zEnterprise.
Freedom by Design

IBM zEnterprise: Announcement Overview

Dror Marom, Technical Specialist, System z, IBM
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The demands placed on the data center have never been greater

32.6 million servers worldwide
- 85% idle computer capacity
- 15% of servers run 24/7 without being actively used on a daily basis

1.2 Zetabytes (1.2 trillion gigabytes) exist in the “digital universe”
- 50% YTY growth
- 25% of data is unique; 75% is a copy

Between 2000 and 2010
- servers grew 6x (‘00-’10)
- storage grew 69x (‘00-’10)
- virtual machines grew 51% CAGR (‘04-’10)

Data centers have doubled their energy use in the past five years
- 18% increase in data center energy costs projected

Internet connected devices growing 42% per year

Since 2000 security vulnerabilities grew eightfold

... while IT budgets are growing less than 1% per year.
This has created an IT conundrum—meeting exploding demand for service on a flat budget.

**Inflexible IT:** Reactive
Inflexibility of infrastructure limits integration across silos and responsiveness to customer demands.

**Sprawling IT:** More Cost
Every IT investment leads to more sprawl which drives up infrastructure and management costs.

**Incomplete, Untrusted Data:** Always Guessing
Decisions are made on incomplete data, big ideas are seen as risky, and small decisions aren’t optimized.
Smarter Computing is an IT infrastructure that is designed for data, tuned to the task and managed in the cloud.

**Managed in the Cloud**: Cloud
Remove barriers to rapid delivery of new services and reinvent business processes to drive innovation.

**Tuned to the task**: Optimized Systems
Remove financial barriers by driving greater performance and efficiency for each workload.

**Designed for data**: Big Data
Remove barriers to harnessing all available information and unlock insights to make informed choices.
What is IBM zEnterprise System?

Re-write the rulebook and set new standards for business-centric IT with IBM System z, to be the world’s premier workload-optimized platform for enterprise applications.

Our Vision:

*Deliver the best of all worlds - Mainframe, UNIX®, x86 and single function processors - integrated in a single system for ultimate flexibility and simplicity to optimize service, risk, and cost across multiple heterogeneous workloads.*
Delivering on the promise of smarter computing

IBM zEnterprise™ System: Freedom by design

The integration of a shared pool of virtualized heterogeneous resources, managed as a single system, that is:

- Optimized across the infrastructure and tuned for every task
- Managed, end-to-end for the flexible delivery of high value services
- Designed for enterprise wide real time data modelling to create new business opportunities

Clients are using the strengths of System z®; security, availability, resiliency, scalability, virtualization and management as part of their infrastructure transformation for better business outcomes
Hybrid Computing with the zEnterprise

*Freedom to innovate your business with a multi-platform that’s both mainframe and distributed*

- Redefining IT frameworks to bring change to operational silos and extend System z governance to POWER7 and IBM System x blades
- Fast and flexible application integration
- Improving agility to compete with consolidation and simplification
- Delivering consistent business controls across applications and platforms
- Focused on integration and collaboration to fuel business growth
- zEnterprise is the industry’s only heterogeneous cloud platform
zEnterprise provides the foundation for the “smart” infrastructure on which we can build the workloads of today and tomorrow.

They are workloads that …

- Rely on data serving and application components on IBM System z®
- Solutions that need to leverage strengths of System z such as security, reliability, availability
- Have application components on UNIX (HP, Sun, Power) or Linux (x86, System z) but require a higher level of integration capabilities and efficiency

… and / or …

- Reside in low utilization / development environments
- Can be made more efficient through consolidation
- Can be optimized by using the newest virtualization technology

... but also may ...

- Reside in complex multi-platform IT environments
- Require flexible development and test infrastructure
- Require simplified, integrated policy and management
Deploy workloads on best fit architecture for efficiency and innovation

- Over 7,000 applications supported on z/OS® & Linux for System z
- zBX enables a broader set of applications
  - AIX® on Power® Blades
  - Linux on System x® Blades
  - Windows on System x Blades

Freedom by design:

Utilize the best fit architecture – Mainframe, Power, x86

1 All statements regarding IBM future direction and intent are subject to change or withdrawal without notice, and represents goals and objectives only.
IBM zEnterprise System – Best-in-class systems and software technologies
A "System of Systems" that unifies IT for predictable service delivery

- Optimized to host large-scale database, transaction, and mission-critical applications
- The most efficient platform for large-scale Linux® consolidation
- Capable of massive scale-up
- New easy-to-use z/OS® V1.12

- Unifies management of resources, extending IBM System z® qualities of service end-to-end across workloads
- Provides platform, hardware and workload management

- Selected IBM POWER7® blades and IBM System x® blades for deploying applications in a multi-tier architecture
- High-performance optimizers and appliances to accelerate time to insight and reduce cost
- Dedicated high-performance private network
Extending the hybrid model

- New I/O subsystem for improved system connectivity and performance
- Security enhancements
- Plan to deliver APIs to enable management of Unified Resource Manager from external tools*

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Introducing IBM zEnterprise 114 (z114)

Bringing the zEnterprise hybrid computing model to clients of all sizes
zEnterprise technology designed for small and mid-sized businesses

*The Value Begins At the Heart with the z114 ...*

**zEnterprise 114 (z114)**

*Machine Type: 2818*

*2 Models: M05 & M10*

- New technology in a new package
  - Modular 2 drawer design for lower cost of entry
  - Granularity for right-sizing your system
  - Additional Scale for consolidation and growth
  - Improved data center efficiency
  - Same Qualities of Service as the z196
  - Hybrid enabled to drive workload expansion and integration

- Improved Platform Economics
  - New Software Curve
  - Lower Hardware Maintenance
  - Lower specialty engine and memory prices
  - Upgradeability for investment protection

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1. Improvement for traditional z/OS workloads
2. Improvement in CPU intensive workloads via compiler enhancements
3. Total capacity improvement

<table>
<thead>
<tr>
<th>Configuration</th>
<th>MIPS</th>
<th>Available Capacity Settings</th>
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<tr>
<td>From</td>
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<tr>
<td>26</td>
<td>3100</td>
<td>130</td>
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<tr>
<td>0-2 IBM provided spare cores</td>
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<td></td>
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<tr>
<td>256 GB RAIM fault tolerant memory</td>
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</table>

| 1-10 configurable cores for client use includes CPs, IFL, zIIP, zAAP, and ICFs |

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1. Relative capacity and performance compares at equal software levels as measured by IBM Large System Performance Reference (LSPR) workloads using z/OS® 1.11, Results may vary.
2. The z114 will exhibit up to 25% increase for CPU intensive workload as provided by multiple C/C++ compiler level improvements when going from z/OS 1.09 to z/OS 1.12.
z114 continues the CMOS Mainframe heritage

- Multiprise 2000 – 1st full-custom Mid-range CMOS S/390
- Multiprise 3000 – Internal disk, IFL introduced on midrange
- z800 - Full 64-bit z/Architecture®
- z890 - Superscalar CISC pipeline
- z9 BC - System level scaling
- z10 BC - Architectural extensions
- Higher frequency CPU
- z114 – Additional Architectural extensions and new cache structure
Continuing to protect your investment with two generation upgrades

Full upgradeability within each server family

Temporary or permanent growth when you need it

z114 offers two models:
- M05 and M10.
- M05 is upgradeable to M10

z114 (M10) is upgradeable to the z196 (M15 Air cooled only)
System Comparisons

Notes:
1. Capacity shown is for CPs only
2. z9, z10 and z114 have additional PUs which can be used as Speciality Engines
Linux on z for consolidation to reduce cost

- Lower acquisition costs of hardware and software vs. distributed servers – **60%** less than Nehalem*
- **~ $500 per year** per virtual server (TCA)*
- Reduce floor space by up to **90%** compared to distributed servers*
- Reduce labor costs by up to **70%** compared to distributed servers

*NOTE ALL PRICING AND PERFORMANCE DATA IS PRELIMINARY AND FOR GUIDANCE ONLY
Distributed server comparison is based on IBM cost modeling of Linux on zEnterprise vs. alternative distributed servers. Given there are multiple factors in this analysis such as utilization rates, application type, local pricing, etc., savings may vary by user.

~ Ted Mansk, IT Director, BCBSM
Introducing New Hybrid Capabilities

To integrate, support and manage an expanding portfolio of operating environments and workloads
zBX Overview

- **Machine Type/Model 2458-002**
  - One Model with 5 configurations for IBM Smart Analytics Optimizer

- **Racks – Up to 4 (B, C, D and E)**
  - 42U Enterprise, (36u height reduction option)
  - 4 maximum, 2 chassis/rack
  - 2-4 power line cords/rack
  - Non-acoustic doors as standard
  - Optional Rear Acoustic Door
  - Optional Rear Door Heat Exchanger (conditioned water required)

- **Chassis – Up to 2 per rack**
  - 9U BladeCenter
  - Redundant Power, cooling and management modules
  - Network Modules
  - I/O Modules

- **Blades (Maximum 112 in 4 racks)**
  - IBM Smart Analytics Optimizer Blades (0 to 7 to 56)
  - Can not mix other Blades in the same Chassis
  - Customer supplied POWER7 Blades (0 to 112)
  - Customer supplied IBM System x Blades* (0 to 28)
  - IBM WebSphere DataPower Integration Appliance XI50 for zEnterprise, M/T 2462-4BX (up to 28 – double width)
  - Non-IBM Smart Analytics Optimizer Blades can be mixed in the same chassis

- **Management Firmware**
  - Unified Resource Manager

- **Top of Rack (TOR) Switches - 4**
  - 1000BASE-T intranode management network (INMN)
  - 10 GbE intraensemble data network (IEDN)

- **I/O**
  - 8 Gb Fibre Channel (FC) connected to customer supplied disks
  - IBM Smart Analytics Optimizer uses DS5020 disks
    - DS5020s not shared with Customer supplied Blades

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zBX with the zEnterprise

Looks like a rack with BladeCenters but much more...

- **zBX is assembled and built at the IBM plant**
  - All parts and microcode - tested and shipped as a completed package

- **zBX hardware redundancy provides improved availability**
  - Redundant switches provide guaranteed connection between z196/z114 and zBX
  - Redundant Power Distribution Units improve availability
  - Extra blowers manage heat dispersion/removal

- **zBX provides an isolated and secure network**
  - Four top-of-rack switches for connection to the controlling z196
  - Traffic on user networks not affected
  - Provides the foundation for the Unified Resource Manager
Putting zEnterprise System to the Task

Use the smarter solution to improve your application design
IBM POWER7 and System x Blades

General purpose processors under one management umbrella

What is it?

The zBX infrastructure can host select IBM POWER7 and IBM System x blades. Each blade comes with an installed hypervisor that offers the possibility of running an application that spans z/OS, Linux on System z, AIX on POWER®, Linux or Microsoft® Windows® 1 on System x but have it under a single management umbrella.

How is it different?

- Complete management: Advanced management brings operational control and cost benefits, improved security, workload management based on goals and policies.
- Virtualized and Optimized: Virtualization means fewer resources are required to meet peak demands with optimized interconnection. Multiple resources (both blade types and optimizers) can reside in a single zBX.
- Integrated: Integration with System z brings heterogeneous resources together that can be managed as one.
- Transparency: Applications certified to run on AIX 5.3 or 6.1 on POWER7 blades and those certified to run on supported releases of Linux on System x or Windows on the System x blades1 will run on those blades in a zBX. No changes to deployed guest images.
- More applications: Brings larger application portfolio to System z.

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IBM Smart Analytics Optimizer
Capitalizing on breakthrough technologies to accelerate business analytics

What is it?
The IBM Smart Analytics Optimizer is a workload optimized, appliance-like, add-on, that enables the integration of business insights into operational processes to drive winning strategies. It accelerates select queries, with unprecedented response times.

How is it different?

- **Performance:** Unprecedented response times to enable 'train of thought' analyses frequently blocked by poor query performance.
- **Integration:** Connects to DB2® through deep integration providing transparency to all applications.
- **Self-managed workloads:** Queries are executed in the most efficient way.
- **Transparency:** Applications connected to DB2, are entirely unaware of IBM Smart Analytics Optimizer.
- **Simplified administration:** Appliance-like hands-free operations, eliminating many database tuning tasks.

Faster insights for enabling new opportunities
IBM WebSphere DataPower Integration Appliance XI50 for zEnterprise Helps Extend the Value of zEnterprise

Purpose-built hardware for simplified deployment and hardened security helps businesses quickly react to change and reduce time to market

What is it?

The IBM WebSphere DataPower Integration Appliance XI50 for zEnterprise can help simplify, govern, secure and integrate XML and IT services by providing connectivity, gateway functions, data transformation, protocol bridging, and intelligent load distribution.

How is it different?

- **Security:** VLAN support provides enforced isolation of network traffic with secure private networks.
- **Improved support:** Monitoring of hardware with “call home” for current/expected problems and support by System z Service Support Representative.
- **System z packaging:** Increased quality with pre-testing of blade and zBX. Upgrade history available to ease growth.
- **Operational controls:** Monitoring rolled into System z environment from single console. Consistent change management with Unified Resource Manager.
Evolution of Specialty Engines Plus . . .

Building on a strong track record of technology innovation with specialty engines

DB Compression, SORT, Encryption

Transparent for applications

1997
Internal Coupling Facility (ICF)

2001
Integrated Facility for Linux (IFL)

2004
System z9 Application Assist Processor (zAAP)

Eligible workloads: Java and XML

2006
IBM System z10 Integrated Information Processor (IBM zIIP)

Eligible workloads: IPSec encryption, HiperSockets™, XML, ISV, some DB2, z/OS Global Mirror, IBM GBS Scalable Architecture for Financial Reporting

2010
Optimizers, Accelerators, Hybrid processing
Service Levels to Match Your Business Needs

*Increased flexibility for your multi-architecture strategy*  
**zEnterprise System**

TCO Focus

- Silo managed islands of computing
- Less dynamic than System z virtualization
- Minimal resource sharing with System z resources

Distributed Systems

Select IBM Blades in zBX

- Expanded ISV support for enterprise applications
- Targeted for applications that interact with mainframe data and transactions
- Provisioned and managed by System z

Linux on z/VM

- Extreme consolidation of servers and networking
- Superior levels of virtual server provisioning, monitoring and workload management
- Industry-best virtual I/O bandwidth and reliability
- Fewer components and reduced complexity
- System z qualities of dynamic resource management and capacity-on-demand
- Seamless integration with z/OS backup and disaster recovery solutions

z/OS

- Extreme scalability and performance for transaction processing and data serving
- High availability and cross-system scalability with Parallel Sysplex® and GDPS
- Leading policy-based capacity provisioning and workload management
- Pervasive, high-performance security support

TCA Focus

LOWER

SCALABILITY, SECURITY, DYNAMIC WORKLOAD MANAGEMENT

HIGHER
How is the Role of the HMC Changing?

- Prior to the ensemble management functions in zEnterprise, HMC availability was not a critical concern
  - HMC was not the authoritative holder of any configuration or state information other than configuration info for the HMC itself
  - HMC was not involved in any flows supporting ongoing operation other than call-home, for which redundancy was provided
  - You could turn the HMC off and there would be no effect on operations of the managed systems
- Addition of ensemble-related function in zEnterprise changes this:
  - The HMC will now be authoritative holder of some ensemble-scoped configuration not held by any of the Nodes in the ensemble
  - Some configuration actions will be available ONLY from the HMC managing the ensemble, not the SE
  - HMC will have a role in monitoring of Workload performance
- This change in role drives a need to provide some additional redundancy in the HMC configuration to improve availability
A zEnterprise for Everyone

*Freedom to choose the “right sized” mainframe to fit your needs.*

If you …

…want the flexibility to manage across heterogeneous platform – including z/OS, AIX, Linux on System x, Windows on System x!

…are looking for an entry level mainframe with options for traditional capacity settings

…need a smaller mix of special engines (*zAAP on zIIP great option here!*)

…have smaller Coupling and/or I/O attachment requirements

…need the lowest cost application development environment.

*The z114 M05 may be the perfect option.*

If you …

…want the flexibility to manage across a heterogeneous platform

…want to replace your server with one that has the same number of engines – but would like more IFLs, zAAPs or zIIPs

…want to replace your standalone coupling facility or Linux only server with a machine that provides engine, memory and I/O scale out capabilities

…have future growth needs, but prefer grow in smaller increments and want to avoid disruptive outage during upgrade

*The z114 M10 is just what you need.*

If you …

…want the flexibility to manage across a heterogeneous platform

…have a large mainframe capacity requirement or desire for massive consolidation – scale to over 52,000 MIPS in one footprint

…have a large disk installment so in turn have large I/O requirements

…need new ways to address your ‘green’ requirements – like water cooling and static power save mode

…have a large CBU requirement – and like the control of having your disaster recovery site right in your own shop.

*The enhanced z196 is right for you.*
### z/OS Support Summary

<table>
<thead>
<tr>
<th>Release</th>
<th>z9 EC WdfM</th>
<th>z9 BC WdfM</th>
<th>z10 EC</th>
<th>z10 BC</th>
<th>z196</th>
<th>z114</th>
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<th>Coexists with z/OS</th>
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**Notes:**

¹The IBM Lifecycle Extension for z/OS provides the ability for customers to purchase extended defect support for that release of z/OS for up to 24 months after the z/OS release’s end of service date.

²z/OS 1.10 EOS is September 29, 2011. Requires Lifecycle Extension after this date

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# System z z/VM & z/VSE Support Summary

<table>
<thead>
<tr>
<th>Model</th>
<th>z9 EC</th>
<th>z9 BC</th>
<th>z10 EC</th>
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Note: z/VSE V4 is designed to exploit 64-bit real memory addressing, but does not support 64-bit virtual addressing. z/VSE V5.1 has been previewed. Crypto Express3 requires z/VSE V4.2 or later.

1) End of Service date for z/VM 5.4 extended

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Note: z/VM 6.1 implements a new Architecture Level Set (ALS) available only on IBM System z10 servers or later.
### System z Linux Support

<table>
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<td>4Q 2011</td>
<td>4Q 2012</td>
<td>03/31/2014</td>
</tr>
<tr>
<td>RHEL 6 support*</td>
<td>4Q 2014</td>
<td>4Q 2015</td>
<td>11/30/2017</td>
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<table>
<thead>
<tr>
<th></th>
<th>General support</th>
<th>Extended support</th>
<th>Self support</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLES 10 support*</td>
<td>07/31/2013</td>
<td>07/31/2016</td>
<td>07/31/2016</td>
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<tr>
<td>SLES 11 support*</td>
<td>03/31/2016</td>
<td>03/31/2019</td>
<td>03/31/2019</td>
</tr>
</tbody>
</table>

- For latest information and details contact your Linux distributor
- Recommendation: use RHEL 6 or SLES 11 for new projects
- For latest information about supported Linux distributions on System z refer to: [http://www.ibm.com/systems/z/os/linux/resources/testedplatforms.html](http://www.ibm.com/systems/z/os/linux/resources/testedplatforms.html)

* SLES = SUSE Linux Enterprise Server  
  RHEL = Red Hat Enterprise Linux  
  Support dates may be changed by Linux distributors
Connectivity Enhancements on z196 and z114
New features with big performance boost

**HMC**
- Location to run Unified Resource Manager – including monitoring CPU, energy, workload performance
- Host of the ensemble – controlling all functions of the ensemble
- Primary with Alternate needed for DR

**For Clustering**
- **NEW**
  - HCA-3 InfiniBand® Coupling Links
    - 12x InfiniBand (improved performance – 12x IFB3 protocol)
    - 1x InfiniBand (4 ports)
- ISC-3 (peer mode only)
- IC (define only)
- STP
  - Improved time coordination for zBX components

**Within z196/z114 and to zBX**
- PCI I/O Infrastructure
- I/O Drawer and I/O Cage
- Intraensemble data network (IEDN)
- Intraneode management network (INMN)

**To the Network**
- **NEW**
  - OSA-Express4S (PCIe-based)
    - 10 Gigabit Ethernet LR and SR
    - 1 Gigabit Ethernet SX and LX
  - OSA-Express3
    - 1000BASE-T Ethernet

**To the Data**
- **NEW**
  - FICON Express8S (PCIe-based)
  - ESCON®
    - Up to 240 maximum

*I/O cage for z196 only*
New Blades Provide Added Flexibility for Workload Deployment and Integration

- Introducing System x Blades in the zBX
  - IBM BladeCenter HX5 7873 dual-socket 16-core blades
  - Complements existing portfolio of POWER7, DataPower XI50z and IBM Smart Analytic Optimizer blades.
  - Ordered and fulfilled through System x providers
  - Blades assume System x warranty and maintenance when installed in the zBX

- Unified Resource Manager will install an integrated hypervisor on blades in the zBX
  - KVM-based with IBM service and support

- Up to 112 Blades supported on zBX
  - Ability to mix and match DataPower XI50z, POWER7 and System x blades in the same chassis for better zBX utilization
  - IBM Smart Analytics Optimizer can mix with others in same rack
  - Number of blades supported varies by type

1 All statements regarding IBM future direction and intent are subject to change or withdrawal without notice, and represents goals and objectives only.
Cloud for Business Top Challenges

- Real time added capacity
- Accelerate time to value for implementing Cloud based Infrastructure as a Service
- Manage your existing Server and Virtualization sprawl
- Control software licenses and cost
- Optimize energy consumption
Cloud on zEnterprise

- IBM Cloud Computing on System z is transforming businesses
  Better qualities of service, advanced workload optimization, and efficient resource consolidation

- zEnterprise is an Infrastructure as a Service platform for workload-optimized, heterogeneous computing
  The Unified Resource Manager is zEnterprise platform management strategy for Infrastructure as a Service facilitating secure cloud services and providing the building blocks for Integrated Service Management

- zEnterprise is the industry’s only heterogeneous cloud platform
  Centralized platform management and optimization across multiple architectures with the ability to also manage other virtualization solutions for a complete cloud portfolio
Thank you

ibm.com/systems/z