Latest Server Technology and Strategies – System z10

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Agenda

- **The New Enterprise Data Center**
- **The role of System z in the data center**
- **Introducing the System z10 Enterprise Class**

IT organizations are challenged by a set of operational issues

	Challenges
 ***Costs & Service Delivery***	**Rising costs of systems and networking operations** **Explosion in volume of data and information** **Difficulty in deploying new applications and services**
 ***Business Resiliency & Security***	**Security of your assets & your clients' information** **Growth of compliance requirements** **Systems and applications need to be available**
 ***Energy Requirements***	**Rising energy costs & rising energy demand** **Power & thermal issues inhibit operations** **Environmental compliance & governance mandates**

The New Enterprise Data Center:
An evolutionary new model for efficient IT delivery . . .

New economics: **Virtualization with optimized systems and networks to break the lock between IT resources and business services**

Rapid service delivery: **Service management enables visibility, control and automation to deliver quality service at any scale**

Aligned with business goals: **Real-time integration of transactions, information and analytics - and delivery of IT as a service**

Stages of Adoption

Simplified

Drives IT Efficiency

- Physical consolidation and optimization
- Virtualization of individual systems
- Systems, network and energy management
- Resiliency & security

Shared

Rapid deployment

- Highly virtualized resource pools – “ensembles”
- Integrated IT service management
- Green by design

Dynamic

Highly responsive and Business Goal Driven

- Virtualization of IT service
- Business-driven service management
- Service oriented delivery of IT

IBM System z:
The Cornerstone of the New Enterprise Data Center

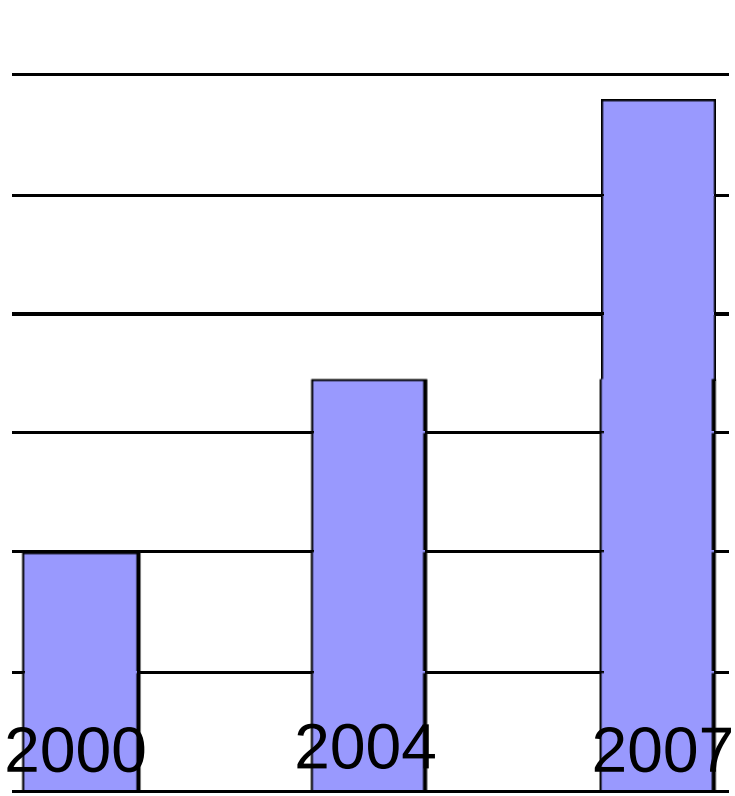
- **Simplified: Change the Operational model to reduce cost**
  - Operational superiority through Extreme virtualization and leading management
  - Robustness through leadership security and availability
  - Save more by adding further virtualized applications
- **Shared: Today's ultimate shared resource pool**
  - Processors, memory and channels can be shared across all the applications
  - Hundreds of applications can share resources on System z simultaneously
- **Dynamic: automating service delivery to meet new business needs**
  - Automated provisioning and management optimize for high value services
  - Services can be added or deleted on the fly
  - Applications can be integrated with centralized enterprise-wide real time data

System z clients are tackling these challenges today

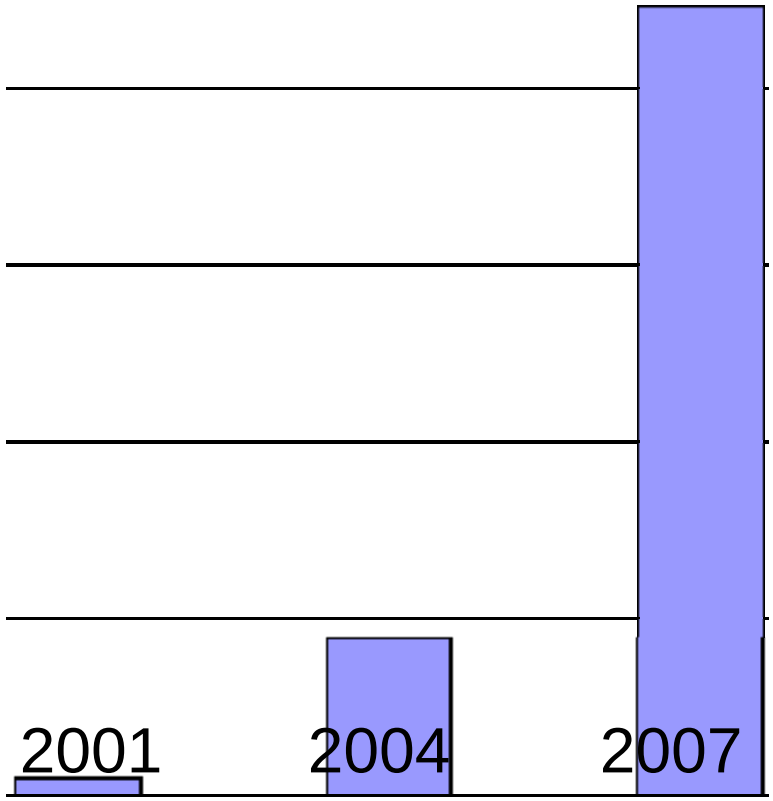
- **Enterprise modernization and SOA**
- **IT Consolidation and Virtualization**
- **Improving Energy Efficiency**
- **Delivering Business Resiliency**

System z Workload Growth

Specialty engines successfully target client issues



System z total inventory



Specialty Engine total inventory

Introducing…

The IBM System z10
Enterprise Class

The worlds' most powerful enterprise computing platform

Introducing the IBM System z10™ Enterprise Class… a marriage of evolution and revolution

Evolution

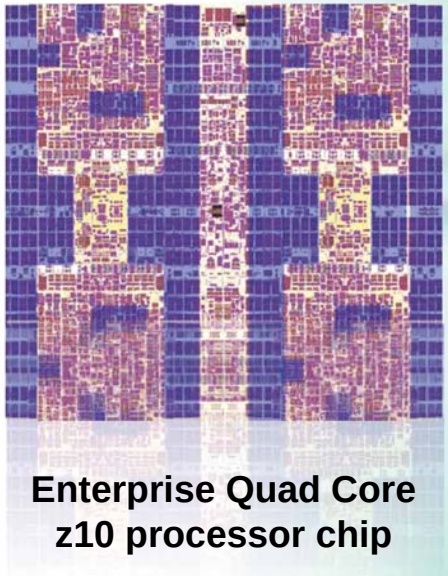
- Scalability and virtualization to reduce cost and complexity
- Improved efficiency to further reduce energy consumption
- Improved security and resiliency to reduce risk
- New heights in storage scalability and data protection

Revolution

- 4.4 GHz chip to deliver improved performance for CPU intensive workloads
- ‘Just in time’ deployment of capacity resources
- Vision to expand System z capabilities with Cell Broadband Engine™ technology

Making high performance a reality

- **New Enterprise Quad Core z10 processor chip**
  - 4.4 GHz - additional throughput means improved price/performance
  - Cache rich environment optimized for data serving
  - 50+ instructions added to improve compiled code efficiency
  - Support for 1MB page frames
- **Hardware accelerators on the chip**
  - Hardware data compression
  - Cryptographic functions
  - Hardware Decimal Floating point
- **CPU intensive workloads get performance improvements from new core pipeline design**

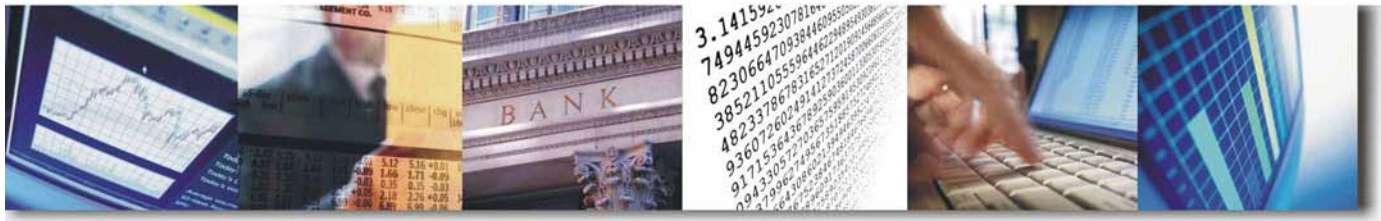


Enterprise Quad Core z10 processor chip

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
- **On z10 EC integrated on every core giving 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
  - Endorsed by key software vendors including Microsoft® and SAP
  - Open standard definition led by IBM

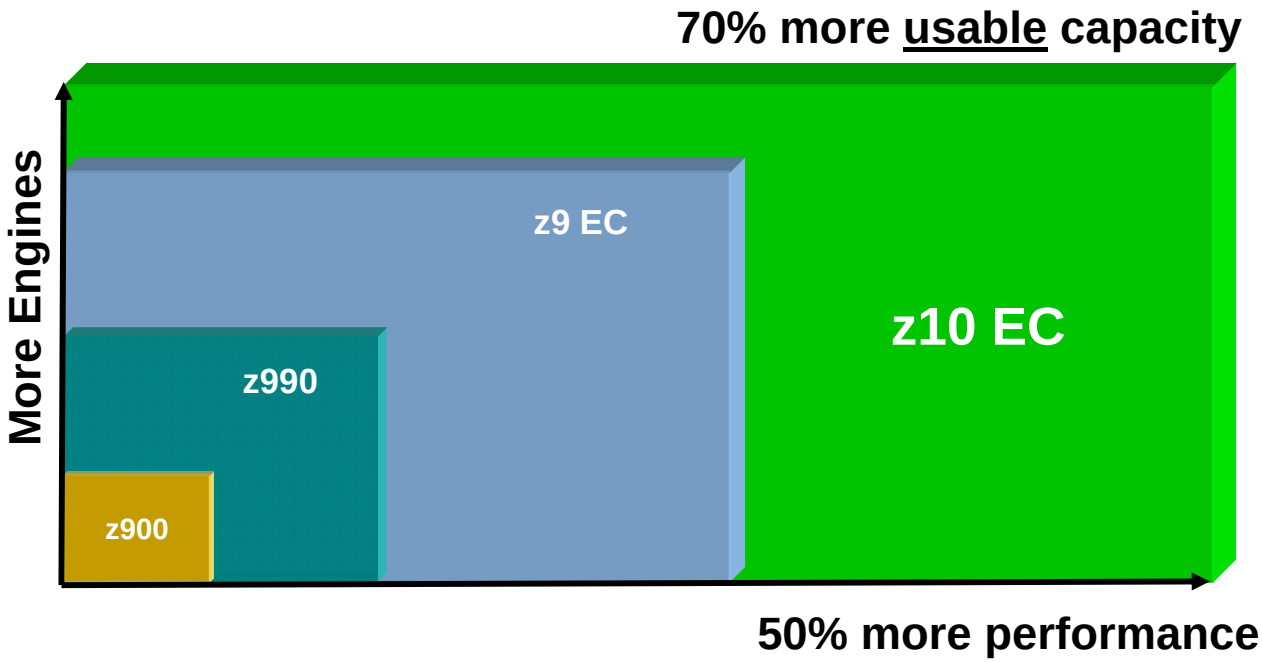


Bringing high performance computing benefits to commercial workloads

Unprecedented performance and capacity

Transforming the economics of the data center

- ***Lower software license costs***
- ***Lower labor costs***
- ***Lower energy and facilities costs***



- **50% average increase in specialty engine performance**
- **Up to 2x performance increase in CPU intensive tasks**
- **Up to 10x improvement in decimal floating point instructions**

"IBM's z10 EC is the computer industry's pinnacle systems platform. Blow-away performance, increased capacity, and expanded memory makes this system the absolute best scale-up architecture — bar none — in the computing industry Joe Clabby, President, Clabby Analytics 2008

Helping to drive down the cost of IT
Now even more workloads can benefit from zIIP

- **zIIP can help to integrate data across the enterprise by optimizing resources and lowering the cost of ownership for eligible data and transaction processing workloads**
  - Centralized data serving - First to exploit zIIP were workloads such as BI, ERP, and CRM applications running on distributed servers with remote connectivity to DB2 V8
  - Network encryption - zIIP becomes an IPSec encryption engine helpful in creating highly secure connections in an enterprise

Available 9/07

  - Serving XML data – zIIP is enabled for XML parsing, first to exploit this is inserting and saving DB2 9 XML data over DRDA®

new!

  - Remote mirror – zIIP becomes a data mirroring engine with zIIP assisted z/OS Global Mirror function (zGM, formerly XRC) helpful in reducing server utilization at recovery site (with z/OS V1.8 and above)

new!

  - Exploiting of zIIPs by ISVs
- **zIIPs offer economics to help you**
  - **PLUS** zIIP price is same for z10 EC as z9 EC and we offer no charge MES upgrades when moving to new technology

zAAPs – not just for Java anymore!
More new application technology exploiters, more new benefits

- **zAAP designed to help implement new application technologies on System z**
  - Java was the first exploiter – lowering the cost of computing for WebSphere® Application Server and other Java technology-based applications
  - z/OS XML System Services (introduced with z/OS V1.9 and rolled back to V1.8 and V1.7) helps make hosting XML data and transactions on System z more attractive. DB2 9 and Enterprise Cobol V4.1 are the first exploiters.

Available 9/07

- **…. and more on Java**
  - SDK6 on z10 EC designed to deliver improved performance over SDK5 on z9 EC
  - New function on z10 EC may benefit Java performance
    - New z10 processor chip design and more available server memory .. plus in 2Q08 –support for new decimal floating point on z10 EC by Java BigDecimal *
  - **PLUS** zAAP price is same for z10 EC as z9 EC and we offer no charge MES upgrades when moving to new technology

System z = z10 EC, z9 EC, z9 BC, z990, z890

IBM System z10 Application Assist Processor and IBM System z9 Application Assist Processor

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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
- ‘No charge’ MES upgrades available when upgrading to new technology

Consolidation on System z

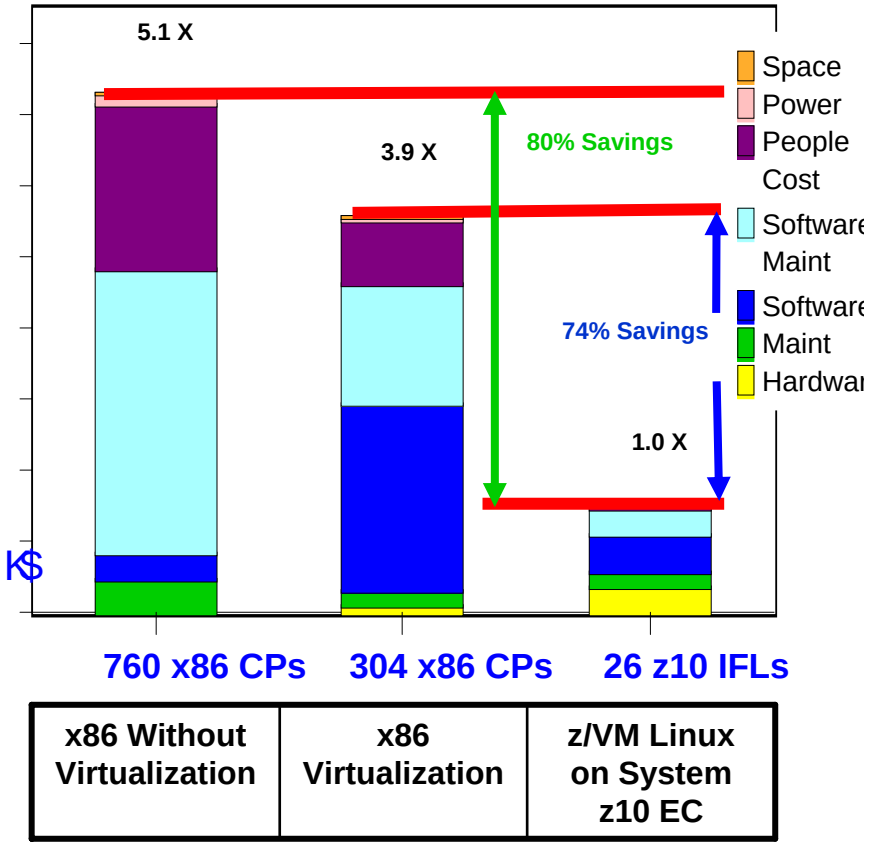
Potential savings up to 80% compared to x/86 implementations

Nationwide Insurance on System z9

- 250 Servers to 6 IFLs on z9
- Will save $16M over next 3 Yrs

Large Linux environment on z10 EC

- 760 x/86 Servers to 26 IFLs
- Save up to 80% over 3 Years
  - Up to $30M in savings



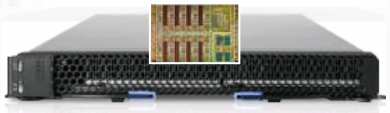
Potential savings of up to 80% when consolidating to System z10 EC and Linux versus distributed x86 Servers

System z and Cell Broadband Engine – The Vision

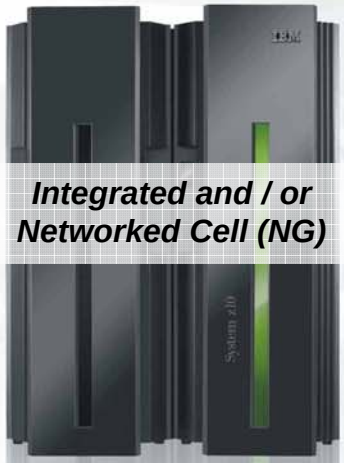
A 'Marriage' of Two Technologies that Perfectly Complement Each Other

z today

Cell Blade



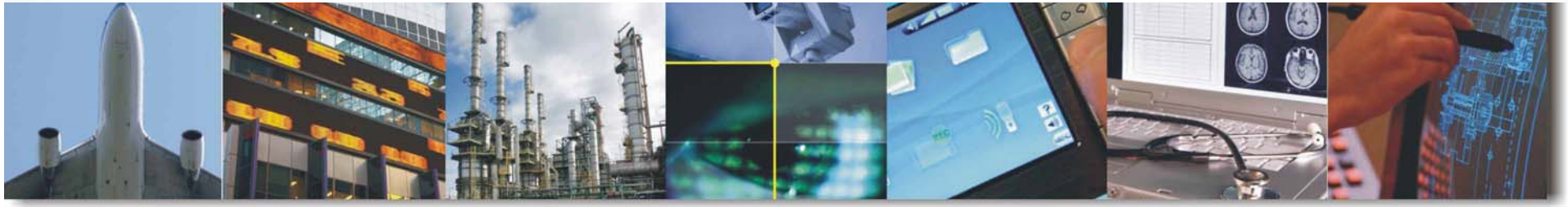
QS20, QS21, QS22, QS2x



Integrated and / or Networked Cell (NG)

z tomorrow

Preserves the same programming model between Network and Integrated



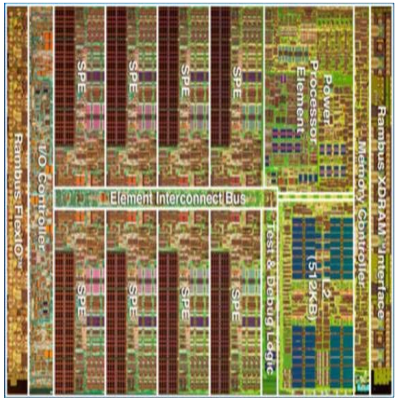
Aerospace and Defense | *Financial Services Sector* | *Chemicals and Petroleum* | *Digital Video Surveillance* | *Digital Media* | *Information Based Medicine* | *Electronic Design Automation*

Collaborate to Innovate

OpenSolaris™ for System z under z/VM

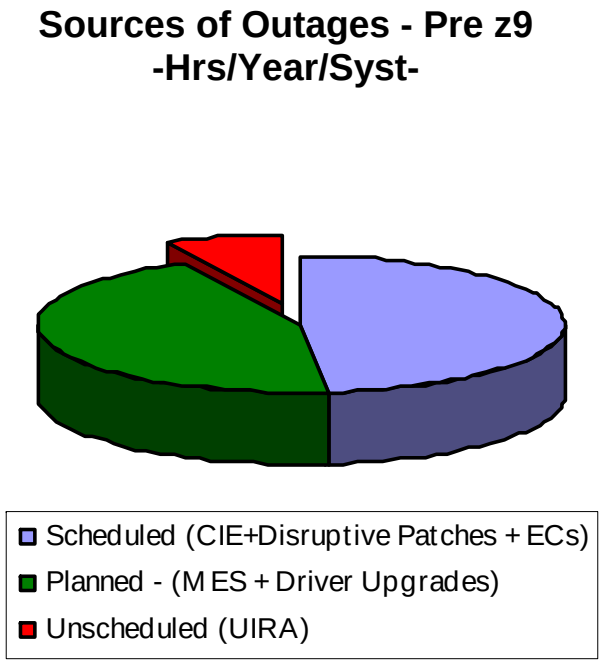
SAP Business Intelligence Accelerator

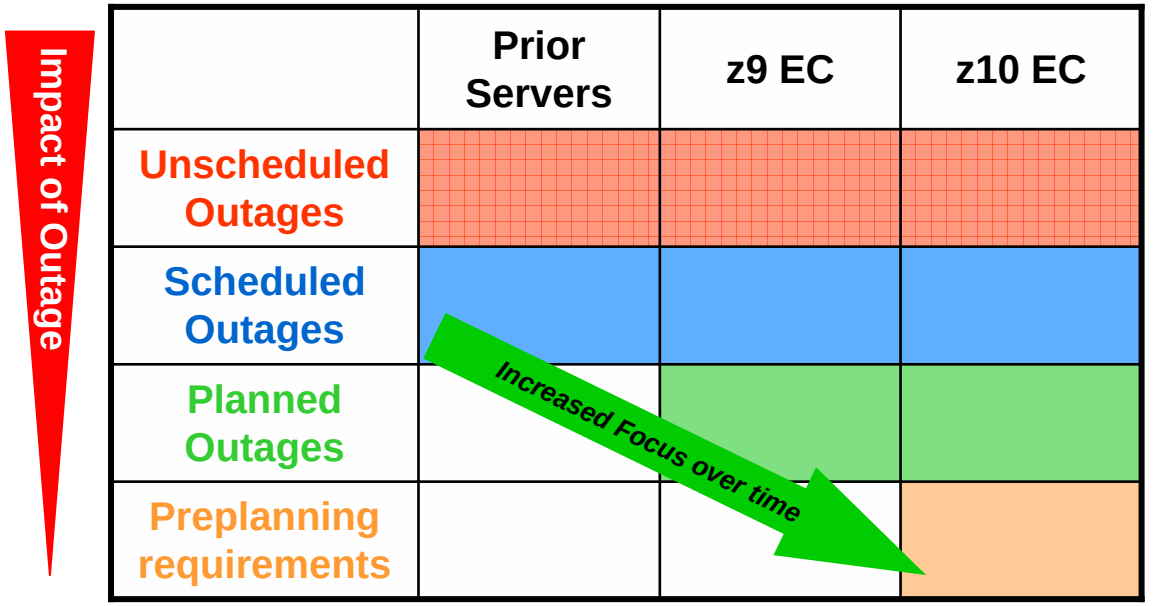
“GameFrame” with Cell Broadband Engine



Cell Broadband Engine

Keeping your system available is central to our design
Continuing our RAS focus helps avoid outages





Just in time capacity gives you control

- **Permanent and temporary offerings – with you in charge**
  - Permanent offerings – Capacity Upgrade on Demand (CUoD), Customer Initiated Upgrade (CIU)
  - Temporary offerings include On/Off Capacity on Demand (On/Off CoD) , Capacity Backup Upgrade (CBU) and a new one – Capacity for Planned Event (CPE)
- **No customer interaction with IBM at time of activation**
  - Broader customer ability to order temporary capacity
- **Multiple offerings can be in use simultaneously**
  - All offerings on Resource Link
  - Each offering independently managed and priced
- **Flexible offerings may be used to solve multiple situations**
  - Configurations based on real time circumstances
  - Ability to dynamically move to any other entitled configuration
- **Offerings can be reconfigured or replenished dynamically**
  - Modification possible even if offering is currently active
  - Some permanent upgrades permitted while temporary offerings are active
- **Policy based automation capabilities**
  - Using Capacity Provisioning Manager with z/OS 1.9
  - Using scheduled operations via HMC

Tracking energy consumption within the infrastructure

- **ResourceLink™ provides tools to estimates server energy requirements before you purchase a new system or an upgrade**
- **Has energy efficiency monitoring tool**
  - Introduced on IBM System z9 platform in April 2007
  - Power and thermal information displayed via the System Activity Display (SAD)
- **New IBM Systems Director Active Energy Manager (AEM) for Linux on System z V3.1**
  - Offers a single view of actual energy usage across multiple heterogeneous IBM platforms within the infrastructure
  - AEM V3.1 energy management data can be exploited by Tivoli® enterprise solutions such as IBM Tivoli Monitoring, IBM Tivoli Usage and Accounting Manager, and IBM Tivoli OMEGAMON® XE on z/OS
  - AEM V3.1 is a key component of IBM's Cool Blue™ portfolio within Project Big Green

Protecting with IBM's world-class Business Resiliency and Security solutions

- Preplanning capabilities to avoid future planned outages, e.g. dynamic LPAR allocation without a system outage
- 100 available capacity settings – 30% more than z9 EC
- 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
  - Advanced Encryption Standard (AES) 192 and 256 and Stronger hash algorithm with Secure Hash Algorithm (SHA-512)
- Tamper-resistant Crypto Express2 feature
  - Supports high levels of security for demanding applications
  - Fully programmable and configurable
  - High scale performance for SSL transactions
- Trusted Key Entry (TKE) 5.2 with optional Smart Card reader
- System z – the only platform that is EAL5 certified

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z10 EC Parallel Sysplex coexistence and coupling connectivity

z800, z900
Not supported!

z9 EC
ISC-3, ICB-4

Current
InfiniBand

z9 BC
ISC-3, ICB-4

ICB-4
2 GBps

z10 EC
E64 no ICB-4

ICB-4
2 GBps

z990
ISC-3, ICB-4

12x IB-SDR
3 GBps

z9 EC
Dedicated CF
PSIFB, ISC-3, ICB-4

z890
ISC-3, ICB-4

z9 BC
Dedicated CF
PSIFB, ISC-3, ICB-4

12x IB-SDR
3 GBps

12x IB-DDR
6 GBps

z10 EC
PSIFB, ISC-3, and
ICB-4 (Except E64)

Note: InfiniBand Coupling Links planned availability 2Q2008

Efficiently Managing Information Growth

The Industry's Best Information Storage Infrastructure for System z!

- **Innovation that Scales! Taking storage capacity to the extreme with *4x the capacity* for System z environments***
- **Innovation that Saves! Significant *reduction in cost* enabled to automate your information storage failover process**
  - **System z customers can leverage IBM Basic HyperSwap for single site automated volume failover.***
  - **Reduced cost for z/OS Global Mirror (XRC) solution possible with zIIP assisted offload and DS8000 Extended Distance FICON**
- **Innovation that Performs! Up to *95% faster data resynchronization* to restore a customer's disaster recovery protection across data centers using DS8000 and GDPS***
  - **As it copies only changed data, z/OS Metro/Global Mirror Incremental Resync can greatly reduce time required to resync mirrored sites (in some cases, from hours to minutes), after a GDPS Hyperswap, maintaining information integrity and reducing network bandwidth required*.**

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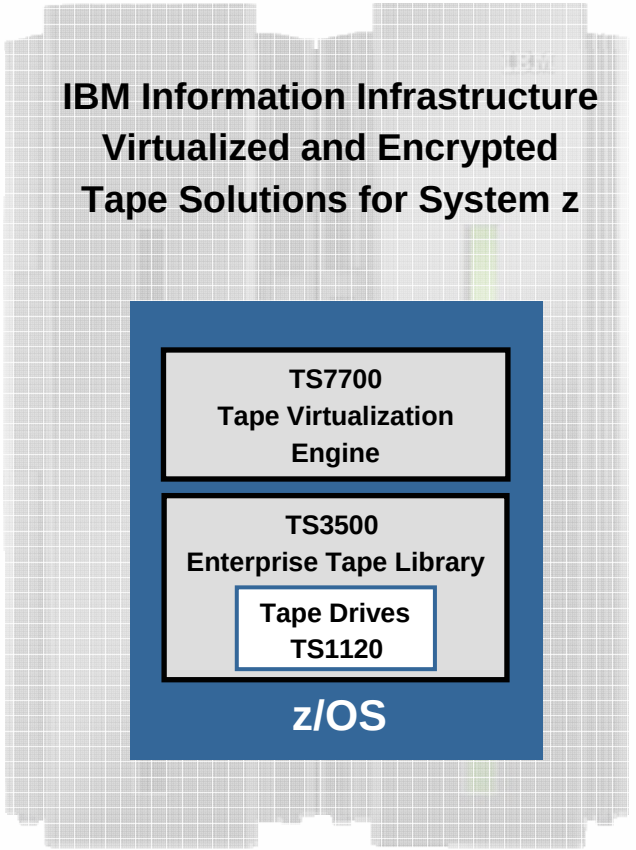
Efficiently Managing Information Security and Capacity

The Industry's Best Information Archiving for System z!

- **Innovation that Protects! Tape Virtualization Engine**
  - **Only the IBM Information Infrastructure *securely archives information* to tape with exclusive encryption capability and deep integration with z/OS Key Management.**
  - ***New* three Site GRID configuration automatically copies tape data to remote sites for enhanced business continuity.**
- **Innovation that Simplifies! SAN made simple for System z environments**
  - **SAN Director simplifies your infrastructure by extending support to 4Gbps for today's information needs and providing a future foundation for *next generation SAN fabrics* with forward and backward compatibility!**



z/OS V1.10 Preview - Integration with the z10 EC

Supporting System z innovation, raising the IT bar and taking System z to the next level of...

... scalability and performance

- HiperDispatch for intelligent dispatching of work for optimized performance[1]
- Up to 1TB of real memory[2] and 64 processors (zIIPs, zAAPs, and CPs) [3] per LPAR
- Extended Address Volume (EAV) capability for large storage volumes, improved storage managemement[4,5]
- Large (1 MB) pages expected to reduce memory management overhead for exploiting applications[3]
- Support for Hardware Decimal Floating Point enables high performance computing for your commercial workloads[3]
- Support for InfiniBand Coupling Links[1,6]

... networking and connectivity

- Policy-based networking helps create a network responsive to your application needs[1]
- Automatic intrusion defense capabilities[4]

...availability

- Basic HyperSwap – for high availability disk[3,*]
- Parallel Sysplex and GDPS enhancements

... simplified operations

- Capacity Provisioning Manager can monitor systems and dynamically activate / deactivate capacity[3]
- New z/OS Management Facility – planned – a single, modern, Web-browser based management console for z/OS, intended to simplify day to day operations and administration of a z/OS system. *

....improved economics

- Additional XML exploitation of specialty engines[3]
- zIIP assisted z/OS Global Mirror (XRC) [3]

(1) available with z/OS V1.7 with appropriate maintenance
(2) available with z/OS V1.8 and appropriate maintenance, 1TB memory on z10 E56 and E64 only
(3) available with z/OS V1.9 and appropriate maintenance
(4) planned for z/OS V1.10
(5) with appropriate storage
(6) Planned availability 2Q08
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Protecting your investment in IBM technology

- **Designed to protect your investment by offering upgrades from z9 EC and z990 to the z10 EC**
- **Full upgradeability within the System z10 family**
  - Upgrade to Model E64 will require a planned outage
- **Temporary or permanent growth when you need it**
  - New provisioning architecture

So what's in the announcement for the z9 BC?
The server for small to medium enterprises

- **IBM storage advantages for System z**
  - Enabling extreme volumes with EAV
  - z/OS Global Mirror (XRC) enabled for zIIP
  - z/OS Metro/Global Mirror Incremental Resync *
  - Tape Virtualization Engine
  - SAN768B for next generation SAN
- **Enterprise wide disaster recovery with GDPS 3.5**
- **Basic HyperSwap with z/OS ***
- **Updated redirect workloads for zIIP and zAAP**
  - IPSec, XML Parsing, z/OS Global Mirror
- **Great server for 'distributed' mainframe computing**
- **Full participation in a Parallel Sysplex with a z10 EC**

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Announcing New IBM Services for System z10: Providing premier service and support for the enterprise

IT Server optimization and integration services

- *Reduce complexity in the IT infrastructure*

Implementation Services for Parallel Sysplex

- *Help move to a centralized data server while protecting data integrity*

Implementation Services for GDPS

- *Industry-unique integrated and automated end-to-end recovery across multiple platforms*

Implementation Services for Tape Systems

- *Tape encryption for compliance and information lifecycle management*

A Growing Community…

- **Over 4,000 applications – up 600 in 2007**
- **Over 1,100 Linux applications – up 260 in 2007**
- **Over 1,200 ISVs – up 67 in 2007**
- **Academic Initiative - Over 400 schools and more than 40,000 students**

z10 EC: Extending leadership capabilities for The New Enterprise Data Center

- **70% greater Capacity**
  - Huge expansion of virtual resource pool
  - enables consolidation of hundreds of additional applications
- **Just in Time capacity to help deliver optimal service to the business**
- **IBM Tivoli Service Management Center for System z**
- **Extended resiliency & security**
- **Green by design**

The Future runs on System z…
…The Future begins today

The System z10 Enterprise Class

"The IBM mainframe has been a key part of our IT infrastructure over the years, with clear cost benefits, but this new system takes that value proposition a leap ahead. The capacity and scale of this system changes the economics of the mainframe and is a significant step forward in addressing our constantly evolving technology needs."

Sandee Kotowski, Manager of Mainframe Infrastructure, Hewitt Associates.

Latest Server Technology and Strategies – System z10

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