IBM z13 (z13)

Highlights

- More memory, cache enhancements, and improved I/O bandwidth to serve up more data to support exponential mobile transaction volumes
- Real time insights at the point of impact with integrated analytics and transaction processing
- Data and services are securely delivered, with minimal risk, on the most reliable platform
- Improved data resilience with SAN Fabric Priority
- Enabled for open source innovation

New market forces are changing the face of every industry, requiring almost every business to transform and embrace digital business. This means supporting existing clients with new services and offerings, while helping new businesses and citizens gain access to products, services and societal benefits. A successful transformation requires an IT infrastructure that is efficient, secure, adaptive, and integrated. It must be designed to handle the explosive growth of increasingly mobile clients, be able to leverage vast amounts of new data, and provide deeper real-time insight at the point for greatest business impact. All deployed within a secure and resilient cloud ready infrastructure.

The IBM z13™ (z13) provides the infrastructure that will help differentiate a refined digital business. It offers the capacity and processing power to improve business performance and growth. The z13 helps better protect sensitive transactions to minimize business risk and client exposure, while helping to deliver on service level agreements for an exceptional customer experience. New economic efficiencies allow the z13 to offer more throughput and capabilities with less impact to the IT budget.

Performance and Scale help improve client experience

The z13 is available with up to 141 configurable processor units for performance and scaling advantages over prior generations of the mainframe, supporting up to 8,000 virtual servers on a single footprint.

With changes in the chip technology industry, microprocessor frequency is no longer the primary means to achieve performance. Hence, the new 22nm 8-core processor chip achieves performance gains over IBM® zEnterprise® EC12 (zEC12) by the following micro-architecture innovations:

- Increased instruction parallelism through wider instruction decode bandwidth, increased execution bandwidth and a more aggressive out-of-order-execution.
- Economies of scale, using simultaneous multi-threading (SMT) to execute two instruction streams (or threads) on a processor core which delivers more throughput for Linux on z Systems™ and IBM z Integrated Information Processor (zIIP) eligible workloads.
- Single Instruction Multiple Data (SIMD), a vector processing model providing instruction level parallelism, to speed workloads such as analytics and mathematical modeling. For example, COBOL 5.2 and PL/I 4.5 exploit SIMD and improved floating point enhancements to deliver improved performance over and above that provided by the faster processor.
- On chip cryptographic and compression coprocessors receive a performance boost improving both general processors and Integrated Facility for Linux (IFL) cryptographic performance and allowing compression of more data, helping to save disk space and reducing data transfer time.
- Redesigned cache architecture, leveraging our leadership eDRAM technology to provide twice as much second level cache and substantially more third and fourth level caches compared to the zEC12. Bigger and faster caches help to avoid untimely swaps and memory waits while maximizing the throughput of concurrent workloads.

The z13 offers up to 10 TB of memory—3X more than the zEC12. This will advantage many types of users. Linux application servers, database servers, analytic and cloud workloads running native or under z/VM®, may see performance benefits when taking advantage of large shared, virtualized memory. Large memory can reduce latency and CPU cost, and thus improving operational efficiency, for WebSphere® Application Server and Java applications by allowing larger heaps without an increase in paging. Large memory for IBM MQ V8 can help to cost effectively manage the increasing message volumes generated from today's mobile and cloud applications.

New scale, intelligent, and resilient I/O infrastructure

The z13 uses industry standard Peripheral Component Interconnect Express Generation 3 (PCIe) technology in the PCIe I/O drawer to support FICON®, Crypto Express, OSA-Express, and our Flash Express solid state disk. The PCIe I/O features allow better granularity and lower energy consumption along with the exploitation of industry standards.

The z13 I/O provides increased scale and addressability providing flexibility in consolidating more servers into a single footprint. The number of I/O devices per channel is increased to 32K, and the number of Logical Channel Subsystems (LCSS) has increased to 6, with 4 available subchannel sets.

The new FICON Express16S links, which auto-negotiates to 4, 8 and 16 Gbps, help improve I/O and DB2® transactional latency to reduce elapsed time for some batch jobs such as SAP® workloads. I/O bound batch jobs can expect a reduction in elapsed time using FICON Express16S versus FICON Express8S.

Because the faster link speed technologies are more sensitive to the quality of the cabling infrastructure, z13 is the first system to use a standards based approach for enabling Forward Error Correction (FEC) for a complete end-to-end solution. FEC technology will allow FICON Express16S to operate at higher speeds, over longer distances, with reduced power and higher throughput, while retaining the same reliability and robustness that FICON has traditionally been known for.

The new High Performance FICON for z Systems (zHPF) Extended Distance II capability can help allow clients using multi-site configurations to receive an I/O service time improvement when writing data remotely (remote site recovery). zHPF Extended Distance II capability will benefit GDPS® or TPC-R HyperSwap® configurations where the secondary DASD subsystem is in another site.

SAN Fabric Priority will help extend z/OS® workload management policies into SAN fabric to manage congestion by prioritizing important work to avoid congestion in the fabric and switches.

IBM zHyperWrite, designed to improve DB2 log write performance with DS8870 and z/OS for Metro Mirror environment, is supported on z13. IBM zHyperWrite can help to reduce up to 43 percent of the DB2 write operations and deliver up to 80 percent throughput improvement.

Trustful, reliable and secure for less risk

The intrinsic platform security and privacy for transactions and sensitive data helps enable z Systems to be the secure enterprise application server and data vault. IBM z Systems employ multiple cryptographic engines. Integrated into each central processor microprocessor chip is a cryptographic coprocessor that provides CP Assist for Cryptographic Function (CPACF) to deliver cryptographic and hashing functions in support of clear-key operations. Exclusive to z Systems is the protected key CPACF which provides the speed of processor based cryptography while helping to keep sensitive keys private from applications and the operating system.

The next generation of cryptographic coprocessor is available with the Crypto Express5S feature, installed in the PCIe I/O drawer. The Crypto Express5S offers a state of the art tamper resistant cryptographic coprocessor for secure-key operations along with new hardware assists to encrypt data faster than Crypto Express4S, allowing for more data to transfer successfully across the internet to support public and private cloud and mobile workloads. The Crypto Express5S feature will support three configuration options - accelerator (SSL), secure CCA (Common Crypto Architecture) and Enterprise PKCS#11 modes.

The z13 and the Crypto Express5S offer enhanced public key support for constrained environments using hardware assisted Elliptic Curve Cryptography (ECC). ECC, initially supported on the zEC12 and zBC12, provides algorithms with much shorter key lengths than RSA keys for similar cryptographic strength. This makes ECC cryptography ideal for mobile and smartcards where memory constraints may be a consideration.

The z13 offers VISA format preserving encryption (VFPE) for payment card account numbers and can help provide additional security by enabling legacy databases and applications to contain encrypted data of sensitive fields without having to undertake a restructure of the database or applications. FPE is a valuable tool for payment card applications that helps to maintain the character length between input clear text and resulting cipher text.

Enterprise Linux qualities of service

IT organizations require a robust and effective workload deployment platform for consolidation, to help eliminate server sprawl and complexity, as well as re-deployment and new workload deployment. The z13 enables enterprise grade Linux, one that is more robust and trusted for critical workloads, has higher performance and throughput at a lower cost per transaction and is integrated with new open capabilities that will lead to wider adoption of open source content. Our Linux clients demand z Systems qualities of service and the z13, along with open source investments, delivers enhancements to availability, scale, and security to meet their needs.

The z13 can support exponential growth for Linux on z Systems with up to 141 IFL specialty engines and 85 logical partitions (compared to 60 on the zEC12). Coupled with better utilization of up to 10 TB of memory for Linux on z Systems, z13 can help improve response time for clients and support the ability to make faster business decisions. The memory increase opens opportunities such as in-memory data marts and in-memory analytics.

IBM announced a statement of direction for a new GDPS Virtual Appliance for Linux on z Systems[1] based on GDPS/PPRC Multiplatform Resiliency for z Systems (xDR) technology. The easy to use and implement appliance can help provide high availability in case of system, application, or network failure.

Another feature, IBM z Advanced Workload Analysis Reporter (IBM zAware), is designed to offer near real time diagnostics to help you identify potential problems in your z Systems environment. It is an analytics solution executed in firmware, which intelligently examines message logs for potential deviations, inconsistencies or anomalies. With rapid identification of message anomalies, organizations can accelerate their response to resolve problems, focus their efforts more precisely, address IT problems quickly, minimize availability lapses and intervene in IT problems before they become more severe. Previously available only for z/OS, with z13, it is now supported on Linux on z Systems too.

IBM General Parallel File System™ (GPFS™) for Linux on z Systems, V4.1 was announced in October 2014. It is a fast and highly available/scalable cluster file system that is designed for high-performance parallel file access and parallel I/O to single or multiple files. GPFS for Linux on z Systems delivers proven reliability, scalability, and performance with automated failure recovery, and decentralized data management for simplifying administration.

IBM also announced a statement of direction to deliver KVM support[2] on the z13. KVM on the mainframe will provide skills portability for clients with existing KVM implementations on alternative architectures and has the potential to create new possibilities for delivery of open source tools, databases and management software to further lower the cost of Linux on z Systems deployments.

z13 is the mainframe optimized for the digital era

Built on z Systems core values and strengths, the z13 delivers innovations and technologies to enable digital business. It is designed to handle the explosive growth of increasingly mobile clients and employees, able to leverage new and vast amounts of data, and can provide deeper real-time insight at the point for greatest business impact. All this needs to be deployed within a secure and resilient cloud ready infrastructure.

Why IBM?

As you transform your business 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 z13 solution optimized for the needs of your business.

IBM z13 (2964) at a glance		
Processor Core Types: CP / IFL / ICF / zIIP*		
Model	Minimum	Maximum
N30	0† / 0† / 0 / 0	30 / 30 / 30 / 20
N63	0† / 0† / 0 / 0	63 / 63 / 63 / 42
N96	0† / 0† / 0 / 0	96 / 96 / 96 / 64
NC9	0† / 0† / 0 / 0	129 / 129 / 129 / 86
NE1	0† / 0† / 0 / 0	141 / 141 / 141 / 94
Coupling Links		
IC maximum	32	
ICA SR maximum	32 ports‡	
12x HCA3-O InfiniBand maximum	32 ports‡	
1x HCA3-O LR InfiniBand maximum	64 ports‡	
Channels		
FICON Express16S / FICON Express8S / FICON Express8§ / OSA-Express5S / OSA-Express4S§	Maximum: 320 / 320 / 64 / 96 / 96	
Flash Express	8 (4 pairs – 8 PCIe adapters); offered in pairs	
HiperSockets™	Up to 32 high-speed “virtual” Local Area Networks	
Cryptography		
Crypto Express5S	Minimum order 2 features; Maximum order 16 features	
Compression Acceleration		
zEDC Express	8 – minimum recommended is 2	
RDMA over Converged Ethernet (RoCE)		
10 GbE RoCE Express	16 – minimum recommended is 2	

IBM z13 (2964) at a glance		
Processor Memory		
Model	Minimum	Maximum
N30	64 GB	2.5 TB**
N63	64 GB	5.0 TB
N96	64 GB	7.5 TB
NC9	64 GB	10.0 TB
NE1	64 GB	10.0 TB
Upgradeability	Upgradeable within the z13 family Upgrading to the NE1 from other z13 models will require a planned outage Upgradeable from IBM zEnterprise EC12 and IBM zEnterprise 196	
Supported Operating Systems		
z/OS	z/OS V2.2 (Planned GA September 30, 2015) z/OS V2.1 z/OS V1.13 z/OS V1.12 (toleration) Available via IBM Software Support Services	
z/VM	z/VM 6.3 z/VM 6.2 (toleration)	
Linux on z Systems	Red Hat Enterprise Linux (RHEL) 5, 6, and 7 SUSE Linux Enterprise Server (SLES) 11 and 12 For minimum or recommended levels please see IBM Tested platforms page **ibm.com**/systems/z/os/linux/resources/testedplatforms.html	
z/VSE®	z/VSE 5.1 and subsequent releases	
z/TPF	z/TPF 1.1	
AIX® on POWER7® blade located in zBX	AIX 5.3 (TL 12+ and up), AIX 6.1 (TL 5+ and up) and AIX 7.1 and subsequent releases	
Linux on System x® on HX5 blade located in zBX Model 004	Red Hat Enterprise Linux (RHEL) 5.5 and up, 6.0 and up, 7.0 and up and SUSE Linux Enterprise Server (SLES) 10 (SP4) and up, SLES 11 SP1 and up, SLES 12 and up – 64 bit only	
Microsoft Windows on HX5 blade located in zBX Model 004	Microsoft Windows Server 2008 (SP2), Microsoft Windows Server 2008 R2, Microsoft Windows Server 2012, Microsoft Windows Server 2012 R2 (Datacenter Edition recommended) – 64 bit only	

IBM z13 (2964) at a glance		
Supported Hypervisors		
PS701 in zBX Model 004	PowerVM® Enterprise Edition – VIOS 2.2.3	
HX5 in zBX Model 004	KVM – Red Hat Enterprise Virtualization Hypervisor (RHEV-H) 6.5	
IBM z BladeCenter® Extension (zBX) Model 004		
WebSphere DataPower® Integration Appliance XI50 for zEnterprise	Minimum: 0	Maximum: 28††
IBM BladeCenter PS701 Express POWER7 blade	Minimum: 0	Maximum: 112††
IBM BladeCenter HX5 blade	Minimum: 0	Maximum: 56††

For more information

To learn more about the IBM z13 (z13), please contact your IBM representative or IBM Business Partner, or visit the following website: **ibm.com**/systems/z13

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Statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only. Actual available storage capacity may be reported for both uncompressed and compressed data and will vary and may be less than stated.

* If ordering a zIIP, one or more general purpose processor (CP) per the specialty engine is required. IBM has modified the ratio of zIIP to CPs to be 2:1. Up to two zIIP processors may be purchased for every general purpose processor purchased on the server.

† There must be at least one CP, IFL or CP ordered on the server. No IFL is required unless ordering an IFL only server—model capacity identifier 400. If you order a 400 no CP is orderable.

‡ N30 (i.e. 1 Drawer) Coupling Feature and Port Maximums:
ICA SR: 10 Features, 20 Ports
12X HCA3-O: 4 Features, 8 Ports
1X HCA3-O LR: 4 Features, 16 Ports

§ Carry forward only

** Provides the minimum physical memory required to hold base purchase memory plus 96 GB HSA

†† The blades for BladeCenter PS701 Express blade, BladeCenter HX5 blade and DataPower XI50z can be shared in the same BladeCenter chassis—note that DataPower XI50z blades are "doublewide" and use two slots. Total zBX capacity cannot exceed 112 total blades.

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