zEnterprise.
A New Dimension in Computing

IBM zEnterprise 196
What did IBM announce

- IBM® zEnterprise™ System
- IBM® zEnterprise™ 196 (z196) Models: Five Models
- IBM® zEnterprise™ BladeCenter® Extension (zBX)
- IBM® zEnterprise™ Unified Resource Manager (zManager)
- IBM® Smart Analytics Optimizer
IBM zEnterprise System – Best in Class Systems

The integration of System z and distributed technologies into a revolutionary combination

zEnterprise Unified Resource Manager

- Unifies resources, extending System z qualities of service across the infrastructure
- Install, Manage, Monitor, Optimize, Diagnose & Service

zEnterprise 196

- The industry's fastest and most scalable enterprise server
- Ideally suited for large scale data and transaction serving and mission critical enterprise applications

IBM Blades

- Runs app unchanged and supports what you know. Logical device integration between System z and distributed resources

Optimizers

- Workload specific accelerators to deliver a lower cost per transaction, appliance for example IBM Smart Analytics Optimizer

Integration and centralized management by System z
## zEnterprise 196 (z196)

**Machine Type:** 2817  
**Models:** M15, M32, M49, M66, M80

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>1 to 80 configurable cores for client use</strong></td>
<td>Up to 40% Improvement for traditional z/OS workloads 1</td>
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<tr>
<td><strong>IFL, zIIP, zAAP, ICFs and optional SAPs</strong></td>
<td>Improvement in CPU intensive workloads via compiler enhancements</td>
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<td><strong>Up to 3 TB RAIM memory</strong></td>
<td>Up to 60% Total capacity improvement 1</td>
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<td><strong>45 subcapacity settings</strong></td>
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<td><strong>Cryptographic enhancements</strong></td>
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<td><strong>Holistic approach for the data center</strong></td>
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<td><strong>Upgradeable from IBM System z10 EC™ and z9® EC</strong></td>
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- **Improved connectivity**
  - One to four books
  - Hot pluggable I/O drawer
  - InfiniBand Coupling links

- **Focus on the environment**
  - Options to help eliminate hotspots and save on energy
  - Static power savings
  - Query maximum potential power
  - Leadership technology for cooling and power distribution

- **Operating System Flexibility**
  - z/OS, z/VM®, z/VSE™, z/TPF and Linux on System z

- **The integration of System z and distributed technologies into a revolutionary combination**
  - Elliptic curve cryptography
  - Concurrent patch update enhancements

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1 For average LSPR workloads running z/OS 1.11.
**z196 Continues the CMOS Mainframe Heritage**

- **G4** – 1st full-custom CMOS S/390®
- **G5** – IEEE-standard BFP; branch target prediction
- **G6** – Copper Technology (Cu BEOL)

- **z900** – Full 64-bit z/Architecture
- **z990** – Superscalar CISC pipeline
- **z9 EC** – System level scaling
- **z10 EC** – Architectural extensions
- **z196** – Additional Architectural extensions and new cache structure
z196 – IBM Leadership Technology At the Core

- New 5.2 GHz Quad Core Processor Chip boosts hardware price/performance
  - 984 instructions (762 implemented entirely in hardware)
  - 100+ new instructions – improvements for CPU intensive, Java™, and C++ applications
  - Over twice as much on-chip cache as System z10 to help optimize data serving environment
  - Out-of-order execution sequence gives significant performance boost for compute intensive applications
  - Significant improvement for floating point workloads
- Performance improvement for systems with large number of cores – improves MP ratio
- Data compression and cryptographic processors right on the chip
z196 Out of Order (OOO) Value

- OOO yields significant performance benefit for compute intensive apps through
  - Re-ordering instruction execution
    Later (younger) instructions can execute ahead of an older stalled instruction
  - Re-ordering storage accesses and parallel storage accesses
- OOO maintains good performance growth for traditional apps
z196 Quad Core PU Chip Detail

- **Up to Four active cores per chip**
  - 5.2 GHz
  - L1 cache/ core
    - 64 KB I-cache
    - 128 KB D-cache
  - 1.5 MB private L2 cache/ core
- **Two Co-processors (COP)**
  - Crypto & compression accelerators
  - Includes 16KB cache
  - Shared by two cores
- **24MB eDRAM L3 Cache**
  - Shared by all four cores
- **Interface to SC chip / L4 cache**
  - 41.6 GB/sec to each of 2 SCs
- **I/O Bus Controller (GX)**
  - Interface to Host Channel Adapter (HCA)
- **Memory Controller (MC)**
  - Interface to controller on memory DIMMs
  - Supports RAIM design

- **12s 45nm SOI Technology**
  - 13 layers of metal
  - 3.5 km wire
- **Chip Area – 512.3mm²**
  - 23.5mm x 21.8mm
  - 8093 Power C4’s
  - 1134 signal C4’s
- **1.4 Billion Transistors**
System z Cache Topology – z10 EC vs. z196 Comparison

**z10 EC**

4 L2 Caches

48MB

Shared L2

L1: 64KI + 128KD
8w Set Associative DL1
4w Set Associative IL1
256B line size

L1.5

3MB Inclusive of L1.5
12w Set Associative
256B cache line size

L2

48MB Excl Inclusive + XI Dir
24w Set Associative
256B cache line size

**z196**

4 L4 Caches

192MB

Shared eDRAM L4

L1: 64KI + 128KD
8w DL1, 4w IL1
256B line size

L2

Private 1.5MB Inclusive of L1s
12w Set Associative
256B cache line size

L3

Shared 24MB Inclusive of L2s
12w Set Associative
256B cache line size

L4

192MB Inclusive
24w Set Associative
256B cache line size
z196 – Under the covers

- Internal Batteries (optional)
- Power Supplies
- Processor Books, Memory, MBA and HCA cards
- Ethernet cables for internal System LAN connecting Flexible Service Processor (FSP) cage controller cards
- InfiniBand I/O Interconnects
- 2 x Cooling Units
- 2 x Support Elements
- I/O cage
- I/O drawers
- Fiber Quick Connect (FQC) Feature (optional)
Storage Connectivity Has Gotten Easier and Performance Better

**Designed, developed and tested together is key to unlocking value**

- Simplified configuration of FICON® disk and tape with z/OS discovery and auto-configuration (zDAC)
- zHPF enhancements allows for increased exploitation transparently to applications and middleware
- Introduction of hot pluggable I/O drawer
- Extending for storage growth with new three subchannel sets per LCSS
z196 – Helping to Control Energy Consumption in the Data Center

- Better control of energy usage and improved efficiency in your data center

- New water cooled option allows for energy savings without compromising performance
  - Maximum capacity server has improved power efficiency of 60% compared to the System z10 and a 70% improvement with water cooled option

- Savings achieved on input power with optional High Voltage DC by removing the need for an additional DC to AC inversion step in the data center

- Improve flexibility with overhead cabling option while helping to increase air flow in a raised floor environment

- z196 is same footprint as the System z10 EC\(^1\)

\(^1\) With the exception of water cooling and overhead cabling
Operating System Support for zEnterprise System

- Currency is key to operating system support and exploitation of future servers
- The following are the minimum operating systems planned to run on z196:
  - **z/OS**
    - z196: z/OS V1.9¹ for toleration only;
    - exploitation starts with z/OS V1.10
    - full exploitation with z/OS V1.12
    - Ensemble support: z/OS V1.10
  - **Linux on System z distributions:**
    - Novell SUSE SLES 10 and SLES 11
    - Red Hat RHEL 5
  - **z/VM**
    - z196: z/VM V5.4 or higher
    - Ensemble support: z/VM V6.1
  - **z/VSE V4.1 or higher**

- Using the general purpose blades:
  - AIX 5.3, 6.1
  - Linux on IBM x86² (SOD)

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¹ z/OS V1.9 support ends on Sept. 30, 2010. Lifecycle Extension for z/OS 1.9 is available Oct. 1, 2010. Note that z/OS 1.8 with the Lifecycle Extension for z/OS 1.8 and z/OS 1.7 with the Lifecycle Extension for z/OS 1.7 are also available with toleration support only.

² All statements regarding IBM future direction and intent are subject to change or withdrawal without notice, and represents goals and objectives only.
IBM zEnterprise BladeCenter Extension (zBX)
Machine Type: 2458 – Model 002

- Integrated IBM Certified Components driven by System z order
  - Standard parts – TOR switch, BladeCenter Chassis, Power Distribution Units, Optional Acoustic Panels

- System z support
  - Problem reporting, hardware and firmware updates

- Expanding operating system support for zEnterprise
  - AIX, Linux on System x

- Simplified management
  - Improved time to install and implement new applications
  - Central point of management for heterogeneous workloads
  - No change to applications

... managed by the zEnterprise Unified Resource Manager

Optimizers
- IBM Smart Analytics Optimizer
- WebSphere® DataPower® appliance

Select IBM Blades
- BladeCenter PS701 Express
- IBM x86

One to four – 42u racks – capacity for 112 blades

No System z software running in zBX – Passport Advantage software licensed to blades

No MIPS/MSU rating

Configured for high availability

Optional rear door heat exchanger

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zEnterprise Hardware Components

zEnterprise 196

zBX

zBX Infrastructure

Blades

Rack

Top-of-Rack Switch

BladeCenter Chassis

Ethernet & FC Cables

Switches (ESM, FC)

Power Dist. Units

Opt: Heat Exchanger, Power cord types

SAO Blades

DataPower Blade

HPA Blade

Power Blade

System x Blade

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IBM BladeCenter PS701 Express

Machine Type: 8406
Model 71Y

Processor Units, Memory, I/O:
- POWER7 8-core processor 3.0 GHz
- Single wide blade server
- 3 configurations supported by zEnterprise System
  - 32 GB, 64 GB, 128 GB
- Flexibility in ordering – acquired through existing channels, including IBM

Environmental:
- EnergyScale Technology with dynamic energy optimization
- POWER7 Intelligent Threads technology enables workload optimization

Software:
- AIX OS 5.3 or higher
- PowerVM

Security and Reliability:
- Hot Swap Power Blades in BladeCenter Chassis
- Auto sensing by z196 initiates configuration and firmware updates done at HMC
- System z support
  - Problem reporting and ‘phone home’ capability
  - Blade warranty provided as part of zBX warranty and terms
  - Support by IBM System z Service Support Rep (SSR)
zEnterprise extends Service Management for improved governance

Unified Resource Manager
- Workload based Resource Allocation and Provisioning for zEnterprise
- Physical and Virtual Resource Management (Server, Storage, Network)
- Goal Oriented Resource Management of zEnterprise (Availability, Performance, Energy, Security)
- Ensemble Network and Storage Management
- Configuration management for hardware / firmware
- Operational controls for the hardware / firmware
- Service and Support for the hardware / firmware

Focused, collaborative innovation
A “complete systems” approach

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zEnterprise Unified Resource Manager

Hardware Management

Hypervisor Management
- Integrated deployment and configuration of hypervisors
- Hypervisors (except z/VM) shipped and serviced as firmware.
- Management of ISO images.
- Creation of virtual networks.

Operational Controls
- Auto-discovery and configuration support for new resources.
- Cross platform hardware problem detection, reporting and call home.
- Physical hardware configuration, backup and restore.
- Delivery of system activity using new user.

Energy Management
- Monitoring and trend reporting of CPU energy efficiency.
- Ability to query maximum potential power.

Network Management
- Management of virtual networks including access control

Key
- Manage suite
- Automate suite
zEnterprise Unified Resource Manager

Platform Management

Hypervisor Management
- Manage and control communication between virtual server operating systems and the hypervisor.

Energy Management
- Static power savings

Workload Awareness and Platform Performance Management
- Wizard-driven management of resources in accordance with specified business service level objectives
- HMC provides a single consolidated and consistent view of resources
- Monitor resource use within the context of a business workload
- Define workloads and associated performance policies

Virtual Server Lifecycle Management
- Single view of virtualization across platforms.
- Ability to deploy multiple, cross-platform virtual servers within minutes
- Management of virtual networks including access control

Key
- Manage suite
- Automate suite
Simplified installation of hypervisors
Gain significant time to market with improved speed of deployment

Save time, cost and simplify asset management
Decrease problem determination and resolution time for cross-platform resources
Improve and simplify cross-platform availability procedures
Enable broader and more granular view of resource consumption

Factory installed and configured network
Improved network security with lower latency, less complexity, no encryption/decryption

Simplified energy management
Energy cost savings

Allow critical workloads to receive resources and priority based on goal-oriented policies established by business requirements
Smart business adjustments based on workload insight
Provide deep insight into how IT resources are being used
Gain flexibility, consistency and uniformity of virtualization
Provide the business with faster time to market
Simplified network management for applications

... Value Made Possible By the Unified Resource Manager
A look inside the IBM zEnterprise System

Enabling a new dimension in application architecture

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zBX requires a Unified Resource Manager HMC
z196 zBX Model 002 – Communications

IBM Service Updates
Virtual Server to Virtual Server Communications
IBM Smart Analytic Optimizer DB Updates
Power Monitoring / Management

Customer Management Network
HMC1 (Primary)
HMC2 (Alternate)

HMC/SE LAN (switch)

IBM Smart Analytic Optimizer
DB Updates

TOR

Customer managed Data Network

OSM (INMN)

OSX (IEDN)

System Analytics Optimizer

System x Blades

POWER7 Blades

System x OSA's

Customer managed Data Network

BPH (Eth Switch)

OSX 10GGE OSA's

OSM 1000BT OSA's

z/OS
DB2
IBM Smart Analytic Optimizer

z196, zBX Info

TOR

Customer managed Data Network

Blade 1

Blade 2
Thank you
Backup

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1 – The Lifecycle Extension for z/OS V1.7 or z/OS V1.8 is required for support
2 – The IBM Lifecycle Extension for z/OS V1.9 will be required after 9/30/2010
3 – Support differs by release, z/OS V1.12 includes XL C/C++ support for ARCH(9) and TUNE(9) Options
4 – A Crypto Web Deliverable is NOT required, but toleration PTF is needed even if a web deliverable is installed
5 – Tolerance PTFs needed to detect Power Saving Mode
6 – Out of Order Execution exploitation provided in Java 31/64 bit SDK for z/OS V7, z/OS XL C/C++ support provides additional exploitation
7 – PTFs recognize crypto control block, AND provide updated reports

B – FMIDin Base product
W – FMIDs shipped in a Web Deliverable
P – PTFs are required, P1 – Support differs by release
P2 – PTF required for toleration, N – Not Supported
Business processes and the applications that support them are becoming more service oriented, modular in their construction, and integrated.

The components of these services are implemented on a variety of architectures and hosted on heterogeneous IT infrastructures.

Approaches to managing these infrastructures along the lines of platform architecture boundaries cannot optimize: alignment of IT with business objectives; responsiveness to change; resource utilization; business resiliency; or overall cost of ownership.

Customers need better approach: The ability to manage the IT infrastructure and Business Application as an integrated whole.