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# Exploiting the Power of the Mainframe: The Latest News from System z

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IBM IMS ATS

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#11875

SHARE in Anaheim 2012

# Agenda

- Smarter Planet / Smarter Computing and the Role of IBM System z®
- IBM zEnterprise™ System

  ***A Smarter 'System of Systems' for a Smarter Planet***

  - IBM zEnterprise 196 (z196)
  - IBM zEnterprise 114 (z114)
  - IBM zEnterprise BladeCenter®Extension (zBX)
  - IBM Unified Resource Manager
- IBM zEnterprise Software


zEnterprise.
A New Dimension in Computing.

# The era of Smarter Planet and Smarter Computing

Three years ago we started describing the Smarter Planet we saw emerging, **fueling innovation across industries.**

Neonatal Care

Law Enforcement

Telecom


Fraud Prevention

Resource Management

Traffic Control

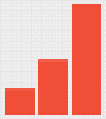
Manufacturing

Trading

# Enterprises must address unprecedented IT challenges…

31.9 million servers worldwide

Digital content volume up 48% in 2011; expected to reach 2.7 ZB (1ZB = 1B TB) in 2012 and 8ZB by 2015



Last 10 years:
servers grew 2x and virtual machines up 42% CAGR

Data centers have doubled their energy use in the past five years

Internet connected devices: 22B in 2020 (24.0% CAGR)

Security vulnerabilities grew eightfold since 2000

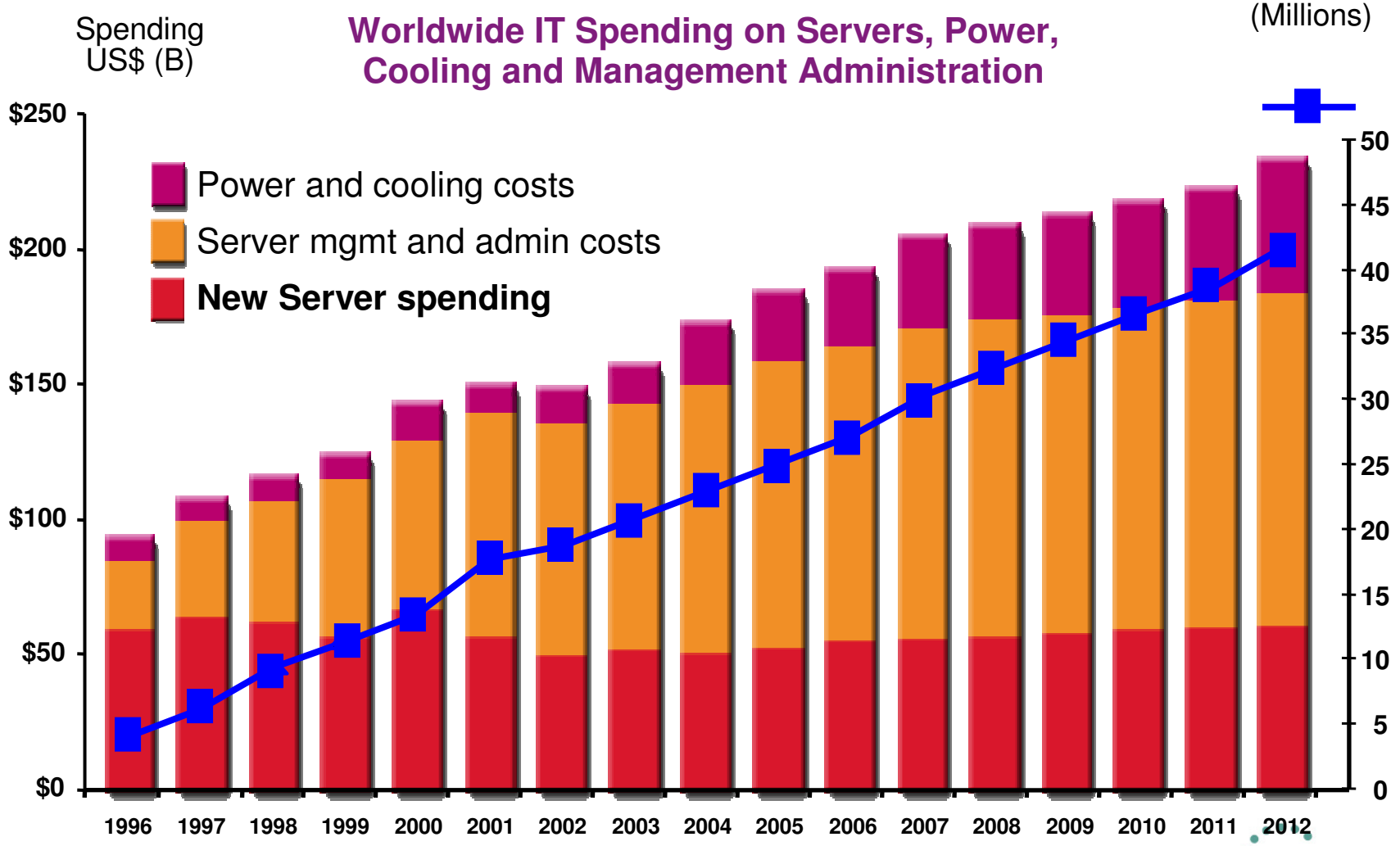
Collaborative software workloads growing 10% CAGR

Real-time analytics workloads growing 13% CAGR with related server spend growing 3x average

## … creating a new era of Information Technology

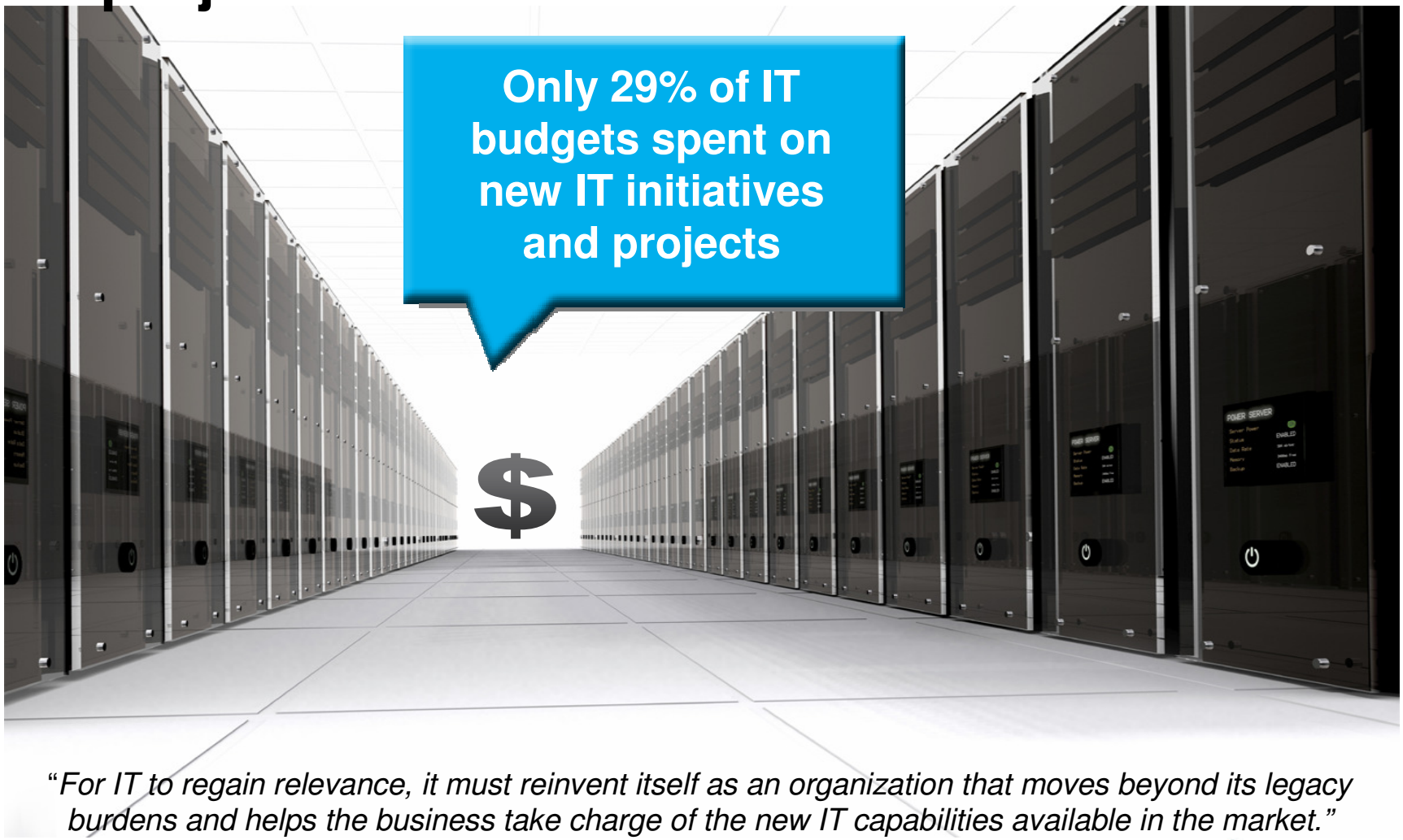
*Source: Industry analysts and IBM Market Intelligence*

# IT Operating Costs Are Out of Control




Source: IDC

# IT budgets are spent on ongoing operations and maintenance instead of new IT initiatives and projects




*"For IT to regain relevance, it must reinvent itself as an organization that moves beyond its legacy burdens and helps the business take charge of the new IT capabilities available in the market."*

Forrester Research, Inc., Accelerating At The Intersection Of Business And Technology -- A Sneak Preview Of Forrester's IT Forum 2011, April 2011

# By thinking differently about computing, IT leaders can overcome the IT conundrum to meet exploding demands with flat budgets.

IT leaders must address the viscous cycle of sprawling IT, inflexible IT and incomplete data to overcome the IT conundrum.


**Incomplete, Untrusted Data:**
Decisions are made on incomplete data, big ideas are seen as risky, and small decisions are not optimized

**Sprawling IT:**
Every IT investment leads to more sprawl which drives up costs

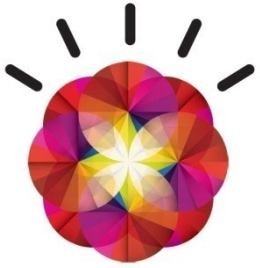
**Inflexible IT:**
Inflexibility of infrastructure limits responsiveness to customer demands

Through a new approach to IT – Smarter Computing, an enterprise can overcome the IT conundrum to double capacity for IT service on a flat budget.


**Designed for Data**
Harness all available information and unlock insights to make informed choices

**Tuned to the Task**
Drive greater efficiency and performance for each workload

**Managed as a Cloud**
Rapid delivery of new services to reinvent business



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## Smarter Computing
is an IT infrastructure that is:

**Designed for data / Tuned to the task / Managed in the cloud**

**Big Data / Optimized Systems / Cloud**

# Smarter Computing is realized through an IT infrastructure that is designed for data, tuned to the task, and managed as a cloud

***Smarter Computing***
***The IT Infrastructure that Enables a Smarter Planet™***

**Designed for data**
Harness all available information - **89% of CEOs** want better insight via Business Intelligence and analytics

**Managed as a Cloud**
Reinvent IT - **60% of CIOs plan to use cloud technologies** and **55% of business executives** believe cloud enables business transformation

**Tuned to the task**
Drive greater performance and improve IT economics - **total cost per workload can be reduced up to 55%** with optimized systems

# IBM zEnterprise System: The complete system of systems


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

**Designed for data**

**Tuned to the task**

**Managed with Cloud Technologies**

# IBM zEnterprise System: Freedom by design

**The integration of a shared pool of virtualized heterogeneous resources, managed as a single system, that is designed for data, tuned to the task and managed with cloud technologies:**

**IBM is now enhancing the System z platform to deliver new capabilities**

## Tuned to the task

Extending and enhancing the hybrid capabilities of zEnterprise with improved management options and support for a broader set of workloads

## Managed with cloud technologies

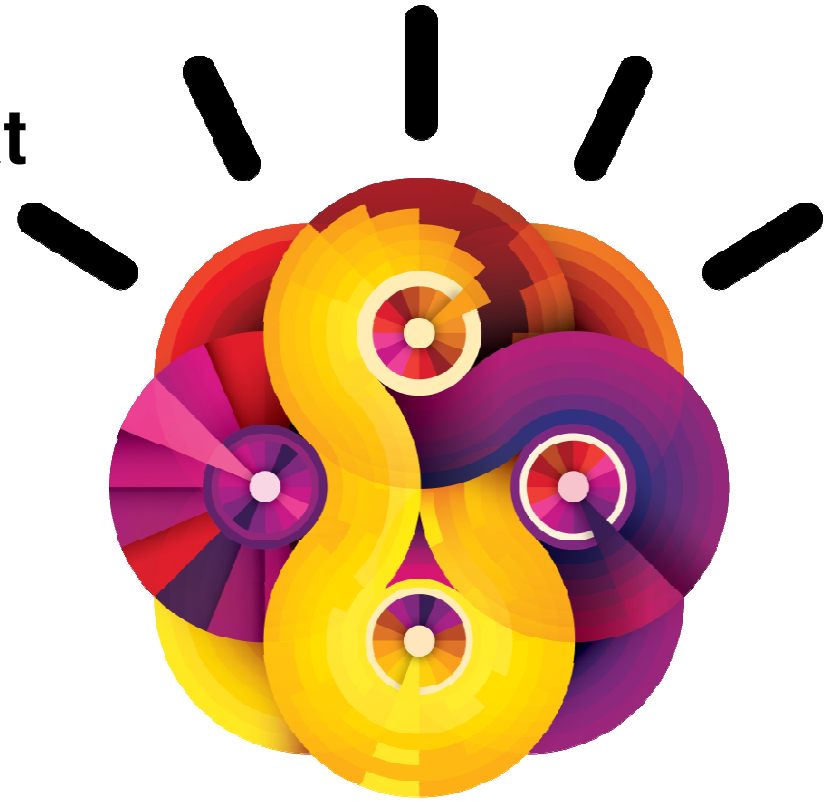
Extending the System z portfolio of cloud offerings with a new entry-level Infrastructure as a Service delivery model

## Designed for data

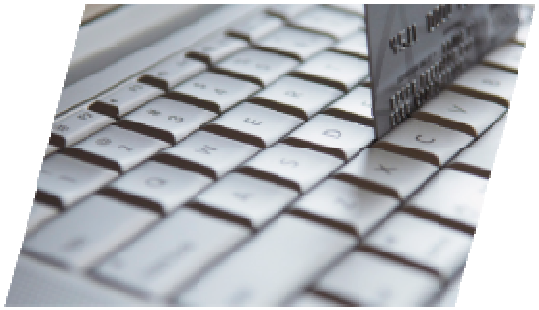
Blending System z and Netezza technologies to deliver unparalleled mixed workload performance for addressing complex analytic business needs with IDAA

# Tuned to the task

**means an infrastructure that matches workloads with platforms for optimized performance and economics.**



# Matching workloads to systems that are optimized for the workloads' characteristics



## Transaction Processing and Database

- Thousands of online users
- Large transactional databases
- 24x7 operation

## Business Intelligence and Analytics

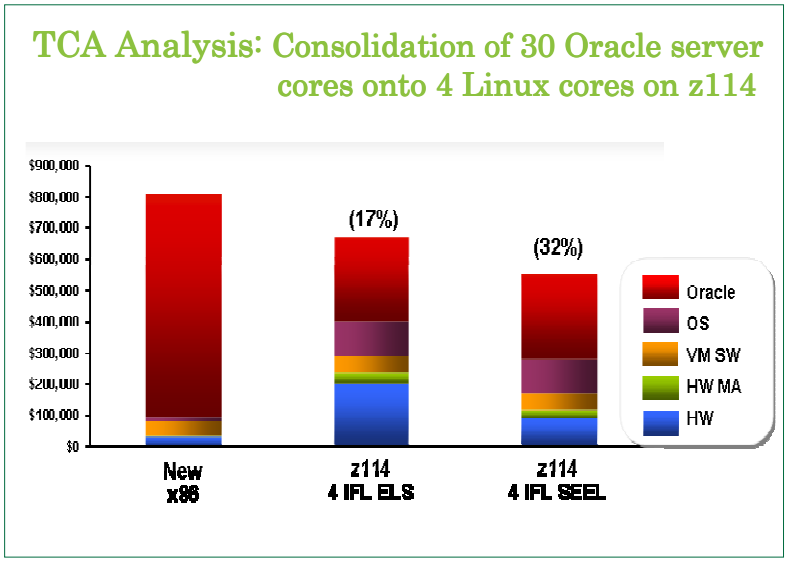
- Fewer users
- Complex queries
- Multiple data sources
- Large data warehouse

## Business Process Management

- Unite content, people and process flows
- Orchestrate multiple services
- Empower business users

# IBM zEnterprise is an IT Optimization platform that is tuned to the task

- **Large-scale server consolidation to Linux® on zEnterprise**
  - *Allows hundreds of workloads to be deployed over fewer cores in a single system*
  - *Massive reductions in software license, energy and facilities costs*




- *IFL = Integrated Facility for Linux = dedicated Linux core*
- *ELS = IBM Enterprise Linux Server*
- *SEEL = IBM Solution Edition for Enterprise Linux*

- **IBM zEnterprise BladeCenter® Extension (zBX) offers additional consolidation capabilities**
  - *Integrated hypervisor offers AIX®, Linux and Windows virtual server hosting*
  - *Unified Resource Manager provides a common management interface for virtual servers running on zEnterprise*


*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.

[1](IBM calculations of zEnterprise limits across maximum z196 configuration. Results may vary)

# Simplify and reduce cost with IBM zEnterprise

- An Integrated system of multiple architectures for optimizing the deployment of multi-tier workloads
- Creating a single point of control for management and administration to reduce operational overheads by up to 80%, including:
  - Power and Facilities
  - Labor
  - Software Licenses

**Lower cost of acquisition by up to 56%***

**Reduce cost of ownership  by up to 55%***

- Based on IBM analysis of a large Financial Services company Datacenter. See details on ibm.com/systems/zenterprise/
- Deployment configurations based on IBM studies and will vary based on workload characteristics. Price calculations based on publicly available US list prices, prices will vary by country.

# 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 IBM System x® Blades
  - Microsoft® Windows® on System x Blades

***Freedom by design:***

***Utilize the best fit architecture– Mainframe, Power, x86***

# 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… 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 …***

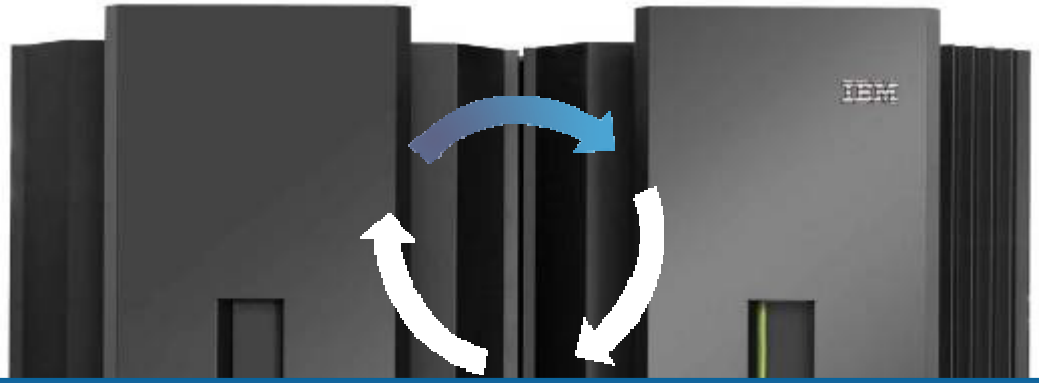
- Reside in complex multi-platform IT environments
- Require flexible development and test infrastructure
- Require simplified, integrated policy and management

# Managed with Cloud Technologies

**means an infrastructure that incorporates cloud technologies to improve service delivery and efficiency.**

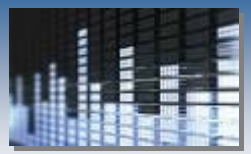
# IBM zEnterprise: A centrally managed enterprise cloud for the flexible delivery of high value services.

- **A highly scalable heterogeneous pool of virtualized resources managed in a single system.**
- **Activate, allocate, prioritize and retire resources on demand and automate service delivery.**
- **Maximize utilization of resources for improved ROI and for low cost service delivery.**
- **Bring new levels of security, resiliency and manageability to create a cloud environment that is enterprise ready.**

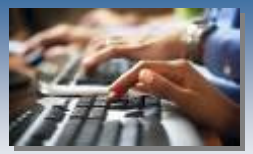



***Security***

***Availability***



***Scalability***



***Efficiency***

***Virtualization***

# IBM zEnterprise provides exceptional capabilities for flexible service delivery

### *Broad Network Access*
Very large number of end user access from multiple sources including mobile devices

### *Rapid Elasticity*
A new dimension of Scale. Most efficient platform for Large-scale Linux consolidation

### *Resource Pooling*
1000s of virtualized systems across a heterogeneous resource pool

### *Measured Service*
Meter, monitor, and track workloads for chargebacks and capacity expectations

### *On Demand Self-Service*
Automate provisioning and service requests reducing provisioning cycles from weeks to minutes

# Helping clients get started with Cloud computing on System z

**The zEnterprise Starter Edition for Cloud is an entry-level Infrastructure as a Service delivery model for Linux on System z with Tivoli® Provisioning Manager**

**z/VM® Live Guest Relocation (LGR) moves virtual servers to another LPAR or another mainframe server for increased flexibility, scalability and availability in cloud deployments on System z**

# An ideal Private Enterprise Cloud

zEnterprise brings together the benefits of enterprise computing and cloud computing in a single system

- **Enterprise Computing capabilities**
  - *Extreme scale and leadership security and resiliency enabling delivery of critical services*
- **Cloud computing capabilities**
  - *Extreme flexibility and efficiency of fully virtualized resources across heterogeneous platforms*
- **Centrally manages and controls a set of resources**
  - *A single integrated system for rapid and efficient provisioning of services to accelerate time to market and reduce cost*

**A Virtual server** on System z can be provisioned in minutes

**System z servers** often run consistently at 90%+ utilization

**zEnterprise** can run hundreds or thousands of diverse workloads in a single system

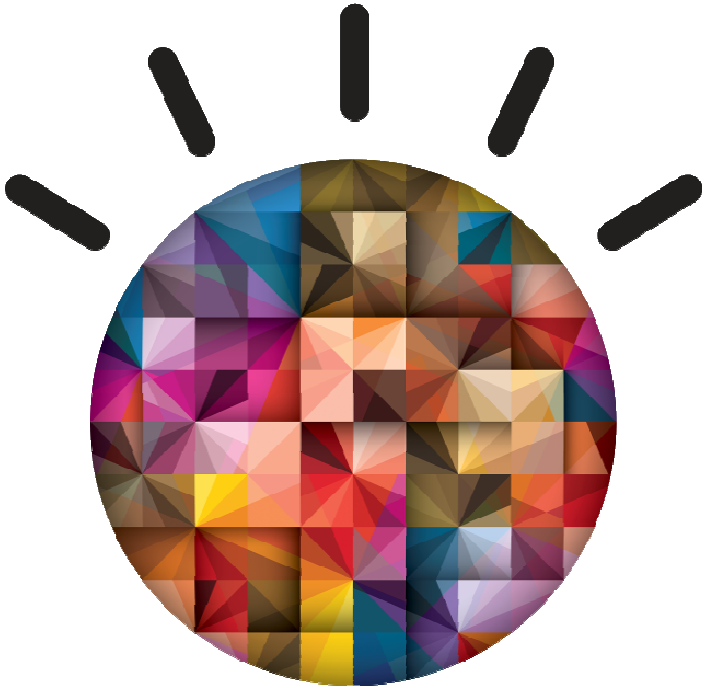
**A Private Cloud** on zEnterprise can lower server TCA by up to 84%[1]

[1] *(Source: IBM SWG CPO – Internal testing)*

[2] *(IBM calculations of zEnterprise limits across maximum z196 configuration. Results may vary)*

# Designed for Data

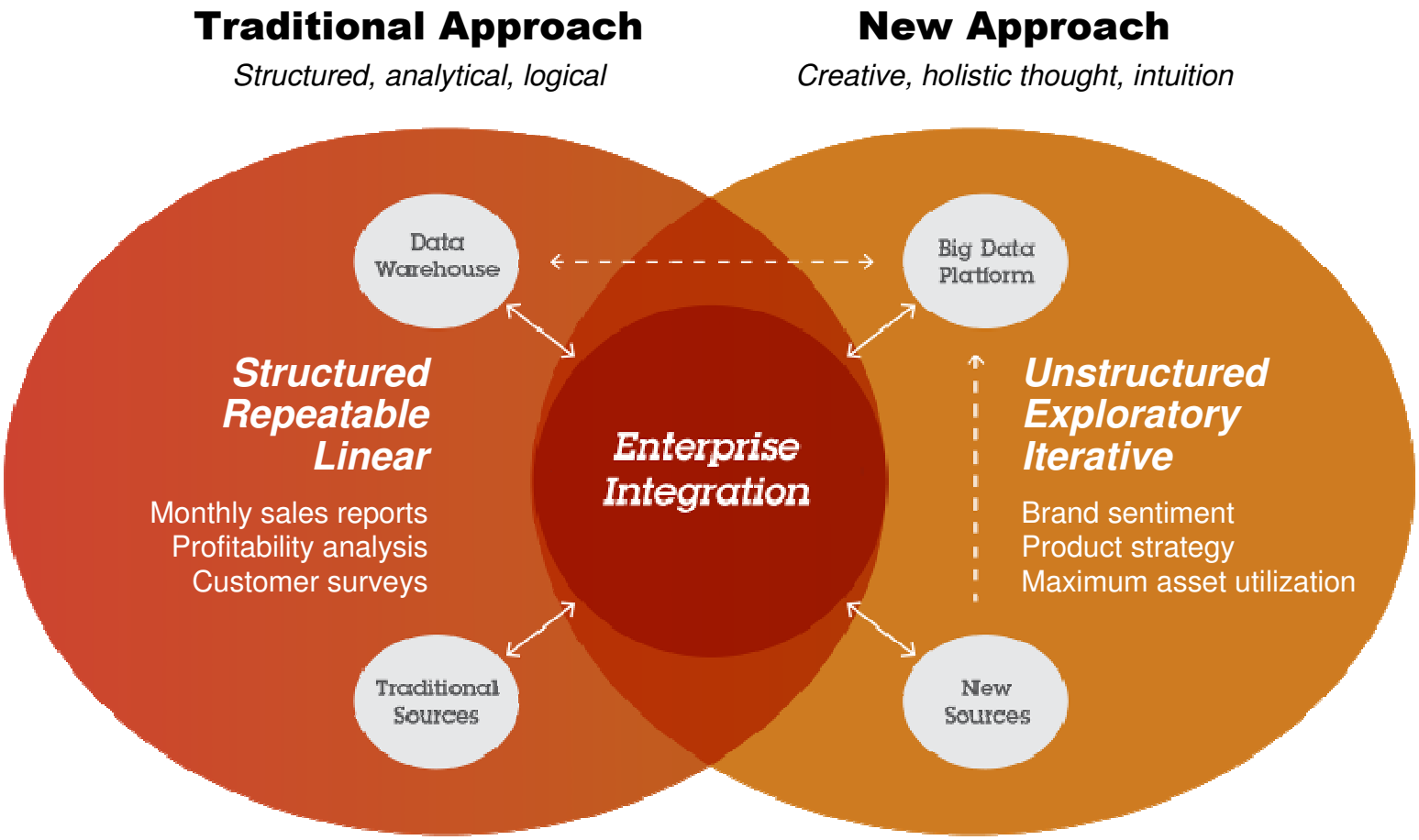
**means an infrastructure that can deliver insights in seconds through systems built to process a variety of data at scale.**



# IBM zEnterprise delivers data for applications across the enterprise

- A single centralized data base that supports all access methods with real time operational data
- Massive scale allows access from vast numbers of users simultaneously without degradation in service levels
- Unmatched security, availability and transactional integrity enables access 24/7 and protects data on the network or at rest

# Integrating new approaches such as Big Data will unlock those insights.



# Combining the best transaction system with the best analytics system

### Best in OLTP

Industry-recognized leader in mission-critical transaction systems

### Best in data warehouse

Proven appliance leader in high-speed analytic systems

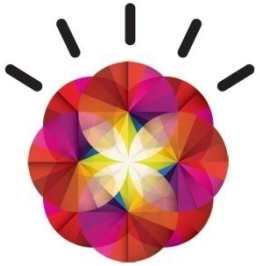
### Best in consolidation

Unprecedented mixed workload flexibility and virtualization providing the most options for cost-effective consolidation

## Business insight integration

**IBM DB2 Analytics Accelerator** is a new workload optimized, appliance add-on, that enables the integration of business insights into operational processes

[Evolution of ISAO]



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## Smarter Computing
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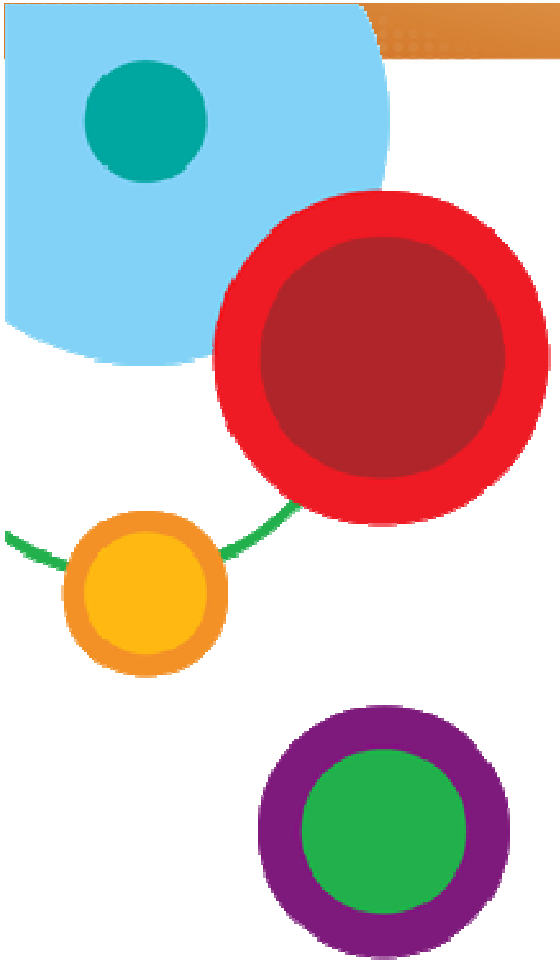


# IBM zEnterprise System – What's New

## *Bringing Hybrid Computing to Organizations of all Sizes*

# The IBM zEnterprise System: Capabilities for smarter computing

An integrated system of systems that delivers freedom by design.

## Designed for Data

Integrates operational data and advanced analytics …

… to deliver actionable insight within a timeframe that matters.

## Tuned to the Task

Consolidates workloads and collapses infrastructures…

… to deliver superior economics to the business.

## Managed in a Cloud

Flexible delivery of high quality services…

… for the convergence of enterprise computing and cloud computing.

# IBM zEnterprise System – What's New?
## *Embracing multi-platform, multi-operating environments with more management capability*

### *IBM zEnterprise™ 196 (z196) and zEnterprise 114 (z114)*

- Performance improvements for High Performance FICON for zEnterprise (zHPF)
- Updated GDPS® disaster recovery support for zEnterprise environment
- xDR extension to support z/VSE®
- And much more ….

### *zEnterprise Unified Resource Manager*

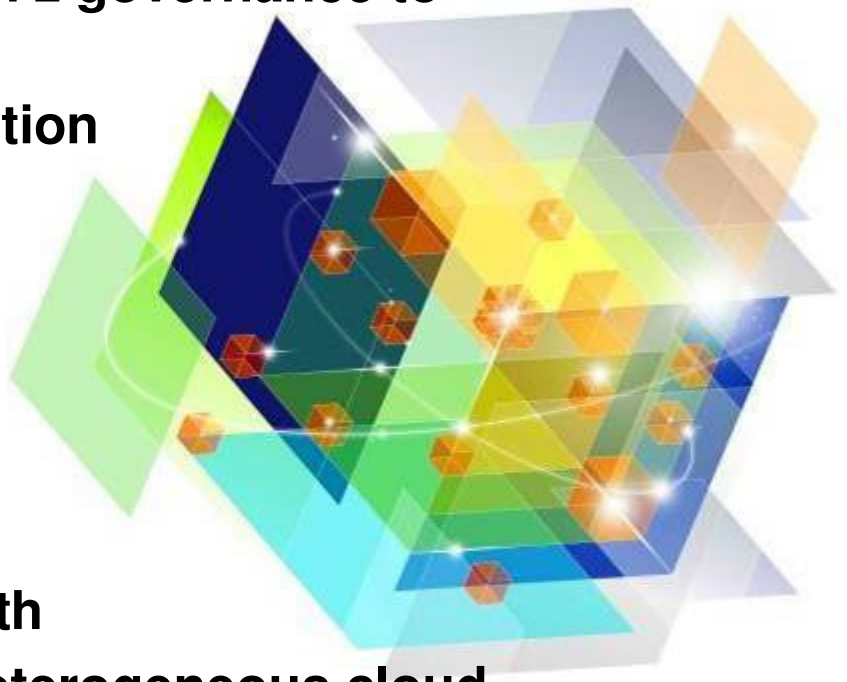
- Operational Controls enhanced with auto-discovery and configuration support for storage resources
- Extending management functions with programmatic access (APIs)
- Improved Network Monitoring
- Load balancing to load balance traffic across virtual servers

### *zEnterprise BladeCenter® Extension (zBX)*

- Now supporting AIX® 7.1 and Microsoft® Windows® 2008 R2 plus more releases of Linux® on IBM System x®
- New optional 1 Gpbs dedicated network to server
- Additional optics to BladeCenter Chassis
- New DataPower® XI50z firmware support

# 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 was Introduced with the z196 at its Heart

| | |
|---|---|
| Up to 40% | Improvement for traditional z/OS workloads[1] |
| Up to an additional 30% | Improvement in CPU intensive workloads via compiler enhancements |
| Up to 60% | Total capacity improvement[1] |

| |
|---|
| 1 to 80 configurable cores for client use |
| IFL, zIIP, zAAP, ICFs and optional SAPs |
| 45 subcapacity settings |
| Up to 3 TB RAIM memory |
| Cryptographic enhancements |
| Designed for EAL5 certification |
| Upgradeable from IBM System z10® Enterprise Class (z10 EC™) and IBM System z9® Enterprise Class (z9® EC) |

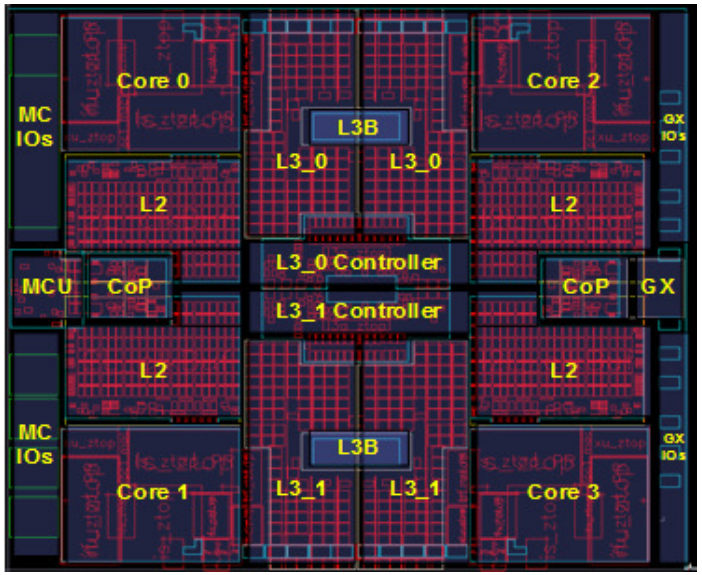
***zEnterprise 196 (z196)***
*Machine Type: 2817*
*Models: M15, M32, M49, M66, M80*

- **World's fastest 5.2 GHz processor chip**
  - 100 new instructions, new out of order sequence, more on chip cache
- **Focus on the environment and data center**
  - Options to help eliminate hotspots and save on energy
- **Operating System Flexibility**
  - z/OS, z/VM®, z/VSE®, z/TPF and Linux on System z
- **Security and reliability**
  - Elliptic curve cryptography
  - Compliance and security improvements
  - Crypto Express3 enhancements

1. For average LSPR workloads running z/OS 1.11.

# z196 – IBM Leadership Technology At the Core

- **New 5.2 GHz Quad Core Processor Chip boosts hardware price/performance**
  - 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**



# zEnterprise Technology Designed for Small and Mid-sized Businesses - 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 integration and management
- **Improved Platform Economics**
  - New Software Curve
  - Lower Hardware Maintenance
  - Lower specialty engine and memory prices
  - Upgradeability for investment protection

Up to **18%** **Improvement for traditional z/OS workloads** [1]

Up to an ADDITIONAL **25%** **Improvement in CPU intensive workloads via compiler enhancements**[2]

Up to **12%** **Total capacity improvement** [1]

Scales From **26 - 3100 MIPS**

Up to **130** **available capacity settings**

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

From **0-2** **IBM provided spare cores**

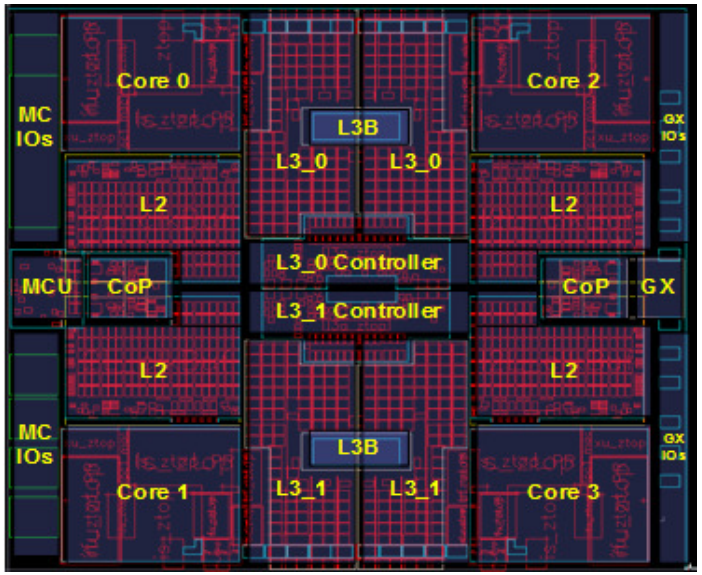
Up to **256** **GB RAIM fault tolerant memory**

**Fully Upgradeable from the IBM System z10 Business Class™ (z10 BC) & IBM System z9® Business Class (z9 BC); and to the z196 M15**

[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 – IBM Leadership Technology At the Core

- **3.8 GHz Superscalar Processor Chip boosts hardware price/performance**
  - 100 new instructions – improvements for CPU intensive, Java™, and C++ applications
  - New on-chip cache structure 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
- **Data compression and cryptographic processors right on the chip**
- **Over 18 percent performance improvement per core and 12% improvement in total system scalability over the z10 BC.**
- **Compiler related enhancements help drive gains of up to 25% improvement in throughput for CPU/Numeric intensive workloads.**



# zBX – A Uniquely Configured Extension of the zEnterprise

## *Looks like a rack with BladeCenters in it..but so much more*

- Creating an integrated solution experience … blades are easier to deploy and manage
  - Increased optics for fibre channel connections
  - Infrastructure built and tested at the factory
  - zBX hardware redundancy provides improved availability
  - IBM System z engineer for installation, service and upgrade process
- Improving the connectivity between blades and IBM System z
  - Isolated, secure, redundant network dynamically configured
  - High speed 10Gb/EN dedicated network for data
  - 1 GbE optics for access from zBX to customer network (routers only)
  - Lower latency due to fewer devices
- Preserving the customer application architecture
  - No modifications required for operating systems or applications
  - No System z software running in IBM zEnterprise BladeCenter Extension (zBX)
  - Customer network and storage architectures unchanged

***… managed by the zEnterprise Unified Resource Manager***

# IBM Blades and Optimizers Integrated within the zBX

- IBM WebSphere® DataPower® Integration Appliance XI50 for zEnterprise
  - Purpose-built hardware for simplified deployment and hardened security helps businesses quickly react to change and reduce time to market
  - DataPower XI50z can provide connectivity, gateway functions, data transformation, protocol bridging, and intelligent load distribution.
  - New DataPower XI50z enhancements can provide a secure connection for public cloud applications

**DataPower XI50z**

- Select IBM POWER7 and IBM System x blades
  - Brings a larger application portfolio to zEnterprise
    - Front end applications to centralized data serving … e.g. SAP
    - Front end to core CICS® or IMS™ transaction processing … e.g. WebSphere
  - Applications certified to run on zBX supported POWER7 and System x blades will run on them when installed in the zBX

**IBM BladeCenter PS701**

**IBM BladeCenter HX5 (7873)**

# Blades Provide Added Flexibility for Workload Deployment and Integration

- **IBM System x Blades**
  - IBM BladeCenter HX5 7873 dual-socket 16-core blades
  - NEW Four supported memory configurations for zBX – 64 GB, 128 GB, 192 GB, 256 GB
- **IBM POWER7 Blades**
  - IBM BladeCenter PS701 8-core processor 3.0GHz
  - Three configurations supported in zBX - 32 GB, 64 GB, 128 GB
- **Flexibility in ordering – acquired though existing channels, including IBM**
- **Unified Resource Manager will install hypervisor on blades in the zBX**
  - Integrated hypervisor (KVM-based) for System x blades
  - PowerVM Enterprise Edition for POWER7 blades
- **Up to 112 Blades supported on zBX**
  - Ability to mix and match blades in the same chassis
  - Number of blades supported varies by type
- **Blades assume System x warranty and maintenance when installed in the zBX**

***IBM zEnterprise BladeCenter Extension (zBX)***
*Machine Type: 2458 Mod 002*

**Optimizers**
- IBM WebSphere DataPower Integration Appliance XI50z for zEnterprise

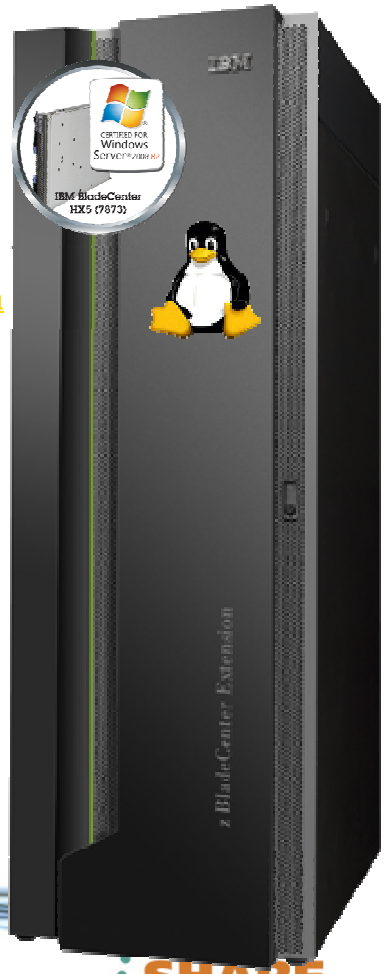
**Select IBM Blades**
- IBM BladeCenter PS701 Express
- IBM BladeCenter HX5 (7873)

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

- **Up to 112 PS701 Power blades**
- **Up to 56 HX5 System x blades**
- **Up to 28 DataPower XI50z blades (double-wide)**

# Operating System Environments extend application flexibility

- **Support for Linux and Windows environments on System x blades in zBX**
  - 64-bit version support only
  - NEW – Linux: RHEL 5.5, 5.6, 6.0 & Novell SUSE SLES 10 (SP4) and SLES 11 SP1
  - NEW – Microsoft Windows Server 2008 R2 and Microsoft Windows Server 2008 (SP2) (for either we recommend Datacenter Edition)
  - The zBX web page will host the most current blade ordering information: http://www.ibm.com/common/ssi/cgi-bin/ssialias?infotype=SA&subtype=WH&appname=STGE_ZS_ZSUSEN&htmlfid=ZSL03128USEN&attachment=ZSL03128USEN.PDF
- **Support of AIX environments on POWER7 blades in zBX**
  - NEW – AIX: AIX 5.3 Technology Level 12 or higher, AIX 6.1 Technology Level 5 or higher, AIX 7.1
  - For the most current POWER7 blade ordering information: http://www.ibm.com/common/ssi/cgi-bin/ssialias?infotype=SA&subtype=WH&appname=STGE_ZS_ZS_USEN&htmlfid=ZSY03019USEN&attachment=ZSY03019USEN.PDF
- **Certifications inherited from blades**
  - NEW – SAP support for Linux and Windows on x86 blades in the zBX
- **Operating Systems are customer acquired and installed**



# The IBM DB2 Analytics Accelerator (IDAA)

## *Capitalizing on the best of both worlds – System z and Netezza*

***The IBM DB2 Analytics Accelerator is a blending of System z and Netezza technologies that delivers unparalleled mixed workload performance for addressing complex analytic business needs.***

- ***Performance, availability and scalability***
- ***Extreme Performance for Complex Analytics***
- ***Breakthrough technologies - Hardware acceleration***
- ***Transparent to DB2 applications***

# Continuing Value using the Unified Resource Manager

Simplified installation of hypervisors

Gain significant time to market with improved speed of deployment

Simplified energy management

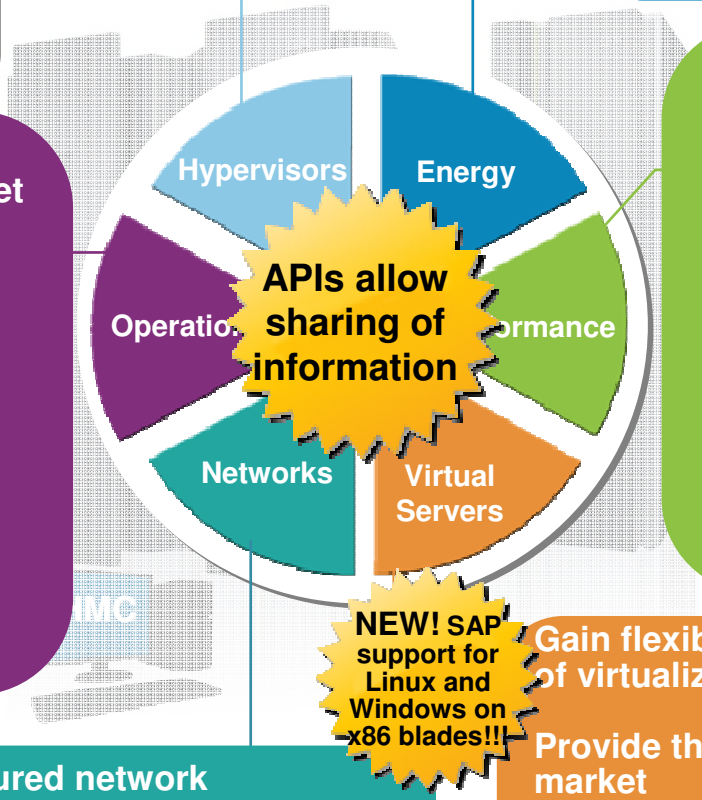
Energy cost savings

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




Allow critical workloads to receive resources and priority based on goal-oriented policies established by business requirements

Smart business adjustments based on workload insight

Load balancing to manage traffic flow

Provide deep insight into how IT resources are being used

Factory installed and configured network

Improved network security with lower latency, less complexity, no encryption/decryption

Monitor status and general health of network resources

Gain flexibility, consistency and uniformity of virtualization

Provide the business with faster time to market

Simplified network management for applications

Bridging of internal HiperSockets network to the entire ensemble

# Extending zEnterprise Unified Resource Manager
## *Continuing to add function and management*

- Operational Controls enhanced with auto-discovery and configuration support for new resources
  - Dynamic discovery and configuration of storage resources by Unified Resource Manager

- Extending management functions of Unified Resource Manager with programmatic access
  - New Unified Resource Manager APIs enable discovery, monitoring and management of ensemble resources using external tools
    - Open documented interface available for clients
      - ***Access using common scripting languages like Perl and Python***
    - IBM Tivoli® will be taking advantage of the APIs:
    - CA Technologies, Dovetailed Technologies, CSL International and other ISVs are interested in taking advantage of the APIs

Co:Z Co-Processing Toolkit

CSL International

Tivoli

ca technologies

# 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

### *Within z1964/z114 and to zBX*
- PCIe I/O Infrastructure
- I/O Drawer and I/O Cage[1]
- Intraensemble data network (IEDN)
  - Updated options for 1 Gbps connection
- Intranode management network (INMN)
- *HiperSockets integration with the IEDN* NEW
- *HiperSockets completion queue* NEW

### *For Clustering*
- HCA-3 InfiniBand® Coupling Links
  - 12x InfiniBand (improved performance – 12x IFB3protocol)
  - 1x InfiniBand (4 ports)
- ISC-3 (peer mode only)
- IC (define only)
- STP
  - Improved time coordination for zBX components

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

### *To the Data*
- FICON® Express8S (PCIe-based)
- zHPF Performance Enhancements
- ESCON®
  - Up to 240 maximum

[*] I/O cage for z196 only

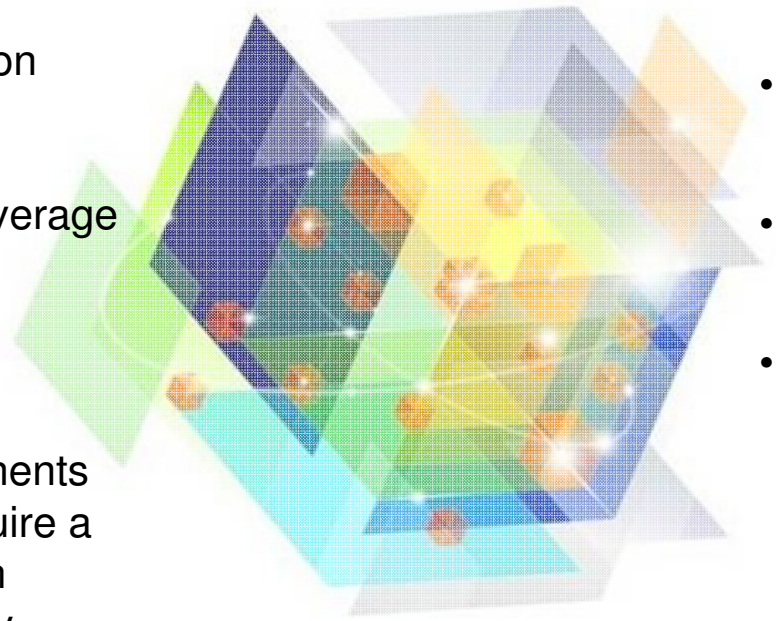
# Enhancing System z world-class Security and Business Resiliency

- **Cryptographic enhancements on zEnterprise**
  - Cryptography is in the “DNA” of System z hardware with Processor and Coprocessor based encryption capabilities
    - Processor Clear Key for bulk encryption – key material visible in storage
    - System z exclusive Protected Key CPACF helps to protect sensitive keys from inadvertent disclosure – not visible to application or OS
  - Crypto Express3 enhanced to support key ANSI and ISO standards for the banking, finance and payment card industry.
  - Enhanced display of cryptographic cards and simplified card configuration and management capabilities via the Trusted Key Entry workstation (TKE).
  - Simplified master key management with ICSF enhancements providing a single point of administration within a z/OS Sysplex.
  - Continued support for the next generation of public key technologies, ECC support is ideal for constrained environments such as mobile devices.
  - Crypto Express3 Coprocessor FIPS 140-2 Level 4 hardware evaluation.
- **PR/SM™ designed for EAL5 certification.**
  - z196 has received EAL5+
- **Policy driven flexibility to add capacity to real or virtual processors.**
- **High Availability, Backup and Disaster Recovery solutions**
  - Updated GDPS support for zEnterprise System
  - xDR extension to support z/VSE

# zEnterprise provides the foundation for the hybrid 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… Security, Reliability, Availability.
- Have application components on Power or x86 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

# z196 Overview


- **Machine Type**
  - 2817

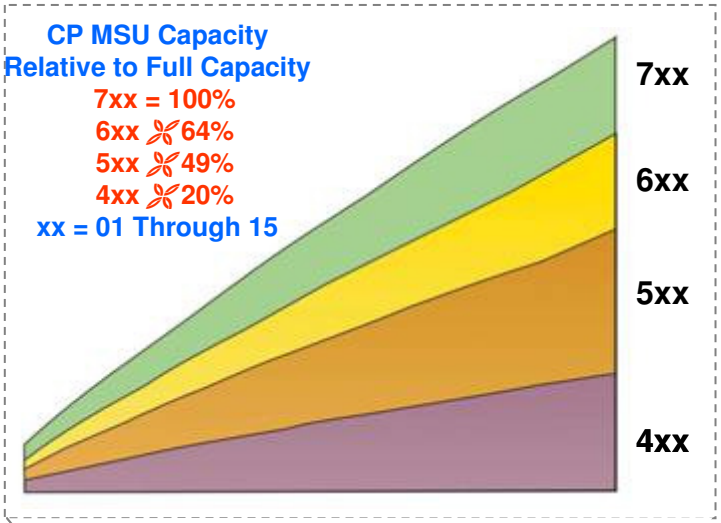
  **5 Models**
  - M15, M32, M49, M66 and M80

  **Processor Units (PUs)**
  - 20 (24 for M80) PU cores per book
  - Up to 14 SAPs per system, standard
  - 2 spares designated per system
  - Dependant on the H/W model - up to 15,32,49,66 or 80 PU cores available for characterization
    - Central Processors (CPs), Integrated Facility for Linux (IFLs), Internal Coupling Facility (ICFs), System z Application Assist Processors (zAAPs), System z Integrated Information Processor (zIIP), optional - additional System Assist Processors (SAPs)
  - Sub-capacity available for up to 15 CPs
    - 3 sub-capacity points

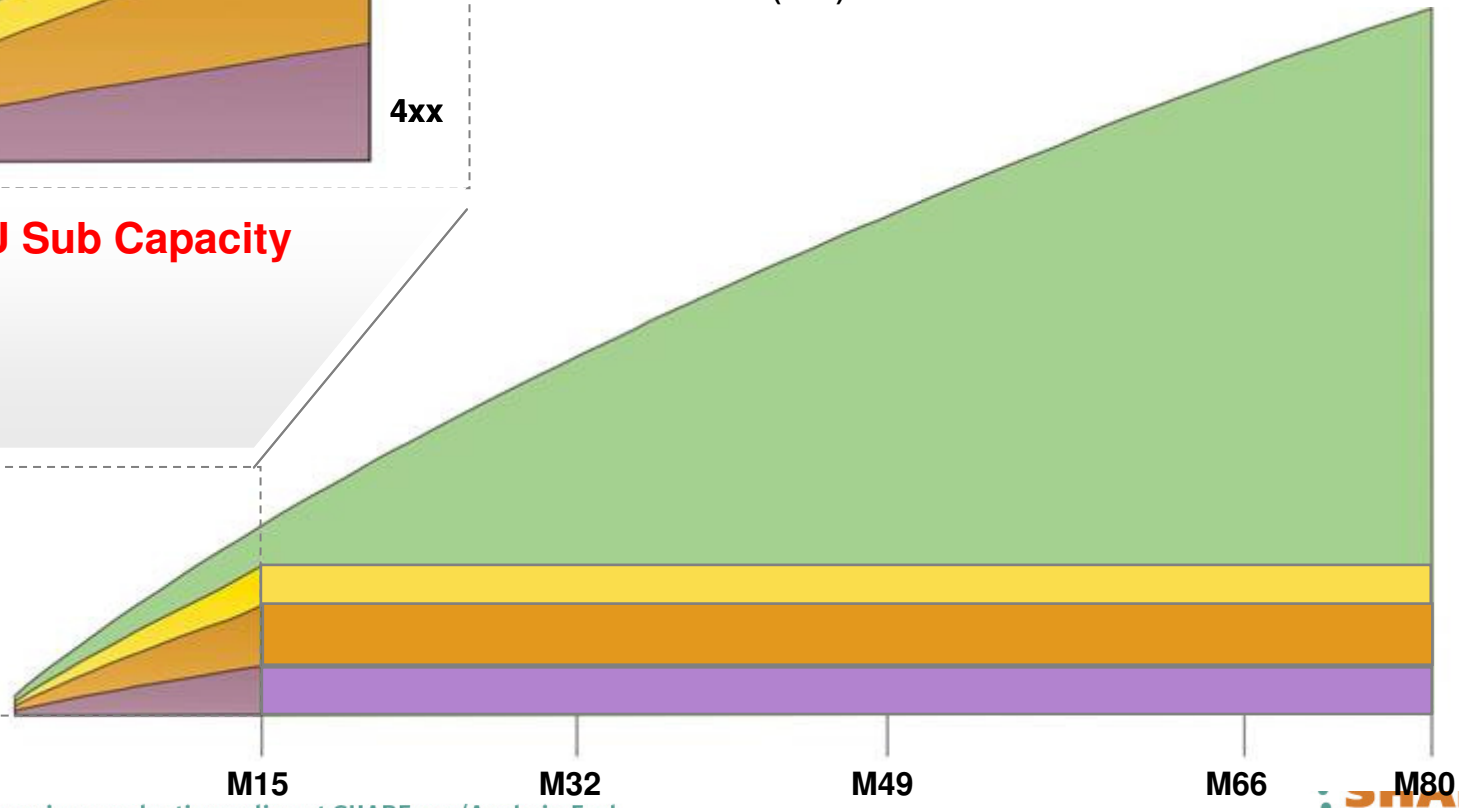
  **Memory**
  - System Minimum of 32 GB
  - Up to 768 GB per book
  - Up to 3 TB for System and up to 1 TB per LPAR
    - Fixed HSA, standard
    - 32/64/96/112/128/256 GB increments

  **I/O**
  - Up to 48 Infiniband I/O Interconnects per System @ 6 GBps each
  - Up to 48 PCIe interconnects per System @ 8 GBps each
  - Up to 4 Logical Channel Subsystems (LCSSs)
    - Up to 3 Sub-channel sets per LCSS
- **STP - optional** (No ETR)

# z196 Full and Sub-Capacity CP Offerings




- Subcapacity CPs may be ordered on ANY z196 model with 1 to 15 CPs. If 16 or more CPs are ordered all must be full 7xx capacity
- All CPs on a z196 CPC must be the same capacity
- All specialty engines run at full capacity. The one for one entitlement to purchase one zAAP and one zIIP for each CP purchased is the same for CPs of any capacity.
- Only 15 CPs can have granular capacity but other PU cores may be characterized as full capacity specialty engines
- The z196 is capable of over 2 million 4k byte read I/O operations per second. This measurement was done using a z196 4 book 14 SAP configuration with 104 FICON Express8 channels connected to 11 DS8000 ®Storage systems using zHPF protocols.
- Processor Value Unit (PVU) for z196 is 120



# 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]**

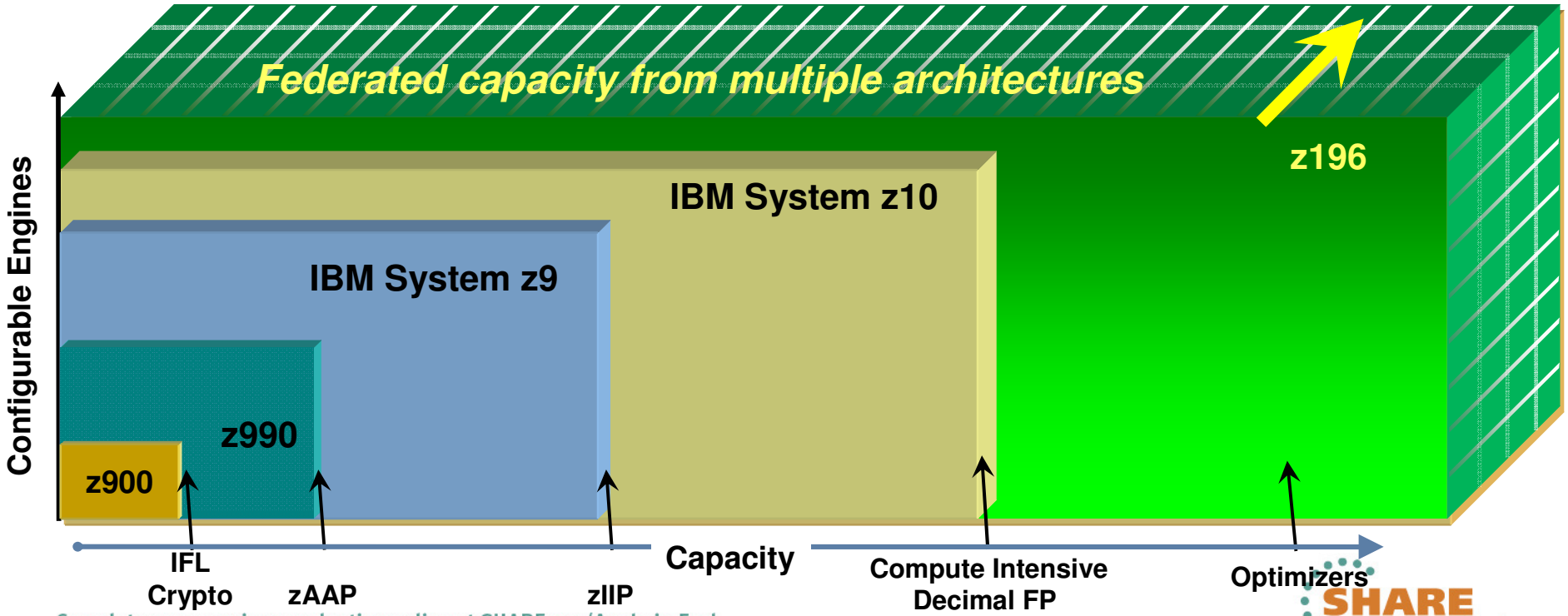
[1] With the exception of water cooling and overhead cabling

# z196 performance and scalability

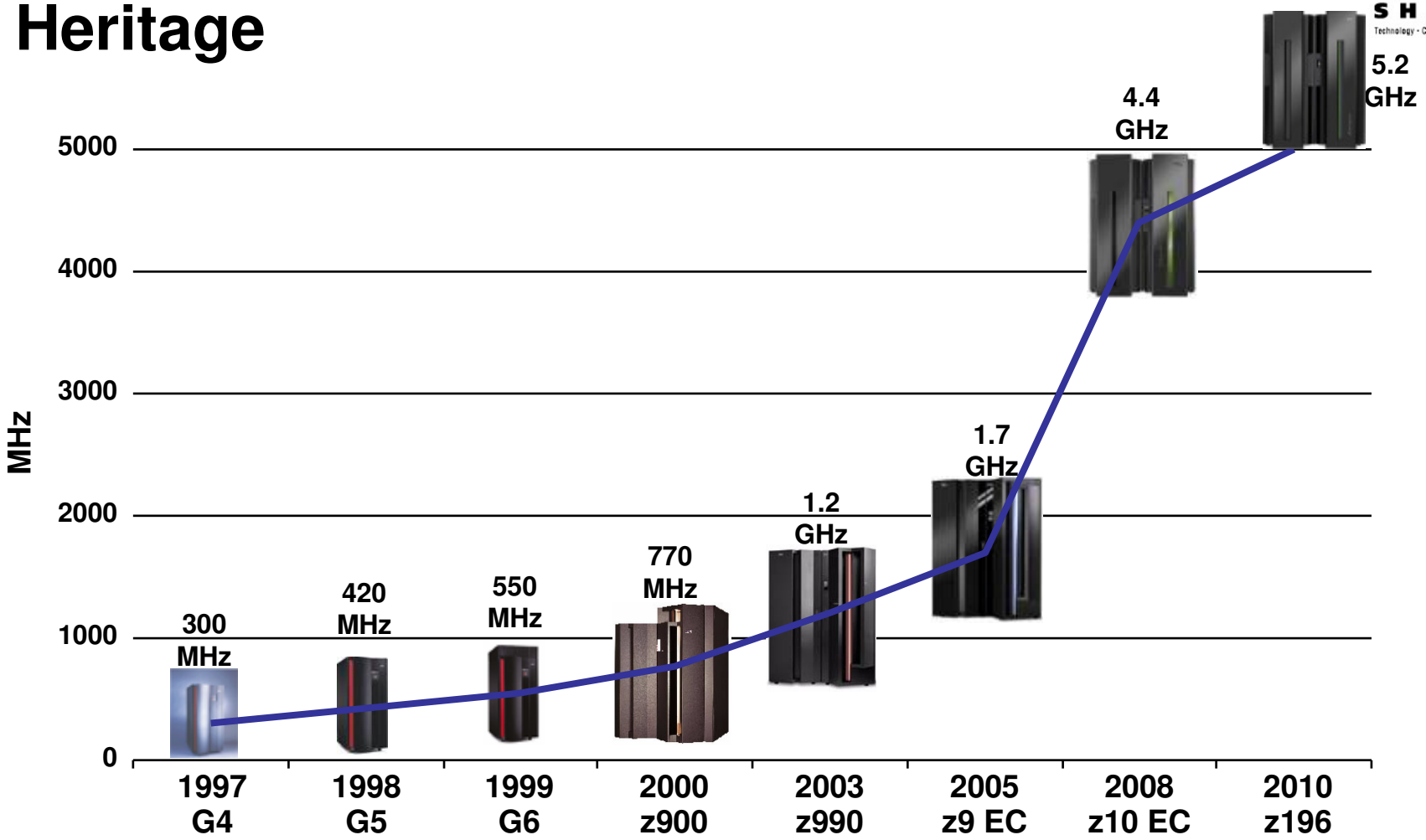
## Think Inside the box! Think System z Qualities of Service!

- **zEnterprise ensembles – Multiple nodes**
  - Node – z196 with or without zBX
- **zEnterprise Unified Resource Manager**
- **Multiple architectures**
  - z/Architecture®
  - Power Architecture® - POWER7
  - X-Architecture®

- **z196**
  - Largest z196 model 1.6x compared to z10 EC E64
  - Equivalent n-ways 1.4x compared to z10 EC
  - With compiler optimization additional 30% additional for some CPU intensive work



# z196 Continues the CMOS Mainframe Heritage

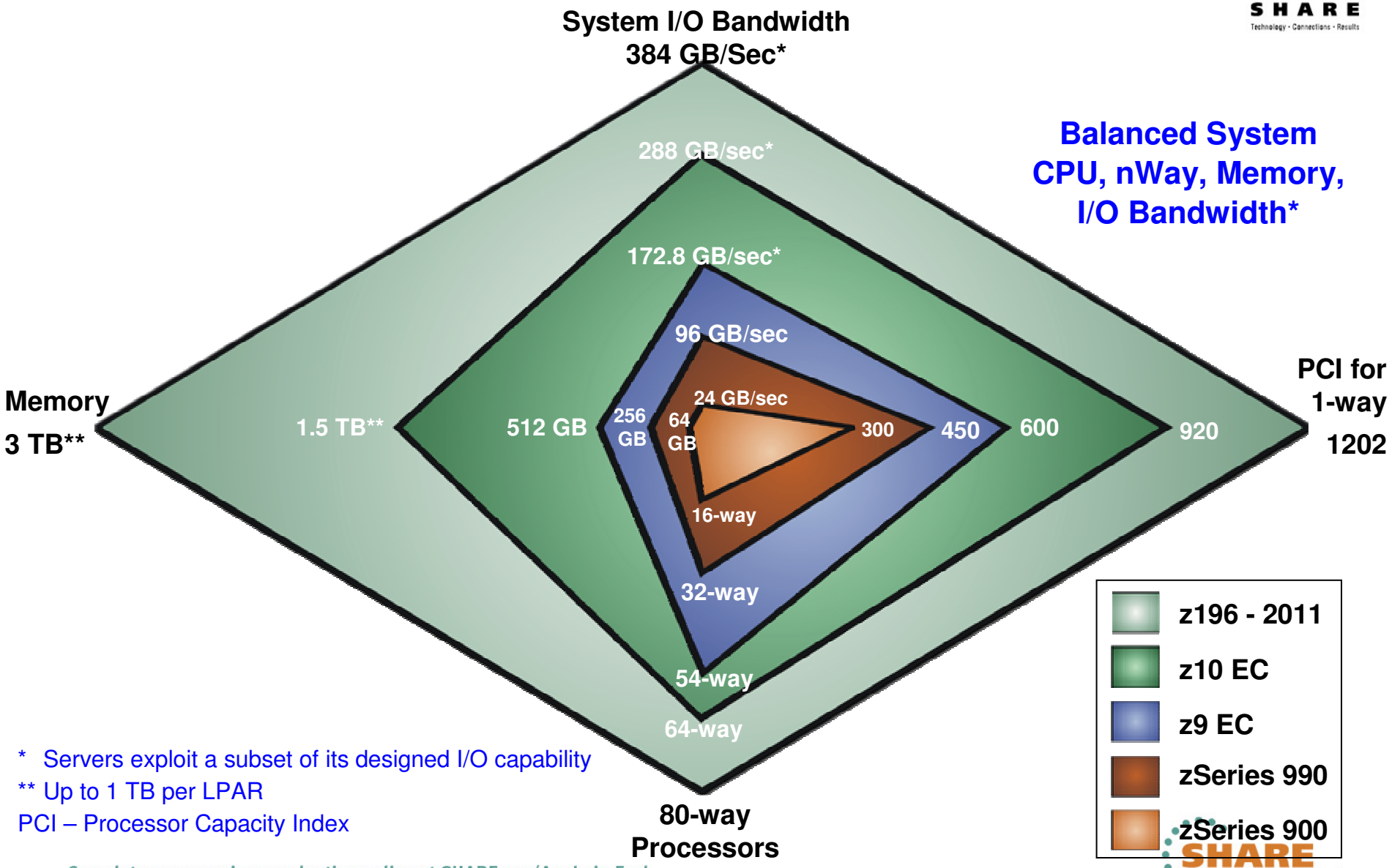



- **G4** – 1st full-custom CMOS S/390®
- **G5** – IEEE-standard BFP; branch target prediction
- **G6** – Copper Technology (Cu BEOL)

- **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

# IBM System z: - Design Comparison for High End Systems – z196




**Balanced System CPU, nWay, Memory, I/O Bandwidth***

* Servers exploit a subset of its designed I/O capability

** Up to 1 TB per LPAR

PCI – Processor Capacity Index

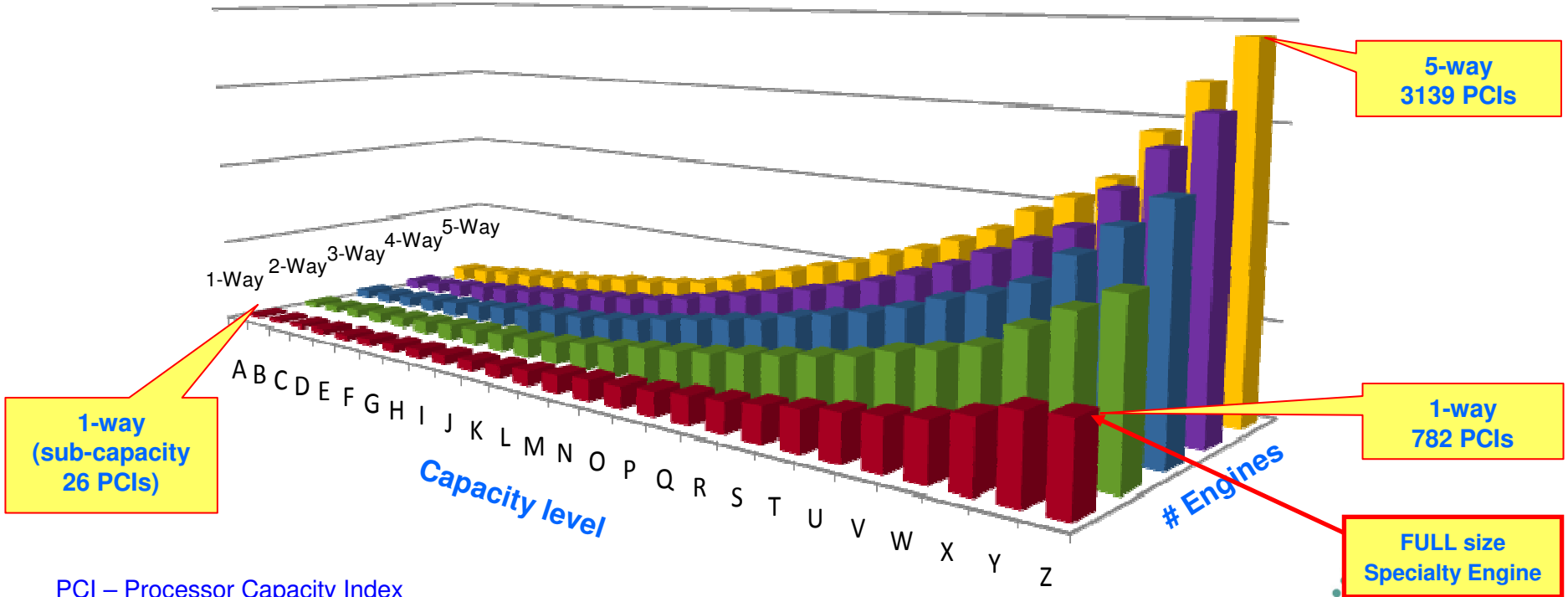
# z114 Overview


- **Machine Type**
  - 2818
- **2 Models**
  - M05 and M10
  - Single frame, air cooled
  - Non-raised floor option available
  - Overhead Cabling and DC Power Options
- **Processor Units (PUs)**
  - 7 PU cores per processor drawer (One for M05 and two for M10)
  - Up to 2 SAPs per system, standard
  - 2 spares designated for Model M10
  - Dependant on the H/W model - up to 5 or 10 PU cores available for characterization
    - Central Processors (CPs), Integrated Facility for Linux (IFLs), Internal Coupling Facility (ICFs), System z Application Assist Processors (zAAPs), System z Integrated Information Processor (zIIP), optional - additional System Assist Processors (SAPs)
  - 130 capacity settings
- **Memory**
  - Up to 256 GB for System including HSA
    - System minimum = 8 GB (Model M05), 16 GB (Model M10)
    - 8 GB HSA separately managed
    - RAIM standard
    - Maximum for customer use 248 GB (Model M10)
    - Increments of 8 or 32 GB
- **I/O**
  - Support for non-PCIe Channel Cards
  - Introduction of PCIe channel subsystem
    - Up to 64 PCIe Channel Cards
  - Up to 2 Logical Channel Subsystems (LCSSs)
- **STP - optional** (No ETR)

# z114 Sub-capacity Processor Granularity

- **The z114 has 26 CP capacity levels (26 x 5 = 130)**
  - Up to 5 CPs at any capacity level
    - All CPs must be the same capacity level
- **The one for one entitlement to purchase one zAAP and/or one zIIP for each CP purchased is the same for CPs of any speed.**
  - All specialty engines run at full speed
  - Processor Unit Value for IFL = 100

| Number of z114 CPs | Base Ratio | Ratio z10 BC to z114 |
|---|---|---|
| 1 CP | **z10 BC Z01** | **1.18** |
| 2 CPs | **z10 BC Z02** | **1.16** |
| 3 CPs | **z10 BC Z03** | **1.14** |
| 4 CPs | **z10 BC Z04** | **1.13** |
| 5 CPs | **z10 BC Z05** | **1.12** |




PCI – Processor Capacity Index

# z114 - Built to Support Future Data Center Design, Modernization and Efficiencies

- More performance and capacity within the same energy envelope as the IBM System z10 Business Class™ (z10 BC)
- Supports raised floor and non-raised floor configurations
- Improved installation flexibility with overhead cabling option
- Reduced footprint depth by 9” (22.8 cm) compared to z10 BC
- Optional high-voltage DC power input

# Save with z114's lower energy consumption

**The average z114 uses less electricity** than a clothes dryer **and about the same amount of power as 4 kitchen coffee makers.**[1]

**With the z114, get** about 12% more work done per unit of energy **over the z10 BC.**

**The z114 M05 can help** lower energy demands by as much as 15% **compared to the z10 BC.**

**49 x4100 Sun servers draw** more than 5X the power **of the z114s needed to replace them to run an identical Linux workload.**[2]

**A z114 can provide** more performance per watt than a Nehalem **x86-blade solution for a mid-sized client.**[2]

… and don't forget about the new High-Voltage DC Power Option



[1] Average z114 3KW. Energy star.gov, manufacture data and ABS Alaskan identify coffee makers as approximately 800 watts.
[2] IBM Eagle customer studies; results may vary.

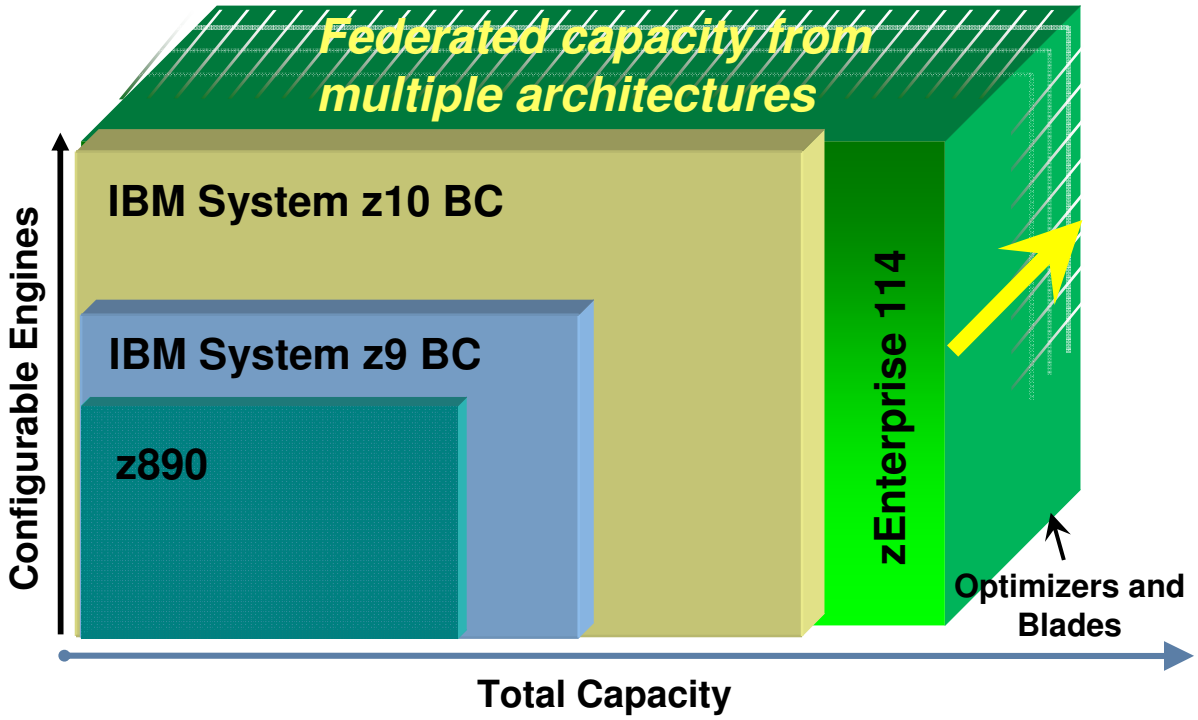
# zEnterprise 114 performance and scalability

*Think both Inside and Outside the box!*

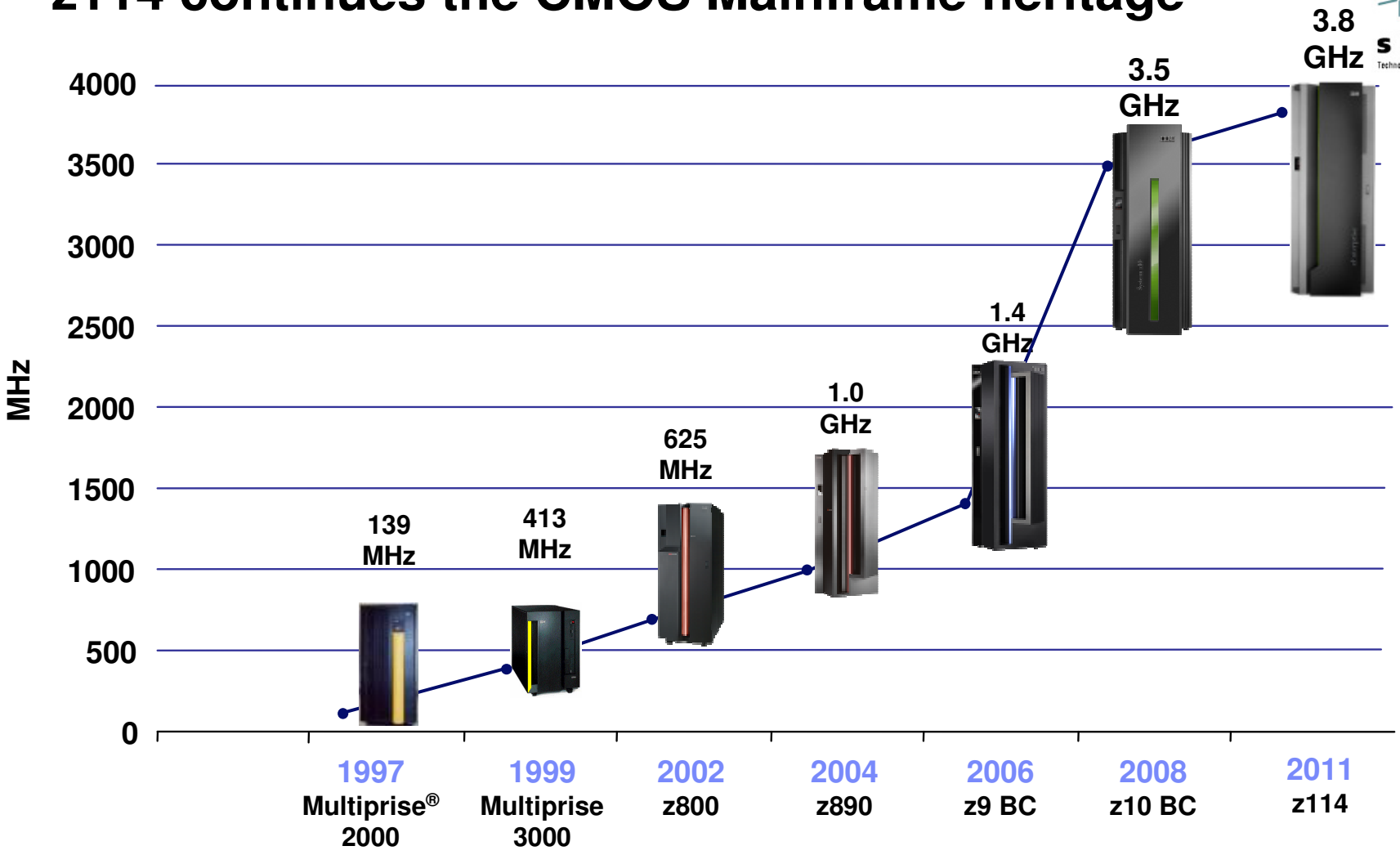
- **Faster Processors**
  - 18% Improvement in Uniprocessor speed
  - 12% Improvement in overall System capacity
- **Architectural equivalence to the z196**
- **More economic delivery of equivalent capacity**

*Think System z Qualities of Service!*

- **zEnterprise 114 Multiple Architecture Ensembles**
  - Tightly integrated heterogeneous systems
  - Robust, n+1 configurations
  - Highly virtualized
  - Managed end-to-end
  - Improved economies of scale, efficiency, and price performance



# z114 continues the CMOS Mainframe heritage

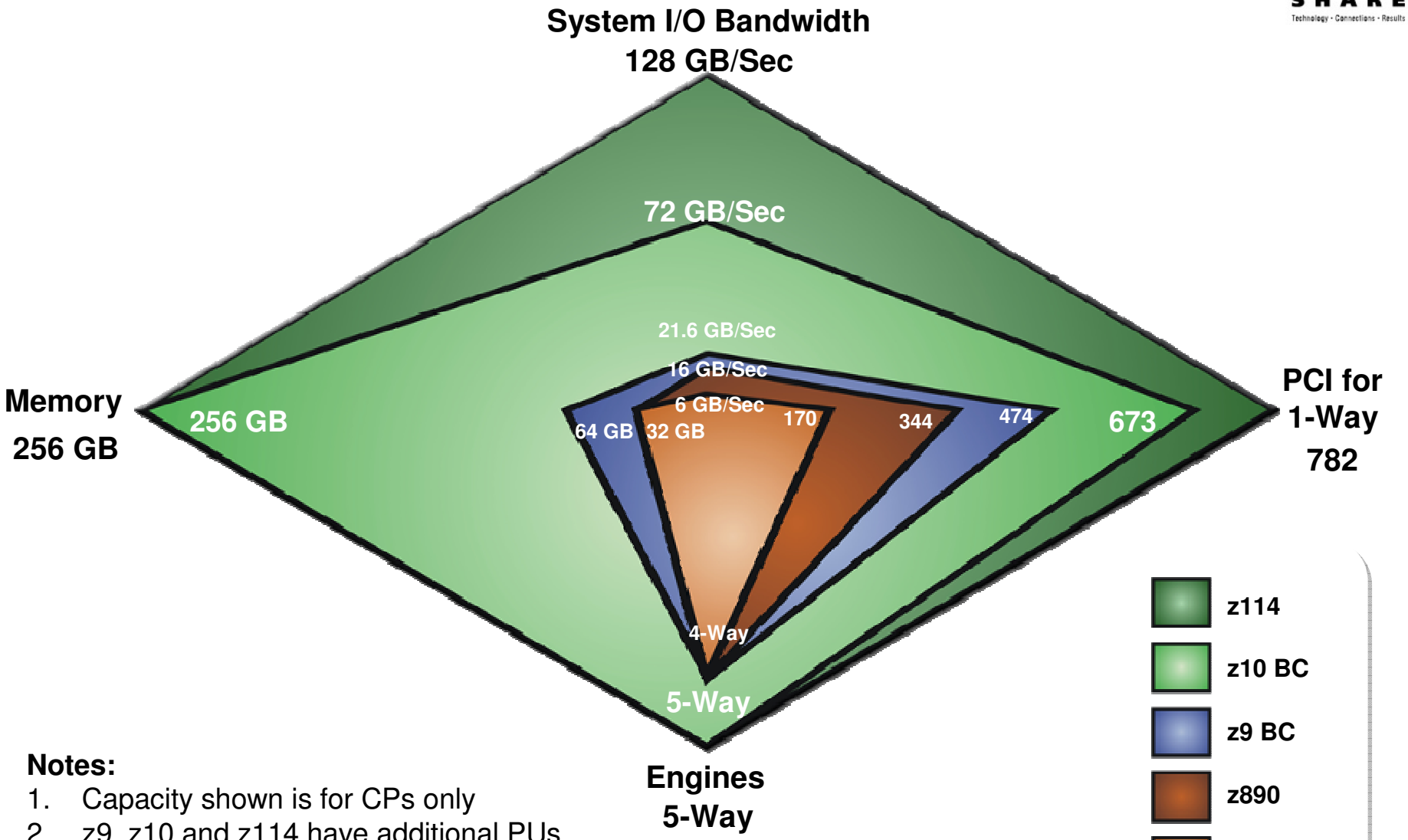



- Multiprise 2000 – 1st full-custom Mid-range CMOS S/390
- Multiprise 3000 – Internal disk, IFL introduced on midrange

- 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

# System Comparisons – z114




**Notes:**

1. Capacity shown is for CPs only
2. z9, z10 and z114 have additional PUs which can be used as Speciality Engines

# zBX Details

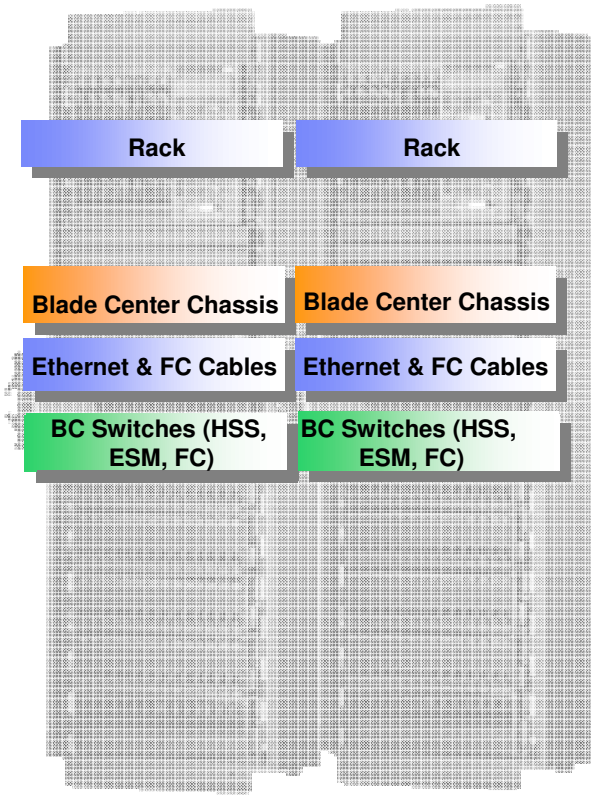


- **Machine Type/Model 2458-002**
- **Racks – Up to 4 (B, C, D and E)**
  - 42U Enterprise, (36u height reduction option)
  - 4 maximum, 2 chassis/rack
  - 2-4 power line cords/rack
  - Non-acoustic doors as standard
  - Optional Acoustic Doors
  - Optional Rear Door Heat Exchanger (conditioned water required)
- **Chassis – Up to 2 per rack**
  - 9U BladeCenter
  - Redundant Power, cooling and management modules
  - Network Modules
  - I/O Modules
- **Blades (Maximum 112 single width blades in 4 racks)**
  - Customer supplied POWER7 Blades (0 to 112)
  - Customer supplied IBM System x Blades (0 to 56*)
  - DataPower XI50z, M/T 2462-4BX (0 to 28 – double width)
- **Management Firmware**
  - Unified Resource Manager
- **Top of Rack (TOR) Switches - 4**
  - 1000BASE-T intranode management network (INMN)
  - 10 GbE intraensemble data network (IEDN)
  - GbE IEDN for customer network
- **Network and I/O Modules**
  - 1000BASE-T and 10 GbE modules
  - 8 Gb Fibre Channel (FC) connected to customer supplied disks

*March 30, 2012

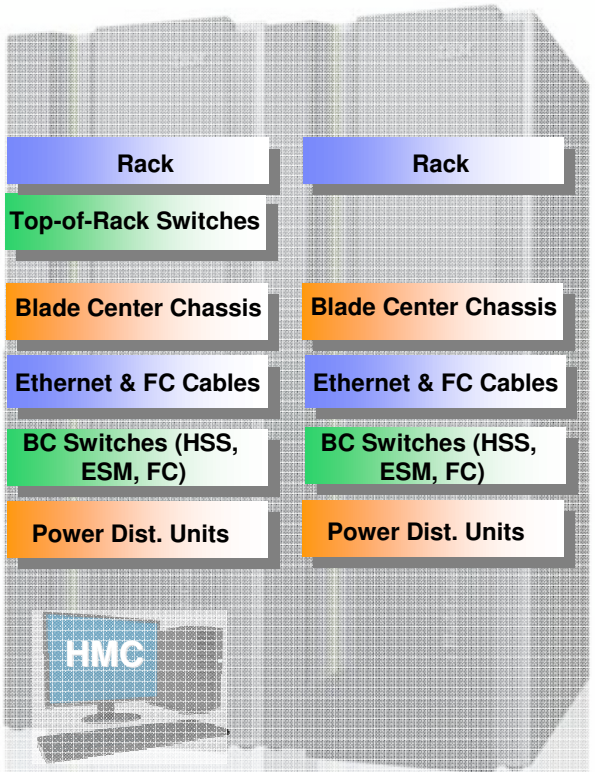
# zBX with the zEnterprise

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




***Rack infrastructure hosting IBM BladeCenters***

- **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/z114
  - Traffic on user networks not affected
  - Provides the foundation for the Unified Resource Manager




***IBM zEnterprise BladeCenter Extension (zBX) 2458 - Model 002***

# IBM zEnterprise Family

## IBM zEnterprise 114 (z114)

IBM zEnterprise BladeCenter Extension (zBX)

Unified Resource Manager


## IBM zEnterprise 196 (z196)

IBM zEnterprise BladeCenter Extension (zBX)

Unified Resource Manager

# IBM zEnterprise family

## IBM zEnterprise 196 (2817)

- **Announced 7/10 – Server w/ up to 96 PU cores**
- **5 models – Up to 80-way**
- **Granular Offerings for up to 15 CPs**
- **PU (Engine) Characterization**
  - CP, SAP, IFL, ICF, zAAP, zIIP
- **On Demand Capabilities**
  - CoD, CIU, CBU, On/Off CoD, CPE
- **Memory – up to 3 TB for Server and up to 1 TB per LPAR**
  - 16 GB Fixed HSA
- **Channels**
  - PCIe bus
  - Four LCSSs
  - 3 Subchannel Sets
  - MIDAW facility
  - Up to 240 ESCON channels
  - Up to 288 FICON channels
  - FICON Express8 and 8S
  - zHPF
  - OSA 10 GbE, GbE, 1000BASE-T
  - InfiniBand Coupling Links
- **Configurable Crypto Express3**
- **Parallel Sysplex clustering**
- **HiperSockets – up to 32**
- **Up to 60 logical partitions**
- **Enhanced Availability**
- **Unified Resource Manager**
- **Operating Systems**
  - z/OS, z/VM, z/VSE, z/TPF, Linux on System z

## IBM zEnterprise Blade Extension (2458)

- **Announced 7/10**
- **Model 002 for z196 or z114**
- **zBX Racks with:**
  - BladeCenter Chassis
  - N + 1 components
  - Blades
  - Top of Rack Switches
  - 8 Gb FC Switches
  - Power Units
  - Advance Management Modules
- **Up to 112 Blades**
  - POWER7 Blades
  - IBM System x Blades
  - IBM WebSphere DataPower Integration Appliance XI50 for zEnterprise (M/T 2462-4BX)
- **Operating Systems**
  - AIX 5.3 and higher
  - Linux for Select IBM x Blades
  - Microsoft Windows for x Blades
- **Hypervisors**
  - PowerVM Enterprise Edition
  - Integrated Hypervisor for System x

## IBM zEnterprise 114 (2818)

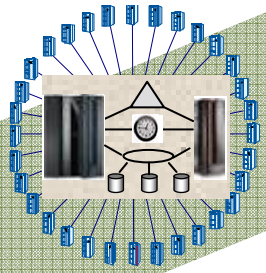
- **Announced 07/11**
- **2 models – M05 and M10**
  - Up to 5 CPs
- **High levels of Granularity available**
  - 130 Capacity Indicators
- **PU (Engine) Characterization**
  - CP, SAP, IFL, ICF, zAAP, zIIP
- **On Demand Capabilities**
  - CoD, CIU, CBU, On/Off CoD. CPE
- **Memory – up to 256 GB for Server**
  - 8 GB Fixed HSA
- **Channels**
  - PCIe bus
  - Two LCSSs
  - 2 Subchannel Sets
  - MIDAW facility
  - Up to 240 ESCON channels
  - Up to 128 FICON channels
  - FICON Express8 and 8S
  - zHPF
  - OSA 10 GbE, GbE, 1000BASE-T
  - InfiniBand Coupling Links
- **Configurable Crypto Express3**
- **Parallel Sysplex clustering**
- **HiperSockets – up to 32**
- **Up to 30 logical partitions**
- **Unified Resource Manager**
- **Operating Systems**
  - z/OS, z/VM, z/VSE, TPF, z/TPF, Linux on System z

# Evolution of Specialty Engines Plus . . .

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

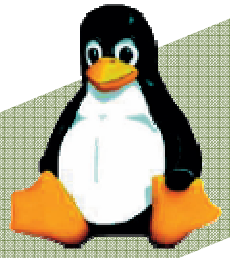
**DB Compression, SORT, Encryption**

***Transparent for applications***



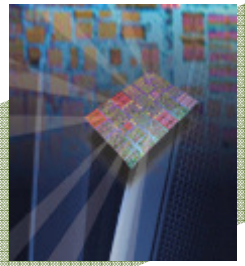
**1997**

**Internal Coupling Facility (ICF)**



**2001**

**Integrated Facility for Linux (IFL)**



**2004**

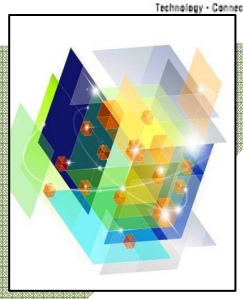
**System z9 Application Assist Processor (zAAP)**

**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 when data is on z/OS

**zEnterprise System**

**TCO Focus**

**TCA Focus**

**Distributed Systems**

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

**Select IBM Blades in zBX**

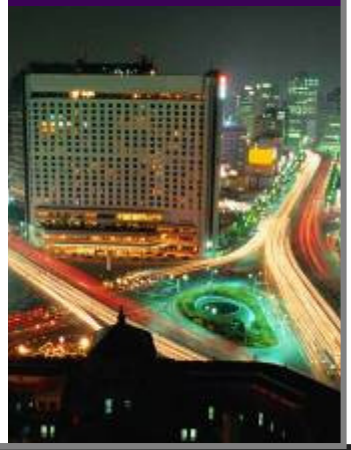
- ✓ Expanded ISV support for enterprise applications
- ✓ Targeted for applications that interact with mainframe data and transactions
- ✓ Provisioned and managed by System z

**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



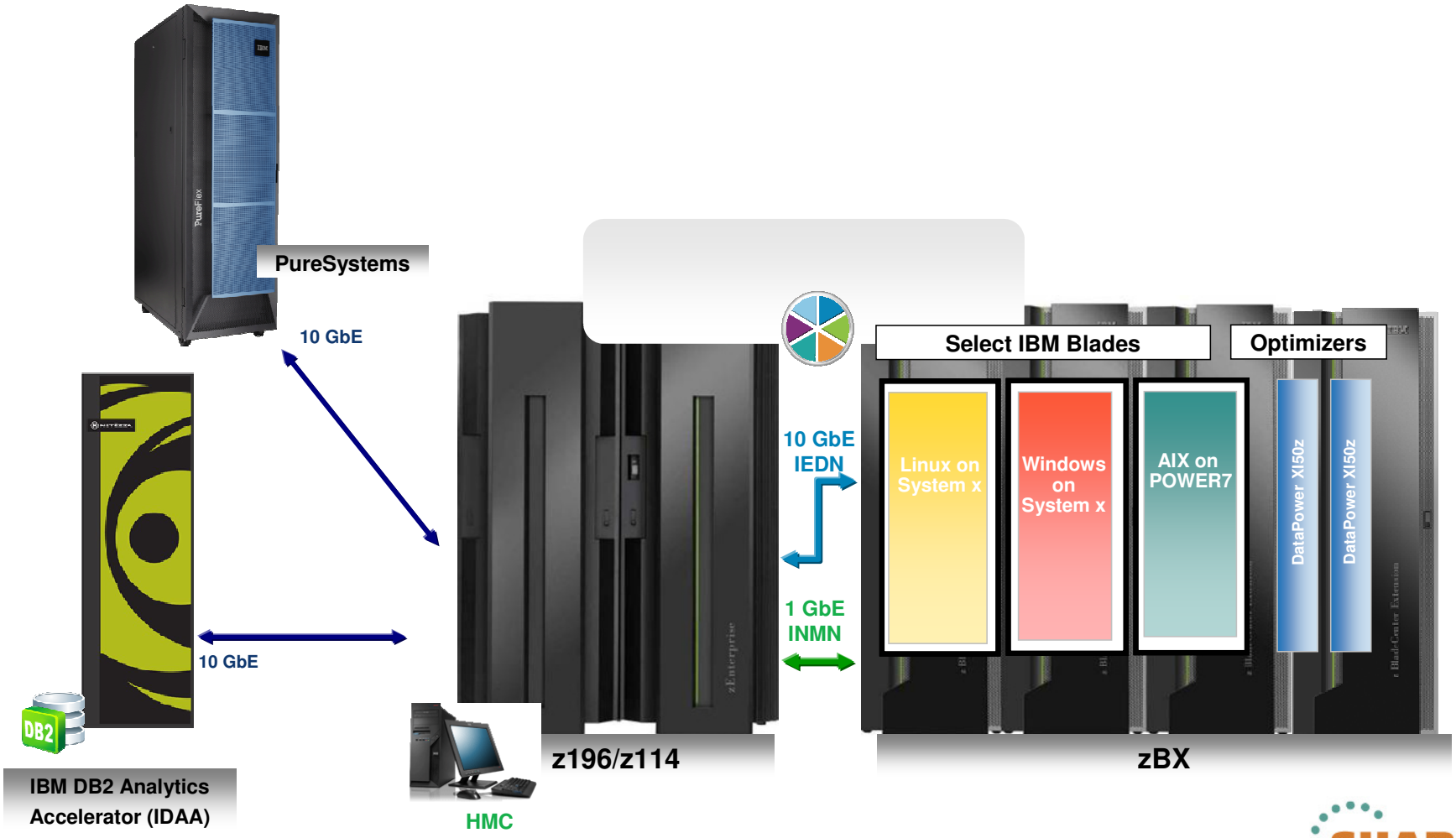
**LOWER**

**SCALABILITY, SECURITY, DYNAMIC WORKLOAD MANAGEMENT**

**HIGHER**

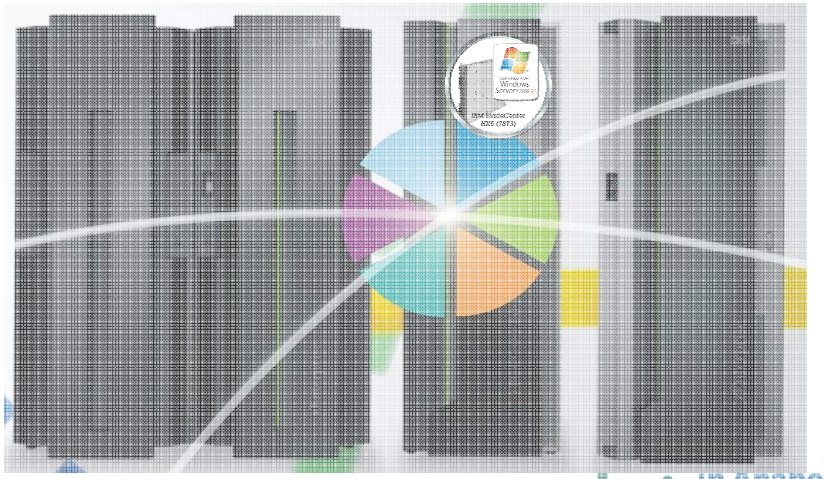
# Increasing your flexibility using zEnterprise Systems

***Additional offerings can help to strengthen business innovation***



# zEnterprise provides the foundation for your hybrid computing infrastructure including…

- Clients with multi-tier business applications such as SAP[1] or Core Banking where the data base tier is DB2® for z/OS® and the application servers are on distributed platforms such as UNIX® for the application tier and x86 for the presentation tier
- Clients with multi-tier business applications where the data base is Oracle on Linux for System z and the application servers are on distributed platforms
- Clients with a mainframe as well as a sprawl of older UNIX and NT servers running on competitive platforms
- Clients with a data base on DB2 for z/OS and possibly data marts on distributed platforms needing to accelerate query performance
- Clients extending their mainframe applications to support web serving
- Clients implementing a Service-Oriented Architecture to extend or re-use existing mainframe assets



NEW *SAP support for Linux and Windows on x86 blades within the zBX!*

# 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

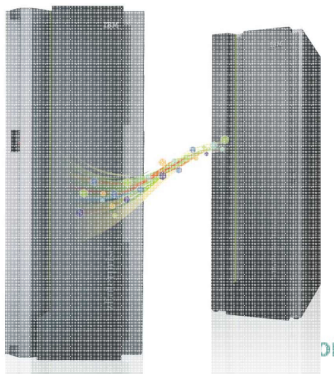
…are looking for an entry level mainframe with options for traditional capacity settings

… 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 …

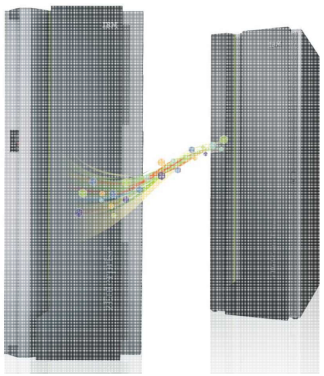
…want the flexibility to manage across a heterogeneous platform

…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

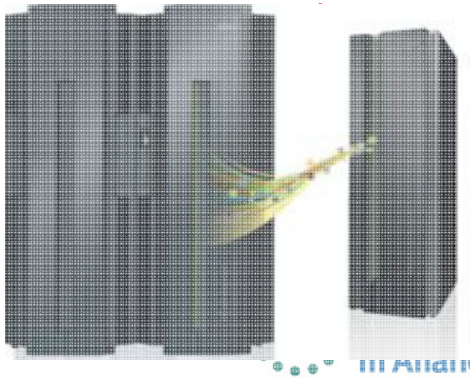
… have a large mainframe capacity requirement or desire for massive consolidation – scale to over 52,000 MIPS in one footprint

… 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.***



# Underpinned by a thriving System z ecosystem

## Thousands of ISVs invest in System z

| | | |
|---|---|---|
| 7,000+ applications supported on z (3250+ Linux and 4000+ z/OS) | 1,200 new and upgraded applications on System z in 2010 | 120+ new ISV partners added to the platform |

## Worldwide adoption of mainframe curriculum

| | | |
|---|---|---|
| 814 schools enrolled with more adding curricula | 32,941 students from 17 countries participated in Master the Mainframe contests | SystemzJobs.com connects System z clients, partners and businesses with students and professionals seeking z jobs |

# Extensive ISV support for zEnterprise


virtualagility

FIS

CÚRAM SOFTWARE

VANGUARD Integrity Professionals
Enterprise Security Software

Compuware
THE TECHNOLOGY PERFORMANCE COMPANY

TEMENOS

callataÿ&wouters
BANKING SOLUTIONS

bmcsoftware

ca technologies

ColeSoft

sas

Co:Z Co-Processing To
for z/OS

suse

Information Builders

TREND MICRO

HORIZONT
Software for Datacenters

EDGE INFORMATION GROUP

Voltage security

INTERCHIP

Sunline

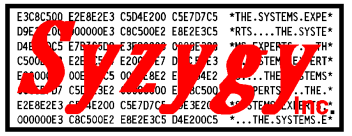
SERENA

FUNDtech

INNOVATION DATA PROCESSING

ASG Software Solutions

software AG




UNICOM Systems
Enterprise Software Solutions

Management Strategies LTD.

Pega
MacKinney
Mainframe Software and Support

PHOENIX Software International

PKWARE

# What is the IBM Academic Initiative?



Membership in the IBM Academic Initiative is free and open to individual faculty members.

*A skills initiative* **– An IBM program that partners with academic institutions worldwide to build a pipeline of skilled students for the IT jobs of tomorrow and skills for a smarter planet.**

System z Mission **(ibm.com/university/systemz):**

- ✓ **Assist clients world wide with z skills**
- ✓ **Demonstrate IBM's commitment and continued investment in the mainframe**

# IBM System z courses

Foundational principles

- **Intro to the Mainframe: z/OS Basics***
- **Intro to the Mainframe: Networking***
- **Intro to the Mainframe: Security***
- **Intro to the Mainframe: Large Scale Commercial Computing**

Operating systems

- **Linux on System z**
- **Introduction to z/VM®**
- **Introduction to z/VSE Basics**
- **UNIX® System Services (Module)**

User interfaces

- **ISPF: z/OS Basic Interfaces**

Storage management

- **VSAM**

Programming languages

- **Assembler**
- **COBOL**
- **JCL**

Other

- **Developing COBOL with Rational Developer for System z V7.6**
- **z/OS Advanced Topics***
- **z/OS Emerging Technologies***
- **z/OS Installation**

Tivoli security, systems, network, and storage management courses

- **IBM Tivoli License Compliance Manager for z/OS 4.2 Implementation**
- **IBM Tivoli System Automation for z/OS 3.1 Introduction and Operations**
- **IBM Tivoli System Automation for z/OS 3.1 Implementation and Administration**
- **IBM Tivoli Workload Scheduler 8.2 for zOS Scheduler's Workshop**

Information, data and transaction management

- **Enterprise Server Data Management**
- **DB2 for z/OS Fundamentals**
- **DB2 Family Fundamentals (Cross product)**
- **DB2 SQL Workshop (Cross product)**
- **DB2 for z/OS Database Admin Workshop, Part 1**
- **DB2 for z/OS Database Admin Workshop, Part 2**
- **DB2 Programming Workshop for z/OS**
- **DB2 for z/OS Application Development**
- **DB2 for z/OS Query Optimization and Performance Tuning**
- **Intro to IMS***
- **IMS Fundamentals**
- **An Introduction to IMS (Textbook reference)**
- **Transaction Management**

*available in audio

Application development

- **WebSphere Application Server for z/OS**
- **Intro to IBM WebSphere Developer for z (Web based)**
- **WebSphere MQ for z/OS System Administration**
- **Developing COBOL with IBM Rational Developer for System z**

Diagnosis

- **z/OS RAS and Diagnostics***

eLearning resources

- **Interactive e-Learning Module: *z/OS Basics***
- **Flash Demo: Introduction to Rational Developer for System z**
- **Develop a batch DB2 for z/OS COBOL application using RDz**
- **Developing and debugging a COBOL DB2 application**
- **Editing record-oriented programs with the System z LPEX editor**
- ***Learn about your future in Large Systems***
- ***Careers in Mainframes***

# Introducing SystemzJobs.com - *The link to your future career*

The IBM System z Job Board at **SystemzJobs.com** is a new resource that connects students learning IBM Enterprise Systems with companies hiring talent.

## Benefits of using SystemzJobs.com

- **Free, secure, and easy to use**
- **Fast access to the best jobs in the IT industry**
- **Global pool of available jobs**

## Getting started

**Follow these steps at SystemzJobs.com to get started:**

1. **Create a secure account (optional)**
2. **Search for jobs with your preferences**
3. **Connect with employers**


**Sponsored by the**
**IBM Academic Initiative, System z**

Visit: **ibm.com**/university/systemz

*Questions? Contact zSkills@us.ibm.com*

# 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*.

# IBM zEnterprise System – What's New?

***Embracing multi-platform, multi-operating environments with more management capability***


## *IBM zEnterprise™ 196 (z196) and zEnterprise 114 (z114)*

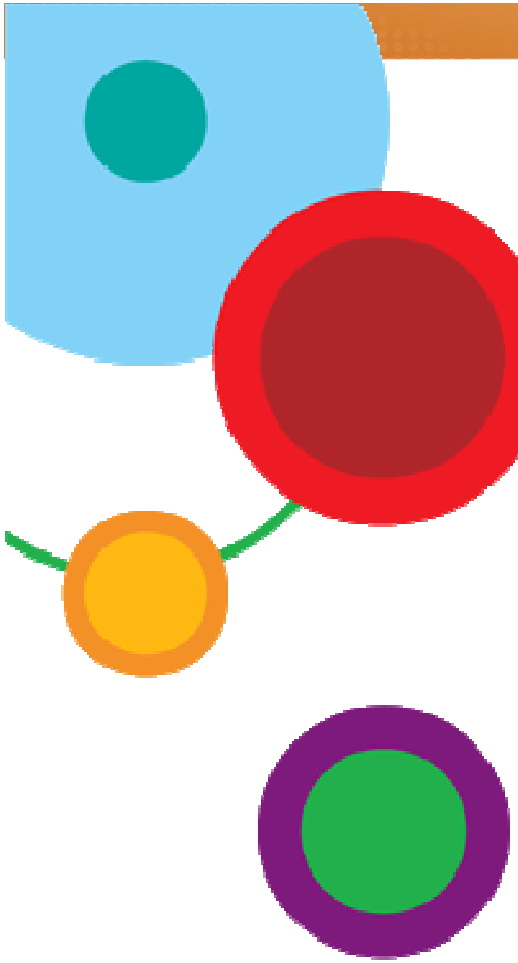
- Performance improvements for High Performance FICON for zEnterprise (zHPF)
- Updated GDPS® disaster recovery support for zEnterprise environment
- xDR extension to support z/VSE®
- And much more ….

## *zEnterprise Unified Resource Manager*

- Operational Controls enhanced with auto-discovery and configuration support for storage resources
- Extending management functions with programmatic access (APIs)

## *zEnterprise BladeCenter® Extension (zBX)*

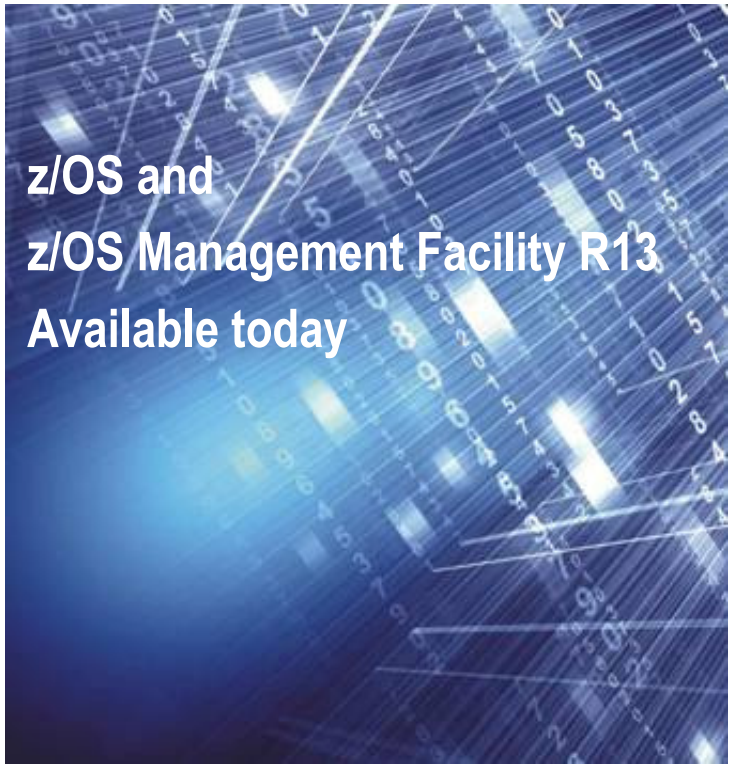
- Now supporting AIX® 7.1 and Microsoft® Windows® 2008 R2 plus more releases of Linux® on IBM System x®
- New optional 1 Gpbs dedicated network to server
- New to DataPower® XI50z firmware support



# What's new with z/OS and z/OS Management Facility Version 1 Release 13

# Agenda

- z/OS® and z/OS Management Facility function and value
- Integration with IBM zEnterprise™ System



# z/OS – Smarter Operating System for Smarter Computing

*z/OS V1.13 – Performance, programming, and operations improvements help you to gain more value from your workloads.*

http://www.ibm.com/systems/z/os/zos/

*z/OSMF V1.13 - Streamlined processes and built-in guidance address a broad scope of z/OS activities and helps create a more integrated z/OS experience and improved productivity*

http://www-03.ibm.com/systems/z/os/zos/zosmf/

# z/OS R13 – Smarter Operating System for Smarter Computing

***z/OS V1.13 - More value from your workloads with performance, programming, and operations improvements:***

- Foundation for modern batch applications
  - Simplified batch application programming and potentially shortened batch windows, with new JES2 JCL improvements
  - New z/OS base component, z/OS Batch Runtime environment, designed to enable COBOL and Java interoperability for DB2*.
  - Leverage the strength of z/OS batch, a new web-based (REST) interface enables you to submit batch jobs and access batch data from non-z/OS systems**
- Improved performance for z/OS UNIX workloads and traditional workloads***
- Autonomics to give you earlier warning of issues before they can potentially disrupt business
- More options to secure your data with newer, faster, and more scalable encryption and security capabilities

***z/OSMF V1.13 - Streamlined processes and built-in guidance address a broad scope of z/OS activities and helps create a more integrated z/OS experience:***

- Clone z/OS images and deploy software more easily and consistently.
- Define new storage volumes quickly and easily
- More easily maintain highly secure connections, even in large complex networks
- Launch and work with multiple 'classic' ISPF interfaces from within z/OSMF, and ink and launch z/OSMF applications to other web-based applications
- Leverage System z Specialty engines

* Prerequisites: IBM 31-bit SDK for z/OS, Java Technology Edition Version 6.0.1 (5655-R31), DB2 V9.1 for z/OS (5635-DB2) or later with PTFs, IBM Enterprise COBOL for z/OS V4.1 (5655-S71) or later
** Prerequisite: RESTful API included in z/OSMF V1.13.
*** Based on IBM Lab results, your results will vary.
I/O performance improvements measured for fully shared zFS ranged from very small to 900%, with the majority of workload conditions tested falling between 50% and 150%. The actual amount of improvement will depend on the environment (monoplex or Parallel Sysplex) and the type of file processing being done. IEBCOPY improvement will depend on conditions such as: the amount of data being copied, block size, and type of IEBCOPY operation.

# z/OS R13 – Smarter Operating System for Smarter Computing

***Improved performance, programming, and operations provide more value from your workloads.***
***Enhancements in z/OS and z/OS Management Facility Version 1 Release 13 help provide:***

- Advantages for your organization. Autonomics and smart operations proactively avoid errors, reduce risk from outages, speed software deployment, simplify z/OS management, and make your organization more productive.
- Advantages to your business. Foundation for modern batch capability, industry leading security, resiliency, and data handling capability enables you to access and transform business data to business value more readily.
- Advantages to your operations. Improved performance and new technologies for Web-based and traditional workloads improves integration of core data in your enterprise and opens new opportunity for applications with affinity to z data.

# z/OS R13 – Smarter Operating System for Smarter Computing

***More value from your workloads with programming, performance, and operations improvements. Enhancements for release 13:***

## ▪Foundation for modern batch applications

- A new z/OS base component, z/OS Batch Runtime environment, provides the framework for Java-to-COBOL interoperability, for transactional updates to DB2, and for sharing database connections between Java and COBOL. *
- Simplified batch application programming and potentially shortened batch windows, with new JES2 JCL improvements, giving you more control of your batch applications.
- Leverage the strength of z/OS batch, a new web-based (REST) interface enables you to submit batch jobs and access batch data from non-z/OS systems**

## ▪Improved performance for new and traditional workloads***:

- Between 50% and 150%* I/O performance improvement for workloads using shared zFS in a Parallel Sysplex.
- Up to 15% to 55%* IEBCOPY performance improvement for traditional workloads
- Potentially shorter batch windows using JES2 JCL improvements to free tape volumes more quickly

## ▪Availability enhancements:

- Improve spool volume management by using new JES2 spool migration function and JES3 dynamic spool add capability
- Improved channel recovery - track errors and automatically remove failing paths (on a controller level) faster
- zFS internal restart - automatically recover disabled aggregates in Sysplex aware mode – avoiding lengthy manual system recovery process.
- Avoid planned outages - Concurrent service for DADSM and CVAF

* Prerequisites: IBM 31-bit SDK for z/OS, Java Technology Edition Version 6.0.1 (5655-R31), DB2 V9.1 for z/OS (5635-DB2) or later with PTFs, IBM Enterprise COBOL for z/OS V4.1 (5655-S71) or later

** Prerequisite: RESTful API included in z/OSMF V1.13.

*** Based on IBM Lab results, your results will vary.

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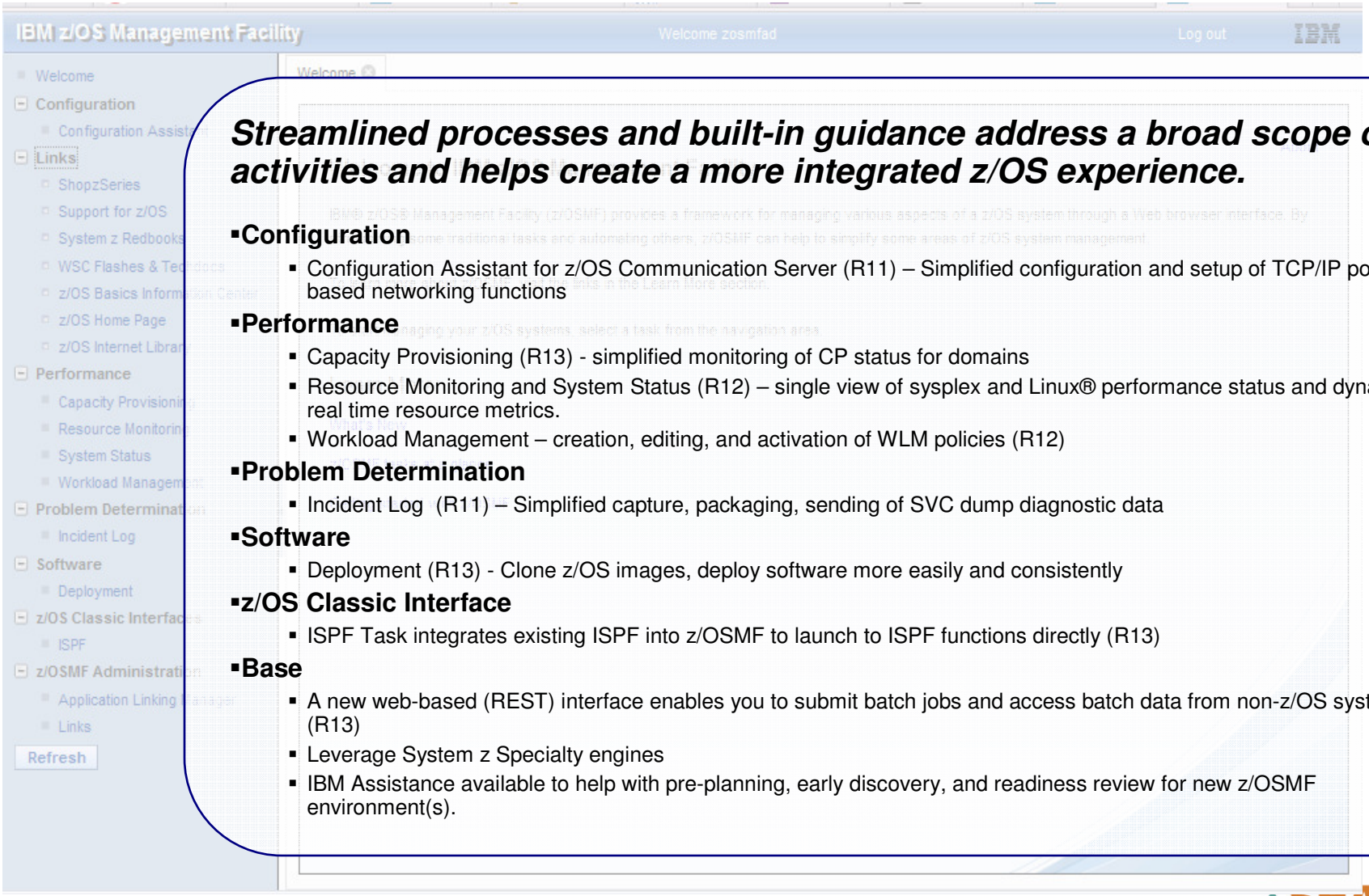
IEBCOPY improvement will depend on conditions such as: the amount of data being copied, block size, and type of IEBCOPY operation

# z/OS Management Facility – the new face of z/OS

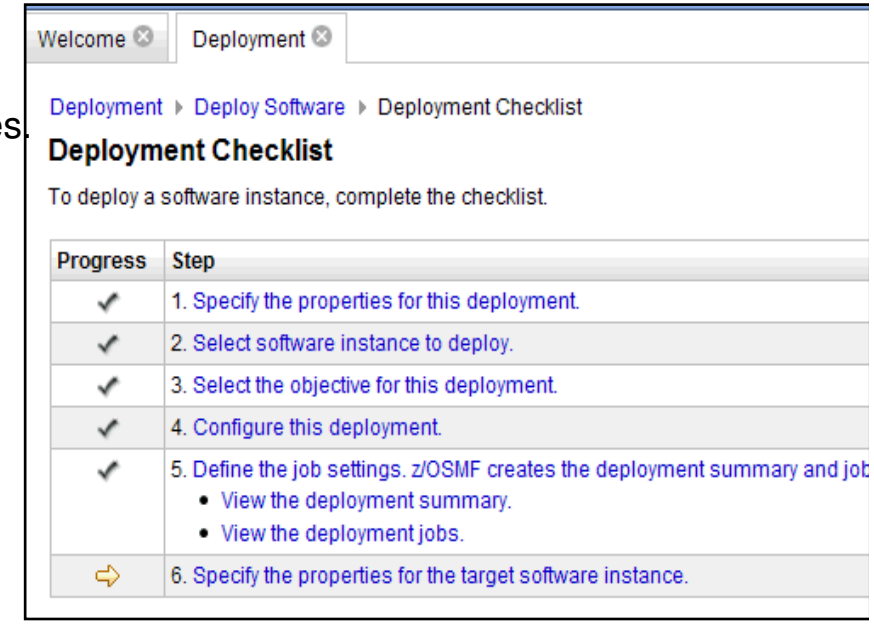



***Streamlined processes and built-in guidance address a broad scope of activities and helps create a more integrated z/OS experience.***

- **Configuration**
  - Configuration Assistant for z/OS Communication Server (R11) – Simplified configuration and setup of TCP/IP policy-based networking functions
- **Performance**
  - Capacity Provisioning (R13) - simplified monitoring of CP status for domains
  - Resource Monitoring and System Status (R12) – single view of sysplex and Linux® performance status and dynamic real time resource metrics.
  - Workload Management – creation, editing, and activation of WLM policies (R12)
- **Problem Determination**
  - Incident Log (R11) – Simplified capture, packaging, sending of SVC dump diagnostic data
- **Software**
  - Deployment (R13) - Clone z/OS images, deploy software more easily and consistently
- **z/OS Classic Interface**
  - ISPF Task integrates existing ISPF into z/OSMF to launch to ISPF functions directly (R13)
- **Base**
  - A new web-based (REST) interface enables you to submit batch jobs and access batch data from non-z/OS systems (R13)
  - Leverage System z Specialty engines
  - IBM Assistance available to help with pre-planning, early discovery, and readiness review for new z/OSMF environment(s).

# z/OSMF Software Deployment (R13)
## *New! - simplified deployment of installed software*

- **New task designed to make deployment of installed software simpler and safer.**
  - Easy to follow checklist replaces manual and error prone procedures with a user friendly application
  - Incorporates IBM recommended best practices for software deployment.
- **Software Deployment can clone software**
  - Locally, single system or within a sysplex
  - Remotely, across a network, and multiple sysplexes.
- **Software Deployment can also:**
  - Identify, modify, delete software instances
  - Generate jobs to copy a software instance
  - Verify cross-system and cross-product requisites, verify fixes
  - Copy ALL parts of the software (SMP/E CSI inventory too)
- **Clones all SMP/E installed software!**
  - IBM, ISV, z/OS, stack or individual products
  - Service upgrades for all of the above (via complete replacement)



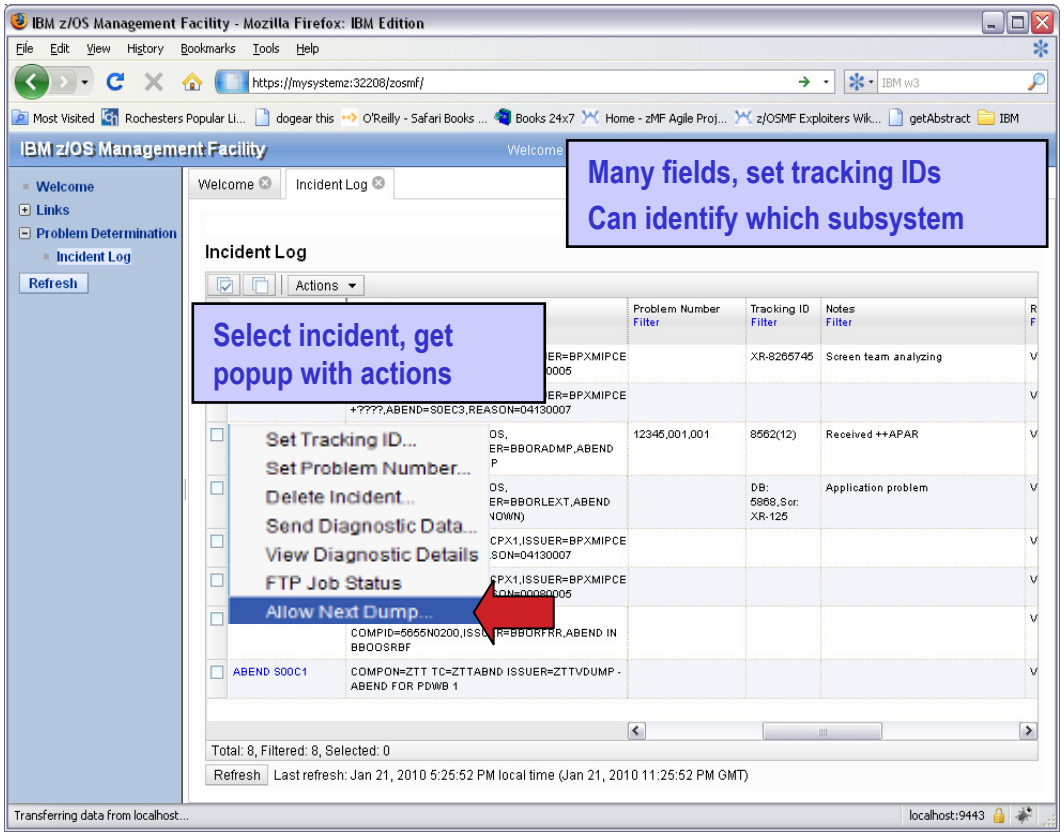
# z/OSMF Incident Log (R11)

## *Save hours of time when diagnosing incidents*

- **Respond to and manage incidents quickly and efficiently**
  - View, sort, and act on incidents (identified by subsystem)
  - Package dump data for transmission in minutes

- **For z/OSMF R12**
  - Add additional comments and diagnostic data
  - Encrypted parallel FTP of the incident files, to IBM .
  - Sending additional user-defined data with an incident

- **For z/OSMF R13**
  - New APAR search
  - View job status via SDSF launch
  - Utilizes new Problem Documentation Upload utility in base of z/OS R13
  - Also available as a download from http://www14.software.ibm.com/webapp/set2/sas/f/zaids/pduf.html

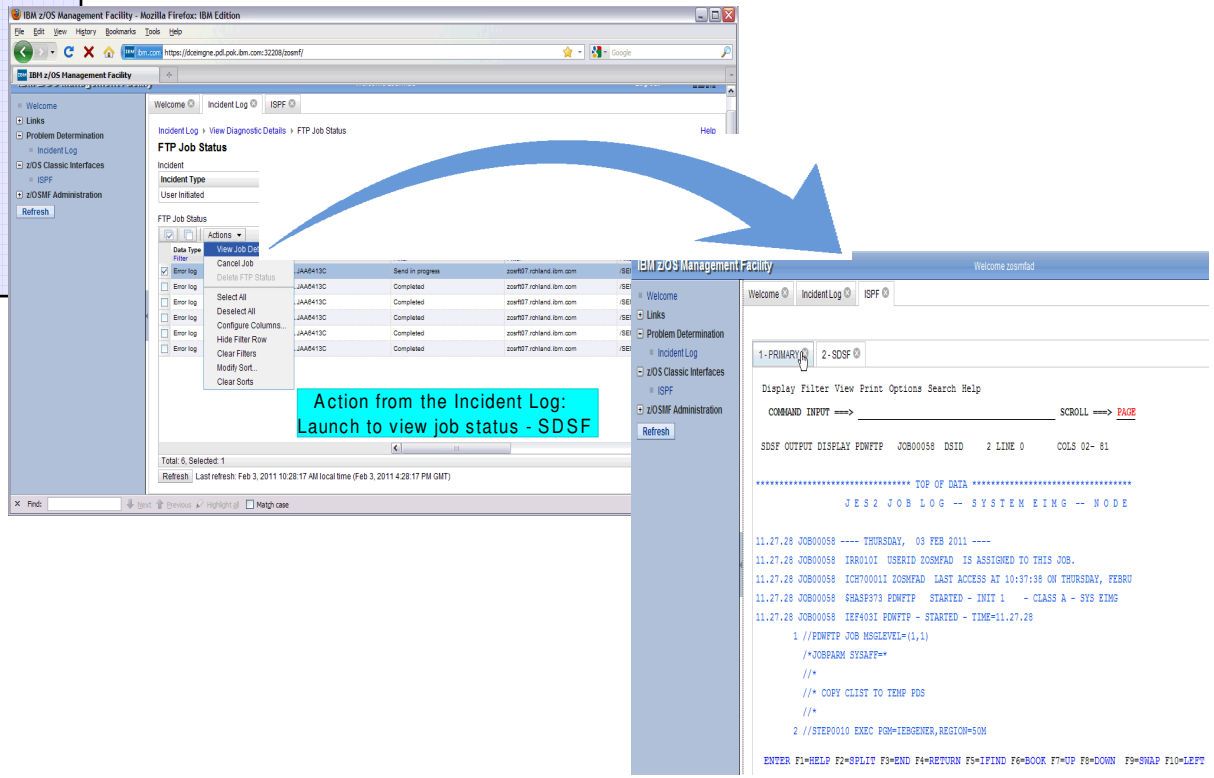



Note, screen capture from z/OSMF R12

# Application Linking (R13)

## *Example, link Incident Log to SDSF in context*

- **A more seamless experience when working with z/OS.**
- **Make your own linkages between z/OSMF apps and even to any web-based apps**



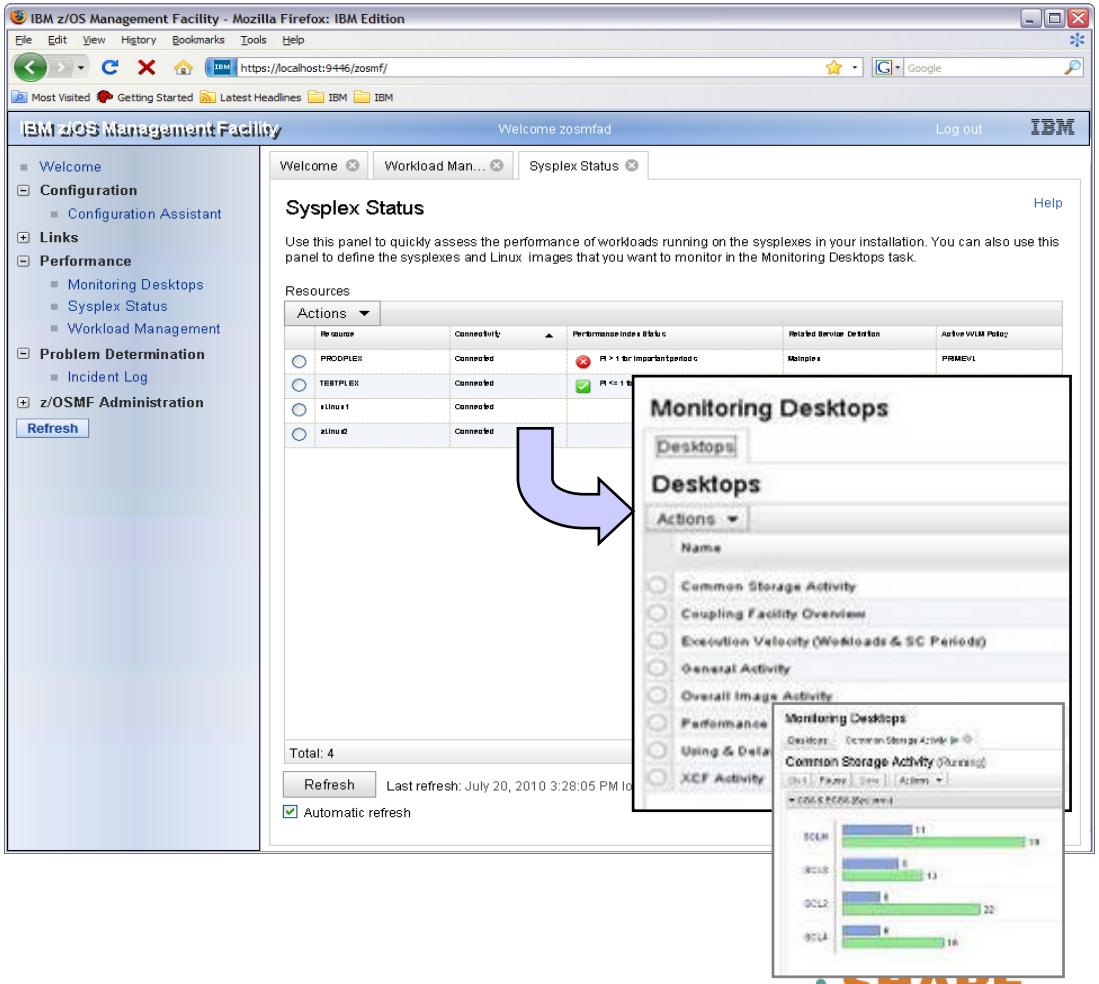

- Define an ‘event’ (such as “View Job Status”)
- Then define the ‘event handler’ action and parameters (such as ‘go to ISPF’ with context of the job)

# Resource Monitoring (R12)

## *A snapshot of the performance of workloads running on your systems*

- **Sysplex status:**
  - Instant snapshot of workload performance
  - RED, YELLOW GREEN status gives instant indication of WLM goals
  - Monitor z/OS AND Linux
  - Drill down to see RMF™ metrics
  - Renamed **System Status** (R13)

- **Monitoring Desktops**
  - GUI for RMF
  - Monitor most Resource Measurement Facility (RMF) Monitor III metrics, create and save custom views, and display real-time performance data as bar charts.
  - Renamed **Dashboards** (R13)

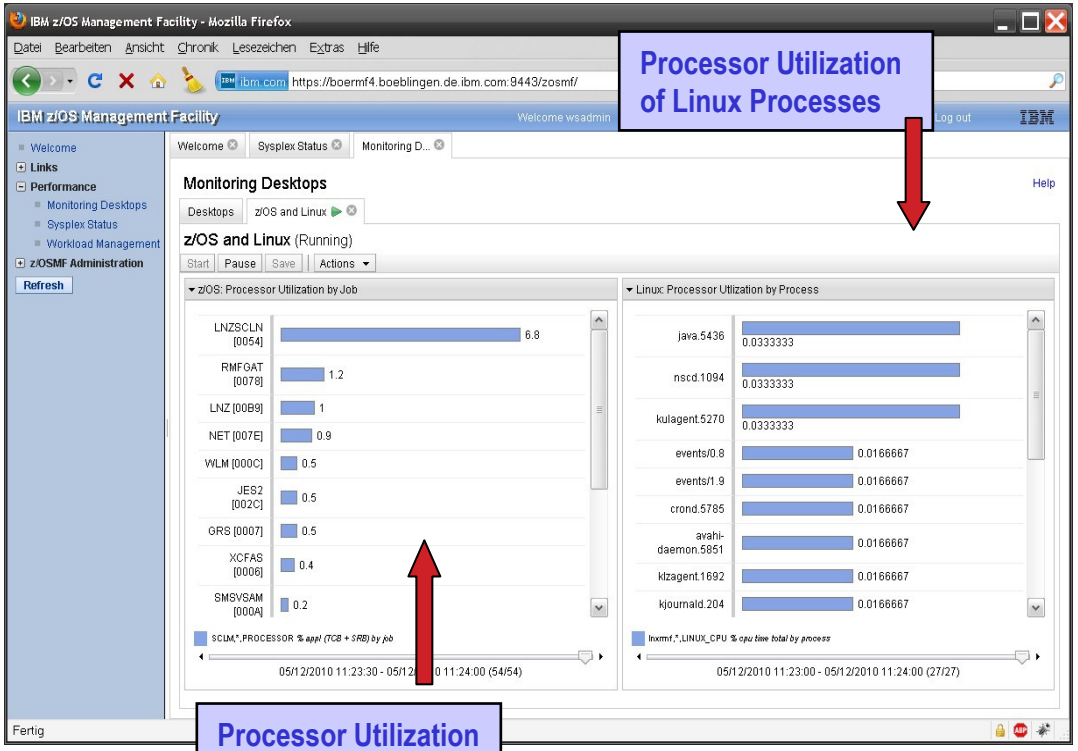



Note, screen captures from z/OSMF R12

# Integrated z/OS and Linux resource monitoring
## *A monitoring solution for multi-tier workloads*

- **Monitor the resources for z/OS and Linux workloads**
- **Ideal for use with System z Enterprise System**

- **For z/OSMF R12**
  - Use separate as-is, no-charge web-download tool to gather resource information for Linux systems.
- **For z/OSMF R13**
  - New integrated performance data gatherers for Linux on System z, Linux on IBM System x®, and AIX® systems
  - Additional monitoring capabilities for your zEnterprise System




Note, screen capture from z/OSMF R12

# New programmatic interface for z/OS batch
## *Function delivered with z/OSMF R13*

- **A new REST API (HTTP(s)-based) interface to z/OS**
- **Easy programmatic access to the power of z/OS batch capabilities**
  - REST API web services can be used by: web applications (javascript/AJAX, Flex(Flash), etc) and other web service clients, such as Java, PHP, Perl, etc
  - The REST API web service will connect to both JES2 and JES3, as well as select secondary subsystems

- **Today:**
- **Complex programming**
  - Allocate and open internal reader
  - TSO/ISPF submit,
  - FTP "interface-level2"
  - Java z/OS submit interface
- **Security protocol limitations**

- **New option today**
- Any web-based, Java, PHP, Perl application, etc. supporting HTTP
- New RESTful HTTPs based API
- Highly secure, firewall friendly,
- Simplified text-like programming

**Break the barriers of batch**
**Submit JCL, get status, retrieve output files, change jobclass, cancel job, purge job**

- z/OS JES2 and z/OS JES3

# z/OS R13 - The foundation for modern batch

- **About 90% of customers consider batch mission critical***
- Challenge: Greater volumes of data and larger batch and on-line processing windows.
- Solution: Need to make batch more efficient.

- **Expand existing COBOL applications with Java!**
  - More choice for application development skills
  - Leverage specialty engines!
- **Simplified programming!**
  - Enhancements in z/OS simplify the development and maintenance of existing batch applications.
  - Enable distributed applications to access the power of z/OS batch
- **Shorter batch windows!**
  - New function in z/OS helps make batch processing more efficient
  - "Pipe" data between two batch jobs to enable these jobs to perform concurrent reads and writes
- **Real time batch!**
  - WebSphere® Compute Grid delivers a batch environment capable of supporting 24x7 batch and OLTP processing, and parallel computing

*IBM Market Research

# z/OS R13 - The foundation for modern batch (detail)

- **Expand existing COBOL applications!**
  - The z/OS Batch Runtime environment, provides Java-to-COBOL interoperability, for transactional updates to DB2®, and for sharing database connections between Java and COBOL (R13)*
    Ideal for processing for computationally intensive programs and extensions
  - Use JZOS Batch Toolkit for z/OS for efficient use of z/OS System interfaces for Java batch (IBM Java SDKs for z/OS)
  - Leverage specialty engines!
- **Simplified programming!**
  - JES2 JCL enhancements provide in-stream data in catalogue procedures, more options on setting job return codes, and the ability to stop and hold a job at the end of a step (not just at the end of the job) give much more granularity and control (z/OS R13)
  - An new REST API allows you to submit z/OS batch jobs and retrieve z/OS batch job information from distributed systems as well as z/OS systems; and is intended to make z/OS batch processing much more accessible to distributed systems and web-based processes (z/OS and z/OSMF R13)
- **Shorter batch windows**
  - Allow overlapping processing for multi-volume data sets (FREEVOL=EOV, R13)
  - Avoid recalling migrated datasets, just to delete them (IEFBR14, R11)
  - "Pipe" data between two batch jobs to enable these jobs to perform reads and writes concurrently (BatchPipes®, 5655-D45)
- **Real time batch**
  - WebSphere Compute Grid delivers a resilient, highly available, secure, and scalable runtime with container-managed services for batch applications
  - Capable of supporting 24x7 batch and OLTP processing, and parallel computing

* Prerequisites:
IBM 31-bit SDK for z/OS, Java Technology Edition, Version 6.0.1 (5655-R31)
DB2 V9.1 for z/OS (5635-DB2) or later with PTFs
IBM Enterprise COBOL for z/OS V4.1 (5655-S71) or later

# Additional z/OS R13 simplification enhancements

- **Health Checker Framework, updates**
  - Greater ability to schedule health checks
  - Ability for checks to raise message severity as conditions change
- **New health checks:**
  - Two new checks for Allocation – intended to warn about potential Allocation deadlock conditions
  - Detects tape library initialization errors with suggestions on how to resolve.
- **New Migration checks for:**
  - zFS configuration options, new symbolic links, z/OS console mode of operation
- **DFSMSrmm™, updates:**
  - NEW automatic recovery for missing our out-of-sequence tape volumes. For multivolume data sets, DFSMSrmm will attempt to return the corrected list
  - New ability to specify data sets by expiration date or VRS policy management. Help simplify retention policies, avoid batch VRS policy management, and enable you to determine how long a tape data set will be retained
- **DFSMSdfp™ updates:**
  - New includes the explanatory text for Open, Close, and End of Volume error conditions along with the error message.
- **SMF dump improvement for log streams** (SMF dump to log stream introduced with z/OS R9)

# z/OS Availability Enhancements

- **Availability enhancements (with R13)**
  - **Avoid JES2 re-starts** with JES2 dynamic spool migration, rapidly discontinue and drain spool volumes quickly
  - **Avoid JES3 re-starts** with JES3 dynamic spool add
  - **Improved channel recovery** - track errors and automatically remove failing paths (on a controller level) faster
  - **zFS internal restart** - automatically recover disabled aggregates in Sysplex aware mode – avoiding lengthy manual system recovery process.
  - **Automatic rerouting and recovery of z/OS system name server resolver**
  - **Concurrent service for DADSM and CVAF and DADSM dynamic exits** – avoid planned outages

# z/OS Availability Enhancements
## *Parallel Sysplex updates for R13*

- **Fully shared zFS in a sysplex!**
  - **Between 50% (1.5x) and 150% (2.5x)* I/O performance improvement** for any z/OS UNIX workload using shared zFS in a Parallel Sysplex®. Applications that use zFS, such as z/OS UNIX System Services and WebSphere Application Server for z/OS, are expected to benefit
  - Also: Less-disruptive recovery from most internal zFS problems (for both single system and sysplex-aware systems)
  - Also: A new health check for zFS configuration files
- **Simplified software deployment – clone z/OS and software in a sysplex (z/OSMF R13)**
- **Eliminate the need for WebSphere MQ for SDSF Sysplex environments.**
- **Automatic monitoring, takeover, and recovery to prevent CSM-constrained conditions**
- **NEW Easier to use XCF signaling protocol**
- **Updated volume information on all systems in the sysplex when DFSMSdss™ or DFSMShsm™ Fast Replication Backup and Recovery processing complete**
- **More responsive to VIPA changes**
- **Workload balancing of IPsec IKEv2 and IPv4.**

* I/O performance improvements measured for fully shared zFS ranged from very small to 900%, with the majority of workload conditions tested falling between 50% and 150%. The actual amount of improvement will depend on the environment (monoplex or Parallel Sysplex) and the type of file processing being done.

# NEW suite of GDPS solutions

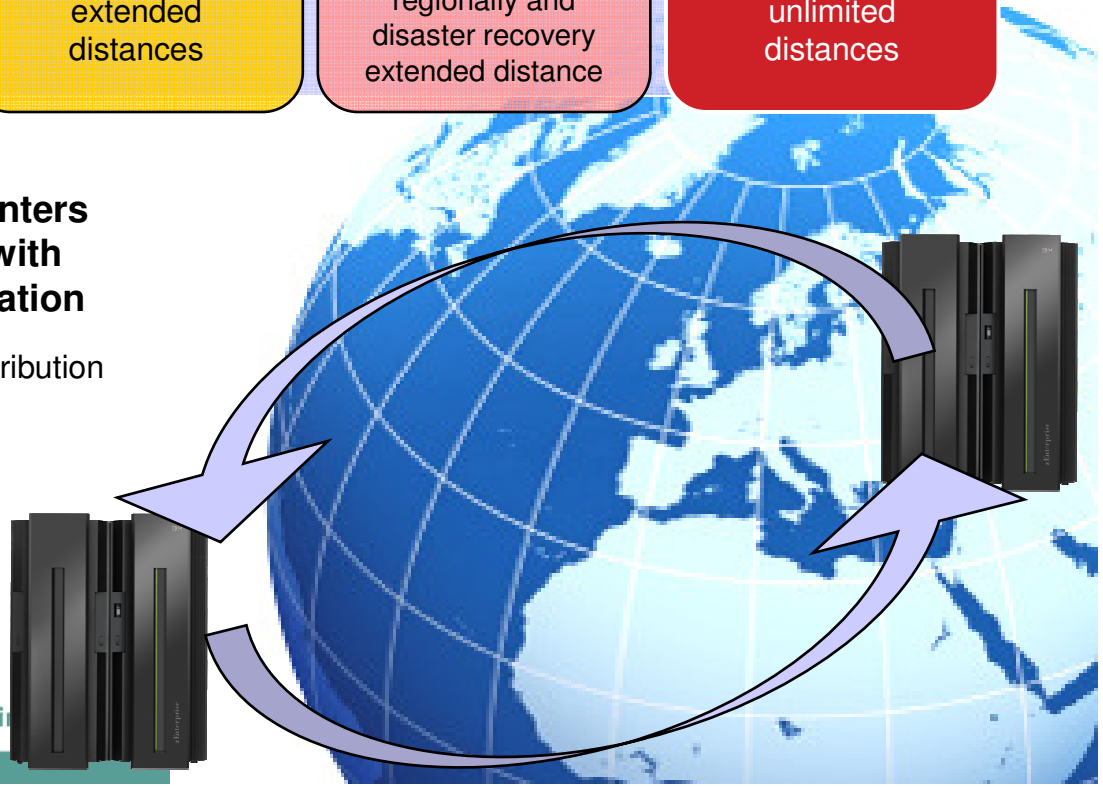
## *IBM GDPS active/active continuous availability family of solutions is the next generation of GDPS*

**IBM Geographically Dispersed Parallel Sysplex (GDPS)**

| GDPS/HyperSwap™ Manager | GDPS/PPRC | GDPS/GM<br>GDPS/XRC | GDPS/MGM<br>GDPS/MzGM | GDPS active/active |
|---|---|---|---|---|
| Continuous availability of data within a data center | Continuous availability or disaster recovery within a metropolitan region | Disaster recovery at extended distances | Continuous availability regionally and disaster recovery extended distance | Near-continuous availability across unlimited distances |

**GDPS/ A-A concept: two or more data centers running the same applications and data with cross-site workload balancing and replication**

- z/OS workload monitoring, management, and distribution
- z/OS data and transaction replication
- GDPS automation
- First configuration is ‘Active Standby’



# IBM GDPS active/active continuous availability family of solutions

## *The next generation of GDPS*

- Challenge
  - Multi-site, global-distance solutions may take up to an hour to recover full application availability at the remote site.
- What's New
  - GDPS/ Active-Active solution, Active Standby configuration*
  - Designed to provide continuous availability for two or more sites separated by global distances and achieve Recovery Time Objective of 1 minute or less**
  - Statement of Direction for Active Query configuration***
- Value
  - Automated recovery of z/OS applications means recovery can be faster and without human error
  - A complete solution for continuous availability (consulting, design, implementation, and maintenance) means piece of mind for you
  - Continuous availability over global distance sites helps meet more stringent audit and legislative compliance requirements

** Active Standby is the first configuration available under the GDPS/Active-Active family of solutions. Additional IBM software prerequisites required*

*** Recovery Time Objective (RTO) is a definition of the amount of time it takes from the initial disaster declaration to having critical business processes available to users. Less than one hour RTO is based on use of IBM best practices and includes the time it takes to: IPL an LPAR, reconfigure disk, reconfigure coupling facility and CF structure, apply System z Capacity Back Up, as well as switching network connections.*

****All statements regarding IBM future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.*

# Risk Management
## *Comprehensive security for a dynamic infrastructure*

- NEW! GDPS/Active-Active - **Two or more sites, separated by *unlimited* distances, running the same applications and having the same data to provide cross-site workload balancing and Continuous Availability / Disaster Recovery**
  - Customer data at geographically dispersed sites kept in sync via replication
  - Shift from disaster recovery model to nearly continuous availability model
  - Integration of IBM products and GDPS control software through an IBM service engagement which includes project management throughout the implementation cycle
  - Active/Standby configuration released now, IBM plans to make available the Active/Query configuration which will provide the ability to selectively query data in either site.

**Minimizing risk for discovery and backup systems**

# Keep critical business applications up and running without data loss in case of disaster for System z platform
## *IBM GDPS/Active-Active continuous availability*

*Reduces application downtime to help lower costs, improve productivity and boost customer loyalty*

- Continuous Availability
  - Provides continuous availability for two or more sites separated by unlimited distances, achieving Recovery Time Objective of 1 minute or less.
  - Shift from disaster recovery model to nearly continuous availability model
- Results
  - Planned workload switch - **20** seconds from active site to standby site
  - Unplanned workload switch - **120** seconds from active site to standby site
  - Planned site switch - (9 * CICS-DB2 and 1 * IMS workloads) **20** seconds
  - Unplanned workload switch - **150** seconds

# z/OS R13 Performance for many key workloads

- **Between 50% and 150%* I/O performance improvement for any z/OS UNIX workload using shared zFS in a Parallel Sysplex**.
  - Applications that use zFS, such as z/OS UNIX System Services and WebSphere Application Server for z/OS, are expected to benefit
- **Between 15% and 55%* IEBCOPY performance improvement for traditional workloads**
  - Workloads copying PDS to PDS, copying PDS to sequential, or compressing a PDS are expected to benefit
- **Potential for shorter batch windows ***
  - New JCL FREEVOL=EOV parameter frees up a tape volume when the batch job is done with it.
- **Network throughput Enterprise Extender** can be improved
  - Using Inbound Workload Queuing (IWQ), available on OSA-Express3 and OSA-Express4S (July 12, 2011)
- **Foundation for extreme data handling and simplified storage management**
  - Potentially improved I/O performance without the need for application changes for QSAM-, BPAM-, and BSAM-based workloads by leveraging High Performance FICON™. Also, existing EAV functionality is enhanced with support for larger, 1 TB Extended Address Volumes (EAVs).** - IBM statements of direction

* Based on IBM Lab results, your results will vary.
I/O performance improvements measured for fully shared zFS ranged from very small to 900%, with the majority of workload conditions tested falling between 50% and 150%. The actual amount of improvement will depend on the environment (monoplex or Parallel Sysplex) and the type of file processing being done.
IEBCOPY improvement will depend on conditions such as: the amount of data being copied, block size, and type of IEBCOPY operation Batch concurrency for multi volume tape datasets and will depend on the amount of data being processed
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# zOS R13 Enhancements in Security

- **IKEv2**
  - Initial support with z/OS R12 Communications Server. z/OS R13 adds Network Address Translation (NAT) traversal support for IKEv2 over IPv4.
- **System SSL, ECC**
  - z/OS R12 Communications Server added support for Elliptic Curve Cryptography (ECC), ECDSA (Elliptic Curve Digital Signature Algorithm).
  - z/OS R13 to extend System SSL ECC support for :
    - Creating ECC-style certificates in key database files or ICSF PKCS#11 tokens
    - Creating ECC-style certificates through the Certificate Management Services (CMS) API
    - Enabling ECC for TLS V1.0 and TLS V1.1 handshakes (RFC4492)
    - ECC certificate support with Crypto Express3 Coprocessor (on zEnterprise server)
- **ICSF support for additional HMAC algorithms**
  - Support for FIPS-198, support planned for SHA-1, SHA-224, SHA-256, SHA-384, and SHA-512
- **TN3270 and FTP support for password phrases**
- **Ported tools**
  - IBM Ported Tools for z/OS (5655-M23), a no-charge product, provides the sudo (su "do") open source tool that allows system administrators to delegate authority to users or groups while providing the RACF® (or equivalent) audit trail of the user and their commands. Already available on UNIX platforms, now available with z/OS UNIX System Services.

# z/OS Security Server – RACF
## *Helping to address security and compliance** guidelines

### Enhancements with z/OS R13

- **RACF**
  - RACF Remote Sharing Facility (RRSF) support for TCP/IP (in addition to SNA APPC)
  - Support for generating Elliptic Curve Cryptography (ECC) secure keys (using Crypto Express3 Cryptographic Coprocessors (CEX3C) available with zEnterprise servers)
- **Tivoli Directory Server for z/OS (LDAP)**
  - Support for SHA-2 and salted SHA-2 hashing of user password attributes. Addresses:
    - Need for stronger hashing and cryptographic algorithms
    - Enhanced interoperability with distributed IBM TDS, openLDAP, and other LDAP servers.
    - The National Institute of Standards and Technology (NIST) policy for the use of hash functions.
  - Support for LDAP administrators to delegate LDAP administrative authority
    - Can improve LDAP administration flexibility, help improve auditability, and help improve security
  - Support for DB2 9 for z/OS (5635-DB2) backend for scalability of large LDAP deployments
  - Improved interoperability between z/OS applications and Microsoft Active Directory environments for Kerberos
  - Support for RFC 2696 and RFC 2891 for improved LDAP sorted search performance

** It is the customer's responsibility to identify, interpret, and comply with laws or regulatory requirements that affect its business. IBM does not represent that its products or services will ensure that the customer is in compliance with the law.

# z/OS and IPv6

- **IPv4 address pool is exhausted** February 3, 2011
  - http://www.ipv6news.info/2011/02/04/ipv4-address-pool-is-exhausted/
  - Now the IPv4 Internet only has the stock of IPv4 addresses held by the regional registrars and Internet Service Provides (ISPs) to keep it going.


- **z/OS is IPv6 certified!** (http://jitc.fhu.disa.mil/adv_ip/register/certs/ibmzosv110_dec08.pdf)

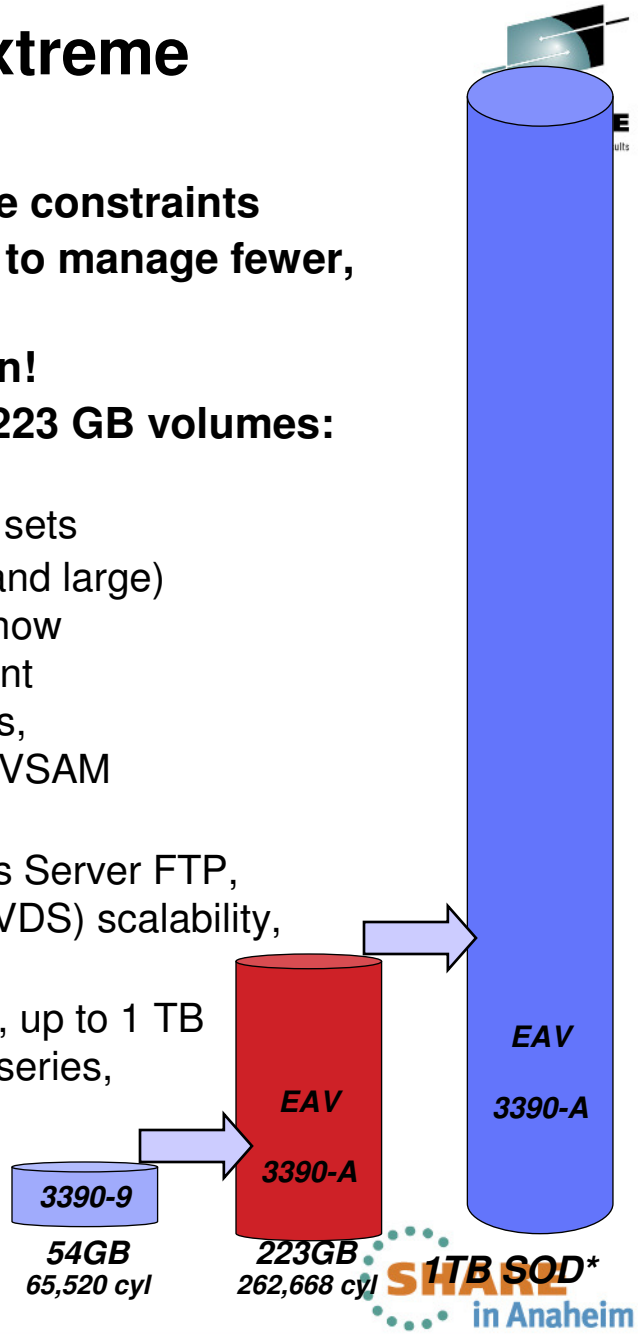
- **z/OS Communications Server is adding function for IPv6 networks:**
  - **For z/OS R11**
  - Support RFC4941 and RFC5095; and the AES-based AES-XCBC-MAC-96 and AES-XCBC-PRF-128 algorithms - intended to meet new government IPv6 standards

  - **For z/OS R12**
  - Health checks for IPv4 and IPv6 routing
  - Support for DFSMSrmm, IKEv2, ability to Send DNS Queries over IPv6, support for security-related RFC3484 and RFC5014

  - **For z/OS R13**
  - Support for IPv6 intrusion detection security equivalent to that provided for IPv4, integrated with the Configuration Assistant (in z/OSMF)
  - Support for IPv6 checksum and segmentation offload enhancements and for LPAR-to-LPAR checksum offload for both IPv4 and IPv6 packets available with OSA-Express4S QDIO (announced July 12 2011)
    - TCP/IP segmentation and checksum processing on OSA card and not on CP

# Taking z/OS Storage Volumes to the Extreme

- **Extended Address Volumes (EAVs) help address storage constraints**
- **Can help simplify storage management by enabling you to manage fewer, larger volumes, as opposed to many small volumes**
- **IDEAL for large datasets, may improve storage utilization!**
- **DS8000® exploitation rolled out over time, starting with 223 GB volumes:**
  - With z/OS R10, support for VSAM
  - With z/OS R11, support for extended format sequential data sets
  - With z/OS R12, support extended to sequential (both basic and large) data sets, partitioned (PDS/PDSE) data sets, catalogs (ICF now larger than 4 GB), BDAM data sets, JES spool and checkpoint data sets, standalone Dump extended format dump data sets, DFSMSrmm data sets, generation data groups (GDGs) and VSAM volume data sets (VVDSs).
  - With z/OS R13 - Support extended to z/OS Communications Server FTP, SDSF extended format print files, VSAM volume data set (VVDS) scalability, ISPF to display data sets eligible for EAV.
  - **SOD** - support for larger extended address volumes (EAVs), up to 1 TB per volume, on IBM System Storage® DS8700 and DS8800 series, with new DS8000 licensed machine code.*





*All statements regarding IBM's plans, directions, and intent are subject to change or withdrawal without notice.

# z/OS and Server support

| | z800/ z900 | z890/ z990 | z9 EC/BC | z10 EC/ BC | z196 | z114 | DS8000 DS6000® | TS1130 | End of service | Lifecycle Extension for z/OS | Coexists with | Ship date |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| R7 | X | X | X | X (1,2) | X(1) | NO | X(1) | X | 9/2008 | 9/2010 | R9 | 9/2005 |
| R8 | X | X | X | X | X | X(4) | X | X | 9/2009 | 9/2011 | R10 | 9/2006 |
| R9 | X | X | X | X | X | X(4) | X | X | 9/2010 | 9/2012 | R11 | 9/2007 |
| R10 | X | X | X | X | X(3) | X(3,4) | X | X | 9/2011 | 9/2013 | R12 | 9/2008 |
| R11 | X | X | X | X | X | X | X | X | 9/2012* | | R13 | 9/2009 |
| R12 | X | X | X | X | X | X | X | X | 9/2013* | | R14* | 9/2010 |
| R13 | X | X | X | X | X | X | X | X | 9/2014* | | R15* | 9/2011* |
| R14* | X | X | X | X | X | X | X | X | 9/2015* | | R16* | 9/2012* |

* All statements regarding IBM future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.

(1) IBM Lifecycle Extension for z/OS V1.7 (5637-A01) was required for the z10 BC, z196, and disk storage

(2) IBM Lifecycle Extension for z/OS V1.7 (5637-A01) required for support for some z10 EC features

(3) z/OS V1.10 and later required for zBX and Ensemble management exploitation

(4) IBM Lifecycle Extension for z/OS V1.8 (5638-A01 ) and for z/OS V1.9 (5646-A01) required for z114. Lifecycle Extension for z/OS V1.10 (5656-A01) required starting October 2011.

(5) See IBM GTS services for additional fee-based extended service options

Out of service (5)

Lifecycle Extension withdrawal 2 years later

General support

# z/OS Statement of Direction
# Software Announcement 212-086 – 4/11/2012

- IBM plans to introduce a new version of the z/OS operating system, z/OS Version 2, with z/OS V2.1 to be released in the second half of 2013 as part of a new two-year release cycle.
- IBM intends to make new z/OS and z/OSMF releases available approximately every two years.
- It is IBM's intent that z/OS V2 and z/OSMF V2 will continue to support coexistence, fallback, and migration rules similar to those for z/OS V1 and z/OSMF V1. IBM plans to support an n-2 approach, where three consecutive releases are planned to be supported for coexistence, fallback, and migration.
- Beginning with z/OS Version 2, IBM plans to provide five years of z/OS support, with three years of optional, fee-based extended service (5+3) as part of the new release cadence.
- IBM further plans to provide enhancements to current z/OS releases during the transition to the new support model as follows:
  - z/OS V1.12 support is planned to be increased from three years to four years. Thus, support for Version 1.12 is planned to be extended from September 30, 2013, to September 30, 2014.
  - z/OS V1.13 support is planned to be increased from three years to five years. Thus, support for Version 1.13 is planned to be extended from September 30, 2014, to September 30, 2016.

# IBM zEnterprise System: Freedom by Design
## The broadest systems architecture – for integration and management of multi-platform applications and data

**IBM zEnterprise z196 (z196)**
**IBM zEnterprise z114 (z114)**
Industry's most robust design for keeping systems and data continuously accessible

**Unified Resource Manager**
Extending zEnterprise qualities of service and management across the infrastructure

**BladeCenter Extension (zBX)**
- AIX®, Linux®, and Microsoft® Windows®* applications
- Appliance Blades - Smart analytics, DataPower®


1. Meets the need of today's heterogeneous data centers
2. Enables mixed workload business processes to be deployed and centrally managed
3. Allows optimized integration of data, applications, and web serving
4. Delivers dynamically responsive IT with lower acquisition and operating costs

# 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[1]

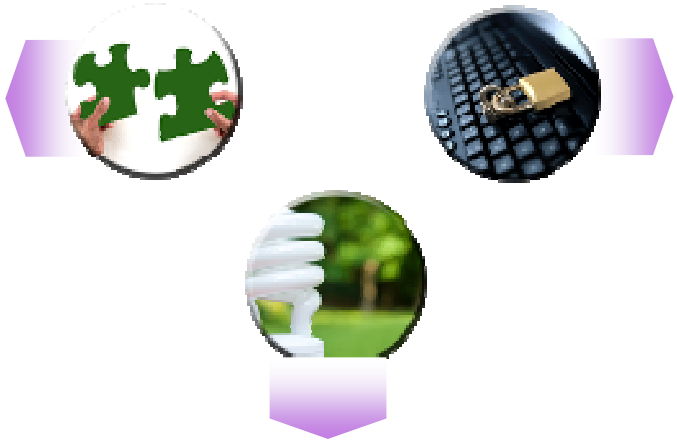
*Freedom by design:*

*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 applies unsurpassed Quality of Service for the delivery of business critical services

***Security***
Extending System z Security to a Private network across heterogeneous resources



***Availability***
Resiliency management and fewer points of failure

***Efficiency***
1/4 network, 1/25th floor space, 1/20 energy, 1/5 administration

| | | |
|---|---|---|
| ***Up to 70% in security audit savings*** | ***Up to 52% lower security admin costs*** | ***Fewer points of breach than pure UNIX or x86*** |

# Service levels to match your business needs

## Increased flexibility for your multi-architecture strategy when data is on z/OS

**zEnterprise System**

**TCO Focus**

**TCA Focus**

**Distributed Systems**

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

**Select IBM Blades in zBX**

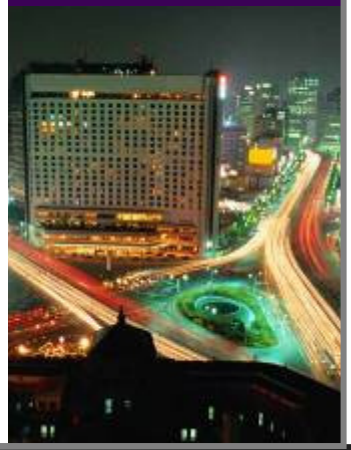
- ✓ Expanded ISV support for enterprise applications
- ✓ Targeted for applications that interact with mainframe data and transactions
- ✓ Provisioned and managed by System z

**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



**LOWER** — **SCALABILITY, SECURITY, DYNAMIC WORKLOAD MANAGEMENT** — **HIGHER**

# 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*.