Smart, Cool, Affordable - A VSE Perspective of the IBM System z10 Business Class

New economics for new workloads

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System z10 BC Offering Manager

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System z	z10 EC

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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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System z – The momentum continues to grow

- **System z is a strategic platform for IBM**
  - Investing approximately $1B annually in System z innovation, client success, and solution development

- **z10 technology has spurred new growth in System z and its ecosystem**
  - 30% capacity growth in 1H 08
  - 32% Revenue growth in Q2, 25% in Q3
  - More than 100 new ISV partners
  - Linux server revenue grew 28% YTY in 2Q08 (1)
  - IDC reports System z grows to 37% share (> $250K space) in 2Q08 (2)
  - System z installations continue to expand (3)

(1) Q208 Gartner Linux Share Results
(2) IDC 2Q 08 WW Server Tracker
(3) IBM Inventory records

Introducing the IBM System z10 Business Class
Its time to rethink the role of the mainframe!

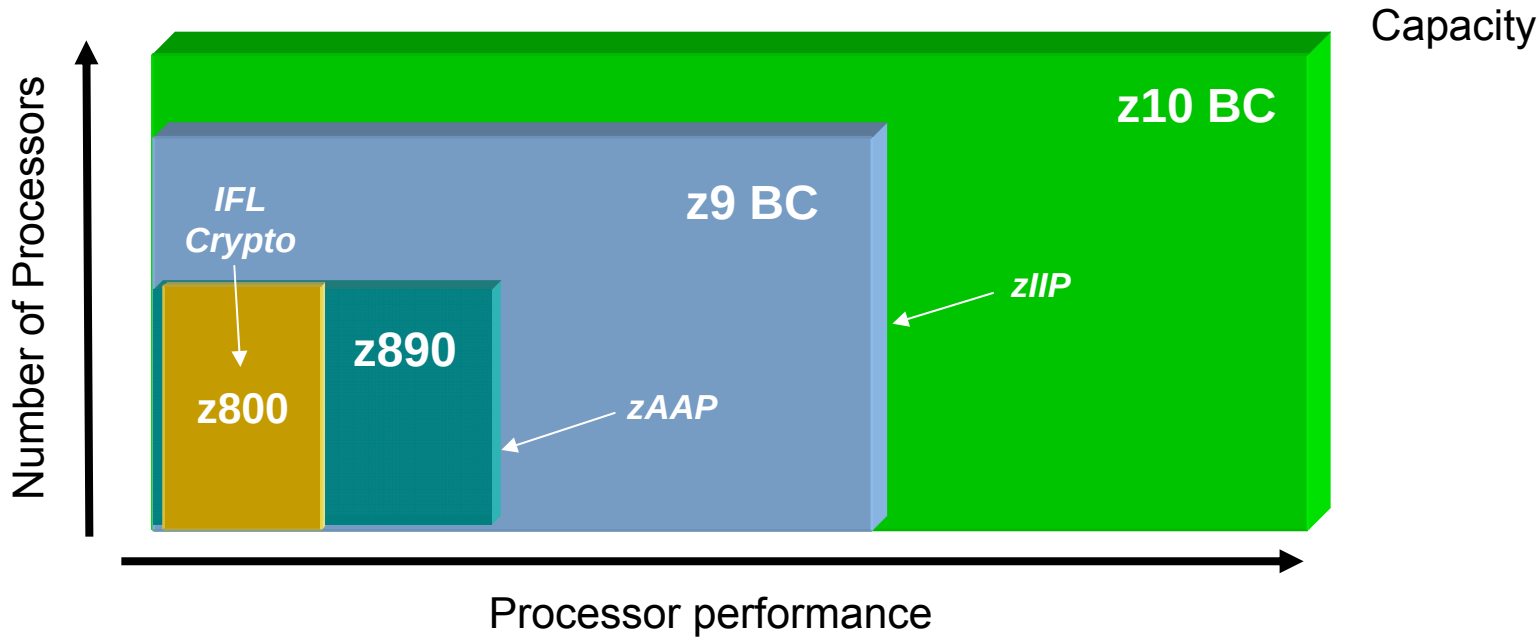
- ***Smart*** technologies enable you to quickly respond to changing requirements
- ***Cool*** Dramatically reduce energy costs compared to distributed server alternatives
- ***Affordable*** A state-of-the-art platform that can help you save through upgrades & consolidation
  - Up to 50% more performance at half the price for incremental Linux workloads (1)

(1) Specialty engines and associated memory on z10 BC are priced 50% and 60% less, respectively, compared to the z9 BC. “incremental” refers to the addition or expansion of IFLs on new or upgraded z10 BC. 50% performance gain based on multi-core performance improvement as measured by IBM for 5 IFL cores. 40% for single cores. ICFs excluded.

z10 BC delivers new levels of performance
for today's demanding applications

- **Up to 10 3.5 GHZ z10 Quad-core processors**
  - Up to 5 processors for z/VSE
  - Up to 10 IFLs for large scale Linux consolidation
- **40-50% more performance than the highly acclaimed IBM System z9® Business Class (z9 BC) (1)**

(1) 40% for uni-processor applications, 50% for 5-processors

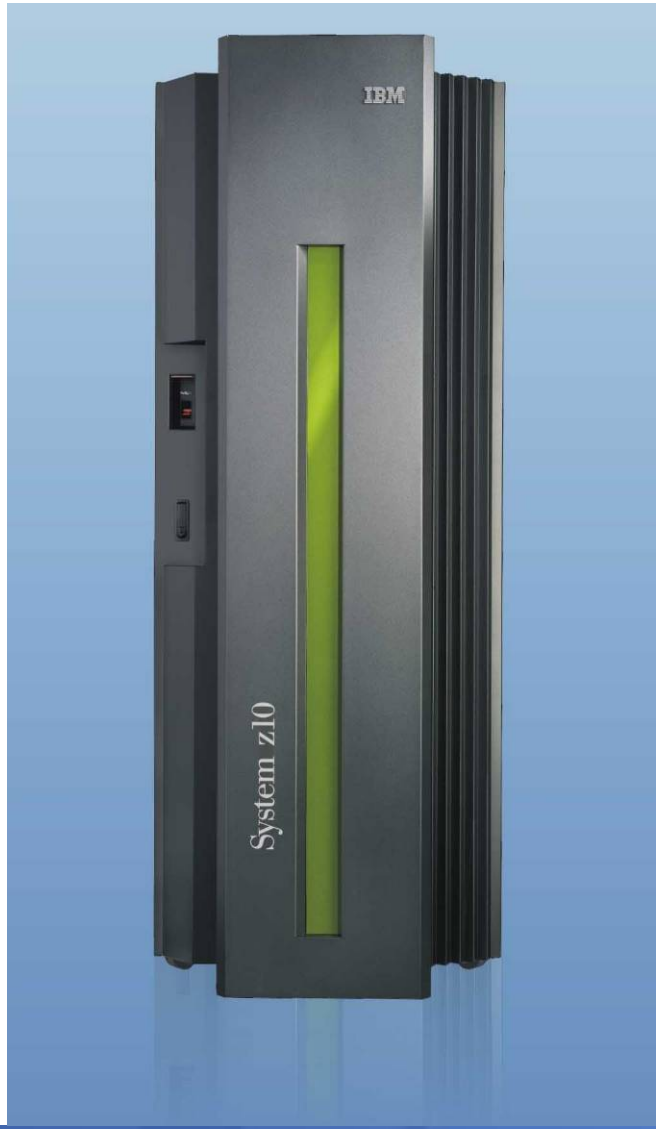


The Smart and Affordable platform for new workloads

- ***Why are client's hosting new workloads on z?***
  - Tremendous efficiencies through co-location of applications and data
  - Huge economies of scale
  - Legendary Quality of Service and Security
  - The Disaster-recovery platform the world trusts

- ***Announcing lower prices for new workloads:***
  - Integrated Facility for Linux (IFL is reduced by 50% (1)

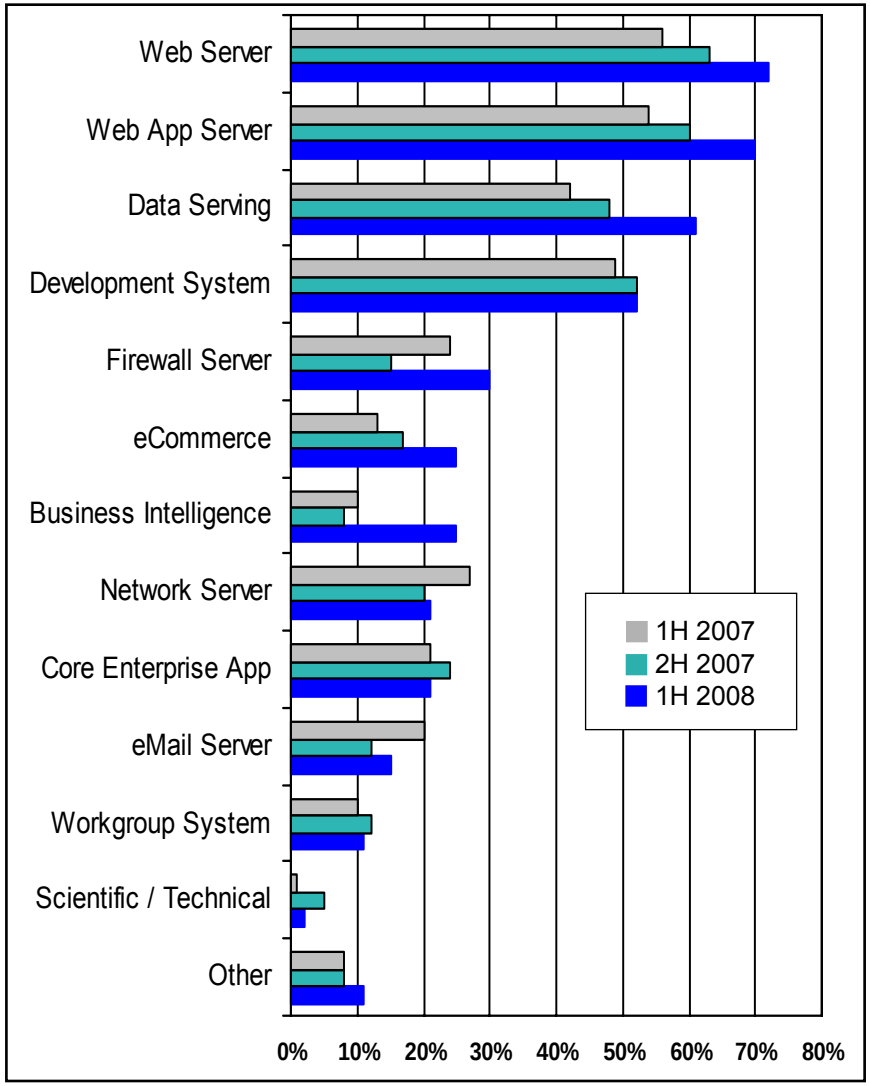
    z10 BC *Only*
  - Memory prices reduced by over 60% (2)
    - For memory purchased with a new Specialty Engine
    - Valid on IBM System z10 Enterprise Class (z10 EC™) *and* z10 BC
  - Special pricing promotions from Novell and Red Hat for Linux support



(1) Based on US list price, May vary in other countries.
(2) Up to 16GB DRAM per specialty engine

Linux on System z Delivers Choice - TODAY

- **Clients are deploying Linux on z for a broad set of applications**
- **Almost 2,500 applications available for Linux on system z**
- **Leading applications for Linux on System z:**
  - **WebSphere**
  - **SAP**
  - **Domino**
  - **Cognos**
  - **DB2 and Oracle**
  - **And many, many more**



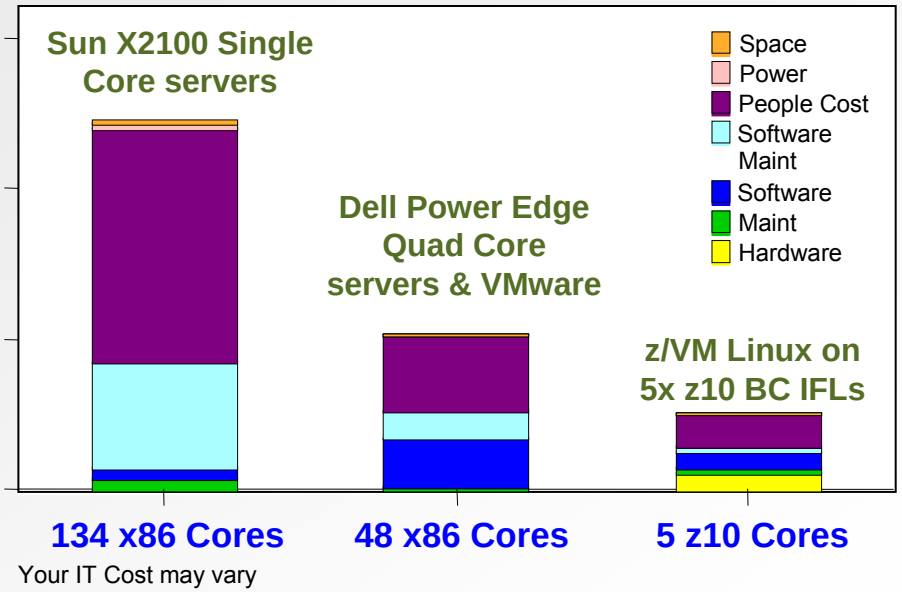
The Smart upgrade to the z10 BC

- ***Unprecedented investment protection***
  - Upgradeable from System z9 BC *and* z890
- ***Increased financial value***
  - Specialty engines upgrade typically at no extra cost
    - Nearly 50 - 100% more capacity than z9 BC and IBM eServer™ zSeries® 890 (z890) respectively
  - IBM software and maintenance technology dividend helps lower costs
    - 10% fewer MSUs for equivalent capacity from z9 BC (19% on z890)
    - A potential average savings of 5% on MLC software on z/VSE workloads (10% average on z890)
    - A potential 5% savings on HW maintenance on a dollar per MIP basis for zero capacity growth, and up to 10% for higher growth
  - Talk to your ISVs about Usage Based Software Pricing to help lower your cost of growing with System z
- ***And all the benefits from the latest innovations in the z10 system design***
  - Infiniband®, Instant On-Demand, ….

It's Cool to Consolidate Penguins!

Consolidating 134 Linux servers to 5 IFLs
Can save up to 50% over x86 w/ VMware

Oracle DB Workload, 3-Year Total IT Cost



Your IT Cost may vary

- ***Domino and Linux on z***
- ***Consolidation:***

Save up to 50% over x86 virtualization

Here's a cool example:

Add one IFL and support up to 7,500 Domino users

- 1,000 users for the energy of a 100 watt bulb
- Hardware at less than $10 per user (IFL + Memory)
- Faster Domino is one of many benefits to come from IBM's own consolidation project

All performance information was determined in a controlled environment. Actual results may vary.

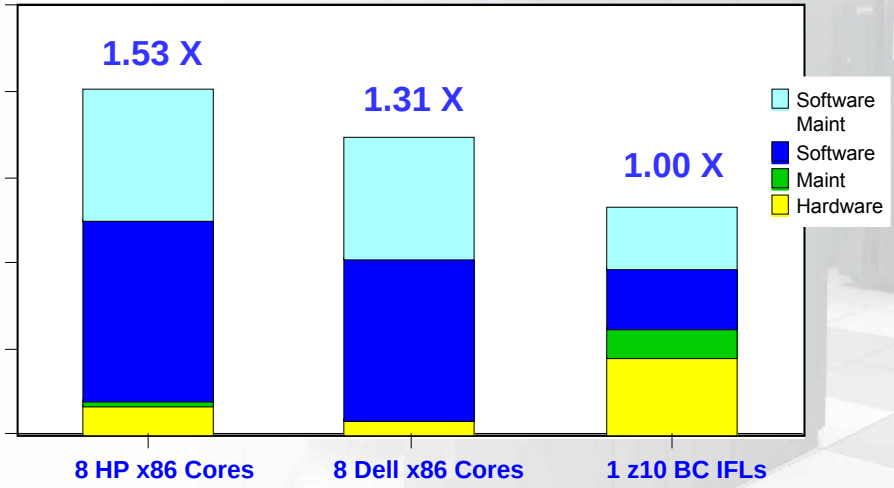
System z10 BC lowers acquisition costs

Why pay up to 50% more for commodity servers?

- **Plus the legendary System z advantage**
  - Lower Operations Cost
    - Management
    - Energy
    - Connectivity
  - Legendary Security for your critical data
  - Leading scalability for a changing world
  - Application Availability for a demanding marketplace
  - Outstanding Service
  - Attractive financing

System z10 BC additional IFL
Lower cost than Dell and HP x86

Oracle DB + WebSphere ND Workload
3-Year Total Acquisition Cost (TCA)



x86 HP Virtualization
HP Itanium Dual Core servers

x86 VMware Virtualization
Dell Power Edge Quad Core servers

z/VM Linux on System z10 BC

z10 BC – More Value, Lower Cost

Why choose anything else?

All performance information was determined in a controlled environment. Actual results may vary.

Your IT Cost may vary

IBM Global Financing – Your technology lifecycle partner

Plan

Sale-leaseback of equipment for cash infusion and better TCO
Project financing for consulting, services, hardware and software

Acquire

Competitive low rates (1) and offerings to address any client budget and project requirement

Manage

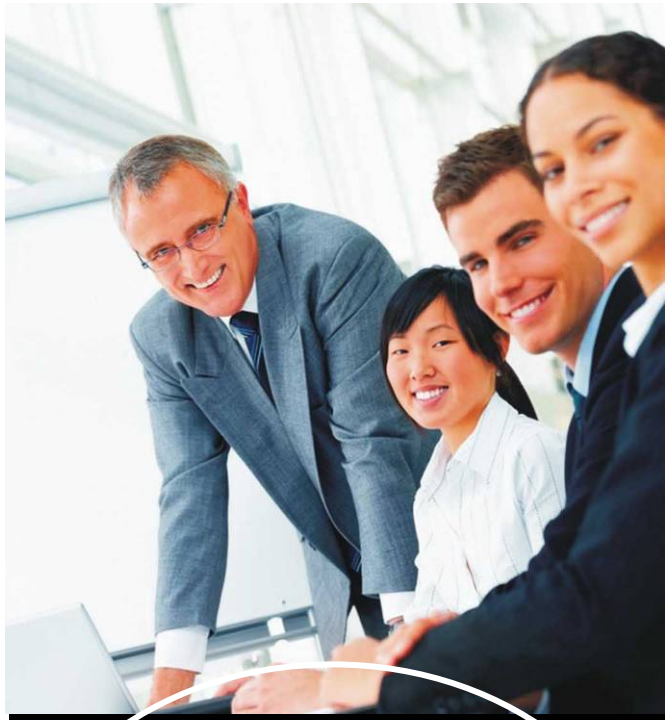
Mid-lease upgrades to optimize price performance with minimal budget impact (2); avoid technology obsolescence

Technology migration offerings

Retire

Unsurpassed asset buyback, recovery and disposal services in compliance with environmental regulations

End of lease options for growth and budget optimization



Why Wait?

- **Q4 2008: 90-day no charge deferral on the IBM System z10 BC**
- **No interest, No payment for 90 days!**

(1) Monthly IBM Global Financing rates based on 36 month term with "Best" credit rating and Value Plan lease. Actual financing rates based on client's credit rating, financing terms, offering type, equipment type and options. Other restrictions may apply. * Actual financing rates based on client's credit rating, financing terms, offering type, equipment type and options. Other restrictions may apply.

(2) Featured offer is a 36-month fair market value lease provided by IBM Global Financing. Customers installing the new hardware under offer terms make no payments for 90 days, and then make 36 even monthly payments, at below market rates. Customers must be credit qualified, lease the eligible equipment with IGF for the promotional term and structure, and install the product in participating countries by Dec 31, 2008.
Available worldwide. Special bid. Terms and conditions may vary by country. See your local IBM or IBM Global Financing representative for details.

System z10 Can Do It All – Smart, Cool, Affordable

- ***Leadership capabilities for the new enterprise data center***
- ***Smart technology for all enterprises***
- ***A modern, energy efficient platform to help you save big through consolidation***
- ***New business growth opportunities with an expanded range of affordable solutions***

IBM System z10 Business Class

Hardware Innovation

The New Face of Enterprise Computing

The modern mainframe for small and medium enterprises

The mainframe made over – Smart, Cool, Affordable

IBM System z10™ Business Class (z10 BC™)

Machine Type: 2098

Single Model: E10

Single Frame

Non-raised floor option

Processor Cores:

- **Faster and larger Processor core**
  - **z10 Enterprise Quad Core at 3.5 GHz**
  - **2.5x-z9 BC, 3.5x-z890, 5.6x-z800**
- **More configurable Processor Cores**

Memory:

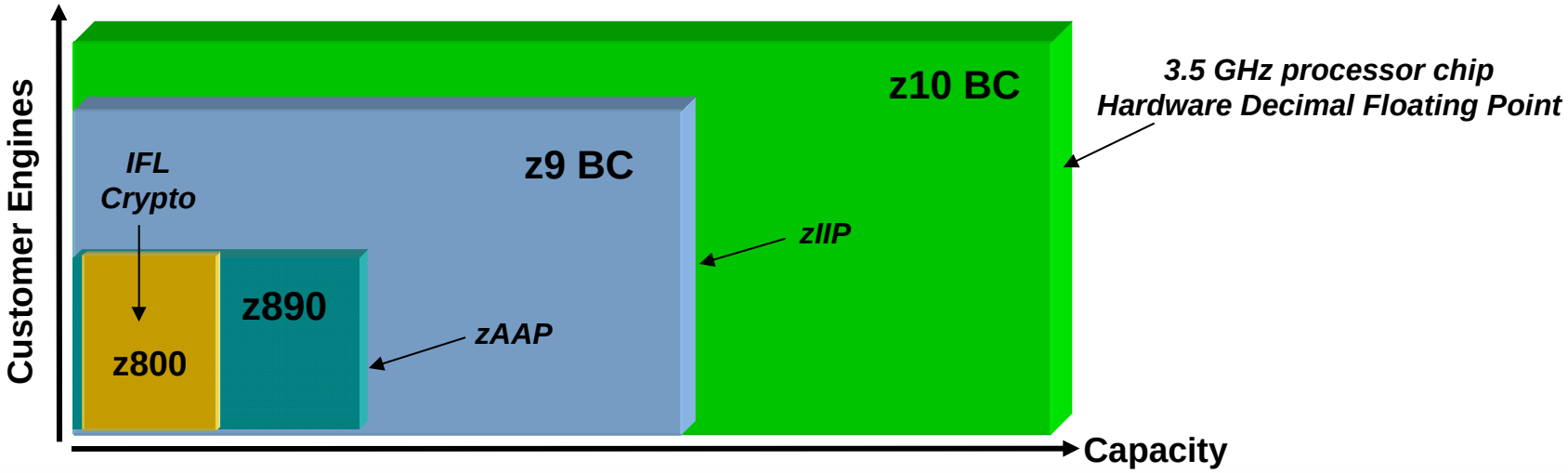
- **8 GB HSA standard**
- **Minimum Memory**
  - **4 GB (lower point)**
- **Maximum memory**
  - **120 GB – Oct08**
  - **248 GB – Jun09**

I/O:

- **New I/O drawer (RAS)**
- **6 GBps InfiniBand® host buses for I/O**
- **New OSA-Express3**

New levels of application performance
Designed for an expanded set of workloads

- The z10™ BC can deliver up to 50% more system performance for general purpose workloads than an IBM System z9® Business Class (z9™ BC)*
- The uniprocessor can deliver up to 40% more performance than z9 BC uniprocessor **
- Up to 1.9x performance improvements for CPU intensive jobs or tasks
- Up to 10X improvement in decimal floating point instructions
- Up to 10 IFLs for large scale consolidation



More capacity and engines for traditional growth and consolidation

All performance information was determined in a controlled environment.
* LSPR mixed workload average running z/OS® 1.9 - z10 BC z05 versus z9 BC z04 ** LSPR mixed workload average running z/OS 1.9 - z10 BC z01 versus z9 BC z01

z10 BC – Under the covers Front View

Power Supplies

CPC (SCMs, Memory, MBA, HCA and FSP) Drawer

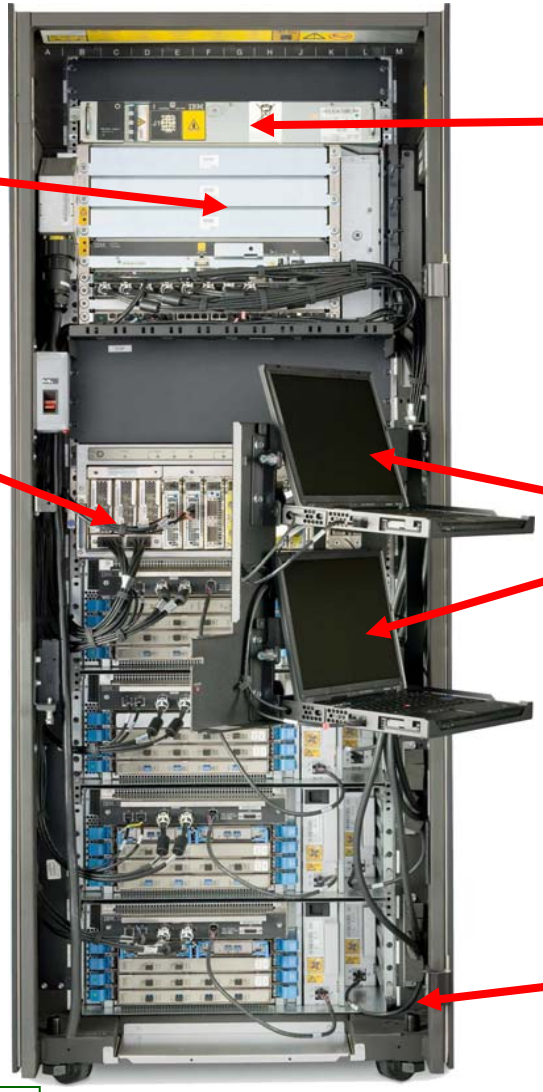
I/O Drawer #3

I/O Drawer #2

I/O Drawer #1

I/O Drawer #4

4 x I/O Drawers



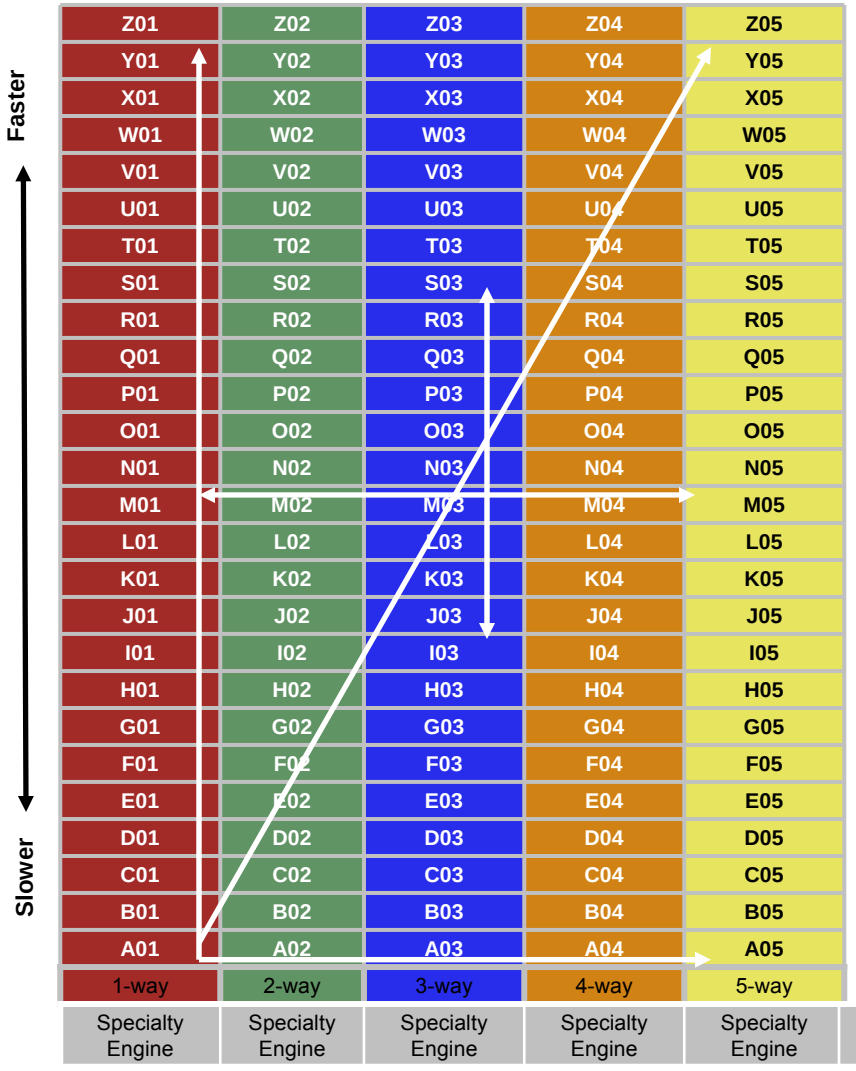
Internal Battery (optional)

2 x Support Elements

Fiber Quick Connect (FQC) Feature (optional – not shown)

- *Same power / plugs and service as z890 and z9 BC*
- *79" high x 71" deep x 31" wide – slightly larger than z9 BC*

The right size for existing and future applications
Smart, affordable and flexible



z10 BC Model E10 with 130 capacity settings

- Granularity designed for flexibility and growth
- Any to any capacity upgradeability within the Model
- All z10 EC temporary capacity offerings are available on z10 BC
- Increased number of specialty engines vs. z9 BC
- All specialty engines run at full capacity
- Linux only IFL and ICF only servers (A00)

CP	IFL	zAAP	zIIP	ICF	Additional SAPs	Spares
0-5	0-10	0-5	0-5	0-10	0-2	0 when fully configured

Remember the IBM Processor Capacity Reference (zPCR) is a free tool available for download that can be used to size your System z processors.

http://www-03.**ibm.com**/support/techdocs/atsmastr.nsf/WebIndex/PRS1381

z10 BC Configuration Comparisons

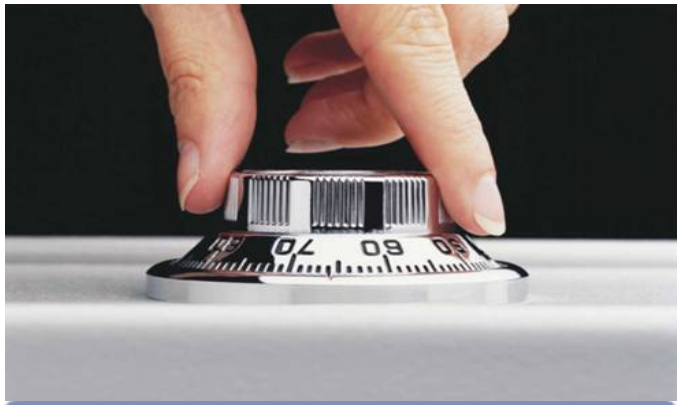
	z9 BC R07	z9 BC S07	z10 BC E10	z10 EC E12
Uniprocessor Performance	470 MIPS		673 MIPS	920 MIPS
System Capacity	26-172 MIPS	193-1748 MIPS	26-2760 MIPS	218-8225 MIPS
Total System Memory			Up to 256 GB (06/09)	Up to 384 GB
Configurable Engines	7	7	10	12
Configurable CPs	1-3	0-4	0-5	0-12
LPARS/LCSS	15/1	30/2	30/2	60/4
HiperSockets	16		16	16
I/O Cages/Drawers	1	1	Up to 4	Up to 3
I/O slots per Cage/Drawers	28	28	8	28
FICON Channels	64	112	128	336
OSA Ports (10GbE/1GbE)	16/32	24/48	48/96	48/96
ESCON Channels	240	420	480	1024
STI (z9), IFB (z10) Bandwidth	2.7 GB/sec		6.0 GB/sec	6.0 GB/sec
Capacity Settings	20	53	130	48
Upgradeable	Upgrade to S07	Upgrade to z9 EC & z10 BC	Upgrade to z10 EC Model E12	Upgrade to z10 EC Models E26, E40, E56 and E64

Security

- **New support**
  - **CPACF support for new standards**
    AES-192, 256 and SHA-384, 512
  - **4096-bit RSA keys, ISO-3 PIN Support**

- **Crypto Express2 feature**
  - **Support high levels of security for demanding applications**
    fully programmable, configurable
  - **FIPS 140-2 level 4 certified**
  - **Offers high-scale performance for SSL transactions**
  - **PRNG**

- **Designed for EAL5 (LPAR security)**



z10 BC Channel Type and Crypto Overview

- **FICON/FCP** up to 32 cards, 128 CHPIDs
  - FICON Express4 (2 and 4 port cards available)
  - FICON Express2 (carry forward on upgrade)
  - FICON Express (carry forward on upgrade for FCV)
- **Networking**
  - OSA-Express3 up to 24 cards, 48 CHPIDs, 96 ports
    10 Gigabit Ethernet LR and SR (October)
    Gigabit Ethernet LX and SX (2 and 4 port SX)
    1000BASE-T Ethernet (2 and 4 port - October)
  - OSA-Express2 up to 24 cards, 48 CHPIDs, 48 ports
    10 Gigabit Ethernet LR (carry forward on upgrade)
    Gigabit Ethernet LX and SX (limited availability or carry forward on upgrade)
    1000BASE-T Ethernet (limited availability or carry forward on upgrade)
  - HiperSockets (Define only)
- **ESCON** up to 32 cards, 480 CHPIDs
  - **No functional change compared to System z9**
- **Crypto** up to 8 cards, 16 engines
  - Crypto Express2
  - 1 port and 2 port cards available
- **Channel types not supported:**
  - FICON (pre-FICON Express)
  - OSA-Express
  - PCIXCC and PCICA
  - Parallel (use ESCON Converter)

System z10 and IBM System Storage
Better Together

- **IBM System Storage DS8000**
  - **Space efficient Flashcopy for z/VSE**

- **IBM Virtualization Engine™ TS7700 Family**
  - New TS7720 provides the benefits of the TS7740 Virtualization Engine without the attachment to physical tape
  - Two highly scalable configurations - 40TB or 70TB usable SATA cache
  - Simplified configuration for TS3500 tape library attachment to TS7720 for reduced cost and floorspace

- **IBM System Storage TM SAN Volume Controller V4.3 – new version**
  - New space-efficient Virtual Disks and Flash Copy support improves utilization and reduces storage growth
  - New Virtual Disk Mirroring helps improve availability for critical applications
  - Supported with Linux on System z, z/VM and z/VSE

z10 BC Enhancements designed to avoid outages

Unscheduled

- Continued Focus on Firmware Quality
- Memory Subsystem Improvements

Scheduled

- DIMM FRU indicators
- Single Processor Core Checkstop
- Single Processor Core Sparing
- Redundant 100Mb Ethernet service network w/ VLAN

New in October

NEW for z10 BC

- Concurrent add/replaceable I/O drawer

NEW for z10 BC and z10 EC

- Plan ahead memory (EC-BC)
- Serviceability enhancements of SAN for both FICON and FCP

Pre-planning Requirements

- **Elimination of unnecessary CBU passwords**
- **Enhanced Driver Maintenance (EDM) Upgrades**
  - Multiple “from” sync point support
  - Improved control of channel LIC levels
- **Reduce Pre-planning to Avoid POR**
  - 8 GB for HSA
  - Dynamic I/O Enabled by Default
  - Add Logical Channel Subsystem (LCSS)
  - Change LCSS Subchannel Sets
  - Add/Delete Logical Partitions
- **Reduce Pre-Planning to Avoid LPAR Deactivate**
  - Change Partition Logical Processor Config
  - Change Partition Crypto Coprocessor Config
- **CoD – Flexible Activation/Deactivation**

Exceptional Quality of service for the Smart business

System z10 BC Operating System Support

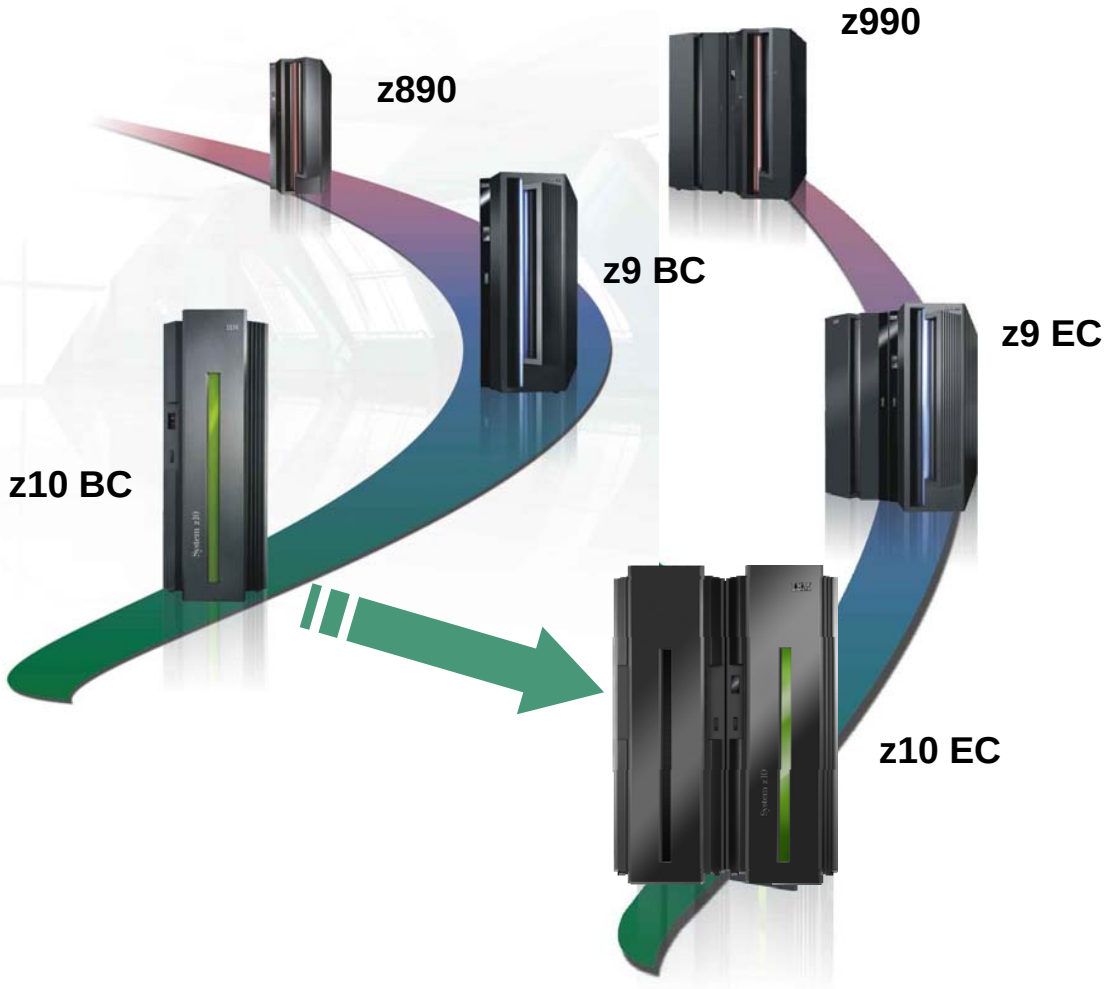
Operating System	ESA/390 (31-bit)	z/Architecture (64-bit)
z/VSE Version 4 Release 1[(2)(5)] and 2[(5)]	No	Yes
z/VSE Version 3 Release 1[(2)(4)]	Yes	No
Linux on System z[(2)], Red Hat RHEL 4, & Novell SLES 9	Yes	Yes
Linux on System z[(2)], Red Hat RHEL 5, & Novell SLES 10	No	Yes
z/VM Version 5 Release 2[(3)] and 3[(3)] and 4	No*	Yes
z/OS Version 1 Releases 8, 9 and 10	No	Yes
z/OS Version 1 Releases 7[(1)(2)]	No	Yes
z/TPF Version 1 Release 1	No	Yes
TPF Version 4 Release 1 (ESA mode only)	Yes	No

1. z/OS R1.7 + zIIP Web Deliverable required for System z10 to enable HiperDispatch on System z10 (does not require a zIIP). z/OS V1.7 support was withdrawn September 30, 2008. The Lifecycle Extension for z/OS V1.7 (5637-A01) makes fee-based corrective service for z/OS V1.7 available through September 2009. With this Lifecycle Extension, z/OS V1.7 supports the z10 BC server. Certain functions and features of the z10 BC server require later releases of z/OS. For a complete list of software support, see the PSP buckets and the Software Requirements section of the System z10 BC announcement letter, dated October 21, 2008.
2. Compatibility Support for listed releases. Compatibility support allows OS to IPL and operate on a z10 BC.
3. Requires Compatibility Support which allows z/VM to IPL and operate on the System z10 providing System z9 functionality for the base OS and Guests. *z/VM supports 31-bit and 64-bit guests
4. z/VSE V3 31-bit mode only. It does not implement z/Architecture, and specifically does not implement 64-bit mode capabilities. z/VSE is designed to exploit select features of IBM System z10, System z9, and zSeries hardware.
5. z/VSE V4 is designed to exploit 64-bit real memory addressing, but will not support 64-bit virtual memory addressing.

Note: Refer to the z/VSE, z/VM, z/OS subsets of the 2098DEVICE Preventive Planning (PSP) bucket prior to installing a z10 BC

Protecting your investment in IBM technology

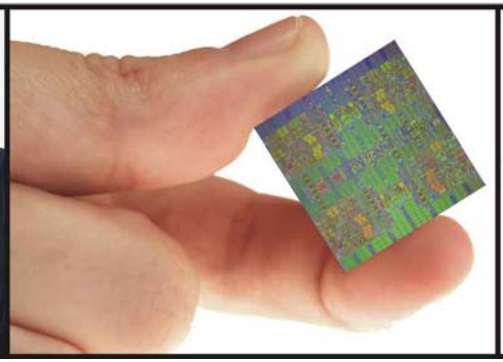
- Designed to protect your investment with two generation upgrades for both z10 EC and z10 BC
- Full upgradeability within each System z10 server family
  - Plus upgrade to z10 EC from z10 BC
- Temporary or permanent growth when you need it
  - New provisioning architecture

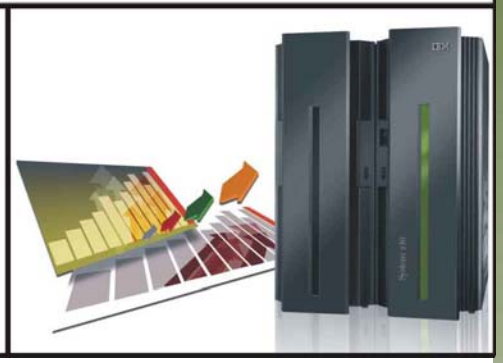


The Mainframe Charter

The evolution of System z

community
innovation
value





Community

Support programs designed to foster vitality in the IBM mainframe community, helping to promote a strong application portfolio and world-class support services.*

Innovation

Provide leadership in innovation to enhance the use of the IBM mainframe to support increasingly integrated and flexible business processes for the on demand business.*

Value

Enhance the value proposition and lower the cost of computing of mainframe solutions in a way that is compelling, clear, and consistent.*

Explore the integral components of the IBM community ecosystem

* Excerpted from the Mainframe Charter – August 2003

System z10 BC delivers continued price / performance and affordability for new workloads

Generation to generation price / performance improvements:	z10 BC
Reduction in software charging units, MSUs,[1] versus z9 BC ([1] Millions of Service Units)	10%
Reduction in software charging units, MSUs, versus z890 or z800	19% or 27%
Maintenance price per MIPS reduction for equivalent capacity[1]	5%
Maintenance price per MIPS reduction with capacity growth[1]	Up to 10%
Performance improvement for Linux (IFLs), Java (zAAPs) and Integrated Information Processors (zIIPs)	Up to 40%
Typical charge for MES upgrades for IFLs, zAAPs, and zIIPs	0
Technology-driven value	**z10 BC**
Number of capacity settings - 5 Full Uni + 125 Sub-Cap settings	130
50% price reduction on Specialty engines for System z10 BC [2, 4]	$47.5 K NEW
IBM Software charges for zAAP capacity and zIIP capacity	0
62% price reduction on System z10 Memory Prices for new workloads when purchased together with Specialty engines [2, 3, 4]	$2,250 USD NEW

Plus

- **100 percent of IBM mainframes are delivered virtualization ready**
- **System z New Application License Charge (zNALC) pricing metrics for New Workloads**
- **On/Off Capacity on Demand (On/Off CoD) enhancements to better manage volatile business requirements**

1 – Comparisons shown are z9 BC to z10 BC; 2 - Prices in USD, may vary by country; 3 – Limited to 16GB per engine; 4 – Does not include Internal Coupling Facilities (ICFs)

Midrange Workload License Charge (MWLC)

- Requires current hardware (IBM System z10 and z9) *and* z/VSE V4
  - exception: z10 and z9 BC Capacity Setting A01 remains zELC
- VSE Central Functions + 12 IBM middleware products are eligible

5686 CF8	VSE Central Functions
5696 234	HLASM
5648 054	CICS TS for VSE/ESA V1
5686 065	ACF/VTAM® VSE/ESA V4
5686 A04	TCP/IP for VSE/ESA V1.5
5648 099	DITTO/ESA® for VSE
5697 F42	DB2 Server for VSE & VM
5686 068	IBM COBOL for VSE/ESA
5686 A01	IBM C for VSE/ESA
5686 069	IBM PL/1 for VSE/ESA
5746 SM3	IBM DFSORT/VSE V3
5746 XX1	DL/I VSE
5686 A06	MQSeries® for VSE/ESA

- Full-capacity and sub-capacity MWLC options
  - full-capacity mode offers improved price/performance compared to GOLC, zELC, and TWLC alternatives
  - additional price/performance possible through sub-capacity mode
- Structured to help address new growth opportunities

System z ecosystem – The growing zCommunity
Dramatic growth responding to market demand

- ***Expanding application portfolio on System z driven by ISV growth:***
  - YTD: 130 New ISVs, 600+ New applications / tools
  - 5,000+ applications available
  - 2,450+ applications for Linux on System z
  - Over 1,400 ISVs building applications

- ***IBM Academic Initiative driving Skills growth on System z***
  - 50,000 Students attended mainframe education
  - 481 Schools registered offering 29 separate courses and more to come
  - Student Mainframe Contest:
    - 10 contests, more than 1,100 schools; more than 8,500 students

z10 BC – The mainframe made over
Smart, Cool, Affordable

- One hardware model
- New CPC and I/O Drawers
- Faster Uni Processor 3.5 GHz
- Up to 10 customer cores
- 130 CP Subcapacity Settings
- Up to 248 GB memory
  120 GB-Oct08 and 248 GB-Jun09
- Fixed 8 GB HSA standard
- Large Page Support (1 MB)
- Enhanced CPACF SHA 512, AES 192 and 256-bit keys
- Crypto & TKE Enhancements
- Hardware Decimal Floating Point
- Capacity Provisioning Support

- InfiniBand (IFB) MBA to I/O interconnect
- InfiniBand Coupling Links
- STP over InfiniBand
- High Performance FICON for System z
- New Family of OSA-Express3
- HiperSockets enhancements
- STP enhancements
- Improved RAS
- Scheduled Outage Reduction
- CBU & On/Off CoD Enhancements
- Power Monitoring support
- HMC Instant Messenger

If it's "mainframe-like" it's not a "Mainframe"

Thank you for your time and for doing business with IBM


Questions ?!?

Backup From z10 BC Hardware Innovation

IBM Systems

IBM System z family

IBM System z9 EC (2094)

- Announced 7/05 - Superscalar Server with up to 64 cores
- 5 models – Up to 54-way
- Granular Offerings for up to 8 CPs
- PU (Engine) Characterization
  - CP, SAP, IFL, ICF, zAAP, zIIP
- On Demand Capabilities
  - CUoD, CIU, CBU, On/Off CoD
- Memory – up to 512 GB
- Channels
  - Four LCSSs
  - Multiple Subchannel Sets
  - MIDAW facility
  - 63.75 subchannels
  - Up to 1024 ESCON channels
  - Up to 336 FICON channels
  - FICON Express2 and 4
  - OSA 10 GbE, GbE, 1000BASE-T
  - Coupling Links
- Configurable Crypto Express2
- Parallel Sysplex® clustering
- HiperSockets – up to 16
- Up to 60 logical partitions
- Enhanced Availability
- Operating Systems
  - z/OS, z/VM, z/VSE, TPF, z/TPF, Linux on System z

IBM System z9 BC (2096)

- Announced 4/06 - Superscalar Server with 8 cores
- 2 models – Up to 4-way
- High levels of Granularity available
  - 73 Capacity Indicators
- PU (Engine) Characterization
  - CP, SAP, IFL, ICF, zAAP, zIIP
- On Demand Capabilities
  - CUoD, CIU, CBU, On/Off CoD
- Memory – up to 64 GB
- Channels
  - Two LCSSs
  - Multiple Subchannel Sets
  - MIDAW facility
  - 63.75 subchannels
  - Up to 420 ESCON channels
  - Up to 112 FICON channels
  - FICON Express2 and 4 Gbps
  - OSA 10 GbE, GbE, 1000BASE-T
  - Coupling Links
- Configurable Crypto Express2
- Parallel Sysplex clustering
- HiperSockets – up to 16
- Up to 30 logical partitions
- Enhanced Availability
- Operating Systems
  - z/OS, z/OS.e, z/VM, z/VSE, TPF, z/TPF, Linux on System z

IBM System z10 EC (2097)

- Announce 2/08 - Server with up to 77 cores
- 5 models – Up to 64-way
- Granular Offerings for up to 12 CPs
- PU (Engine) Characterization
  - CP, SAP, IFL, ICF, zAAP, zIIP
- On Demand Capabilities
  - CoD, CIU, CBU, On/Off CoD, CPE
- Memory – up to 1.5 TB for Server and up to 1 TB per LPAR
- Channels
  - Four LCSSs
  - Multiple Subchannel Sets
  - MIDAW facility
  - 63.75 subchannels
  - Up to 1024 ESCON channels
  - Up to 336 FICON channels
  - FICON Express2 and 4
  - OSA 10 GbE, GbE, 1000Base-T
  - InfiniBand Coupling Links
- Configurable Crypto Express2
- Parallel Sysplex clustering
- HiperSockets – up to 16
- Up to 60 logical partitions
- Enhanced Availability
- Operating Systems
  - z/OS, z/VM, z/VSE, TPF, z/TPF, Linux on System z

IBM System z10 BC (2098)

- Announced 10/08 – Server with 12 cores
- Single model – Up to 5-way
- 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 120 GB
- Channels
  - Two LCSSs
  - Multiple Subchannel Sets
  - MIDAW facility
  - 63.75 subchannels
  - Up to 480 ESCON channels
  - Up to 128 FICON channels
  - FICON Express2 and 4 Gbps
  - OSA 10 GbE, GbE, 1000BASE-T
  - InfiniBand Coupling Links
- Configurable Crypto Express2
- Parallel Sysplex clustering
- HiperSockets – up to 16
- Up to 30 logical partitions
- Enhanced Availability
- Operating Systems
  - z/OS, z/OS.e, z/VM, z/VSE, TPF, z/TPF, Linux on System z

z10 BC to z9 BC Functional Comparison

Processor / Memory	▪ Uniprocessor Performance	▪ Up to 1.40 performance improvement over z9 BC uniprocessor*
	▪ System Capacity	▪ Up to 1.50 times system capacity performance improvement over z9 BC**
	▪ Processor Design	▪ 3.5 GHz processor chip for z10 BC vs. 1.4 GHz for z9 BC
	▪ Models	▪ z10 BC has 1 and z9 BC has 2 models
	▪ Processing Units (PUs)	▪ z10 BC has up to 10 cores to configure, up to 7 on z9 BC
	▪ Granular Capacity	▪ z10 BC has up to 130 Capacity settings vs. 73 on the z9 BC
	▪ Memory	▪ z10 BC has up to 256 GB vs. up to 64 GB on z9 BC
	▪ Fixed HSA	▪ z10 BC has fixed 8 GB HSA, z9 BC had HSA from purchased memory
Virtualization	▪ LPARs	▪ z10 BC has up to 5 logical processors in an LPAR vs. 4 on z9 BC
	▪ HiperDispatch	▪ z10 BC has HiperDispatch for improved synergy with z/OS Operating System to deliver scalability and performance
Connectivity	▪ HiperSockets	▪ z10 BC New HiperSockets Layer 2 and Multiple Write Facility
	▪ FICON for SANs	▪ Up to 128 FICON channels on z10 BC vs. 112 on z9 BC
	▪ Total channels	▪ z10 BC can support up to 480 vs. 420 for z9 BC
	▪ Internal I/O Bandwidth	▪ z10 BC has industry standard 6 GBps InfiniBand supports high speed connectivity and high bandwidth vs. z9 BC using 2.7 GBps Self Time Interconnects (STIs)
	▪ Enhanced I/O structure	▪ New I/O Drawer
	▪ Coupling	▪ Coupling with InfiniBand[1] – improved distance and potential cost savings
	▪ Cryptography	▪ Improved AES 192 and 256, stronger hash algorithm with Secure Hash Algorithm (SHA-512) and support for longer Personal Account Numbers up to 19
	▪ LAN Connectivity	▪ New family of OSA-Express3 features for z10
On Demand / RAS	▪ RAS Focus	▪ z10 can help eliminate preplanning required to avoid scheduled outages
	▪ Just in Time deployment of Capacity	▪ Capacity on Demand offerings CBU and On/Off CoD plus new Capacity for Planned Events are resident on z10
	▪ Enhanced I/O structure	▪ z10 BC has 'hot-pluggable' I/O drawers
Environmentals	▪ Monitoring	▪ z10 displays energy efficiency on SAD screens
		▪ Utilizes IBM Systems Director Active Energy Manager for Linux on System z for trend calculations and management of other servers that participate

* LSPR mixed workload average running z/OS 1.9 - z10 BC Z01 versus z9 BC Z01
** This is a comparison of the z10 BC 10-way and the z9 BC 7-way and is based on LSPR mixed workload average running z/OS 1.9

z9 BC to z890 Functional Comparison

Processor / Memory	▪ Uniprocessor Perf. ▪ System Capacity ▪ Processor Design ▪ Models ▪ Processing Units (PUs) ▪ Granular Capacity ▪ Memory	▪ Up to 1.35x performance improvement over z890 Capacity Setting 170 uniprocessor * ▪ Up to 1.30x system capacity performance improvement over z890 Capacity Setting 470 ** ▪ z9 BC adds instructions, new technology, larger L2 cache ▪ z890 has one and z9 BC has 2 hardware models, both with a book ▪ z9 BC has up to 7 PUs to configure Vs 4 on z890 ▪ z9 BC has up to 73 Capacity settings ▪ z9 BC has up to 64 GB vs. up to 32 GB on z890
Virtualization	▪ LPARs ▪ FCP ▪ PR/SM™ Dispatching	▪ z9 BC has up to 30 LPARs ▪ z9 BC supports N_Port ID Virtualization ▪ z9 BC has separate Processor core pools for CPs, IFLs, ICFs, zAAPs, zIIPs
Connectivity	▪ HiperSockets ▪ FICON for SANs ▪ OSA for LANs ▪ Total channels ▪ Internal I/O Bandwidth ▪ Enhanced I/O structure	▪ Both - 16 HiperSockets, z9 BC adds IPv6 support, z890 IPv4 only ▪ Up to 112 FICON channels on z9 BC, 80 on z890 ▪ Both - 48 OSA ports, z9 BC adds OSA-Express2 1000BASE-T ▪ Same - Up to 420 channels ▪ z9 BC has up to 16 STIs at 2.7 GB/s, z990 has 8 STIs at 2GB/s ▪ z9 BC has RII for availability, z890 Single I/O Bus
On Demand / RAS	▪ Capacity BackUp ▪ MBA repair ▪ STI repair ▪ Driver Upgrade	▪ For CPs, IFLs, ICFs, zAAPs, zIIPs on z9 BC, CPs only on z890 ▪ Concurrent on z9 BC, unscheduled outage on z890 ▪ Concurrent on z9 BC without loss of I/O (RII). z890, I/O for STI lost ▪ Concurrent on z9 BC versus scheduled outage on z990[1]

* LSPR mixed workload average running z/OS 1.7 – z9 BC Z01 versus z890 capacity setting 170
** This is a comparison of the z9 BC 7-way and the z890 4-way and is based on LSPR mixed workload average running z/OS 1.7
Note 1: Concurrent driver upgrades possible only at certain MCL levels.

Wessels+Müller AG improves application response times and cuts operating costs with an IBM System z mainframe

Business challenge:

Wessels+Müller had migrated many of its key business systems to an IBM zSeries® 890 mainframe. And, while it was pleased with the platform, it found that the IBM hardware was unable to keep pace with the company's growing processing demands. With the system operating at 80 percent just to handle day-to-day operations, the business was concerned about peak processing periods when high volumes of data need to be analyzed.

Solution:

Working with IBM Business Partner Becom, Wessels+Müller migrated its business systems to an IBM System z9® Business Class mainframe. The IBM hardware, **leveraging the IBM z/VSE™ operating platform, supports multiple Linux® virtual machines** that host the client's online parts ordering and information management systems as well as an IBM DB2® data server containing part information.

Benefits:

- Improved application speeds and reduced response times—even during peak processing periods
- Increased staff productivity with a more responsive environment
- Reduced operating costs by simplifying the infrastructure

"This System z main-frame has reaffirmed our confidence in IBM's hard-ware. Not only does the server offer more power but more control over the environment as well."

— Wessels+Müller AG

Solution components:

- IBM System z9 Business Class (BC) mainframe
- IBM DB2 data server

Hardware group of companies Häfele cuts transaction processing run times in half with an IBM System z9 Business Class server

Business challenge:

With customers in more than 150 countries, demands for quick order turn-around and immediate delivery status updates, Häfele's transaction processing system needs to operate 24x7. Its existing IBM S/390® Multiprise® 3000 platform was nearing its operating capacity. Häfele needed a new platform that could accommodate rising order volumes and provide increased flexibility, stability and availability, together with moderate operating costs.

Solution:

With the help of IBM Business Partner Comparex, Häfele has migrated to an IBM System z9® Business Class server running the IBM z/VSE™ V3.1 operating system, subsequently moving to the IBM z/VSE V4.1 and IBM z/VM® V5.2 operating systems. Häfele's data is stored on IBM TotalStorage® Enterprise Storage Server® technology, which, in spite of the high transaction volume, is handling the new requirements quite well.

Benefits:

- Reduces transaction processing run times by half
- Protects the company's investment in existing in-house, custom-designed applications
- Meets the high requirements of the company's flexible merchandise management system

"The IBM System z9 with z/VM V5.2 and z/VSE V4.1 offers optimum investment protection for our custom-designed, in-house developments."

— Horst Reichardt, director of systems engineering, Häfele GmbH & Co KG

Solution components:

- IBM System z9 Business Class mainframe
- IBM z/VM V5.2 and IBM z/VSE 4.1 operating systems
- IBM TotalStorage Enterprise Storage Server technology

HÄFELE

BRZ Deutschland accelerates data processing run times with IBM System z9 and IBM System Storage DS6800 technology

Business challenge:

As an IT service provider to the fast-paced construction industry with more than 13,000 clients, the ability to respond quickly to its customers' needs is paramount. Having reached capacity on its IBM S/390® Multiprise® 2000 mainframe, BRZ Deutschland GmbH (BRZ) needed to migrate to a more flexible platform that could run Virtual Storage Extended (VSE) and Java-based applications on a Linux® operating system in parallel.

Solution:

BRZ decided to migrate to an IBM System z9® Business Class server running the IBM z/VSE™ V4 operating system. IBM and IBM Premier Business Partner Fritz & Macziol GmbH, who recommended the change, **completed the migration in one weekend**. Three VSE systems run in a logical partition with the System z9 server functioning as a data hub. An IBM System Storage™ DS6800 provides BRZ with the latest hard drive technology.

Benefits:

- Accelerates processing times for batch jobs
- Cuts run times by 20 percent compared to the previous system
- Reduces run times even further with addition of DS6800 technology

"A maximum in flexibility, stability and availability is simply what our clients expect and is a requirement for the permanent improvement of process flows. With the IBM System z9 BC we can meet these requirements."

— Oliver Neureuther, director of product management systems BRZ Deutschland GmbH

Solution components:

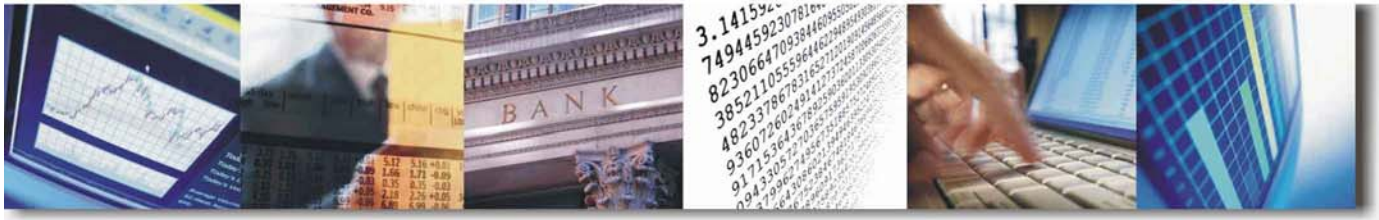
- IBM System z9 Business Class
- IBM System Storage DS6800
- IBM z/VSE

BRZ Deutschland Bauinformationstechnologie

Focused performance boost
Hardware Decimal Floating Point

Up to 10X improvement in decimal floating point instructions*

- **Decimal arithmetic widely used in commercial and financial applications**
- **Computations often handled in software**
- **First delivered in millicode on the System z9 – brought improved precision and function**
  - Avoids rounding and other problems with binary/decimal conversions
- **Integrated on every z10 core to deliver a performance boost to execution of decimal arithmetic**
- **Growing industry support for hardware decimal floating point standardization**
  - Java BigDecimal, C#, XML, C/C++, GCC, DB2® V9, Enterprise PL/1, Assembler
  - Open standard definition led by IBM



Delivering the benefits of System z to a new set of workloads

*** All performance information was determined in a controlled environment.**

Operating systems

z/OS

- Intelligent workload dispatching for performance
- Simplified verification and installation of service
- Enable enterprise-wide password synchronization
- High availability disk solution with simplified management
- Extreme storage volume scaling
- More zIIP exploitation
- Up to 64-way support
- Capacity provisioning

z/TPF

- Support for 64+ processors
- Workload charge pricing
- Exploit encryption technology

z/VSE™

- Interoperability with Linux on System z
- Exploit encryption technology
- MWLC pricing with sub-capacity option

z/VM

- z/VM Evaluation Edition
- Exploitation of new z/VM-mode partitions providing additional flexibility for hosting workloads
- Dynamically add processors and memory to z/VM LPARs and virtual servers
- Extended systems management functions using the HMC
- More secure network connectivity
- Reduced latency and better networking performance for bandwidth hungry applications

Linux on System z

- Enhanced performance for applications with large memory requirements
- Reduced latency and better network performance for bandwidth hungry applications
- Improved performance with Intelligent Dispatching
- HiperSockets Layer 2 support for easier IP configuration and problem diagnosis
- Enhanced encryption technology support

Protecting with IBM's world-class Business Resiliency solutions

- New I/O drawer with concurrent add/replace for drawers 2-4
- Preplanning capabilities to avoid future planned outages, e.g. dynamic LPAR allocation without a system outage and plan ahead memory
- Integrated enterprise level resiliency for heterogeneous data center disaster recovery management
- Policy driven flexibility to add capacity and backup processors
- Basic HyperSwap improves storage availability *
- Integrated cryptographic accelerator
- Tamper-resistant Crypto Express2 feature with enhanced secure key AES support and capability for increased Personal Account Numbers
- Audit logging on new Trusted Key Entry (TKE) 5.3 with optional Smart Card reader
- System z – the only platform that is EAL5 certified

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

Consolidation with Linux gets a "green light"

System z servers may help customers become more energy efficient:

- Deploy energy efficient technologies – reduce energy consumption and save floor space

Economics of IFLs and z/VM help to drive down the cost of IT

- IFLs attractively priced, have no impact on z/OS license fees, and z/VM and Linux software priced at real engine capacity
- New 50% price reduction on IFLs for System z10 BC, now $47,500*
- Plus 62% price reduction on System z10 memory prices for new workloads when purchased with Specialty Engines*, now $2250 per GB **
- And typically MES upgrades when moving to new technology are priced at no charge

* Prices are stated in US currency and may vary by country.
Specialty engines do not include Internal Coupling Facilities (ICFs)
** Limited to 16 GB per engine

Harness the Unique Value of Specialty Engines

- **Specialty engine Prices have remained constant yet deliver more capacity**
  - Up to 40% more capacity from z9 BC!!!
  - New lower Prices on z10 BC, now $47.5k USD[1,3]
- **Specialty engine MES upgrades to z10 BC typically move with NO charge**
  (exception for all IFL server and short path upgrades)
- **New lower memory costs for specialty engine enabled workloads, now $2250 per GB[1,2,3]**
- **Distributed Server model over same time:**
  - 3 Technology Refreshes (New Hardware)
  - 3 System migrations

Specialty Engines:
The investments that continues to deliver value generation to generation

1 - Prices in USD, may vary by country, 2 – Limited to 16GB per engine, 3 – Does not include Internal Coupling Facilities (ICFs)