction. That visibility gave it the inside information it needed to optimize the execution parameters of different kinds of transactions.

The benefits of this solution included the following:

- ✔ Lowers CPU requirements by up to 15 percent, resulting in lower overall software costs
- ✔ Reduces storage consumption and associated hardware and software costs
- ✔ Enables the agency to develop new services faster because of enhanced support for XML functionality
- ✔ Increases IT staff productivity through automated tuning functionality

Home improvement stores improve SAP performance

Improving the quality of service and support to store associates and customers, providing continuous availability of SAP for retail applications at 173 stores and warehouses, and ensuring that all SAP systems can be fully recovered within 48 hours of a disaster are key strategic objectives for a major home improvement retail store.

To achieve these objectives, the retail chain needed to build an IT infrastructure capable of processing more than four million line items per hour in SAP for retail applications, while reducing the overall cost of the IT infrastructure.

The retail chain deployed one IBM System z10 and four z9 servers at two data centers, with failover capability

and EMC storage mirrored asynchronously. They also run 72 IBM DB2 for z/OS databases for their SAP applications (some in active-active data-sharing mode), IBM AIX on IBM Power Systems servers, SUSE Linux Enterprise Server, and z/VM on IFL processors.

System z provides continuous availability for DB2 databases and can process five million line items per hour in SAP for retail applications, providing significant capacity for growth. Fast provisioning of servers with z/VM eliminates the need to deploy and configure new hardware, and hardware data compression on System z reduces their storage needs by 50 percent.

Retail

Retail is experiencing its biggest transformation in decades. Customers have more choices than ever on how, when, and where they shop. This requires retailers to rethink their current value propositions to make sure they're sufficiently differentiated and compelling to target consumers. They're constantly challenged by the rise of the perpetually connected, hyper-informed consumer, as well as social media's influence on consumer brand sentiment and purchase intent.

They need to adopt new services and new ways to sell based on how customers are buying, what they want, where they want to buy it, and at a price they're willing to pay. Retailers need to personalize offers and services to the individual,

align sales tactics and processes to the specific channel, and ensure that they create efficiencies in all areas of operations, such as enhanced inventory management.



System z benefits retailers by

- ✓ **Helping drive smarter operations and efficiencies in core back-office operations:** The result is reduced costs, improved staff productivity and a cost structure that is appropriate for new retail channels.
- ✓ **Building smarter merchandising supply chains that can help retailers spot trends early and integrate that insight into interactions with their partners:** System z can create a more responsive supply chain that can adapt to over-supply issues and more rapidly supply new products and services.
- ✓ **Creating a smarter shopping experience by building insight into existing online transactions:** With powerful systems in place, System z can provide a better customer experience and create new opportunities.

Telecommunications

Telecommunications businesses are in the midst of a great transformation. As smartphones, tablets, and other mobile devices increasingly become the consumer's entry point to products and services, telecommunications has become the superhighway for retail, banking, and a host of other industries. This new reality has attracted more global competition, new entrants to the marketplace, nontraditional alternatives, and more direct competition from other telecommunications businesses.

Telecommunications providers need to become more efficient. They need to leverage the massive amounts of data at their disposal to differentiate themselves, create innovative new services and deliver superior customer experiences.



System z can help transform telecommunications organizations to address their key business requirements:

- ✔ They can deliver smarter services by gaining a better understanding of the ways in which customer needs and buying behavior are changing.
- ✔ They can also transform operations by improving operational efficiency and reducing operating expenses. With better customer and operational information and updated processes, they can improve customer service.
- ✔ They can build smarter networks by correlating data from lines of business across the enterprise. This enables them to gain an understanding of the services and offerings needed to create a better customer experience.

Taking wireless communications to the cloud with System z

To cut costs and respond to fierce competition in the wireless communications industry — including competition between its own companies — a Tokyo-based telecommunications service provider needed to establish a much simpler, more efficient IT infrastructure. The company planned to integrate hundreds of servers and approximately 200 data centers. It sought a partner that could provide the technology, expertise, and implementation services for a smooth transformation.

The service provider deployed five IBM zEnterprise 196 (z196) servers

and other solution components, running Novell SUSE Linux Enterprise Server operating system to support integration of 100 web-based applications in the cloud. Though still in its early stages, the company expects to

- ✔ Consolidate its data centers by approximately 97.5 percent — from 200 data centers into five sites — over the next three years
- ✔ Reduce its JPY50 million annual licensing fee for Oracle software by 70 percent
- ✔ Reduce total cost of ownership (TCO) by 30 percent

Use IBM software solutions for System z to mine data for maximum value

IBM Software for System z For Dummies, Limited Edition, explores how you can get the maximum value out of your data to make real-time decisions. IBM System z plays a pivotal role in building a Smarter Planet, which is IBM's vision for a more instrumented, interconnected, and intelligent world. With enterprise systems and software cloud technologies, you can increase your business value and rapidly scale cloud environments with excellent time-to-market, integration, and management.

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- *Explore the data challenges for enterprises — see how IBM software solutions for System z help*



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- Ways to adhere to compliance requirements and challenges
- Major industry challenges and how to address them
- More information on Smarter Planet

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