Capacidades del Nuevo zEnterprise EC12

Seminario Técnico de Actualización Software para System z

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Mainframe Client Technical Specialist

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Evolution of hybrid computing with IBM System z

**IBM zEnterprise® 196 (z196)
First ever multiplatform
computer – mainframe and
distributed with single
management**

**DataPower® XI50z
within the IBM
zEnterprise
BladeCenter®
Extension (zBX)**
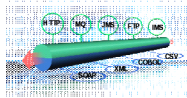
**Availability of Linux®
on IBM System x® on
HX5 blades in the zBX**

**Availability of
Microsoft® Windows®
on System x blades
in zBX and APIs**

July 2010   **Nov 2010**   **Mar 2011**   **Jul 2011**   **Sep 2011**   **Oct 2011**   **Dec 2011**   **Aug 2012**

**Availability of zBX with IBM
POWER7® blades and
IBM Smart Analytics Optimizer**
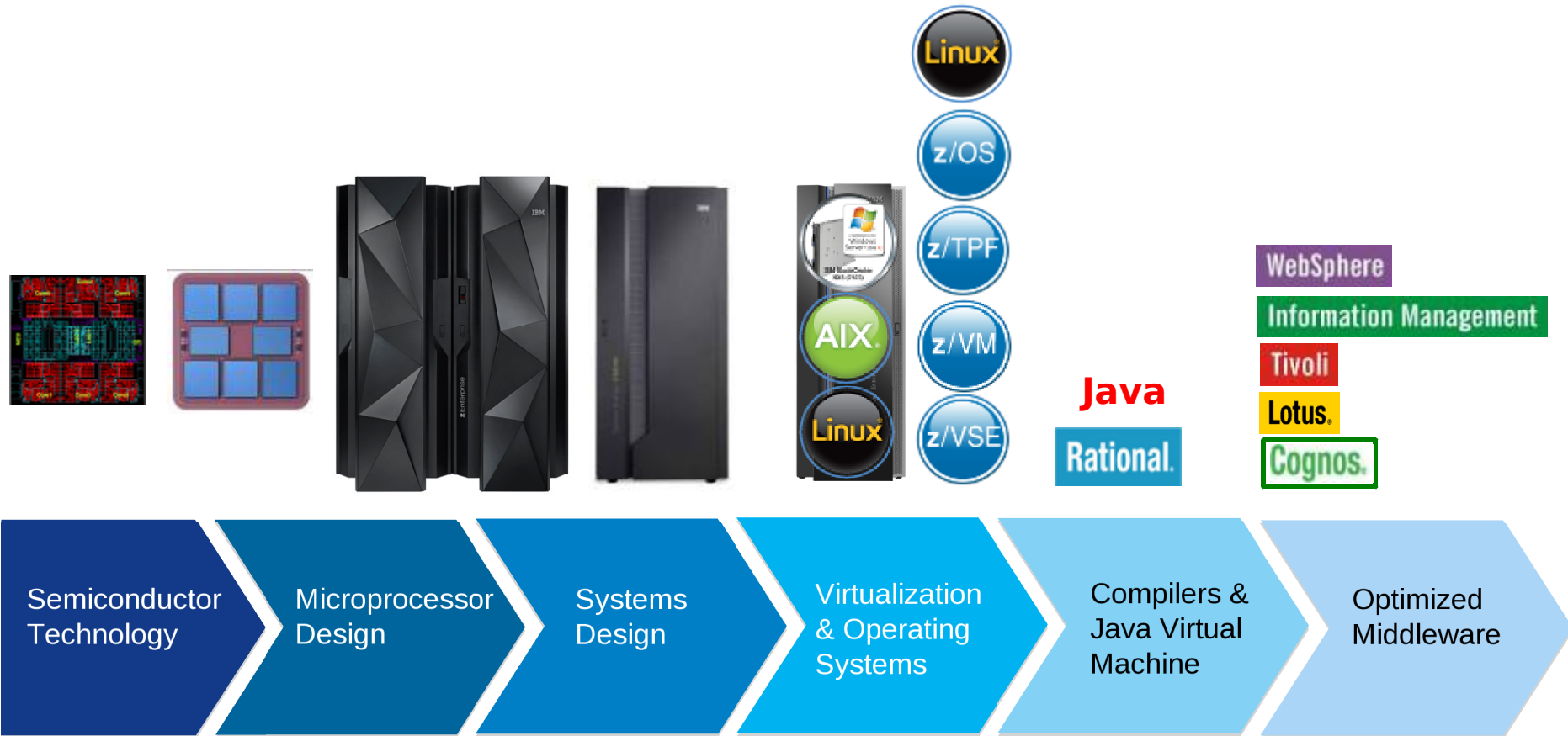
**Announce
IBM zEnterprise 114**

**IDAA – evolution of IBM
Smart Analytics Optimizer –
coming out of the zBX and
into Netezza technology**

**IBM zEnterprise EC12
(zEC12)
Next generation of
hybrid computing**

3

IBM zEnterprise EC12: An optimized system

Linux
z/OS
z/TPF
z/VM
z/VSE

AIX
Linux

Java
Rational.

WebSphere
Information Management
Tivoli
Lotus.
Cognos.

| Semiconductor Technology	Microprocessor Design	Systems Design	Virtualization & Operating Systems	Compilers & Java Virtual Machine	Optimized Middleware

Introducing the newest members of the zEnterprise System family
The zEnterprise EC12 and zEnterprise BladeCenter Extension Model 003

IBM zEnterprise EC12 (zEC12)

- zEC12 has the industry's fastest chip with each core at 5.5 GHz
- New innovation to drive availability with IBM zAware and Flash Express
- Optimized for the corporate data serving environment
- Hardware functions boost software performance for Java™, PL/I, DB2®
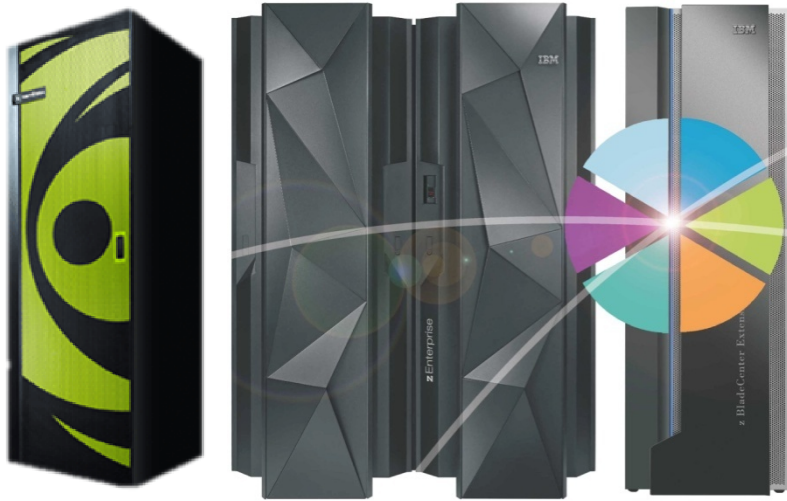
IBM zEnterprise Unified Resource Manager and zEnterprise BladeCenter Extension (zBX) Mod 003

- Supports the new zEC12 platform
- Hosts PS701 and HX5 blades
- Provides workload-awareness resource optimization
- Enhancements to System Director support zBX
- System z will continue to expand hybrid computing

Plus more flexibility and function by connecting IBM DB2 Analytics Accelerator

- IBM DB2 Analytics Accelerator (IDAA) allows deployment of business analytics on the same platform as operational applications
- Analytics and OLTP can be run as the same workload

5

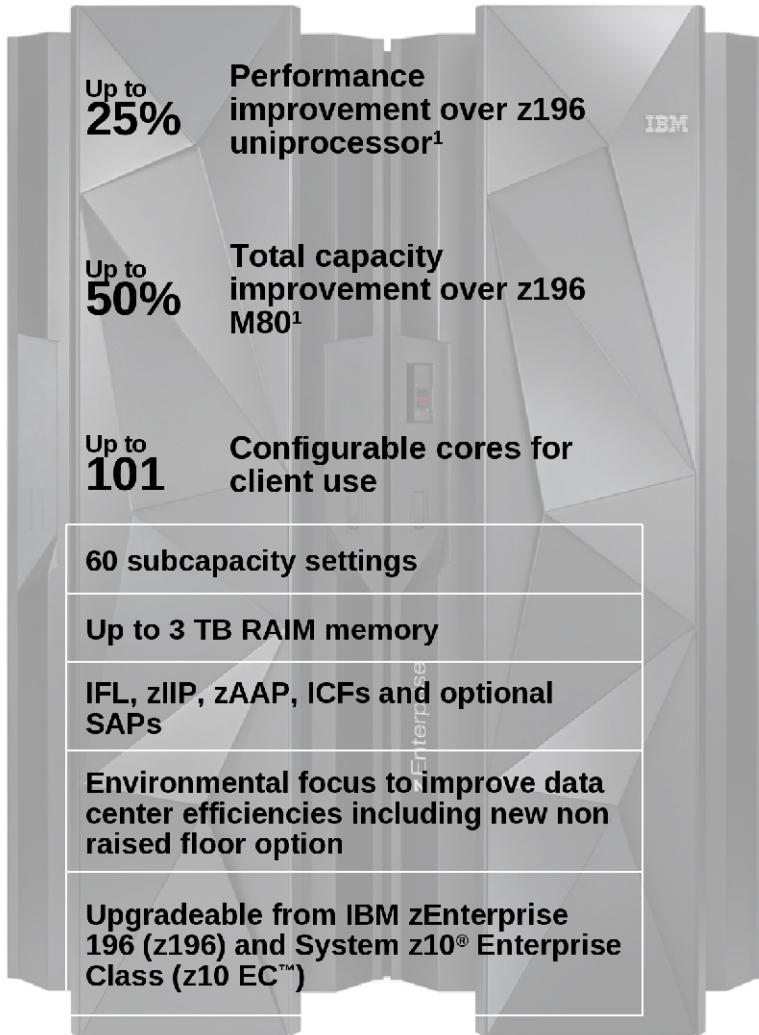# zEnterprise zBX Hybrid Architecture – *Logical Design*

… By mapping each server to an architecture optimized for its requirements

System z Hardware Management Console (HMC)
with Unified Resource Manager

System z

Select IBM Blades

Optimizers

z/OS

z/TPF z/VSE

Linux on System z

Linux on System z

Windows and Linux on System x

Windows 64-bit

AIX on POWER7

DataPower XI50z

DataPower XI50z

z/VM

KVM Hypervisor

KVM Hypervisor

POWER VM EE Hypervisor

System z PR/SM™

z HW Resources

Blade HW Resources

Support Element

zBX

zEnterprise Ensemble
Private Layer 2 Data Network (OSA Express 4S)

Unified Resource Manager

Private Management Network

Private High Speed Data Network (Layer 2)

Customer Network

Customer Network

6

zEnterprise EC12 is the core of next generation System z

Up to 25%	Performance improvement over z196 uniprocessor[1]
Up to 50%	Total capacity improvement over z196 M80[1]
Up to 101	Configurable cores for client use

60 subcapacity settings

Up to 3 TB RAIM memory

IFL, zIIP, zAAP, ICFs and optional SAPs

Environmental focus to improve data center efficiencies including new non raised floor option

Upgradeable from IBM zEnterprise 196 (z196) and System z10® Enterprise Class (z10 EC™)

zEC12
Machine Type: 2827
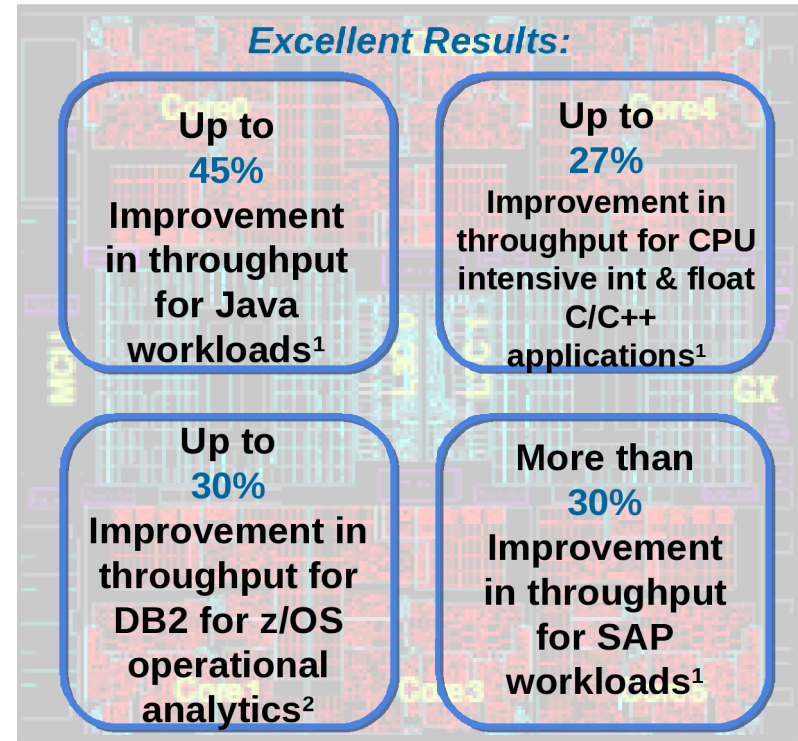### *Models: H20, H43, H66, H89, HA1*

- Advanced Technology 5.5 GHz processor chip for performance boost for all workloads
    - Over **78,000 MIPS** for large scale consolidation
    - **Larger cache** for data serving
- Processor chip optimized for software performance
    - Advanced performance functions exploited by **Java, PL/I, compilers, DB2** and more
- Innovation to drive availability to superior levels
    - **IBM zAware** with out-of-band analytics provide point in time snap-shot of the current state of your business and can help you improve availability
    - **FLASH Express and pageable large pages** to drive availability and performance for critical workloads
- Security and reliability are in our DNA
    - High speed **cryptography integrated as part of the chip**
    - Enhanced support for applications requiring data encryption, cryptographic keys and digital signing with new **Crypto Express4S**
    - PR/SM designed for **EAL5+ certification**

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

Processor chip optimized for software performance
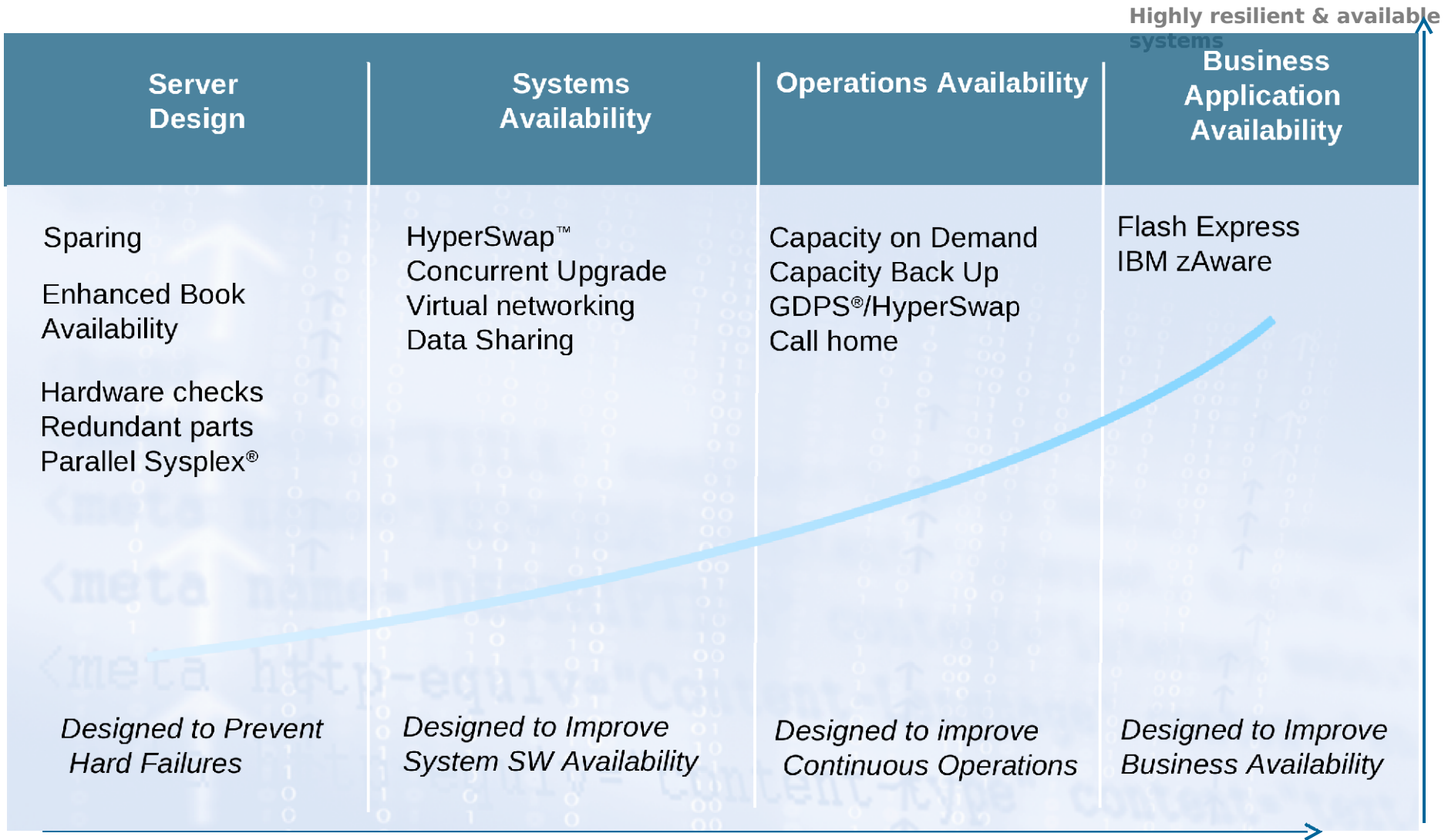*Exploited by Java, PL/I, compilers, DB2, more*

- **Our leadership in microprocessor design supports a boost in performance for all workloads**
  - Second generation out of order execution design
  - Multi-level branch prediction supports complex workloads
- **Larger caches to optimize data serving environments**
  - Almost 2x on chip and 2x additional on book
- **New hardware functions optimized for software performance**
  - *Transactional Execution Facility* for parallelism and scalability
  - *Runtime Instrumentation Facility* is intended to help reduce Java overhead
  - *2 GB page frames* are intended to offer performance Improvements for DB2 buffer pools and Java heaps
  - New IBM Enterprise PL/I compiler is planned to exploit and get a performance boost from **decimal format conversions facility**
  - Up to **30% improvement in IMS™ throughput** due to faster CPU, cache and compliers[1]

Excellent Results:

Up to **45%** Improvement in throughput for Java workloads[1]	Up to **27%** Improvement in throughput for CPU intensive int & float C/C++ applications[1]
Up to **30%** Improvement in throughput for DB2 for z/OS operational analytics[2]	More than **30%** Improvement in throughput for SAP workloads[1]

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[1] Based on preliminary internal measurements and projections
[2] As measured by the IBM 9700 Solution Integration Center. The measured operational BI workload consists of 56 concurrent users executing a fixed set of 160,860 Cognos reports . Compared DB2 v10 workload running on IBM's z196 w/10 processors to an zEC12 w/10 processors
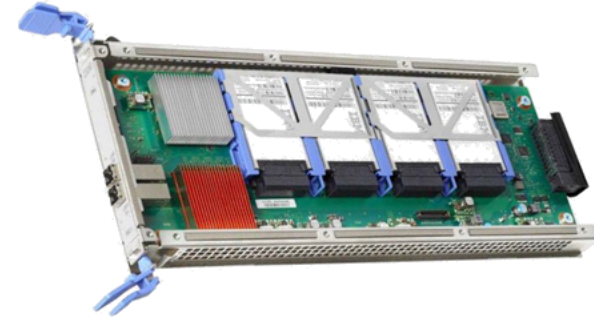
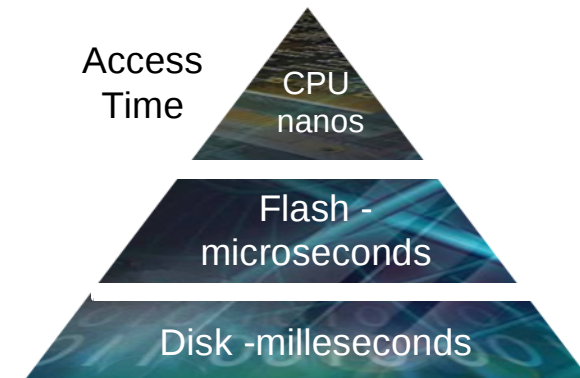# Extending System z Availability with Flash Express and IBM zAware

Highly resilient & available systems

Server Design	Systems Availability	Operations Availability	Business Application Availability
Sparing Enhanced Book Availability Hardware checks Redundant parts Parallel Sysplex®	HyperSwap™ Concurrent Upgrade Virtual networking Data Sharing	Capacity on Demand Capacity Back Up GDPS®/HyperSwap Call home	Flash Express IBM zAware
Designed to Prevent Hard Failures	*Designed to Improve System SW Availability*	*Designed to improve Continuous Operations*	*Designed to Improve Business Availability*

Flash Express – What is it?

FLASH Express

- **Physically comprised of internal storage on Flash SSDs**
- **Used to deliver a new tier of memory, storage class memory**
- **Uses standard PCIe I/O drawer**
- **Supported on z/OS® V1.13 plus web deliverable**
- **Flash Express cards delivered as a RAID 10 mirrored card pair**
- **Sized to accommodate** *all LPAR paging*
  - Each card pair provides **1.6 TB** usable storage (3.2 TB total)
  - Maximum 4 card pairs (4 X1.6=6.4 TB)
- **Immediately usable**
  - No capacity planning needed
  - No intelligent data placement needed
  - Full virtualization of card across partitions
- **Robust design**
  - Designed for long life
  - Designed for concurrent replacement or upgrade
- **Security Characteristics**
  - Data encrypted on the flash express adapter with 128 bit AES encryption
  - Keys stored on smart cards plugged into the System z SE
  - Removal of smart cards renders data unusable

One Flash Express Card

Access Time

CPU - nanos

Flash - microseconds

Disk -milleseconds

Flash memory blurs the distinction between memory and storage characteristics

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# IBM Flash Express – Smarter Availability for Smarter Systems

- **Flash Express is an innovative solution designed to help you compete effectively in today's market**
  - Automatically improve availability for key workloads at critical processing times
  - Drive availability and performance for workloads that cannot tolerate paging spikes or inconsistent performance
  - Slash latency for critical application processing such as diagnostics collection
- **Extends IBM's expertise in memory management introducing a new tier of memory using Flash Express**
- **Provides a secured, resilient and immediately usable solution**
- **Planned Flash Express and pageable large page exploiters:**
  - z/OS V1.13 *Language Environment*
  - *Java SDK7* and by extension
    - *WAS Liberty Profile* v8.5
    - *DB2*
    - *IMS 12*
    - And a future release of *CICS® Transaction Server*
  - *IMS 12 Common Queue Server*

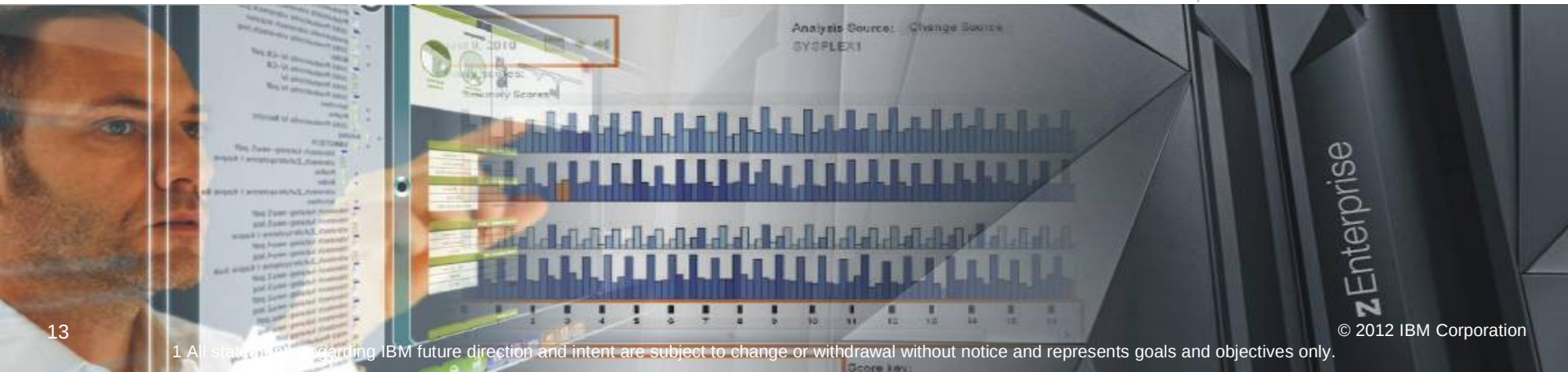# IBM zAware delivers smarter message monitoring capabilities

- **The complexity and rate of change of today's IT infrastructures stress the limits of IT to resolve problems quickly and accurately–while preserving SLAs**
- **IT is challenged to diagnose system anomalies and restore service quickly**
    - Systems often experience problems which are difficult or unusual to detect
    - Existing tools do little to quickly identify messages preceding system problems
    - Some incidents begin with symptoms that remain undetected for long periods of time
    - Manual log analysis is skills-intensive, and prone to errors
- **IBM zAware with Expert System Diagnostics Gets it Right, Fast**
    - IBM zAware helps improve problem determination in near real time – helps rapidly and accurately identify problems and speed time to recovery
    - Analyzes massive amounts of data to identify problematic messages, providing information to enable faster corrective action
    - Analytics on log data provides a near real time view of current system state
    - Cutting edge pattern recognition examines system behavior to help you pinpoint deviations
    - Machine learning, modeling and historical data work to describe your unique environment
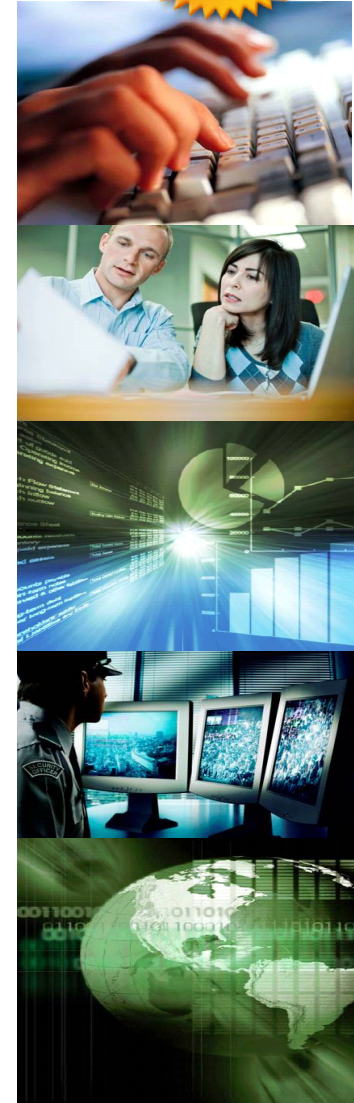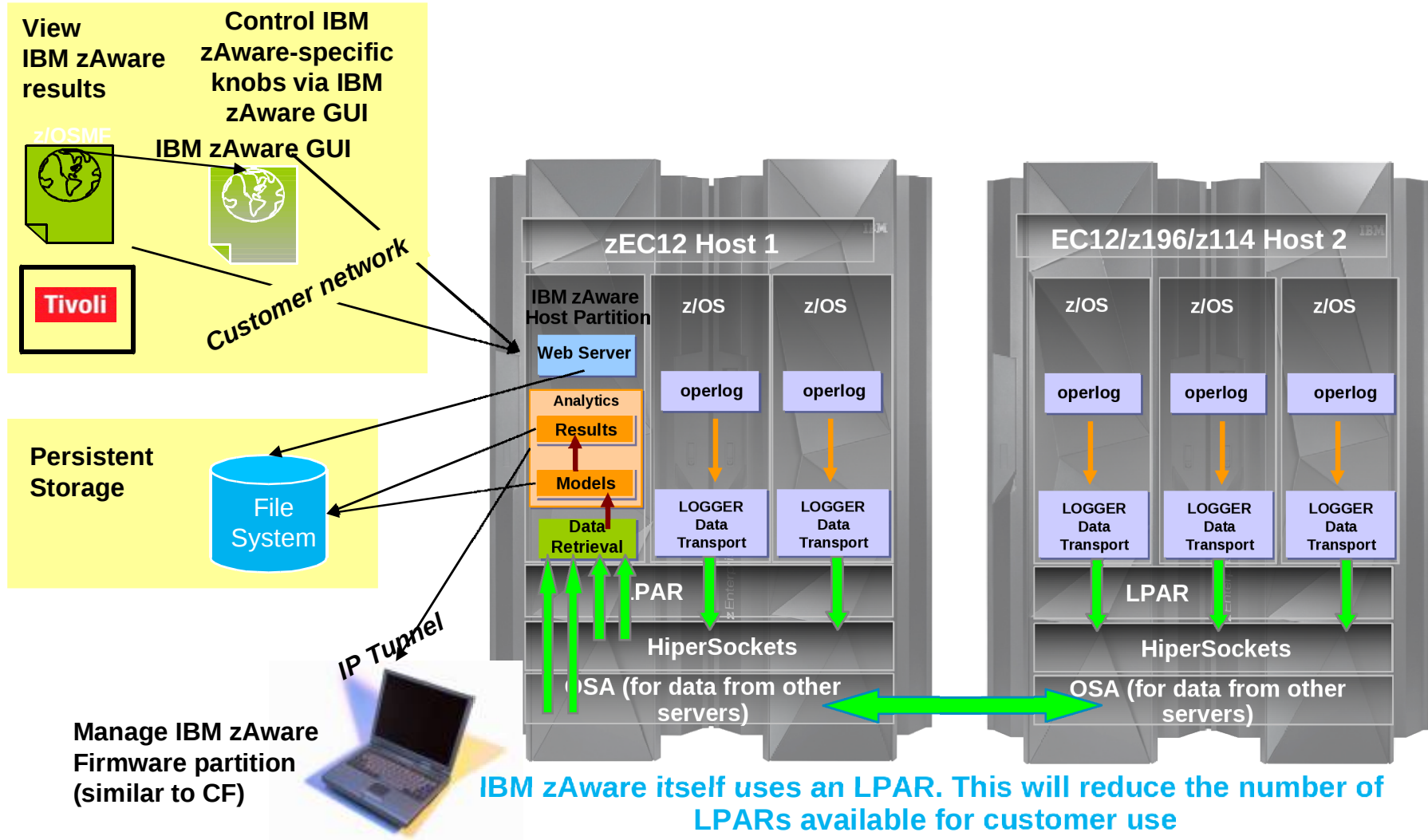
IBM zAware - Identifies Unusual System Behavior

IBM zAware contains sophisticated analytics, applies IBM insight, and <u>machine learning</u> to understand your unique system.

Monitoring	Detection	Frequency	Reporting
• Supports IBM and non IBM middleware and applications • Monitors OPERLOG in a sysplex or monoplex • Assigns a message anomaly score to help identify potential issues	• Detects anomalies other solutions might miss • Can find the rare or infrequent message • Can detect an unusual number of normal messages • Can detect messages issued out of context	• Samples every 2 minutes • 10 minute interval • Uses 90 day rolling baseline; a utility provided to populate baseline; flexibility provided	• Near real time analysis • Intuitive reporting – both high level and drill down • Color coded browser display • XML output can feed ISVs or processes – Tivoli® intends to provide alert and event notifications[1]

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

A closer look inside IBM zAware

View IBM zAware results

Control IBM zAware-specific knobs via IBM zAware GUI

z/OSMF

IBM zAware GUI

Tivoli

Customer network

Persistent Storage

File System

IP Tunnel

Manage IBM zAware Firmware partition (similar to CF)

zEC12 Host 1

IBM zAware Host Partition

Web Server

Analytics
Results
Models
Data Retrieval

z/OS — operlog — LOGGER Data Transport
z/OS — operlog — LOGGER Data Transport

LPAR

HiperSockets

OSA (for data from other servers)

EC12/z196/z114 Host 2

z/OS — operlog — LOGGER Data Transport
z/OS — operlog — LOGGER Data Transport
z/OS — operlog — LOGGER Data Transport

LPAR

HiperSockets

OSA (for data from other servers)

IBM zAware itself uses an LPAR. This will reduce the number of LPARs available for customer use

Note: z/OS 1.13 plus PTFs or higher for monitored client

# IBM System z Security as the Enterprise Standard

- **Intrinsic platform security and privacy for transactions and sensitive data helps enable System z to be the secure enterprise application server and data vault**
  - Hardware cryptography built into each general purpose CP and IFL, and via the new Crypto Express4S coprocessors
  - Secure your critical information assets (or data) throughout their life cycle
- **Security capabilities that span the needs of multiple industries**
  - Strong focus on security and crypto functions required by the Banking/Finance industries
  - Support for the payment card industry with solutions that leverage the zEC12 for compliance and security (i.e. EMV for American Express)
  - New IBM Enterprise PKCS #11 Coprocessor firmware and support from z/OS helps meets the requirements of the European Union and public sector clients
- **Leveraging the strengths of operating system security and cryptographic capabilities**
  - Qualities needed by enterprises adopting cloud application architectures
  - Wide range of cryptographic primitives exploited by operating system and middleware to help secure and accelerate workloads
- **zEC12 supports the System z exclusive protected key processor based cryptography**
  - Blends the speed of processor based crypto with the security of the Crypto Express coprocessor
- **PR/SM™ designed for EAL 5+ certification**

Crypto Express4S

new!

- **One PCIe adapter per feature**
  - › **Initial order – two features**
- **FIPS 140-2 Level 4**
- **Installed in the PCIe I/O drawer**
- **Up to 16 features per server**
- **Prerequisite: CPACF (#3863)**
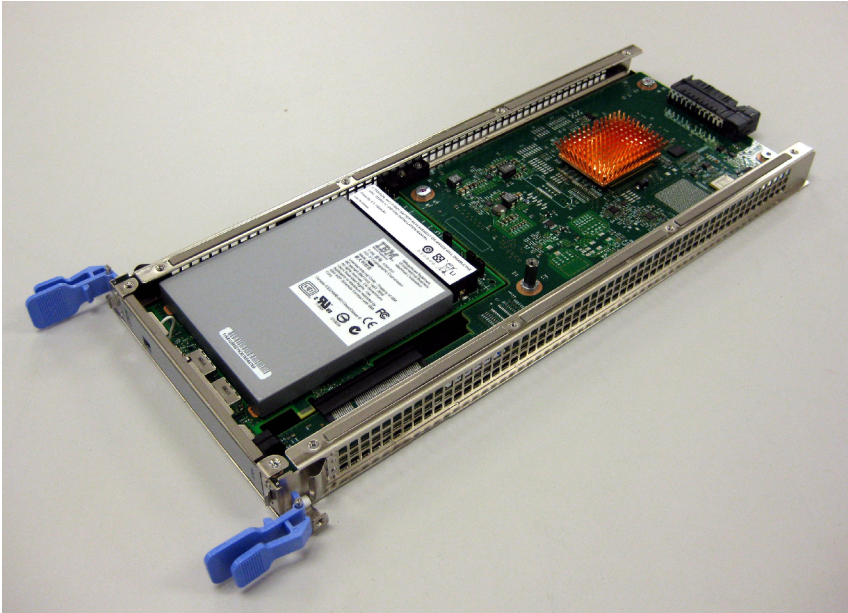
Three configuration options for the PCIe adapter
- Only one configuration option can be chosen at any given time
- Switching between configuration modes will erase all card secrets
  - Exception: Switching from CCA to accelerator or vice versa

- Accelerator
  - For SSL acceleration
  - Clear key RSA operations

- **Enhanced: Secure IBM CCA coprocessor (default)**
  - Optional: TKE workstation (#0841) for security-rich, flexible key entry or remote key management

- **New: IBM Enterprise PKCS #11 (EP11) coprocessor**
  - Designed for extended evaluations to meet public sector requirements
    - Both FIPS and Common Criteria certifications
  - *Required:* TKE workstation (#0841) for management of the Crypto Express4S when defined as an EP11 coprocessor

zEC12 – Supports efficiencies in the data center

- **New non-raised floor option offers flexible possibilities for the data center**

- **Continuing to support options for better control of energy usage and improved efficiency in your data center**

  - zEC12 has a new radiator-based air cooled system design for more efficient cooling and improved concurrent maintenance

  - Water cooled options on zEC12 allow for up to 9% additional data center energy savings[1]

  - Savings with optional HV DC power when implemented in a new data center could be on the order of 7-12% of server input power[2]

- **More capacity but little change to the footprint in the data center**

  - Identical floor cutouts for zEC12 as the z196 and z10 EC[3] with no significant increase in weight

  - Depth of system with covers will increase by 64 mm / 2.52 inches

- **Over 12 years experience in designing and building earthquake resistant servers**

[1] Based on internal measurements with average power usage effectiveness (PUE) of 2 with well configured zEC12 configuration.
[2] Based on internal measurements and projections.
[3] With the exception of water cooling and overhead cabling

17

Synergy with zEC12 operating systems

z/OS

- Java exploitation of **Transactional Execution** for **increased parallelism and scalability**
- Enhanced security support for **digital signatures**
- Faster problem determination with **IBM zAware for improved availability**
- Improve availability and performance with **Flash Express**
- **2 GB page** support
- Simpler Specialty Engine (**zIIP**) exploitation
- z/OS v1.13 exploitation of new hardware
- Plus **over 4,100** applications enabled on z/OS®

z/VM

- z/VM® **Compatibility support**
- Guest exploitation **support for new encryption technology**
- Improved I/O performance using **High Performance FICON (zHPF)** for guest exploitation

Linux on System z

- **Improved consolidation ratio** through new capacity performance
- Improved I/O performance using **High Performance FICON (zHPF)**
- **Application and Linux optimization** enabled by full exploitation of zArchitecture extensions
- Optimized system setup via **Linux health checker**
- **FCP end-to-end data integrity checking** for applications and storage subsystems
- Plus **over 3,000** applications on System z

z/TPF

- Support for **86 CPUs**
- **Hardware exploitation** for performance improvements

z/VSE

- **64-bit addressing** with z/VSE® V5.1
- Strong **interoperability with Linux** on System z
- New CICS functionality (**CICS Explorer**)

- **AND** with blades on the zBX there are even more options with applications on **AIX, Linux on System x or Microsoft Windows**

18

Operating System Support for zEC12

- **The following are the minimum operating systems planned to run on zEC12:**
  - z/OS
    - z/OS V1.12, V1.13
    - z/OS V1.11, V1.10 Lifecycle Extension
  - Linux on System z distributions:
    - SUSE Enterprise Server (SLES) SLES 10 and SLES 11
    - Red Hat Enterprise Linux (RHEL) 6 and RHEL 5
  - z/VM
    - VM V5.4, 6.1, 6.2 with PTFs
    - z/VM V6.1, 6.2 for zBX support
  - z/VSE
    - z/VSE V4.3, V5.1, with PTFs
    - z/VSE V5.1 with PTFs for Crypto Express4S toleration
  - z/TPF V1.1
- **Using the general purpose application server blades we have:**
  - Linux: Red Hat RHEL 5.5 and up, 6.0 and up and SUSE Linux Enterprise Server (SLES) 10 (SP4) and up and SLES 11 SP1 and up
  - Microsoft Windows Server 2008 R2 and Microsoft Windows Server 2008 (SP2) (for either Windows we recommend Datacenter Edition)
  - AIX: AIX 5.3 Technology Level 12 or higher, AIX 6.1 Technology Level 5 or higher, AIX 7.1

IBM zEnterprise EC12 in an information-centric world

Operational analytics to enable business opportunities

- Most sophisticated data warehousing and analytics solutions with the fastest query performance in the market
- Leverage your data to build competitive advantage

Trusted resilience for unmatched security and reliability

- Most secure system with 99.999% reliability
- Unified platform for rapid development of secure applications end-to-end

Efficiency at scale

- Most efficient and fastest system for mission-critical workloads
- Increased efficiency will free up IT resources to focus on new services to drive growth
- Hybrid architecture enables rapid cloud deployment

Gracias