7 Kasım 2012 - Çırağan Palace Kempinski

IBM Connected 2012 Istanbul

Learn. Collaborate. Innovate.

IBM zEnterprise EC12

Dennis Wunder
Executive IT Specialist, IBM

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Notes:

Performance is in Internal Throughput Rate (ITR) ratio based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput that any user will experience will vary depending upon considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve throughput improvements equivalent to the performance ratios stated here.

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As the demands on IT continue to increase...

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

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

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

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

Internet connected devices growing 42% per year

Since 2000 security vulnerabilities grew eightfold

…IT budgets are growing less than 1% per year.

The Development Focus

Then (up to ~2003)

- <u>Scaling</u> **drove performance**
- Scaling **drove down cost**
- Performance **constrained**
- <u>Active</u> **power dominates**
- **Focus on** <u>processor</u> **performance**

Now

- <u>*INNOVATION*</u> **drives performance**
- Scaling **drives down cost**
- Power **constrained**
- <u>Standby</u> **power dominates**
- **Focus on** <u>*SYSTEM*</u> **performance**

We can no longer simply increase the clock frequency (processor "speed") at the same rate as we have in the past in order to increase performance. - Intel Paper: From a Few Cores to Many, 2006

Information technology today: Limitations

Information technology today is limited by the technology and architecture configurations available.
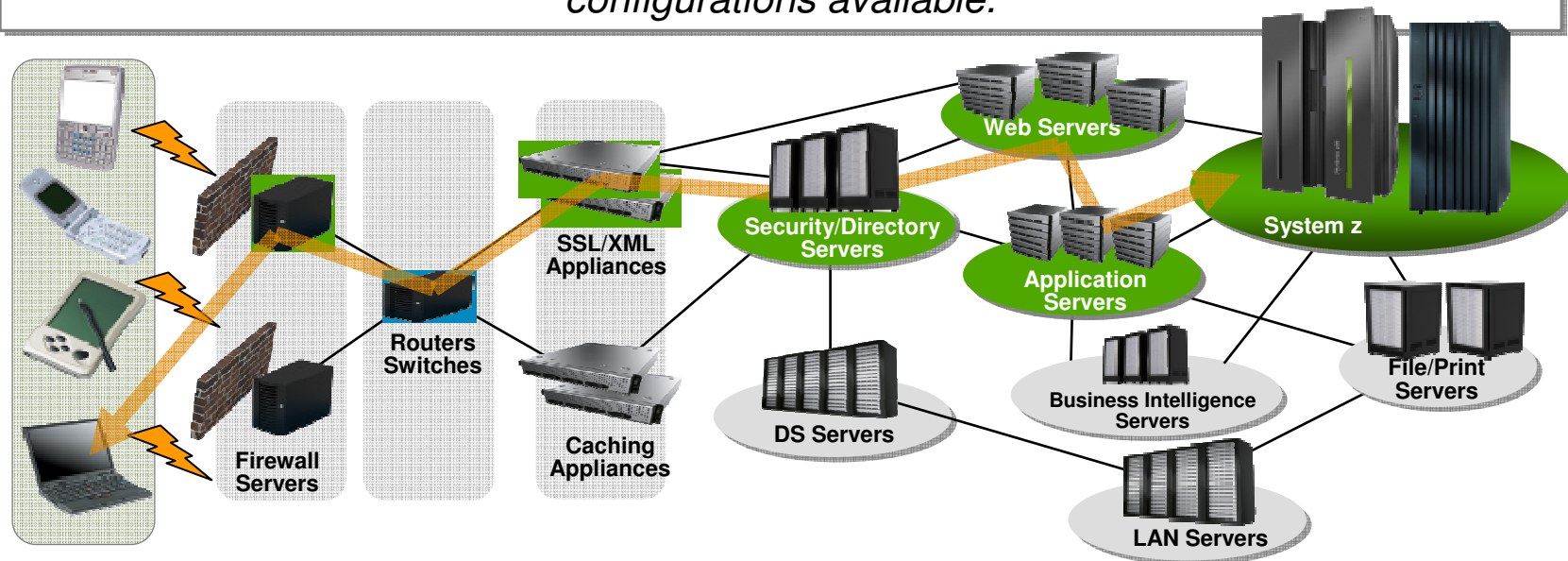
- Business processes and the applications that support them are becoming more service oriented, modular in their construction, and integrated.

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

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

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

IBM zEnterprise System-
Embracing multi-platform, multi-operating environments with more management capability

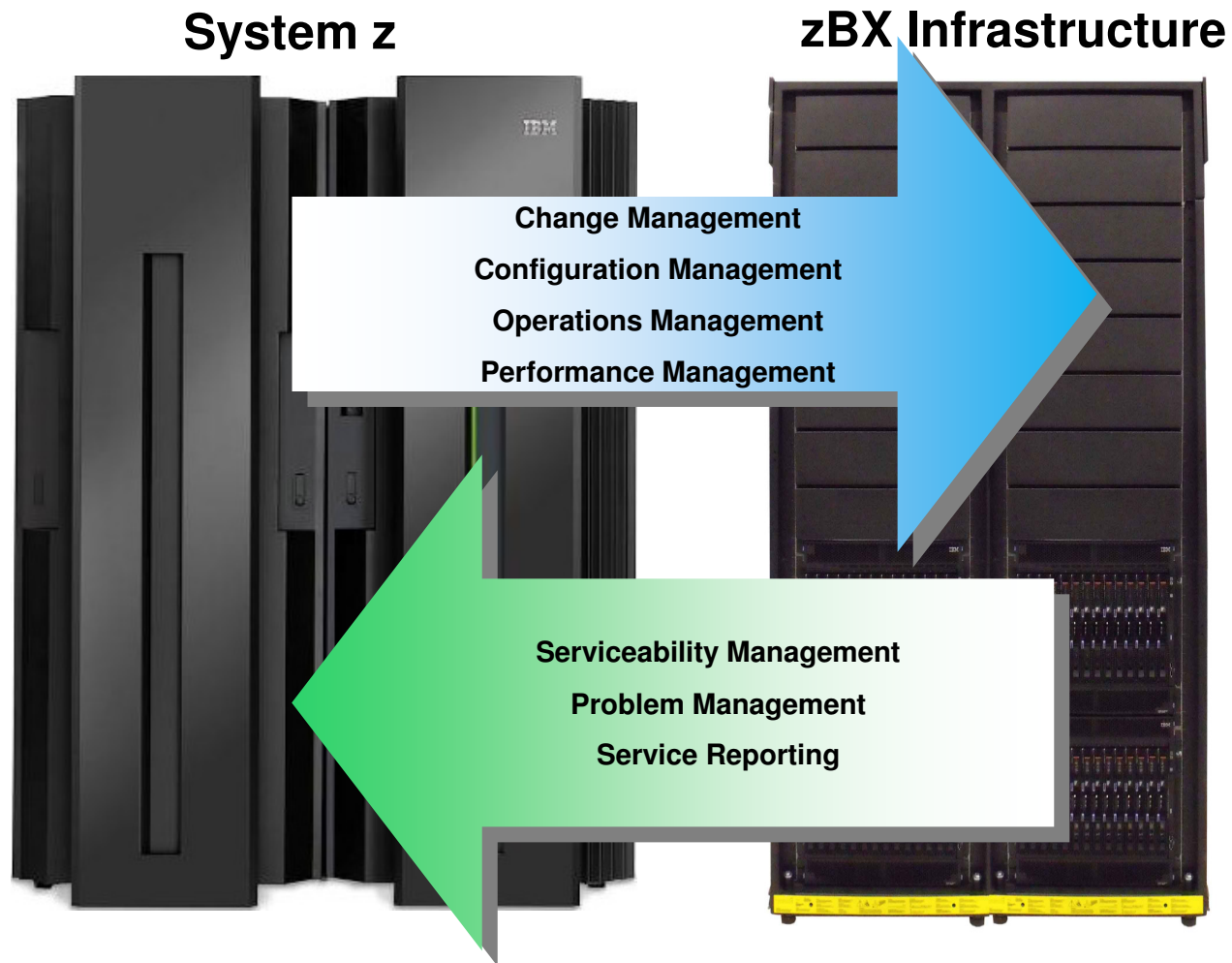| **IBM zEnterprise z196, z114, zEC12**	**zEnterprise Unified Resource Manager**	**zEnterprise BladeCenter Extension (zBX)**
▪ Optimized to host large-scale database, transaction, and mission-critical applications ▪ The most efficient platform for large-scale Linux consolidation ▪ Capable of massive scale-up	▪ Unifies management of resources, extending IBM System z qualities of service end-to-end across workloads ▪ Provides platform, hardware and workload management	▪ Selected IBM POWER7 blades and IBM System x Blades* for tens of thousands of AIX, Windows and Linux applications ▪ High-performance optimizers and appliances to accelerate time to insight and reduce cost ▪ Dedicated high-performance private network

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

Unified Resource Management

System z

zBX Infrastructure

Change Management

Configuration Management

Operations Management

Performance Management

Serviceability Management

Problem Management

Service Reporting

IBM zEnterprise EC12 System: The Next Generation in Hybrid Computing

The foundation for a
secure cloud for data*,*
enabling enterprises to
improve service to their
customers.

Efficiency at scale
Provides a highly secure and
scalable enterprise cloud for
efficiently running multiple
critical applications

Operational analytics
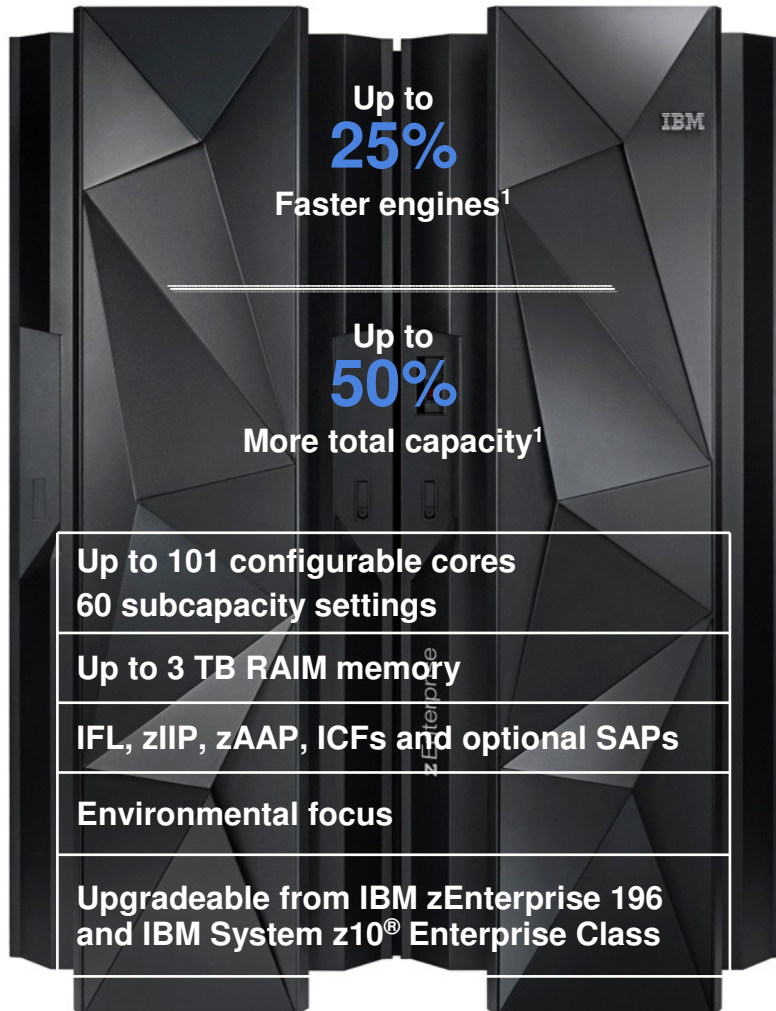A secure and scalable
enterprise data repository
that integrates operational
analytics for accelerated
insight

Ultimate security
Delivering unmatched security for
critical business processes,
applications and data

8

zEnterprise EC12 is the core of next generation System z

Up to
25%
Faster engines[1]

Up to
50%
More total capacity[1]

Up to 101 configurable cores
60 subcapacity settings

Up to 3 TB RAIM memory

IFL, zIIP, zAAP, ICFs and optional SAPs

Environmental focus

Upgradeable from IBM zEnterprise 196
and IBM System z10® Enterprise Class

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 – exploited by *Java, PL/I, compilers, DB2* and more
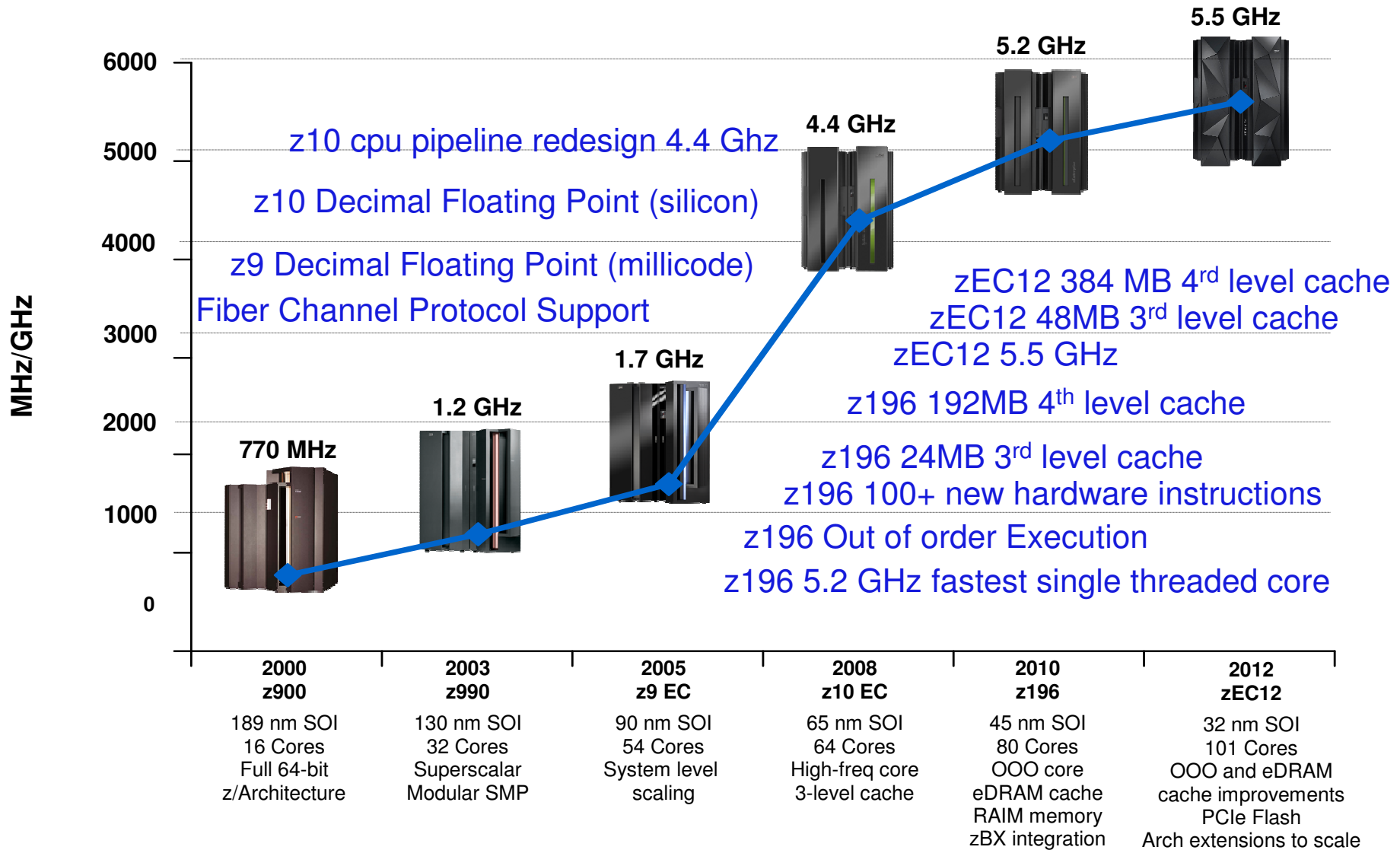
Innovation to drive availability to superior levels

– *IBM zAware* offers snap-shot of the current state of your business
– *FLASH Express and pageable large pages* to drive availability and performance for critical workloads

Trusted resilience is a zEnterprise standard

– High speed *cryptography integrated as part of the chip*
– Enhanced functions with new *Crypto Express4S*
– PR/SM designed for *EAL5+ certification*

[1] Based on preliminary internal measurements and projections against a z196. Official performance data will be available upon announce and can be obtained online at LSPR (Large Systems Performance Reference) website at: https://www.ibm.com/servers/resourcelink/lib03060.nsf/pages/lsprindex. Actual performance results may vary by customer based on individual workload, configuration and software levels.

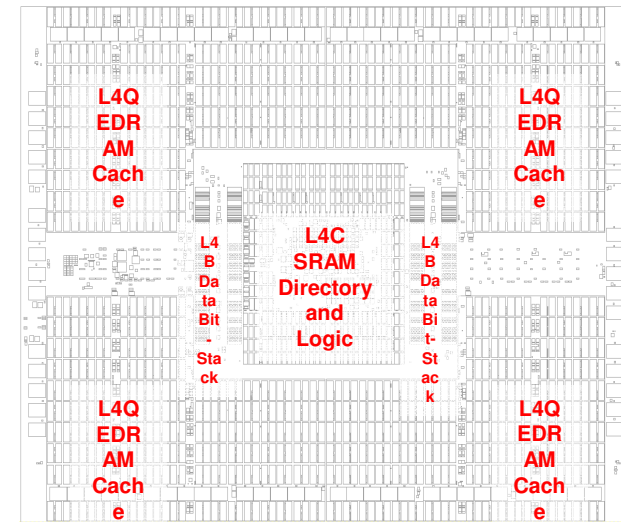# zEC12 Continues the CMOS Mainframe Heritage Begun in 1994

5.5 GHz

5.2 GHz

4.4 GHz

MHz/GHz

6000

5000

z10 cpu pipeline redesign 4.4 Ghz

z10 Decimal Floating Point (silicon)

4000

z9 Decimal Floating Point (millicode)
Fiber Channel Protocol Support

zEC12 384 MB 4rd level cache
zEC12 48MB 3rd level cache

3000

zEC12 5.5 GHz

1.7 GHz

z196 192MB 4th level cache

1.2 GHz

2000

z196 24MB 3rd level cache
z196 100+ new hardware instructions

770 MHz

1000

z196 Out of order Execution

z196 5.2 GHz fastest single threaded core

0

2000 z900	2003 z990	2005 z9 EC	2008 z10 EC	2010 z196	2012 zEC12
189 nm SOI 16 Cores Full 64-bit z/Architecture	130 nm SOI 32 Cores Superscalar Modular SMP	90 nm SOI 54 Cores System level scaling	65 nm SOI 64 Cores High-freq core 3-level cache	45 nm SOI 80 Cores OOO core eDRAM cache RAIM memory zBX integration	32 nm SOI 101 Cores OOO and eDRAM cache improvements PCIe Flash Arch extensions to scale

zEC12 Processor Design

- Built on solid foundation of z196
  - Leverage IBM 32nm SOI technology with eDRAM
- Enhanced high-frequency out-of-order core
  - Instruction pipeline streamlined for smoother flow
  - 2nd-level BTB expands branch prediction coverage
  - Faster engine for fixed-point division
  - Millicode performance improvements
- Cache hierarchy leadership extended
  - New structure for 2nd-level private cache
    - Separate optimizations for instructions and data
    - Reduced access latency for most L1 misses
  - 3rd-level on-chip shared cache doubled to 48MB
  - 4th-level book-shared cache doubled to 384MB
- More processors in the same package as z196
  - 6 processor cores per CP chip
  - Crypto/compression co-processor per core
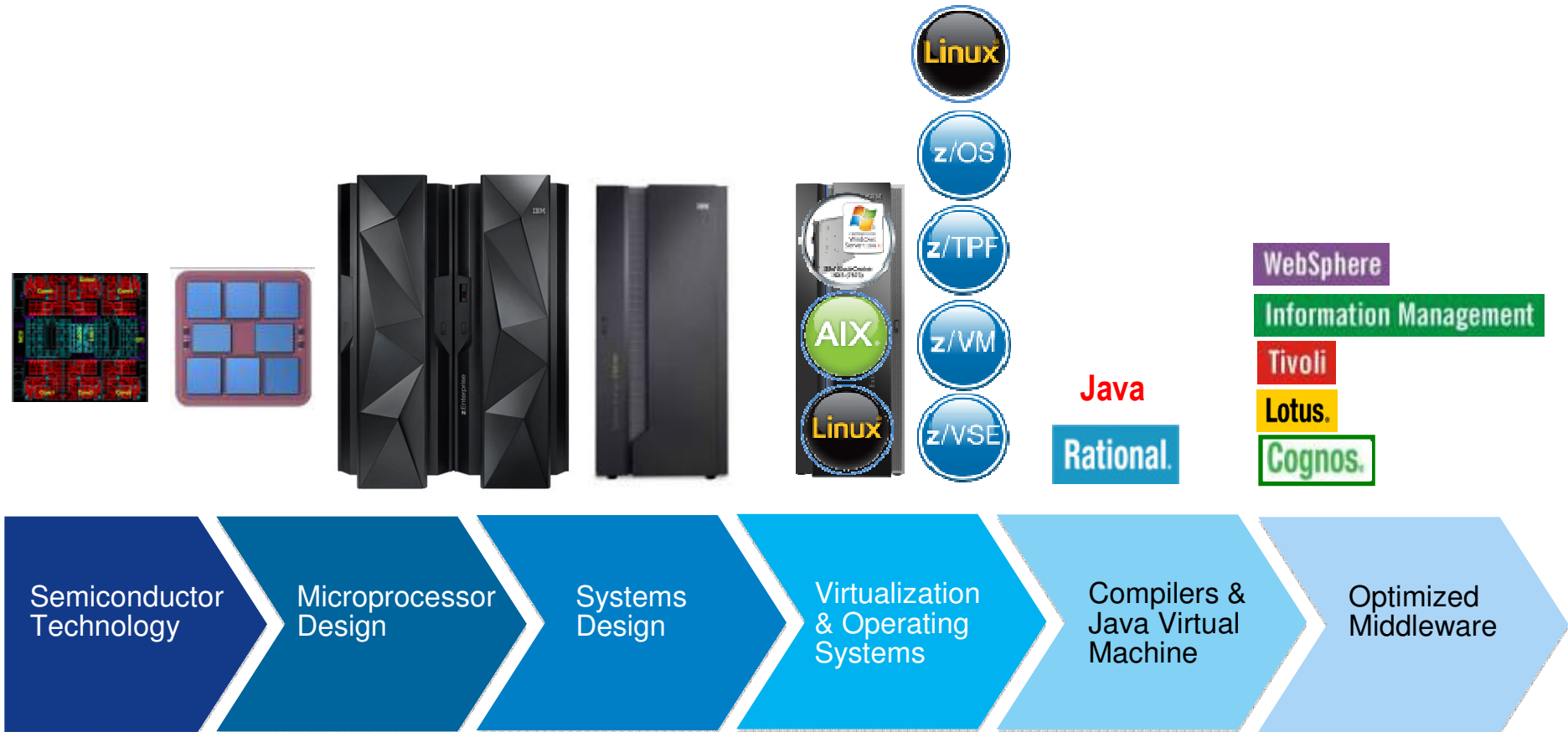 - Same power consumption as z196
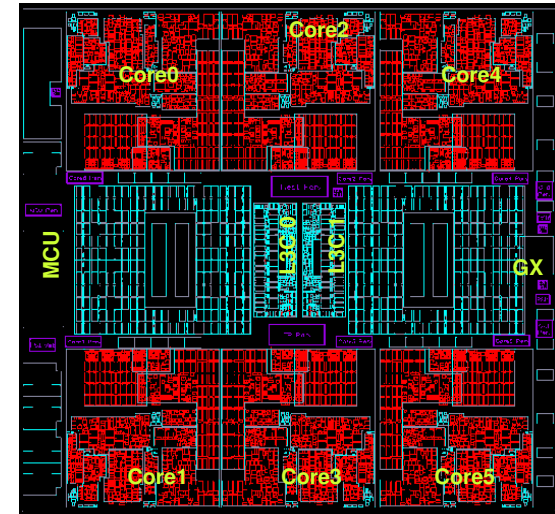
zEC12 PU Chip: 6 cores, 598 mm² chip

zEC12 SC Chip: 192MB cache, 526 mm² hip

IBM zEnterprise: An optimized system

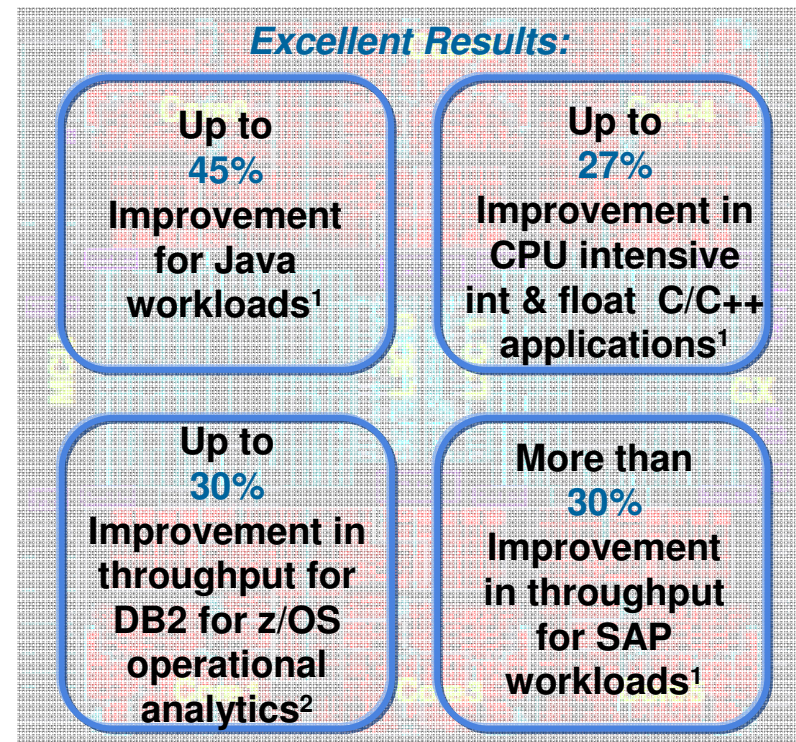| Semiconductor Technology | Microprocessor Design | Systems Design | Virtualization & Operating Systems | Compilers & Java Virtual Machine | Optimized Middleware |

12

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

    - Up to *30% improvement in IMS™ throughput* due to faster CPU and cache, compliers, and more[1]

    - New IBM Enterprise PL/I compiler is planned to exploit and get a performance boost from *decimal format conversions facility*

Excellent Results:

Up to 45% Improvement for Java workloads[1]	**Up to 27% Improvement in 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]**

[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

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

zBX – z Blade Extension
A Uniquely Configured Extension of the zEnterprise

- **zBX Model 003 supported by zEC12**

  – Investment protection – Model 002 upgrades to Model 003

- **No need to make changes to applications and application certifications are inherited from blades**

- **Managed by Unified Resource Manager**

  – Management of resources as defined by your business goals and objectives

  – Integrated network for better security, control and faster time to value

  – Programmable interfaces (APIs) to connect with system management tools for total management capabilities - IBM Tivoli Monitoring (ITM) has been enhanced to use the APIs

zBX
Machine Type: 2458
Model: 003

PS701 blades (112 max)

Up to **112**   **HX5 (7873) blades (56 max)**

DataPower XI50z (28 max)

1-4 Racks based on number of installed blades

One zBX per zEC12

Optional Acoustic Doors

Optional Rear Door Heat Exchanger

Upgradeable from zBX Model 002

PowerHA

NEW
zBladeSizer Tool

Continuing to build a multi-platform roadmap for the future
Strengthening the story

- **IBM Intends to deliver new Systems Director capability through Unified Resource Manager APIs[1]**

  - Ability to discover, inventory, and visualize zBX resources under the Systems Director umbrella

  - Image management provided for blades with in a zBX to support provisioning of new virtual servers

  - Energy Management of the zBX to lower energy consumption and costs

  - Power capping on System x and Power blades and power savings for Power blades

- **In the future, System z will continue to expand in the hybrid computing area[1]**

- **IBM intends to deliver workload-aware optimization for System x blades through function in Unified Resource Manager[1]**

- **IBM intends to deliver automated multi-site recovery for zBX hardware components based upon Geographically Dispersed Parallel Sysplex™ GDPS® technologies.[1]**

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

zEnterprise and PureSystems Hybrids

zEnterprise Client Optimized Systems	PureSystems Integrated Expert Systems

Tivoli Enterprise Service Management

zManager

SE

FSM

- Multi-Architecture System for z/OS, AIX, Linux and Windows
- Centrally managed through the Unified Resource Manager
- Best fit when data or applications exist on System z and clients desire z governance

- Multi-Architecture system for AIX, i/OS, Linux and Windows
- Centrally managed through Flex System Manager (FSM)
- Best fit when data and applications run on a combination of POWER and System x architecture and clients desire distributed system governance

- Leverage Next Generation Hardware and Integrated Hardware Features
- Preserves Integrated, z-Centric Heterogeneous Management Model (zManager Control)
- No Requirement for Flex System Manager Functions (hardware or virtualization)
- Customer Investment Protection (Workloads and Management Features)
- Multi-Platform Management Federation provided by Tivoli

IBM DB2 Analytics Accelerator
Accelerating decisions to the speed of business

Blending System z and Netezza technologies to deliver unparalleled, mixed workload performance for complex analytic business needs.

Get more insight from your data
- Designed for long-running queries
- Fast, predictable response times for "right-time" analysis
- Accelerate analytic query response times - 2.5 hours to 5 seconds!
- Transparent to the application
- Connects to/directly managed by DB2 for z/OS
- Minimize the need to create data marts for performance
- Highly secure environment for sensitive data analysis
- In production in days
- Improve price/performance for analytic workloads
- Based on Netezza technology

IDAA Performance & Savings

Query	Total Rows Reviewed	Total Rows Returned		DB2 Only			DB2 with IDAA			Times Faster
				Hours	Sec(s)		Hours	Sec(s)		
Query 1	2,813,571	853,320		2:39	9,540		0.0	5		1,908
Query 2	2,813,571	585,780		2:16	8,220		0.0	5		1,644
Query 3	8,260,214	274		1:16	4,560		0.0	6		760
Query 4	2,813,571	601,197		1:08	4,080		0.0	5		816
Query 5	3,422,765	508		0:57	4,080		0.0	70		58
Query 6	4,290,648	165		0:53	3,180		0.0	6		530
Query 7	361,521	58,236		0:51	3,120		0.0	4		780
Query 8	3,425.29	724		0:44	2,640		0.0	2		1,320
Query 9	4,130,107	137		0:42	2,520		0.1	193		13

Queries run faster

- **Save CPU resources**

- **People time**

- **Business opportunities**

Actual customer results, October 2011

DB2 Analytics Accelerator: "we had this up and running in days with queries that ran over 1000 times faster"

DB2 Analytics Accelerator: "we expect ROI in less than 4 months"
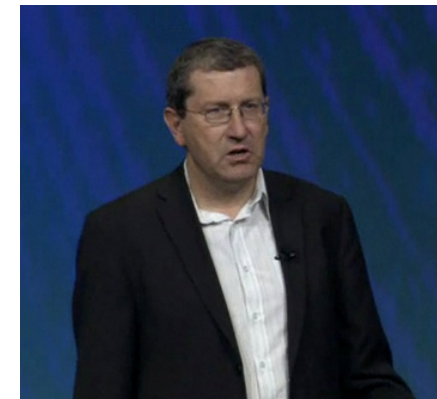
http://www.youtube.com/watch?v=xkcp_pJxT5E

Accelerating decisions to the speed of business

IBM DB2 Analytics Accelerator V3.1 - Highlights

Building on the Core Values

Fast

Complex queries run
up to 2000x faster while
retaining single record
lookup speed

Cost Saving

Eliminate costly query
tuning while offloading
complex query
processing

Appliance

No applications to
change, just plug it in,
load the data, and gain
the value

Reducing the Cost of High Speed Analytics

Choice of historical data location – High Performance Storage Saver
Reduces host data warehouse storage usage by over 95%
Significantly reduces cost of host storage resources and administration

Real time analytics – Incremental Update
Data changes are propagated for high-speed use as they occur
Current information is available for right-time decisions
Extends the accelerator use to reporting on operational data

Faster data refresh – Unload Lite
Data available for analytics faster
Refresh of tables or partitions is much faster and more efficient
More optimized version of unloading data from DB2

New capacity – Full range of Netezza models supported
Now expandable to 960 cores and 1.28 petabytes

New queries
More queries eligible for acceleration

Operational Analytics
can rapidly deploy actionable insight.

"The IBM DB2 Analytics Accelerator delivers the speed to create the insights we need to work smarter. Putting the right answers into the hands of decision makers in seconds, across our business enables us to quickly adapt and grow."

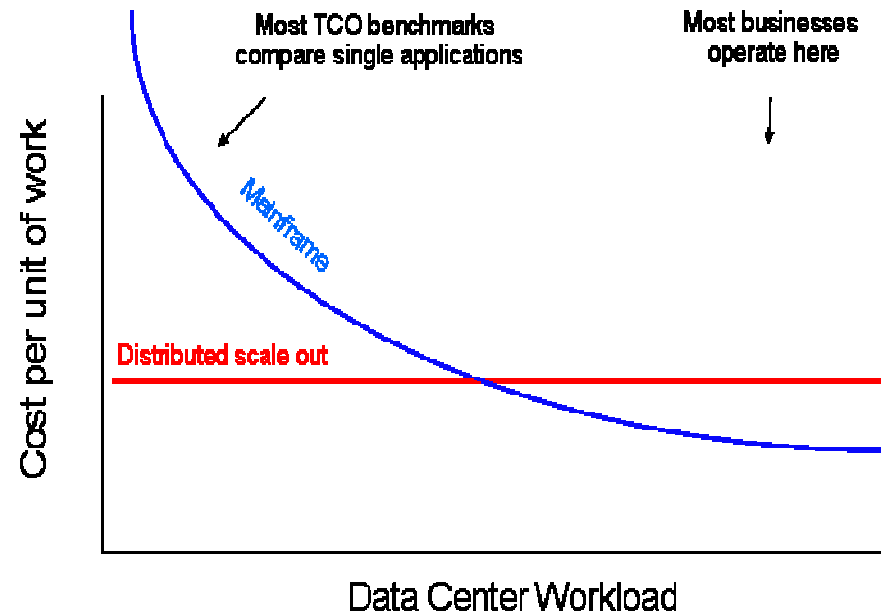*– Reto Estermann,*
Director, Information Technology,
SwissRe

Swiss Re

"We deployed our production business analytics environment on System z within 11 days, providing us with an efficient platform that ensures the flexibility, availability and reliability that our users demand. Creating a new Cognos server used to take months, and now it takes just hours"

Adrienne DiPrima,
*Manager, Strategic Technologies Support. Miami Dade*

MIAMI-DADE COUNTY

Smarter Virtualization
For Cost Savings and Operational Efficiencies

Most TCO benchmarks
compare single applications

Most businesses
operate here

Cost per unit of work

Mainframe

Distributed scale out

Data Center Workload

- **A fundamental strength of z/VM is its ability to *share* system resources to an extreme level**

- **System z virtual machines can share all hardware assets with very high levels of resource *utilization* and virtualization *efficiency***
  - Both real and virtual resources can be shared with very high levels of bandwidth and reliability for enhanced workload throughput
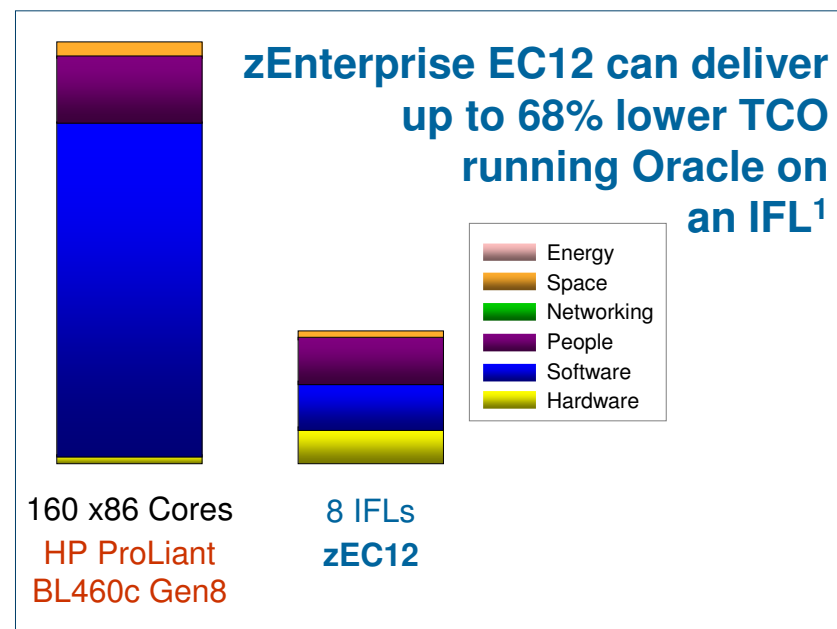
Why High-End Servers?

Mixed Utilization on IBM High End Servers
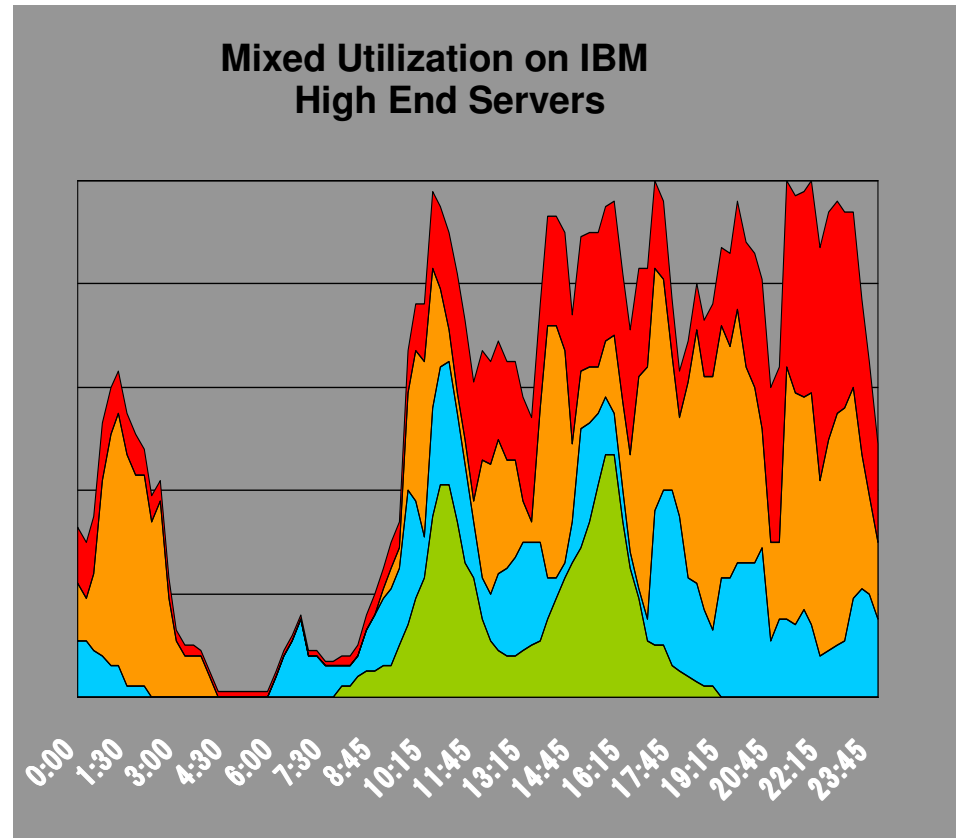
IBM High End Server: Up to 100% utilization

– Highly virtualized and shared resources

– Fewer physical servers, less power, cooling and admin

– Optimized use of software assets

The Economics of Consolidation with System z

Large-scale server consolidation to Linux on System z

– *Allows hundreds of workloads to be deployed over fewer cores in a single system*

– *Massive reductions in software license, energy and facilities costs*

zEnterprise EC12 can deliver up to 68% lower TCO running Oracle on an IFL[1]

Legend:
- Energy
- Space
- Networking
- People
- Software
- Hardware

160 x86 Cores
HP ProLiant
BL460c Gen8

8 IFLs
zEC12

- Simplified IT infrastructure inside a single server, reduced floor space

- Up to 100% utilization

- Tight workload integration

- Highly scalable, flexible and secure

- Business continuance that help avoid downtime

- Reduced energy consumption

- Pay less as you run more

[1] Distributed server comparison is based on IBM cost modeling of Linux on zEnterprise 196 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.

Blue Cross Blue Shield of Minnesota
Reducing TCO with virtualized Linux on System z

Business Challenge:

The Microsoft® Windows® and Intel® processor-based server landscape at Blue Cross and Blue Shield of Minnesota (BCBSM) was inflexible and costly to operate and maintain.

Solution:

IBM helped BCBSM consolidate 140 servers to a single IBM System z® with six Integrated Facility for Linux® (IFL) engines. Key applications now run in Linux virtual servers, while IBM DB2® databases run on z/OS® on the same physical machine.

Benefits:

- Significant TCO reduction over five years

- Virtualization cuts server provisioning times by 99 percent

- Disaster recovery can be achieved 97 percent faster than before

"From every perspective, running applications under Linux on System z makes sense for our organization. Performance, reliability, disaster recovery, server provisioning and cost efficiency have all seen dramatic improvements— helping BCBSM deliver better service and better value to its members across the state."

— Ted Mansk, Director of Infrastructure Engineering and Databases at BCBSM

Solution Components

- IBM System z9® EC

- IBM System z10™ EC

ZSP03163-USEN-00

25

Vietin Bank

BENEFITS to Clients

Scalability for business growth
Strengthen operational risk management

35% business growth past year

Continuous banking services to customers

Across 800 offices and 1200 ATMs
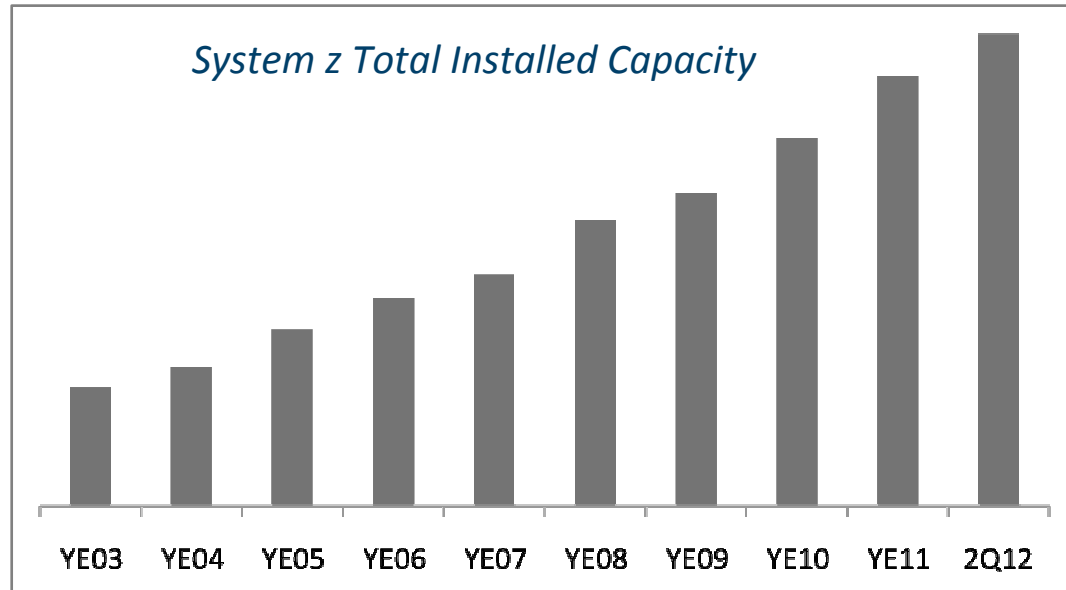
Competitive win over Sun distributed platform

Enterprise Linux Server

"The IBM System z10 BC investment and collaboration with IBM will help us drive significant cost and management efficiencies, rather than allowing large distributed server farm sprawls as developed nations did in recent years."

- Pham Anh Tuan, Deputy Director, VietinBank

Vietnam Joint Stock Bank for Industry and Trade (VietinBank) is one of the largest banking institutions in Vietnam.

ibm.com/press/us/en/pressrelease/32082.wss

Clients continue to invest in the value of zEnterprise

System z Total Installed Capacity

YE03 YE04 YE05 YE06 YE07 YE08 YE09 YE10 YE11 2Q12

150+	**140+**	**36%**	**2/3+**	**1/3+**	**20%+**
BladeCenter Extension units; 1100+ blades shipped* [ITD]	new accounts since 3Q10 zEnterprise launch [as of 2Q12]	new accts in growth market;19% new accts in Public Sector [3Q10 - 2Q12]	of Top 100 customers have installed IFLs [as of 2Q12]	System z customers have IFLs installed [as of 2Q12]	of total installed MIPS run Linux [as of 2Q12]

*Includes Strategic Outsourcing

[IFL = Linux-on-z Only Engine]

zEC12 – Overall Attributes Highlights (compared to z196)

- Industries fastest processor at 5.5GHz
- 50% more capacity
- 25% faster engines
- Bigger caches and shorter latency
- Transactional Execution
- Architectural extensions for software use
- Smarter monitoring with zAware
- Higher availability with FlashExpress
- Non-raised floor option
- Same energy footprint
- Do more with less

Thank you!
ibm.com/**systems**/z

Dennis Wunder
IBM Poughkeepsie Executive Briefing Center
dwunder@us.ibm.com

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 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**

IBM Flash Express – Smarter Availability for Smarter Systems

NEW

- **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*
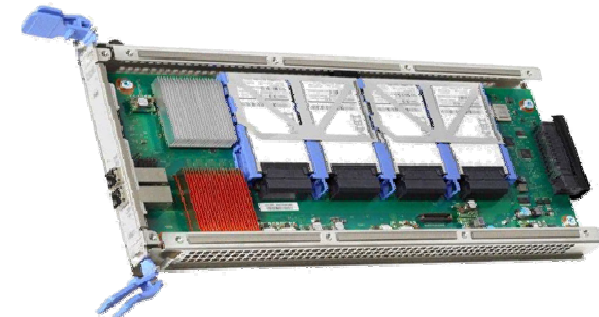
Protecting your investment in IBM technology

- **Designed to protect your investment**
  - Offering upgrades from z10 EC™ and z196 to the zEC12
  - Upgrades from zBX Model 002 to zBX Model 003

- **Full upgradeability within the zEC12 family**
  - Upgrade to Model HA1 will require a planned outage

- **On demand offerings offer temporary or permanent growth when you need it**
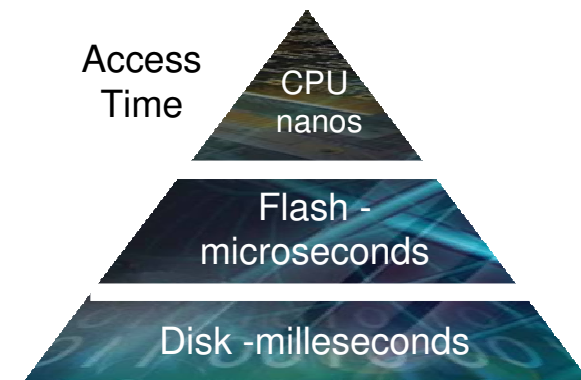
z10 EC

z196

zBX
Mod 002

zEC12

zBX
Mod 003

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

All statements regarding IBM's future directions and intent are subject to change or withdrawal without notice and represent goals and objectives only

Develop a cloud infrastructure with System z

Linux on System z Cloud Roadmap

3

Orchestrate

"Seamless"
Service Lifecycle Management

2

Automate

"Simplify"
Automate and Manage Better

1

Integrate

"Take out cost"
Consolidate and Virtualize

Differentiation

zEnterprise System

z/VM 6.2

Linux on System z

Standardization

Tivoli Provisioning Manager 7.2

zEnterprise Starter Edition for Cloud

Cloud Ready for Linux on z

SmartCloud Provisioning 2.x

SmartCloud Entry 2.3

Service Management

Tivoli Service Automation Manager 7.2.4

System z Solution Edition for Cloud Computing

Modernize System z by moving to Private Cloud in a stepwise approach

2013

- Updated! SmartCloud Provisioning
- Updated! SmartCloud Entry
- New! Smart Cloud Orchestrator (includes TPM and TSAM)

zEC12 New Build Radiator-based Air cooled – Under the covers (Model H89 and HA1) Front view
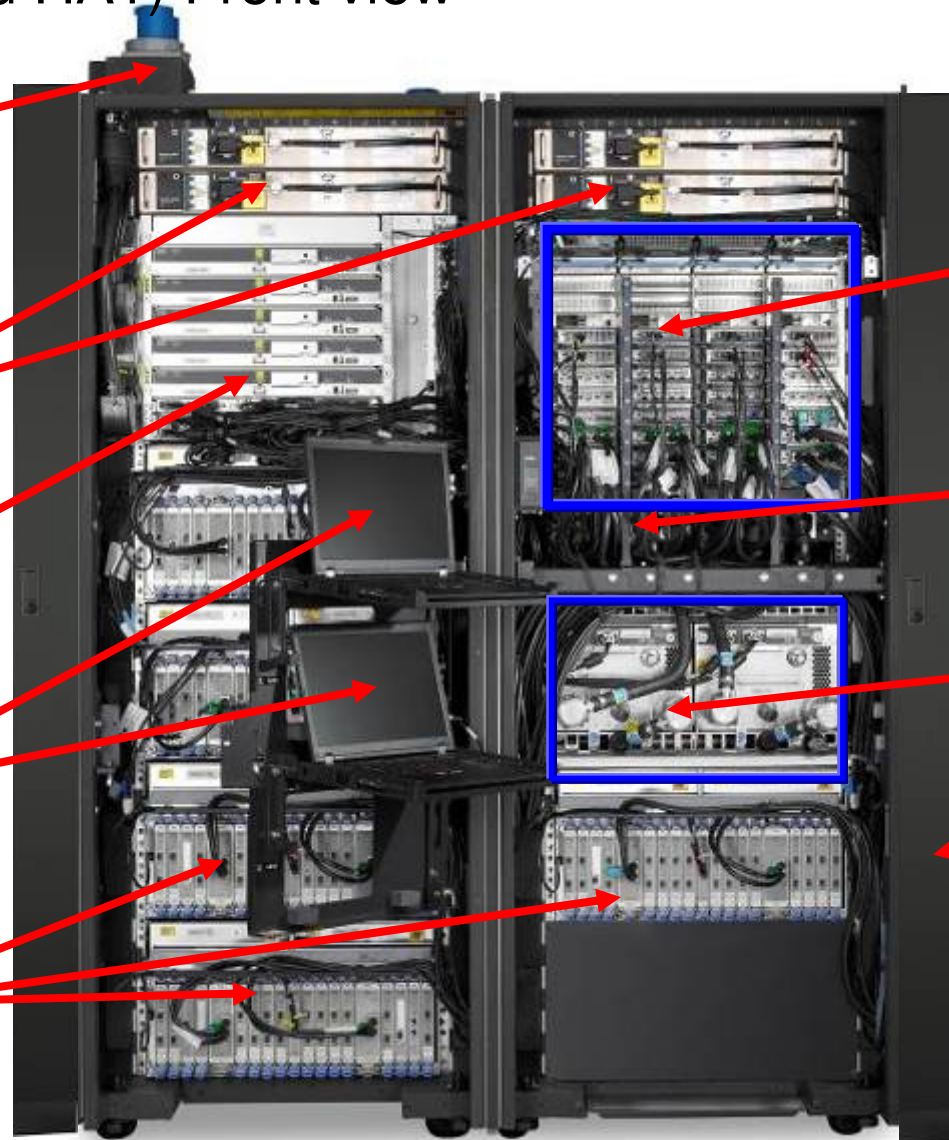

Overhead Power Cables (option)

Internal Batteries (option)

Power Supplies

2 x Support Elements

PCIe I/O drawers (Maximum 5 for zEC12)

Processor Books with Flexible Support Processors (FSPs), PCIe and HCA I/O fanouts

PCIe I/O interconnect cables and Ethernet cables FSP cage controller cards

Radiator with N+1 pumps, blowers and motors

Overhead I/O feature is a co-req for overhead power option

Optional FICON LX Fiber Quick Connect (FQC) not shown

Bank of New Zealand *uses Red Hat Enterprise Linux on System z10 to reduce their carbon footprint, and address datacenter cost and capacity concerns*

Business challenge:
– Datacenter with 200 Sun servers was at capacity
– Need to grow, become more open, reduce costs, reduce emissions, and seeks to become carbon-neutral by 2010

Solution:
– Consolidated 200 Sun servers down to just 1 IBM System z10 mainframe running Red Hat Enterprise Linux

Benefits: ROI of over 20%
– Reduced power consumption by close to 40%, heat output by 33%
– Just one administrator per 200 virtual servers
– New environments deployed in minutes, not days

"Deploying IBM mainframes with Red Hat Enterprise Linux to address our carbon footprint and cost savings concerns was a very big deal, especially at the senior management level."

Lyle Johnston
Infrastructure Architect
Bank of New Zealand

To directly impact the bottom line, SMART is

Consolidating hundreds of servers to maximize space, reduce power consumption and operating costs

Bank of New Zealand: Consolidates its front-end systems data center **reducing its footprint by 30 percent; power consumption by nearly 40 percent; heat output by 33 percent; and carbon dioxide emissions by 39 percent**. BNZ is also expecting **20 percent ROI** over the life of the platform, deploys new environments in minutes vs. days and, with just **one administrator needed per 200 virtual servers**, is saving on resources used to manage the platform.