zEnterprise EC12 (zEC12)

Highlights

- Next generation IBM® zEnterprise® System offers a proven hybrid computing design able to manage workloads on multiple platforms, with the simplicity of a single system
- New 5.5 GHz processors deliver increased performance and cross platform virtualization solutions to help address server sprawl
- Industry's premier enterprise infrastructure supports today's smarter computing solutions
- Cutting edge pattern recognition analytics for smart monitoring of system health and faster problem resolution
- New options for physical planning, such as non-raised floor and overhead I/O and power, provide increased flexibility for disaster recovery solutions

The demand for smarter solutions that leverage large volumes of data is pushing enterprises to deliver higher service levels with 24x7 availability, security, and scale, especially as they invest in new service delivery models like cloud. The new IBM zEnterprise EC12 has up to 50 percent more total system capacity, new innovations like IBM zAware, security hardened into its architecture, and continued support for a hybrid infrastructure, while maintaining core workload strategies of data serving and transaction processing.

Business innovation is about transforming business processes, technologies, products and services to enable growth and gain competitive edge. In facilitating innovation, successful organizations examine their existing business model and the IT infrastructure required to support it. Typically there is a mix of technology—each designed to provide the best support for each workload and/or business process. Being heterogeneous makes sense, as long as there are no issues with management and integration. The IBM zEnterprise System (zEnterprise) offers a proven hybrid computing design that can help you manage and integrate workloads on multiple architectures with the simplicity of a single system.

The newest member of the zEnterprise family is the zEnterprise EC12 (zEC12), designed to deliver new levels of performance and capacity for large scale consolidation and growth, support for the next generation of digital signature security support, cutting edge pattern recognition analytics for smart monitoring of system health, and new environmental capabilities such as the new non raised floor option. In addition, the

zEC12 supports heterogeneous platform requirements with the new IBM zEnterprise BladeCenter® Extension (zBX) Model 003 and IBM zEnterprise Unified Resource Manager for extending management strengths to other systems and workloads running on AIX® on POWER7®, Linux on IBM System x® and Microsoft Windows on IBM System x servers.

Unprecedented performance and scale

The new IBM zEnterprise EC12 (zEC12) is the cornerstone of our latest zEnterprise System and flagship of the IBM Systems portfolio. The superscalar design allows the zEC12 to deliver a record level of capacity over the prior System z® servers. It is powered by 120 of the world's most powerful microprocessors running at 5.5 GHz and is capable of executing more than 78,000 millions of instructions per second (MIPS)[1]. This extreme scale, up to 50 percent[1] more total capacity than its predecessor, the IBM zEnterprise 196 (z196), makes the zEC12 perfect to grow either horizontally or vertically within one server. The zEC12 is excellent for doing large scale consolidation, providing secure data serving and delivering mission critical transaction processing capabilities. Plus with up to 101 configurable cores, finding the best mix of cores to fit your processing requirements is not a problem.

Specialty engines continue to help deliver greater efficiencies and help optimize the capabilities of the platform to support a broad set of applications and workloads, while helping to dramatically improve mainframe economics. The zEC12 continues to offer these integrated and aggressively priced technology offerings providing cost-effective, specialized application execution environments. The 101 processor cores can be characterized as general-purpose Central Processors (CPs), Integrated Facility for Linux (IFLs), System z Application Assist Processors (zAAPs), System z Integrated Information Processors (zIIPs) or Internal Coupling Facilities (ICFs). These cores can also be defined as additional System Assist Processors (SAPs) if support for especially heavy data traffic is required.

Like predecessor System z processor cores, data compression and cryptographic processors are right on the processor chip. IBM continues to enhance z/Architecture® with memory hierarchy improvements enabled by System z chip designs, continued refinements in execution processing, and improved prefetch instructions. All of these can help you realize throughput for many workloads including those using Java and DB2® for z/OS®. New z/OS and zEC12 hardware support for 2 GB pages helps reduce system memory management overhead to help improve performance. This can benefit both exploiting memory-intensive workloads such as those using Java, with better overall JVM performance and improved Java garbage collection (memory reclamation), and also improve performance for other workloads running alongside appropriate exploiters. These advantages are expected to be especially helpful for industries like financial markets where applications are continually refreshed.

All five models of the zEC12 are machine type 2827. The server supports up to a total of 3 terabytes (TB) of real memory. Beyond the customer-purchased memory, the zEC12 has doubled the amount of memory—32 gigabytes (GB) for the Hardware System Area (HSA) which holds the I/O configuration data for the server.

High-speed connectivity out to the data and the network are critical in achieving sufficient levels of transaction throughput and enabling resources inside and outside the server to maximize application performance. The host bus interface of the zEC12 is designed to help satisfy storage class memory, clustering, security, SAN and LAN requirements. The industry standard Peripheral Component Interconnect Express Generation 2 (PCIe Gen2) I/O drawer not only provides improved performance and granularity support for FICON®, OSA-Express, Crypto Express, but also a new feature, Flash Express, an internal solid state disk. The zEC12 continues to offer High Performance FICON for System z (zHPF) for OLTP workload performance optimization.

Embracing and managing all system resources

The new zEnterprise BladeCenter Extension (zBX) Model 003 continues to support workload optimization and integration for zEnterprise. As an optional feature attached to the zEC12 via a secure high-performance private network, the zBX can house the IBM WebSphere® DataPower® Integration Appliance XI50 for zEnterprise (DataPower XI50z), and select IBM BladeCenter PS701 Express blades or IBM BladeCenter HX5 (7873) blades for increased flexibility in "fit for purpose" application deployment.

The zBX is tested and packaged together at the IBM manufacturing site and shipped as one unit—relieving complex configuration and set up requirements. With a focus on availability, the zBX has hardware redundancy built in at various levels—the power infrastructure, rack-mounted network switches, power and switch units in the BladeCenter chasses and redundant cabling for support and data connections. Best of all, support for the zBX is with System z hardware maintenance services (24×7 with System z Support Specialist Representative) and the System z maintenance strategy is extended to DataPower XI50z and any installed blades.

The innovative zEnterprise Unified Resource Manager handles the job of managing system resources across the entire environment. It can help achieve throughput goals by providing hardware and platform management for the system as a whole. Presenting resources simply as a single virtualized heterogeneous system; Unified Resource Manager provides "workload context" that can be used to identify and optimize the physical and virtual system resources that support an application. This allows Unified Resource Manager to have workload awareness—the ability to inspect, report, and manage all connected resources (no matter which platform or operating environment) used in the service of the defined workload.

Affordable technology for workload optimization

The specialty engines can be used independently or can complement each other to optimize workload execution and lower costs by enabling you to purchase additional processing capacity without affecting IBM software pricing and the MSU rating of the IBM zEnterprise model designation. This means that adding a specialty engine will not cause increased charges for IBM System z platform software running on general purpose processors and may even help reduce the utilization and demands on general purpose processors possibly lowering your overall MSU requirements and associated IBM software costs.

The IBM System z Integrated Information Processor (zIIP) is designed to help free up general computing capacity and lower overall total cost of computing for select data and transaction processing workloads for business intelligence (BI), ERP and CRM, and select network encryption workloads on the mainframe. This wide and varied group of eligible workloads include: DB2 for z/OS V8 and up exploit the zIIP capability

for portions of eligible data serving, pureXML®, utility workloads and select HiperSockets™ large message traffic; z/OS Communications Server exploits the zIIP for portions of IPSec network encryption and decryption workloads; z/OS XML System Services is enabled to take advantage of the zIIP for eligible XML validating and non-validating workloads; z/OS Global Mirror (zGM, formerly Extended Remote Copy - XRC) enables DFSMS System Data Mover (SDM) processing to be eligible for the zIIP; IBM Global Business Services can enable the Scalable Architecture for Financial Reporting (SAFR) enterprise business intelligence reporting solution for zIIP; intra-server communications—portions of z/OS CIM Server processing are eligible for zIIP (with z/OS V1.11); Tivoli® OMEGAMON® XE on z/OS for DASD scanning; and OMEGAMON XE for DB2 Performance Expert (and DB2 Performance Monitor) for normalizing DB2 for z/OS raw instrumentation data. You can also optimize the purchase of a new zIIP or maximize your investment in existing zIIPs by enabling zAAP-eligible workloads to run on zIIPs when you have no zAAPs—allowing the zIIP to support Java and XML-based data services.

The System z Application Assist Processor (zAAP) is designed to support the strategic integration of application technologies such as Java, technology-based web applications, and XML-based data interchange services with core business database environments. It helps make running these new application technologies on z/OS much more cost effective. Workloads eligible for the zAAP (with z/OS V1.8 or above) include all Java processed with the IBM Solution Developers Kit (SDK), and XML processed locally via z/OS XML System Services.

An Integrated Facility for Linux (IFL) supports Linux and open standards, which creates a great opportunity for consolidation and infrastructure simplification. Linux on System z brings a wealth of available applications that can be run in a real or virtual environment within System z. If you need a stand-alone Linux environment, the zEC12 can be configured as a Linux-only server.

The Internal Coupling Facility (ICF) helps cut the cost of coupling facility functions by reducing the need for an external coupling facility. IBM System z Parallel Sysplex® technology allows for greater scalability and availability by coupling mainframes together. Using Parallel Sysplex clustering, System z server groups are designed for up to 99.999 percent availability. Clients are able to reduce labor, energy, and development costs when consolidating database workloads to Linux on System z rather than on Intel servers.

The System Assist Processor (SAP) isn't always at the top of the mind when thinking about specialty engines, but it is standard on IBM System z servers and plays an important role in differentiation of our servers. The SAP is a dedicated I/O 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 (z/OS, z/VM®, Linux on System z, z/VSE® or z/TPF). For high I/O intensive workloads an additional one or more SAPs can be purchased.

Designed for Data

Business analytics are more critical than ever before. Having the right insight allows individuals, no matter which industry they are in, to make smarter, faster decisions and drive better business outcomes. The zEnterprise plays a critical role in business analytics because System z is the right place to store your data—it's secure, available and easy to manage. And with zEnterprise you get the scale and performance you need along with Unified Resource Manager to configure, monitor and govern workloads that are deployed across zEnterprise assets.

DB2 for z/OS is engineered for the zEnterprise platform and takes full advantage of the hardware components such as the zIIP, integrated hardware compression, and Licensed Internal code to maximize the performance of analytical workloads. The use of 1 MB large pages, available with z/OS V1.9, improves DB2 performance on all servers. The zEC12, with additional function planned to be made available for z/OS V1.13, will be able to support 1 MB pageable large pages with both the new Flash Express feature.

Data analytics solutions on the zEC12 include the IBM Smart Analytics System and the IBM DB2 Analytics Accelerator for zEnterprise, which are designed to enable you to efficiently store, manage, retrieve, and analyze vast amounts of data for business insight, without creating unnecessary cost or complexity.

Optimized workloads on zEnterprise

Applications in your enterprise grow exponentially, and the resulting proliferation of servers across your business has driven hidden costs and growing complexity. Leveraging your existing investments, and the IBM zEnterprise System, is a great way to help address these challenges.

The zEC12 can help to reduce costs by delivering superior resource sharing and virtualization efficiency, improve service through system management capabilities that help users satisfy business demands with incredible speed and agility, manage risk through unrivaled system availability and flexible business continuance, as well as disaster recovery options to help you protect your business. The unmatched scalability of the zEC12 allows for growth and expansion without changing the IT footprint, and with the zBX it provides the ideal platform and infrastructure required for our customers' increasingly complex workloads.

Applications running in two or three-tier environments, with data maintained by zEnterprise, may be excellent candidates for migration to zEC12 and the zBX. The PS701 BladeCenter Express and the BladeCenter HX5 blades represent the most flexible and cost- efficient blade solutions available in the market, and they support AIX on Power Systems™, Linux on System x, and Microsoft Windows applications. Workloads across all industries can exploit the capabilities provided by the zEnterprise hybrid computing architecture model. For example, in banking there are components across retail and wholesale banking that rely on several architectures to execute, but the core of most banking applications relies on zEnterprise and z/OS. The insurance industry typically maintains claims processing on System z but reaches out to the internet for interaction with consumers, utilizing UNIX and Intel®.

The IBM WebSphere DataPower Integrated Appliance XI50 for zEnterprise (DataPower XI50z) is a multifunctional appliance that can be implemented to provide XML and non-XML message hardware acceleration, to streamline and secure valuable service-oriented architecture (SOA) applications, or to provide drop-in integration for heterogeneous environments by enabling core Enterprise Service Bus (ESB) functionality including routing, bridging, transformation and event handling. Installed in the zBX, the DataPower XI50z benefits from having Unified Resource Manager do the management and having the IBM Systems Support Representative (zSSR) maintain and support the blades.

Managed in cloud

From consumers to IT professionals, the buzz word in all aspects of life today is 'cloud'. For businesses, Cloud computing promises greater business agility and performance at a lower cost than today's IT infrastructures. Further cost savings, flexibility and performance benefits can result from architecting the IT infrastructure with purpose-built components that help eliminate the traditional fixed-hardware boundaries of CPU, memory, network and storage.

IBM zEnterprise is designed to create a centrally managed and controlled set of IT resources that provide an ideal private enterprise cloud for the rapid and flexible delivery of high value services. zEnterprise and the Tivoli® suite of service management products offers a robust set of cloud management capabilities allowing greater control and automation of cloud resources. New accounts and existing zEnterprise customers also have the option of building their own customized cloud infrastructure using the function-rich zEnterprise (z/VM®) virtualization management infrastructure and this advanced virtualization, combined with the unmatched workload management of System z, ensures that business-oriented

service level agreements are achieved while driving system resources near 100 percent. The value derived from IT can be identified through advanced accounting and chargeback enabling allocation of IT costs to the business processes they support. These leading enterprise computing capabilities combine with a flexible and efficient resource deployment model which allows new and existing services to co-exist and to be rapidly deployed creating an IT environment that is deployed with cloud technologies.

Slow down server sprawl

Virtualization on System z offers industry-leading and large-scale IT optimization capabilities to help drive down the costs of managing and maintaining the tremendous proliferation of servers in distributed infrastructures. Single server simplicity means savings from software licensing, simplified administration and management, improved business continuity, and environmental savings of floor space and energy consumption. With up to 101 client-configurable cores usable for virtualization on the hardware level and 25 percent larger IFLs[1], the zEC12 can help clients to become more efficient by "doing more with less". Plus the use of integrated blades offers an added dimension for workload optimization.

With these capabilities, many workload types can be easily consolidated onto IBM System z. Linux on System z can run all types of workloads, such as business intelligence and analytics with Cognos® and SPSS®, data warehousing and data serving with InfoSphere®, DB2, Informix®, Oracle Database and others, collaboration with the Lotus® suite, Enterprise Content Management (ECM), as well as SAP, Oracle E-Business Suite, Java/WebSphere-based applications.

The IBM zEnterprise Unified Resource Manager brings end-to-end management to this heterogeneous virtual environment, to provide energy monitoring and management, goal-oriented policy management, increased security, virtual networking, and data management, consolidated in a single interface that can be tied to business requirements.

Next generation availability

The zEnterprise, along with z/OS and its middleware stack, have earned a well-deserved reputation for industry-leading reliability and high availability (HA), and the zEC12 is no exception. Many types of planned outages, such as planned maintenance, upgrades or configuration changes are avoided through support for non-disruptive configuration changes and dynamic replacement capabilities. Unplanned outages are mostly avoided or their effects mitigated through robust support for recovery after a failure. This support can help limit the scope of an outage's impact, mask the effects completely or dynamically restart a failed element after an unrecoverable error. The zEC12 continues to offer fault tolerant memory through Redundant Array of Independent Memory (RAIM) to support memory availability.

Flash Express is designed to help improve availability and handling of paging workload spikes when running z/OS V1.13 (with additional function) and later. Using Flash Express can help availability by eliminating slow downs that can occur at the start of the workday. It can also help to eliminate delays that can occur when collecting diagnostic data during failures. Flash Express can therefore help organizations meet their most demanding service level agreements enabling them to compete more effectively. Flash Express is easy to configure, requires no special skills and provides rapid time to value.

A new feature, IBM zAware, is designed to offer a real-time, continuous learning, diagnostics and monitoring capability intended to help you pinpoint and resolve potential problems quickly enough to minimize impacts to your business. IBM zAware runs analytics in firmware and intelligently examines your message logs for potential deviations, or inconsistencies, or variations from the norm. For many z/OS operating system environments, (based on system size, the number of applications and the amount of users), the volume of OPERLOG messages may exceed 25M messages per day. The number of messages make it too difficult for operations personnel to consume and analyze easily. IBM zAware provides

a simple graphical user interface (GUI) for easy drill-down and identification of message anomalies, which can facilitate faster problem resolution.

Availability requirements also mean that IT departments must be agile so they can respond rapidly to change. It may be necessary to coordinate changes in people, processes and technology. The zEC12 continues to build on the zEnterprise capacity on-demand offerings that simplify modifications. Permanent and temporary capacity is available to help satisfy capacity requests that are long-term or short-term (such as capacity spikes or for testing new applications). Defining processor cores as Capacity Back-up (CBU) can help provide reserved emergency capacity for multiple processor configurations. And Capacity for Planned Events (CPE), a variation on CBU, is available when there is unallocated capacity available in a server.

Built for data centers of the future

Energy-efficient IT continues to be part of essential business practices. Business leaders continue to look for ways to reduce costs by minimizing energy usage. Technology can be part of the solution. The zEC12 can help provide better control of energy usage in the data center. A static power savings mode allows for turning off engines that are not being used. And, the query maximum potential power mode can help when doing total data center energy use management. Unified Resource Manager monitors and provides trend reporting of energy efficiency for the entire heterogeneous infrastructure. Application programming interfaces (APIs) allow integration between Unified Resource Manager and the broader ecosystem of management tools.

The zEC12 offers solutions that can help reduce wattage and power usage across an entire data center. There is an option for high-voltage DC, which can eliminate the need for a Universal Power Supply (UPS) inverter and Power Distribution Unit (PDU). Top exit I/O cabling and power cabling, can improve flexibility in the data center by helping to increase air flow in a raised-floor environment. The zEC12 offers a water cooling option that does not increase the system footprint and offers energy savings without compromising performance. The zBX has an optional rear door heat exchanger to help reduce energy consumption. And something new, the zEC12 server is able to install and run on a non-raised floor, a new option for data center designs, particularly for disaster recovery solutions.

Security that lets you sleep

Many experts believe that the best way to secure information is to encrypt it. Cryptography is in the 'DNA' of zEnterprise hardware and providing exceptional performance and function using Crypto Express4S cryptographic coprocessors and accelerators that are individually specialized to address various encryption needs.

To help secure sensitive data and business transactions, the zEC12 is designed for Common Criteria Evaluation Assurance Level 5+ (EAL5+) certification for security of logical partitions. This means that the zEC12 is designed to prevent an application running on one operating system on one LPAR from accessing application data running on a different operating system image on another LPAR on the server.

On the processor core two kinds of protection are available. Bulk encryption is available with clear key support, and protected key support protects sensitive keys from inadvertent disclosure—the keys are not visible to the application or the operating system. Security for the internet with secure sockets layer (SSL) transactions and secure co-processing is delivered with a new feature—Crypto Express4S—that is installed into the PCIe I/O drawer introduced previously on zEnterprise servers.

The zEC12 meets standards for digital signatures with new support for PKCS #11—which will soon replace handwritten signatures in all industries. This capability will be important for smart cards or other mission-critical applications such as online banking. The zEC12 also supports Elliptic Curve Cryptography (ECC), a modern public-key algorithm that many experts believe provides the same or better security, with much shorter key lengths and less processing overhead, than RSA keys. This technology is appropriate in resource-constrained environments such as mobile phone and smart cards which may have limited

space for saving of storage keys. Additional standards for the banking and finance industry, such as ANSI and ISO, are also supported by the zEC12.

Bigger, better and best—all in one

The new zEnterprise EC12 is a workload-optimized system designed to support business innovation at all levels. It is capable of supporting all your mission-critical data and applications, plus it is an excellent platform to support change. In System z we do not sit still. Our consolidation and virtualization solutions can help you get your budget under control. And, System z continues to bring you the balanced design, availability and security that you expect, with new features and tools to tackle the challenges and opportunities that lie ahead.

Why IBM?

As you drive business innovation by examining your business processes, technology, products and services, IBM remains your trusted partner. You want smart, robust technology solutions without sending your budget out of control. We have the total expertise—in systems, software, delivery and financing—to help you refresh and optimize your IT for the constant flow of opportunities and challenges you face. Our experts can help you configure, design and implement a zEnterprise solution optimized for the needs of your business.

For more information

To learn more about the zEnterprise EC12, please contact your IBM representative or IBM Business Partner, or visit the following website: **ibm.com**/systems/zec12

Additionally, IBM Global Financing can help you acquire the IT solutions that your business needs in the most cost-effective and strategic way possible. We'll partner with credit-qualified clients to customize an IT financing solution to suit your business goals, enable effective cash management, and improve your total cost of ownership. IBM Global Financing is your smartest choice to fund critical IT investments and propel your business forward. For more information, visit: **ibm.com**/financing

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[1] Based on preliminary internal measurements and projections. Official performance data will be available upon announce and can be obtained online at LSPR (Large Systems Performance Reference) website at: https://www-304.ibm.com/servers/resourcelink/lib03060.nsf/pages/lsprindex?OpenDocument. Actual performance results may vary by customer based on individual workload, configuration and software levels.

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