

What's new with z/VM, z/VSE, and Linux on System z ?

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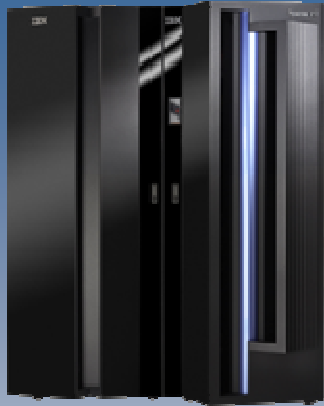
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Agenda

- ■ **IBM System z10 Enterprise Class**
- **z/VSE**
- **z/VM and Linux on System z**
- **Middleware and Systems Management Solutions**
- **IBM/GSE European Conference for VM/VSE + Linux**
- **Summary**

IBM System z family

IBM System z9 EC (2094)



- Announced 7/05 - Superscalar Server with up to 64 PUs
- 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
 - ▶ Enhanced FICON Express2 and 4
 - ▶ 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 z9

IBM System z9 BC (2096)



- Announced 4/06 - Superscalar Server with 8 PUs
- 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
 - ▶ Enhanced FICON Express2 4 Gbps
 - ▶ 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 z9

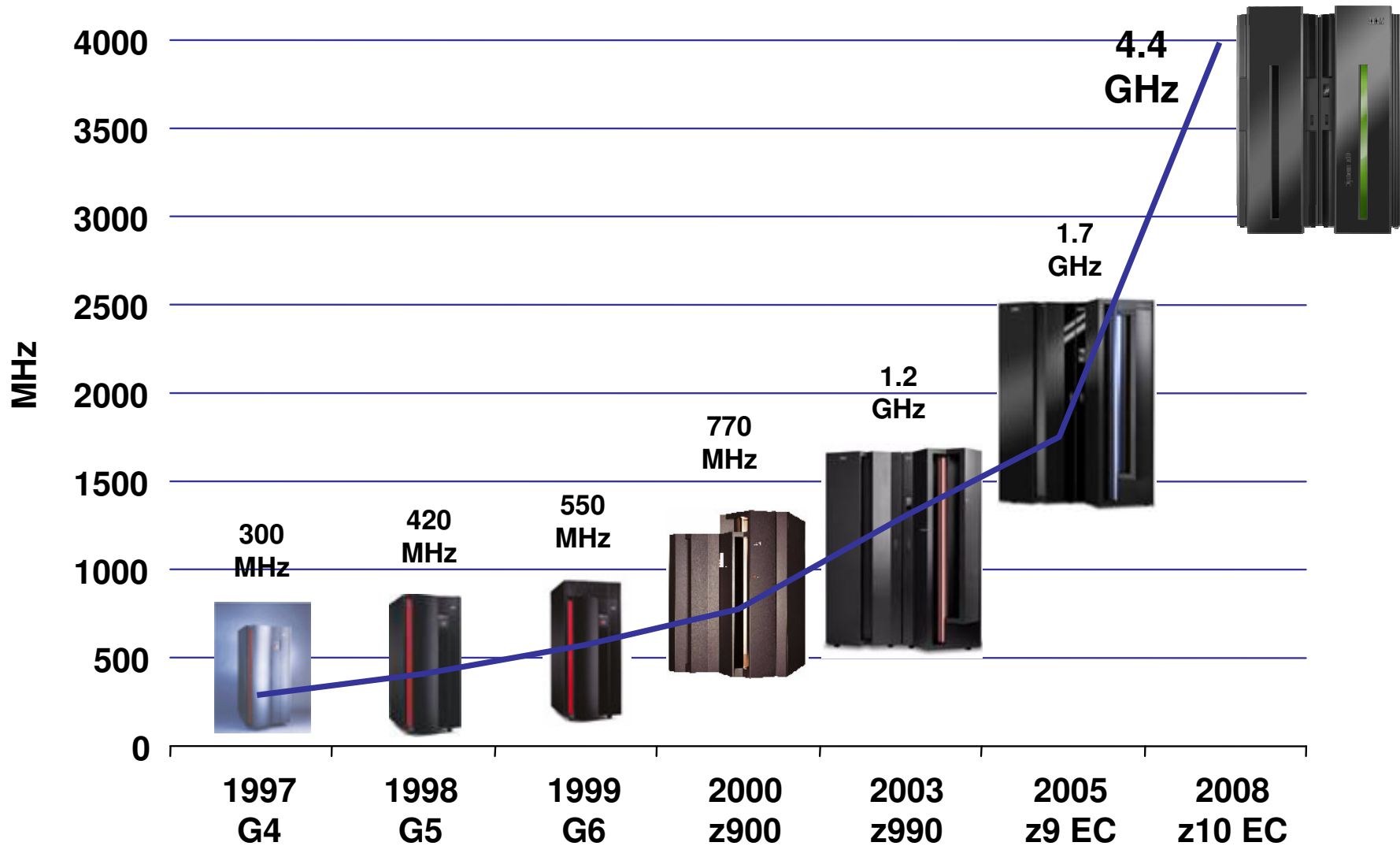
IBM System z10 EC (2097)



- Announced 2/08 - Server with up to 77 PUs
- 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
 - ▶ CUoD, CIU, CBU, On/Off CoD, CPE
- Memory – up to 1.5 TB
- Channels
 - ▶ Four LCSSs
 - ▶ Multiple Subchannel Sets
 - ▶ MIDAW facility
 - ▶ 63.75 subchannels
 - ▶ Up to 1024 ESCON channels
 - ▶ Up to 336 FICON channels
 - ▶ Enhanced FICON Express2 and 4
 - ▶ 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
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 - ▶ z/OS, z/VM, z/VSE, TPF, z/TPF, Linux on System z

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IBM z10 EC continues the CMOS Mainframe Heritage



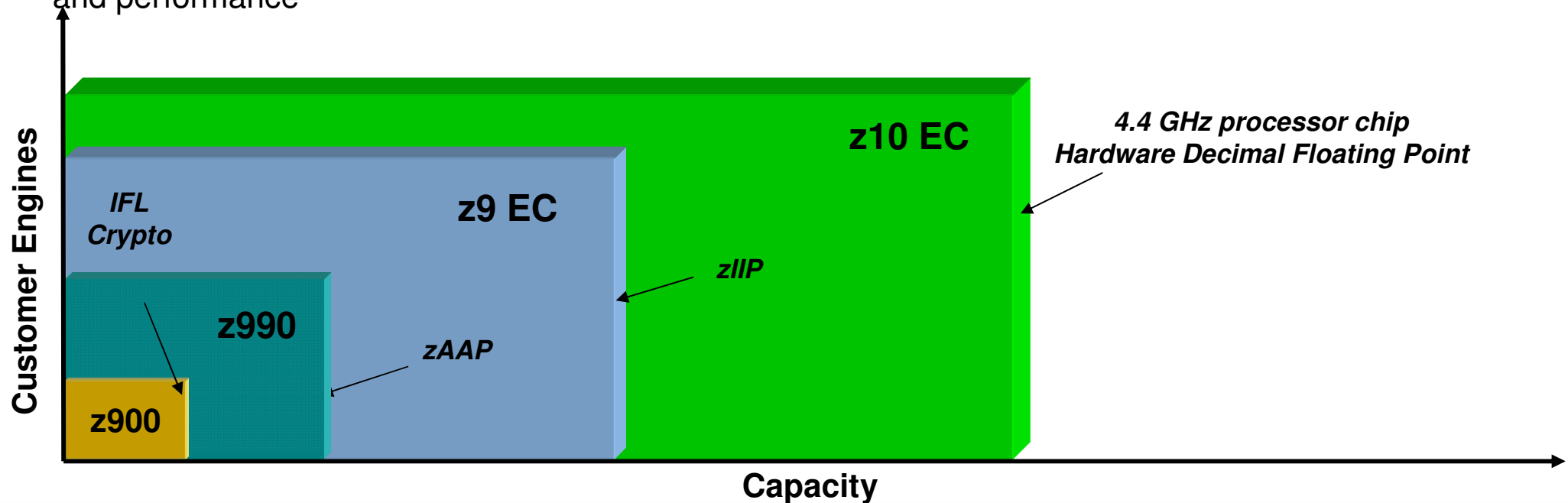
- G4 - 1st full-custom CMOS S/390®
- G5 - IEEE-standard BFP; branch target prediction
- G6 - Cu BEOL

- IBM eServer™ zSeries® 900 (z900) - Full 64-bit z/Architecture®
- IBM eServer zSeries 990 (z990) - Superscalar CISC pipeline
- z9 EC - System level scaling

- z10 EC - Architectural extensions

Designed for improved server performance and scalability with faster and more processors and improved dispatching synergy

- The z10 EC can deliver, on average, up to 50% more performance in a n-way configuration than an IBM System z9[®] Enterprise Class (z9[™] EC) n-way
 - ▶ **The uniprocessor can deliver up to 62% more performance than z9 EC uniprocessor ***
- The z10 EC 64-way can deliver up to 70% more server capacity than the largest z9 EC**
- Introducing HiperDispatch for improved synergy with z/OS[®] operating system to help deliver scalability and performance



Significant capacity for traditional growth and consolidation

* LSPR mixed workload average running z/OS 1.8 - z10 EC 701 versus z9 EC 701

** This is a comparison of the z10 EC 64-way and the z9 EC S54 and is based on LSPR mixed workload average running z/OS 1.8

* All performance information was determined in a controlled environment.

System z10 EC Operating System Support

Operating System	ESA/390 (31-bit)	z/Architecture (64-bit)
z/OS Version 1 Releases 7 ⁽¹⁾ , 8 and 9	No	Yes
Linux on System z ⁽²⁾ , RHEL 4, 5 & SLES 9, 10	No	Yes
z/VM Version 5 Release 2 ⁽³⁾ and 3 ⁽³⁾	No	Yes
z/VSE Version 3 Release 1 ⁽²⁾⁽⁴⁾	Yes	No
z/VSE Version 4 Release 1 ⁽²⁾⁽⁵⁾	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 z10 EC to enable HiperDispatch**
2. **Compatibility Support for listed releases. Compatibility support allows OS to IPL and operate on z10 EC**
3. **Requires Compatibility Support which allows z/VM to IPL and operate on the z10 EC providing System z9 functionality for the base OS and 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/OS, z/VM, z/VSE subsets of the 2097DEVICE Preventive Planning (PSP) bucket prior to installing a z10 EC

Agenda

- **IBM System z10 Enterprise Class**
- ■ **z/VSE**
 - **Changes in 2007 and 2008 YtD**
 - **Sub-Capacity Tools**
 - **z/VSE V4.2 Preview**
 - **Encryption Facility for z/VSE V1.1**
- **z/VM and Linux on System z**
- **Middleware and Systems Management Solutions**
- **IBM/GSE European Conference for VM/VSE + Linux**
- **Summary**

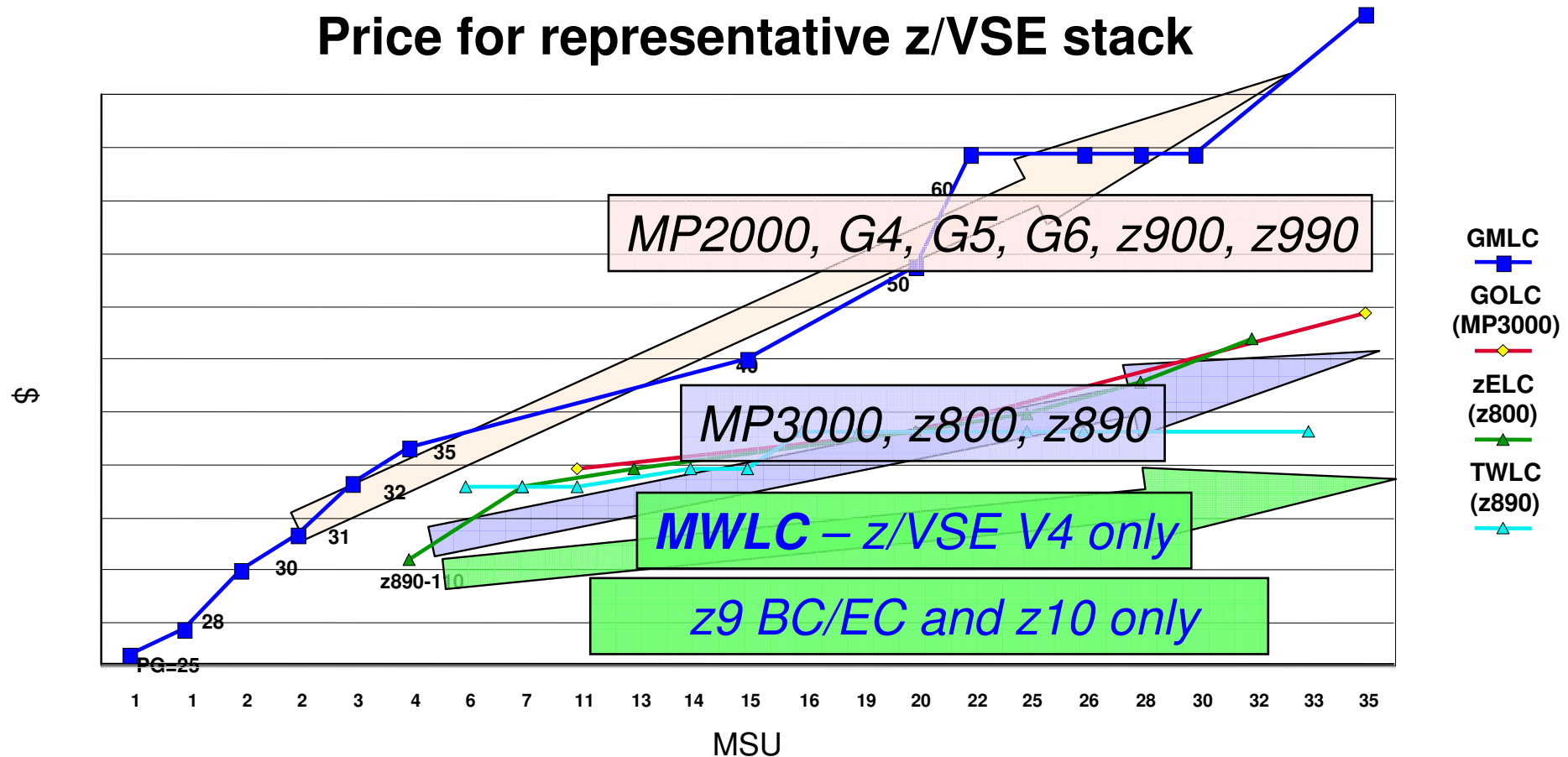
Changes in 2007 and 2008

- 02/28/2007 - **End-of-Service for VSE/ESA V2.7 effective**
- 03/16/2007 - **z/VSE V4.1 General Availability**
- 03/16/2007 - SecureFTP PTF available
- 04/18/2007 - IBM System z9 EC and z9 BC Enhancements
- 05/18/2007 - IBM TS1120 encrypting tape PTF available for z/VSE V4.1
- 06/05/2007 - **End-of-Marketing for z/VSE V3.1 announced (effective 5/31/2008)**
- 06/18/2007 - IBM TS1120 encrypting tape PTF available for z/VSE V3.1
- 06/29/2007 - **z/VM V5.3 General Availability**
- 07/10/2007 - IBM TS3400 Tape Library attachment to System z
- 08/07/2007 - **End-of-Service for z/VSE V3.1 announced (effective 7/31/2009)**
- 08/09/2007 - DL/1 enhancement (up to 10 datasets for HD databases) available
- 10/09/2007 - **z/VSE V4.2 Preview**
- 10/09/2007 - **Encryption Facility for z/VSE V1.1 announced (available 11/30/2007)**
- 10/10/2007 - **SCRT V14.2 available for z/VSE V4.1**
- 11/14/2007 - **IBM DB2 Server for VSE & VM V7.5 announced (available 11/30/2007)**
- 11/30/2007 - **z/VSE V4.1.1 available**
- 01/18/2008 - **z/VSE V3.1.3 available**
- 02/26/2008 - IBM System z10 Enterprise Class



MWLC - Introduced with z/VSE V4.1 on System z9

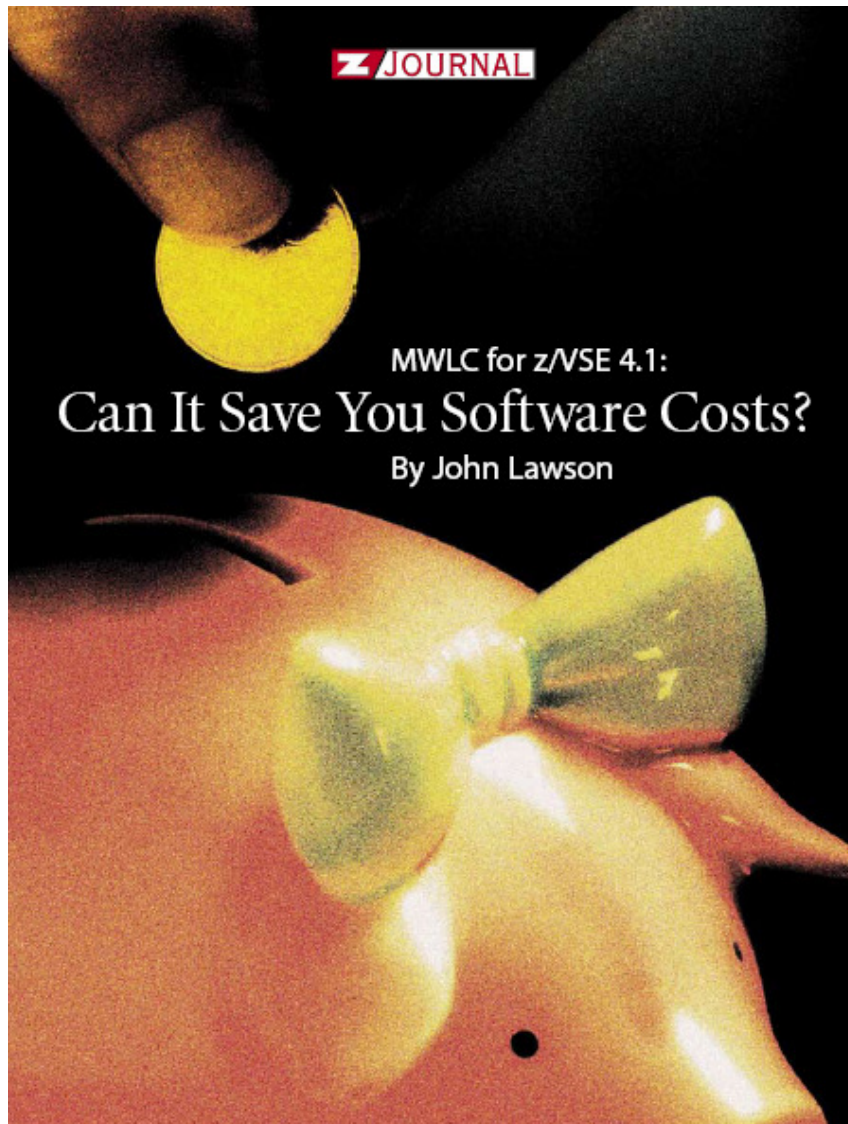
Price for representative z/VSE stack



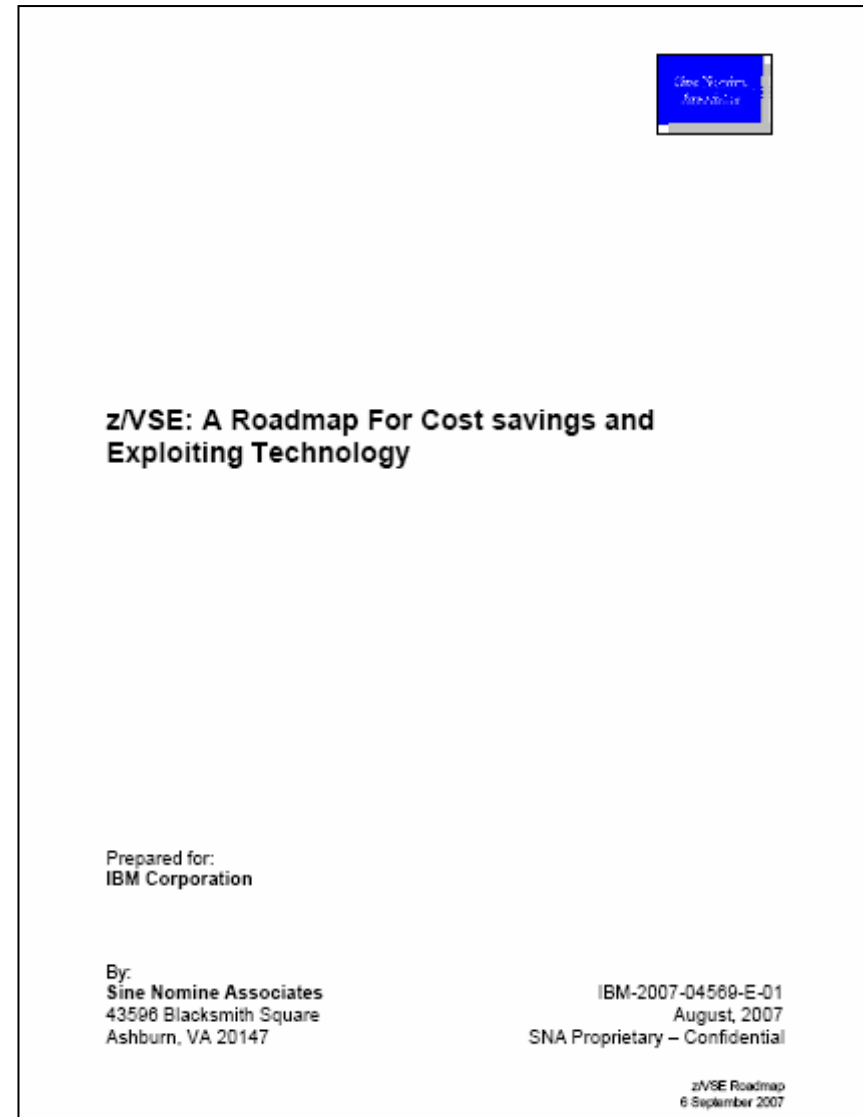
■ *"I just got our April software bill from IBM for the first month on our z9 under z/VSE 4.1 and MWLC. We were paying \$22,965 per month on our z800 under z/VSE 3.1.2. The April bill is for the same software and it is \$12,318: a difference of \$10,647 per month."*
 Mike Moore, IT Manager, Alabama Judicial Datacenter, Alabama

*Sample software stack includes: VSE CF V8, HLASM, VTAM, DITTO, COBOL

Press and Analyst Articles



Source: z/Journal, April / May 2007

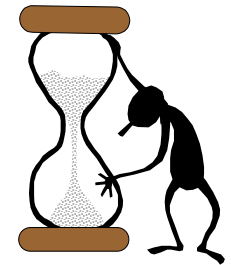


Source: Sine Nomine Associates, August 2007

z/VSE Sub-Capacity Tools

■ CMT: Capacity Measurement Tool

- ▶ Announced and available with z/VSE V4 since March 16, 2007
- ▶ Can be activated on z9 BC, z9 EC, and z10 EC models only
- ▶ Requires z/Architecture mode → z/VSE V4 only
- ▶ Collects data for LPARs and/or guest machines running under z/VM 5.2 (or later)
- ▶ Implemented as a new z/VSE V4 system task
- ▶ Output from CMT is input for SCRT



■ SCRT: Sub-Capacity Reporting Tool

- ▶ ~~Not announced and not available for z/VSE V4.1~~
- ▶ ~~Requires z/OS system to execute~~
- ▶ Analyzes SCRT89 records as produced by CMT on z/VSE V4.1
- ▶ ~~Customers must send SCRT89 records to IBM, and IBM runs SCRT on z/OS~~
- ▶ Output from SCRT is a report, similar to a spreadsheet report
- ▶ Customers must send that report to the IBM billing department via Web interface



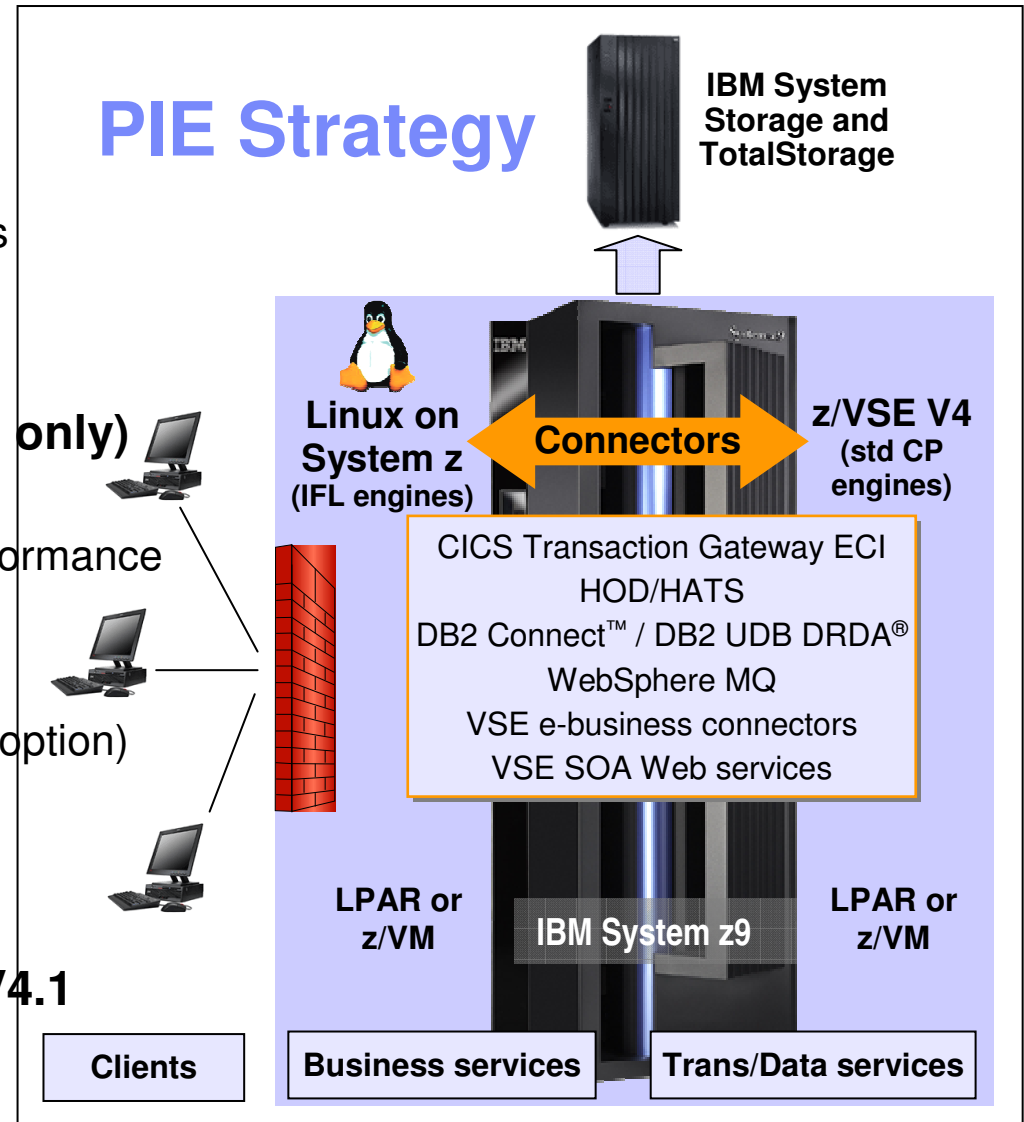
■ SCRT: Sub-Capacity Reporting Tool

- ▶ Announced for z/VSE V4.1 on October 9, 2007
- ▶ Available as SCRT V14.2 since October 10, 2007
- ▶ Planned to be integrated into z/VSE V4.2 (when available)

z/VSE V4.1 Overview

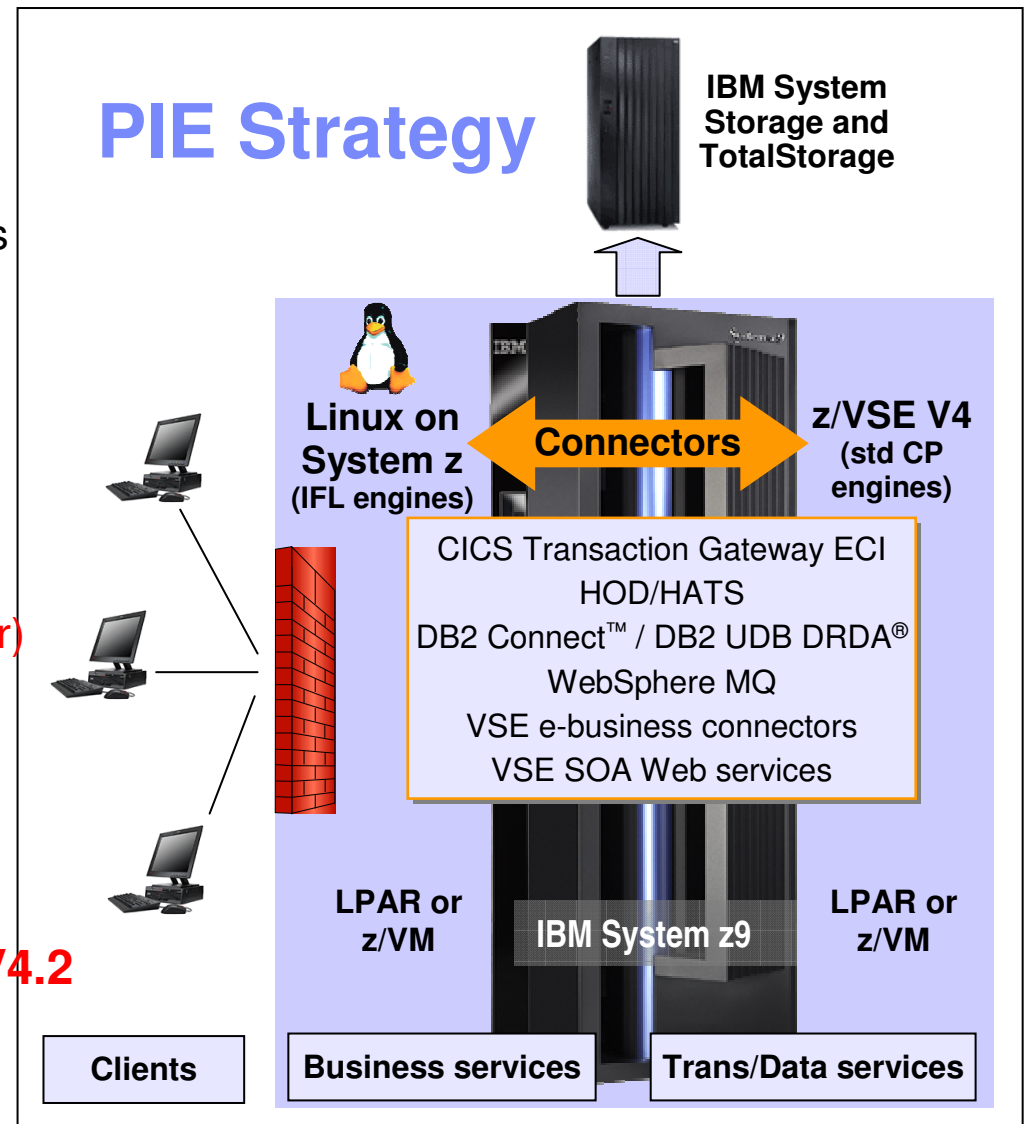
- Preview 4/27/2006, Announce 1/9/2007, **General Availability 3/16/2007**
- **z/Architecture mode only**
 - ▶ 64-bit *real* addressing (31-bit *virtual* addressing)
 - up to 8 GB real processor storage
 - ▶ IBM System z9 EC, z9 BC, z10 EC servers
 - ▶ IBM eServer zSeries 990, 890, 900, 800 servers
- **Capacity Measurement Tool (CMT)**
 - ▶ Fulfills SoD from July 2005
- **New MWLC pricing metrics (System z9/z10 only)**
 - ▶ Attractive full-capacity MWLC price points
 - ▶ Sub-capacity MWLC option for added price/performance
- **Encryption enhancements**
 - ▶ CPACF enhancements (AES-128)
 - ▶ Configurable Crypto Express2 (add accelerator option)
 - ▶ TS1120 encrypting tape
 - ▶ SecureFTP
- **SOA and interoperability improvements**
- **CICS TS & CICS/VSE supported w/ z/VSE V4.1**
- **FSU from z/VSE V3.1 and VSE/ESA V2.7**
- **Implemented 22 customer requirements**

z/VSE V4.2 Preview

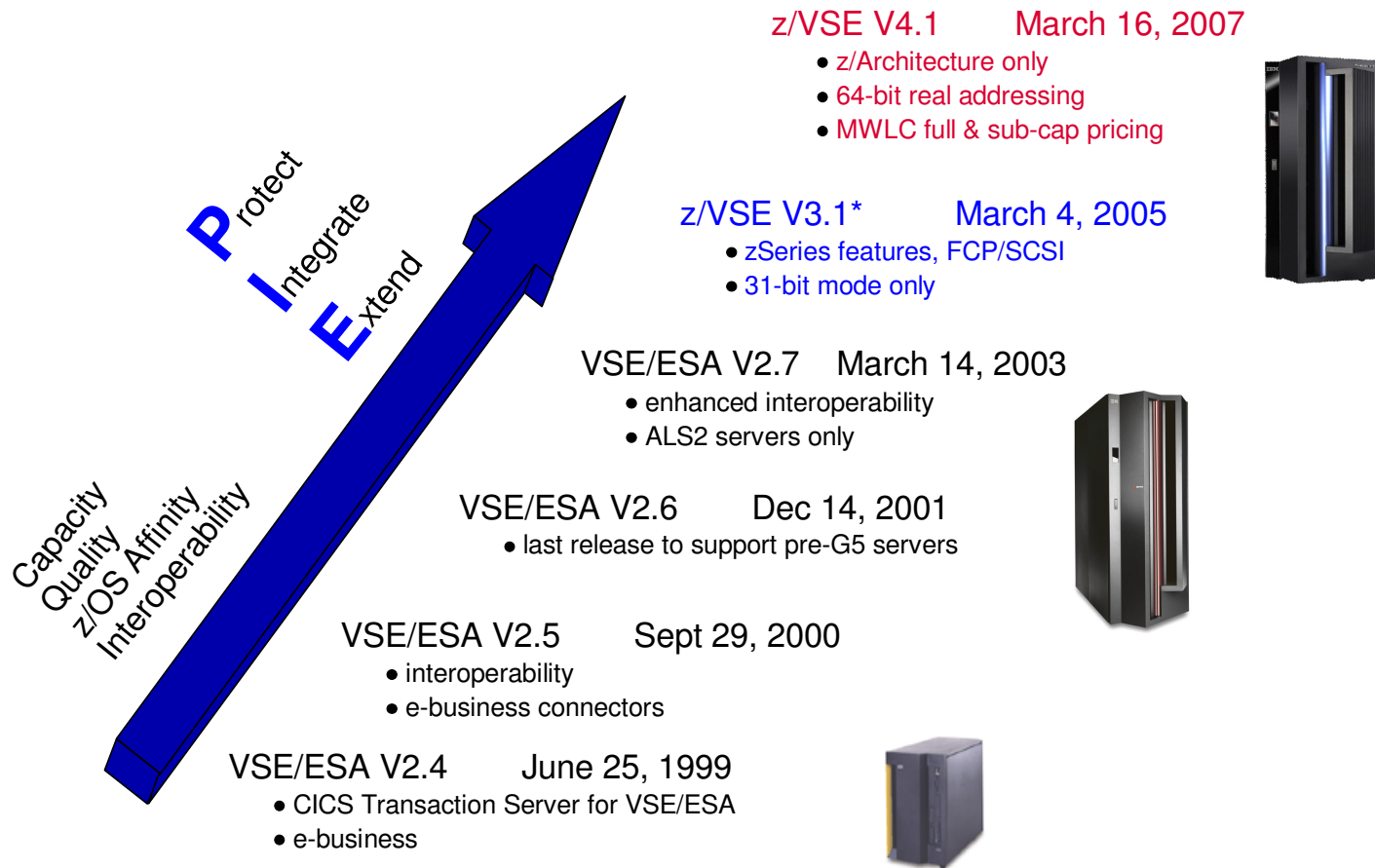


z/VSE V4.2 – What's changed, what's new ?

- **Preview Oct 9, 2007; planned availability 4Q2008**
- **z/Architecture mode only**
 - ▶ 64-bit *real* addressing (31-bit *virtual* addressing)
 - up to 32 GB real processor storage
 - ▶ IBM System z9 EC, z9 BC, z10 EC servers
 - ▶ IBM eServer zSeries 990, 890, 900, 800 servers
- **More than 255 VSE tasks**
 - ▶ Enable growth, ease migration to CICS TS
- **Sub-Capacity Reporting Tool (SCRT)**
 - ▶ Available now with z/VSE 4.1 (and later)
- **Encryption Facility for z/VSE V1.1**
 - ▶ Optional priced feature on z/VSE V4.1 (and later)
 - ▶ MWLC enabled
- **Added support for System Storage**
 - ▶ TS3400 Tape Library
 - ▶ TS7740 Virtualization Engine
- **CICS TS & CICS/VSE supported w/ z/VSE V4.2**
 - ▶ Statement of Direction (SoD) for CICS/VSE
- **FSU from z/VSE V3.1 and z/VSE V4.1**

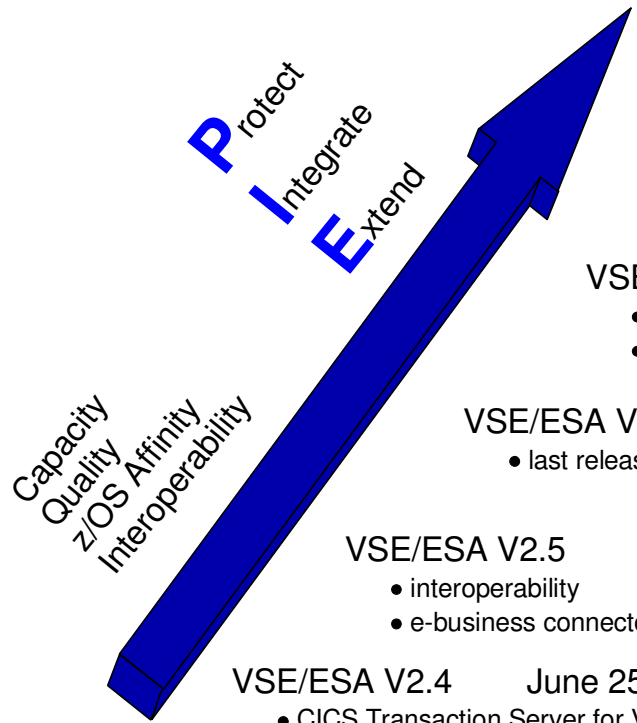


z/VSE Roadmap



•Note: z/VSE V3 can operate in 31-bit mode only. It does not implement z/Architecture and specifically does not implement 64-bit mode capabilities. z/VSE V3 is designed to support selected features of IBM System z hardware.

z/VSE Roadmap



VSE/ESA V2.4 June 25, 1999

- CICS Transaction Server for VSE/ESA
- e-business

VSE/ESA V2.5 Sept 29, 2000

- interoperability
- e-business connectors

VSE/ESA V2.6 Dec 14, 2001

- last release to support pre-G5 servers

VSE/ESA V2.7 March 14, 2003

- enhanced interoperability
- ALS2 servers only

z/VSE V3.1* March 4, 2005

- zSeries features, FCP/SCSI
- 31-bit mode only

z/VSE V4.1 March 16, 2007

- z/Architecture only
- 64-bit real addressing
- MWLC full & sub-cap pricing

z/VSE V4.2 - Preview Oct 9, 2007

- More tasks, more memory
- EF for z/VSE, SCRT on z/VSE
- SoD for CICS/VSE



Statement of Direction **
z/VSE V4.2 is planned to be the last release to offer CICS/VSE.

•Note: z/VSE V3 can operate in 31-bit mode only. It does not implement z/Architecture and specifically does not implement 64-bit mode capabilities. z/VSE V3 is designed to support selected features of IBM System z hardware.

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

Encryption Facility for z/VSE V1.1

- **Announce:** Oct-09-2007
- **GA:** Nov-30-2007
- **Optional priced feature for VSE Central Functions V8**
 - ▶ requires z/VSE V4.1 or later
 - ▶ MWLC-eligible
- **Requires CP Assist for Cryptographic Function (CPACF)**
 - ▶ no charge feature
 - ▶ only on z990, z890, z9 EC, z9 BC, and z10 EC servers
- **Extends affinity between z/VSE and z/OS**
 - ▶ function roughly equivalent to EF for z/OS V1.1
 - ▶ compatible with EF for z/OS V1.1 (Encryption Facility System z format)
 - EF for z/VSE tapes can be read by EF for z/VSE, EF for z/OS, EF for z/OS Java Client, and Decryption Client for z/OS
 - EF for z/OS V1.1 and EF for z/OS Java client tapes can be read by EF for z/VSE V1.1
- **Complements z/VSE support for IBM TS1120 tape**
 - ▶ TS1120 preferred solution for high volume backup/archive
 - ▶ EF option for limited backup/archive and/or exchange with partners with no TS1120

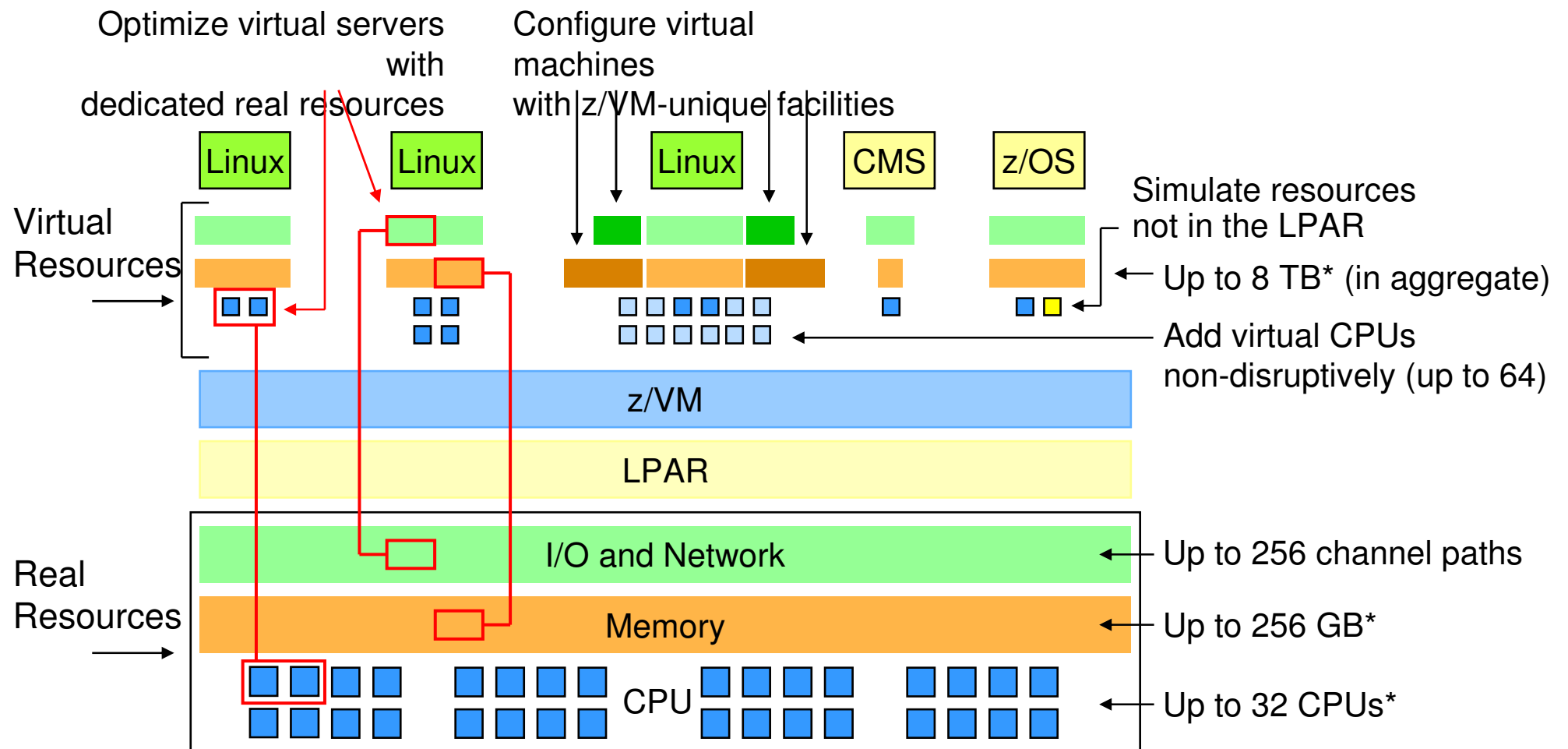


Agenda

- **IBM System z10 Enterprise Class**
- **z/VSE**
- ■ **z/VM and Linux on System z**
 - **z/VM V5.3**
 - **Project 'Big Green'**
 - **Linux Distributions**
- **Middleware and Systems Management Solutions**
- **IBM/GSE European Conference for VM/VSE + Linux**
- **Summary**

Extreme Virtualization with z/VM V5.3

z/VM can provision virtual machines with a mix of real and virtual resources with exceptional levels of scalability, availability and security



* z/VM V5.3 maximums

Press on z/VM V5.3

The screenshot shows a Microsoft Internet Explorer browser window displaying the IBM Press room page for the release titled "IBM Supercharges Mainframe Virtualization". The browser's address bar shows the URL: <http://www-03.ibm.com/press/us/en/pressrelease/21029.wss>. The page features the IBM logo, a navigation menu with links to Home, Products, Services & industry solutions, Support & downloads, and My IBM. A search bar is also present.

The main content area is titled "IBM Supercharges Mainframe Virtualization" and includes the following text:

Helping Customers Reduce Server Sprawl, Company Launches New Scalability Enhancements to Support the Industry's Largest Number of Virtual Images on a Single z/VM

ARMONK, NY - 06 Feb 2007: IBM (NYSE: IBM) today announced expanded scalability enhancements to the industry's most powerful virtualization technology z/VM. With this new release, z/VM version 5.3 can now host the industry's largest number of virtual images on a single hypervisor -- virtualization technology that makes one computer look like multiple computers -- allowing customers to further optimize and consolidate their infrastructures.

Internal testing conducted by IBM reveals that the new virtualization product release can host more than 1,000 virtual images on a single copy of z/VM. The new software, which can be used to replace many physical servers with "virtual" ones running in a single mainframe, helps customers lower energy consumption and other costs associated with data centers that have large numbers of single-application servers.

The announcement follows a year of remarkable growth and interest in the mainframe at IBM, as System z has chalked three consecutive quarters of growth, thanks in part to its advanced virtualization capabilities.

The latest z/VM release helps clients prepare for data center growth by offering support for larger memory configurations which are designed to help clients eliminate the need to spread large virtual-machine based workloads across multiple copies of z/VM.

On the right side of the page, there are sections for "Contact us" (with links to "Contact a media relations representative" and "Site feedback") and "Document options" (with a checked checkbox for "E-mail this page").

A left-hand navigation menu includes links to: Press room, Press releases, Press kits, Photo gallery, Biographies, Background, Press room feeds, Global press resources, Press room search, and Media contacts. Below this menu is a "Related links" section with links to "IT Analyst support center" and "Investor relations".

Consolidation and Virtualization Case Studies

Case Study: Nationwide Uses Linux and High-Power Virtualization for Web Presence

Gartner PaaS Core Research Note G00148213, John R. Phelps, Mike Chubb, 29 June 2007

Nationwide Insurance significantly reduced expenditures by consolidating nonmainframe server workloads using Linux-only System z mainframes, while improving quality of service and providing for growth that has minimal impact on floor space, power and cooling. Its approach will interest any organization that houses a combination of Windows (where its applications have Linux equivalents), Linux, Unix and IBM mainframe operating environments and that is looking at new and innovative ways to consolidate its server environment.

Key Findings

- Mainframes running Linux can be used to consolidate some workloads that run on x86 servers, deliver substantial operational savings and avoid/defer potentially costly data center expansions.
- The large number of Linux virtual servers that Nationwide needed made the total cost of ownership (TCO) benefits easier to prove. Those implementing the solution with a small number of potential virtual servers (one to 30) will need closer evaluation.
- In-house skills that can be leveraged should be considered as part of any virtualization/consolidation strategy.
- Nationwide achieved very significant results. Although not all situations lend themselves as readily to the Nationwide approach, there are a growing number of opportunities in which this approach might yield significant benefits and should at least be considered.

Recommendations

- Use cross-disciplinary teams that are dedicated to the project to gain broad commitment.
- Be prepared to change your billing model as you move from individual dedicated servers to a virtualized shared-resource model.
- Do not implement virtualization as a "knee-jerk" reaction to the issue of underutilized servers, but rather introduce it as part of a process that incorporates meeting performance, availability and security objectives while also allowing for possible volatility in usage.

WHAT YOU NEED TO KNOW

Nationwide was able to significantly reduce expenditure by consolidating nonmainframe server workloads using Linux-only System z mainframes. The nature of this consolidation solution also has improved quality of service and provided for growth within the same footprint of the two installed mainframes. This growth will have minimal impact on floor space, power and cooling in the data center.

Gartner.

Source:

<http://mediaproducts.gartner.com/gc/reprints/ibm/external/volume2/article13/pdf/article13.pdf>

IBM Case Study

IBM

Nexxar Group transfers to IBM System z9 Business Class for cost savings



Overview

■ Challenge

Enable very high availability to support business growth; develop an IT Service Management solution to enable integration, automation and optimization of IT resources; provide high security for customer-specific data and applications; enable rapid, low-cost provisioning of new servers

■ Solution

Worked with IBM Global Technology Services to consolidate more than 80 physical servers to virtual servers running under Linux® on an IBM System z9™ Business Class mainframe; implemented IBM Service Management methodologies to enable easy management of complex environment

■ Key Benefits

Significant reduction in physical complexity of infrastructure for improved security and greater ease of management; fewer processors means reduction in software licensing fees, while virtualization improves utilization of resources; overall 30 percent reduction in operational costs; faster time-to-market for new customer solutions; greater ease and speed of integrating new corporate acquisitions

Founded in 2003, Nexxar Group, Inc. is a money transfer company that also offers bill payment, check cashing and money order services. Headquartered in the US, Nexxar Group has a network of agents and branches in more than 40,000 locations across 105 countries. The company provides money transfer services under several of its own brands and also as a white-label offering to other financial services providers.

Nexxar has grown rapidly through corporate acquisitions, and plans to continue growing in this way. To enable acquisitions to be swiftly integrated into its business, and to support the

Source: [http://www-](http://www-306.ibm.com/software/success/cssdb.nsf/CS/STRD-6VHGK2?OpenDocument&Site=swzseries&cty=en_us)

[306.ibm.com/software/success/cssdb.nsf/CS/STRD-6VHGK2?OpenDocument&Site=swzseries&cty=en_us](http://www-306.ibm.com/software/success/cssdb.nsf/CS/STRD-6VHGK2?OpenDocument&Site=swzseries&cty=en_us)

Project 'Big Green'

- **IBM to reallocate \$1 billion each year:**
 - To accelerate “green” technologies and services
 - To offer a roadmap for clients to address the IT energy crisis while leveraging IBM hardware, software, services, research, and financing teams
 - To create a global “green” team of almost 1,000 energy efficiency specialists from across IBM

- **Re-affirming a long standing commitment at IBM:**
 - Energy conservation efforts from 1990 – 2005 have resulted in a 40% reduction in CO₂ emissions and a quarter billion dollars of energy savings
 - Annually invest \$100M in infrastructure to support remanufacturing and recycling best practices
 - *Will double compute capacity by 2010 without increasing power consumption or carbon footprint saving 5 billion kilowatt hours per year ... equals energy consumed by Paris – “the City of Lights”.*

- **What “green” solutions can mean for clients:**
 - For the typical 25,000 square foot data center that spends \$2.6 million in power annually, energy costs could be cut in half
 - Equals the reduction of emissions from taking 1,300 automobiles off of the road



IBM consolidates its own Data Centers for large Savings

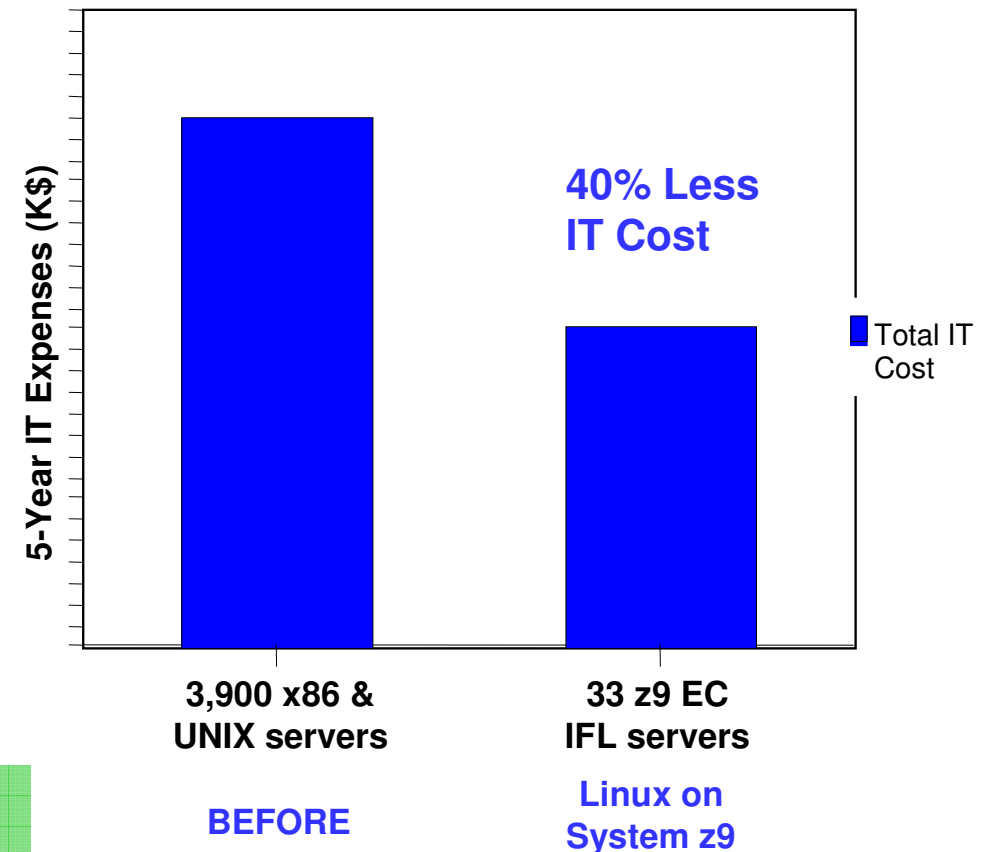
Your IT Cost may vary:

- **92% less hardware**
 - ▶ 23,000 processor cores going to 1,782 IFLs
 - ▶ +80% energy reduction
 - ▶ +85% space reduction
- **180% greater utilization**
 - ▶ 30% average utilization going to over 85%
- **Reduced people cost through virtualization**
 - ▶ Freeing up resources for growth opportunities
- **Potential for dramatic reductions in software expense for processor based licenses**
 - Elimination of 23,000 SW licenses and related on-going S&S costs
- **Significant reductions in power and cooling costs are possible**
 - ▶ Less Stress on Data Center Infrastructure
- **Significant reductions in IT Data Center square footage are likely**
 - ▶ Enables growth and better utilization of facilities

Workload consolidation using Linux on a mainframe may result in over 40% IT Cost savings.

IBM Global Account (IGA) IT Costs Varied Distributed Workloads 5-Year IT Cost Study Results

Potential 5-Year IT Cost Savings



New Red Pieces



Steve Womer
Rick Troth
Mike MacIsaac

Sharing and maintaining Linux under z/VM

Large operating systems, such as z/OS®, have, for several decades, taken advantage of *shared file structures*. The benefits of a shared file structure are reduced disk space, simplified maintenance, and simplified systems management. This IBM® Redpaper describes how to create a Linux® solution with shared file systems on IBM System z™ hardware (the mainframe) running under z/VM®. It also describes a maintenance system where the same Linux image exists on a test, maintenance and *gold* virtual servers. The benefits of such a system are:

- ▶ Extremely efficient resource sharing, which maximizes the business value of running Linux on System z
- ▶ Staff productivity because fewer people are needed to manage a large-scale virtual server environment running on z/VM
- ▶ Operational flexibility because companies can take advantage of and use their IT infrastructure to enhance business results

Note: A word of caution and a disclaimer are necessary. The techniques that we describe in this paper are not simple to implement and require both z/VM and Linux on System z skills. Further, it is not guaranteed that such a system will be supported. Therefore, you need to check with your Linux distributor and your support organization to verify that the changes that we describe in this paper will be supported. This being said, this paper is based on a system that was implemented and is in production at Nationwide Mutual Insurance Company.

This paper is divided into the following parts:

- ▶ "Read-only root Linux" on page 2 describes the shared root file structure and the maintenance system.
- ▶ "Building a read-write maintenance system" on page 18 describes how to create the maintenance system using conventional Linux images with read-write directories.
- ▶ "Building a read-only root system" on page 35 describes how to create Linux systems with only certain file systems read-write. Most are read-only, including the root file system.
- ▶ "Contents of tar file" on page 46 lists all the Linux scripts, z/VM REXX™ EXECs, and configuration files that are available in the tar file that is associated with this paper.

This paper is based on z/VM Version 5.3 and Novell SUSE Linux Enterprise Server 10.



SG24-7316-00

Draft Document for Review September 6, 2007 1:10 pm

Introduction to the New Mainframe: z/VM Basics

Understand introductory z/VM concepts

Learn basic system administration tasks to manage your system

Study z/VM performance, networking and security



Lydia Parziale
Ell M. Dow
Klaus Egeler
Jason J. Herne
Clive Jordan
Edi Lopes Alves
Erasimangalath P. Haveen
Manoj S Pattabhiraman
Kyle Smith

Redbooks

ibm.com/redbooks

SG24-7316-00

Distributions for Linux on System z

	Latest service level	Based on kernel	Gcc	Glibc
SLES 8	SP4	2.4.21	3.2	2.2.5
SLES 9	SP4	2.6.5	3.3	2.3.3
SLES 10	SP1	2.6.16	4.1	2.4
RHEL 3	Update 8	2.4.21	3.2.3	2.3.2
RHEL 4	Update 6	2.6.9	3.4	2.3.4
RHEL 5	Update 1	2.6.18	4.1	2.5

Which System z HW runs on what Distribution ?


- IBM Partners supporting Linux on System: Novell and Red Hat
 - ▶ IBM Linux on System z development maintains and supports System z specific code for

	S/390	zSeries				System z	
	G5, G6	z900, z800		z990, z890		System z9 EC, System z9 BC System z10 EC	
	31 bit	31 bit	64 bit	31 bit	64 bit	31 bit	64 bit
SLES 8	✓	✓	✓	✓	✓	✓**	✓**
SLES 9	✓	✓	✓	✓	✓	✓	✓
SLES 10	x	x	✓	x	✓	x	✓
RHEL 3	✓*	✓*	✓*	✓*	✓*	✓**	✓**
RHEL 4	✓	✓	✓	✓	✓	✓	✓
RHEL 5	x	x	✓	x	✓	x	✓

* toleration of existing workloads

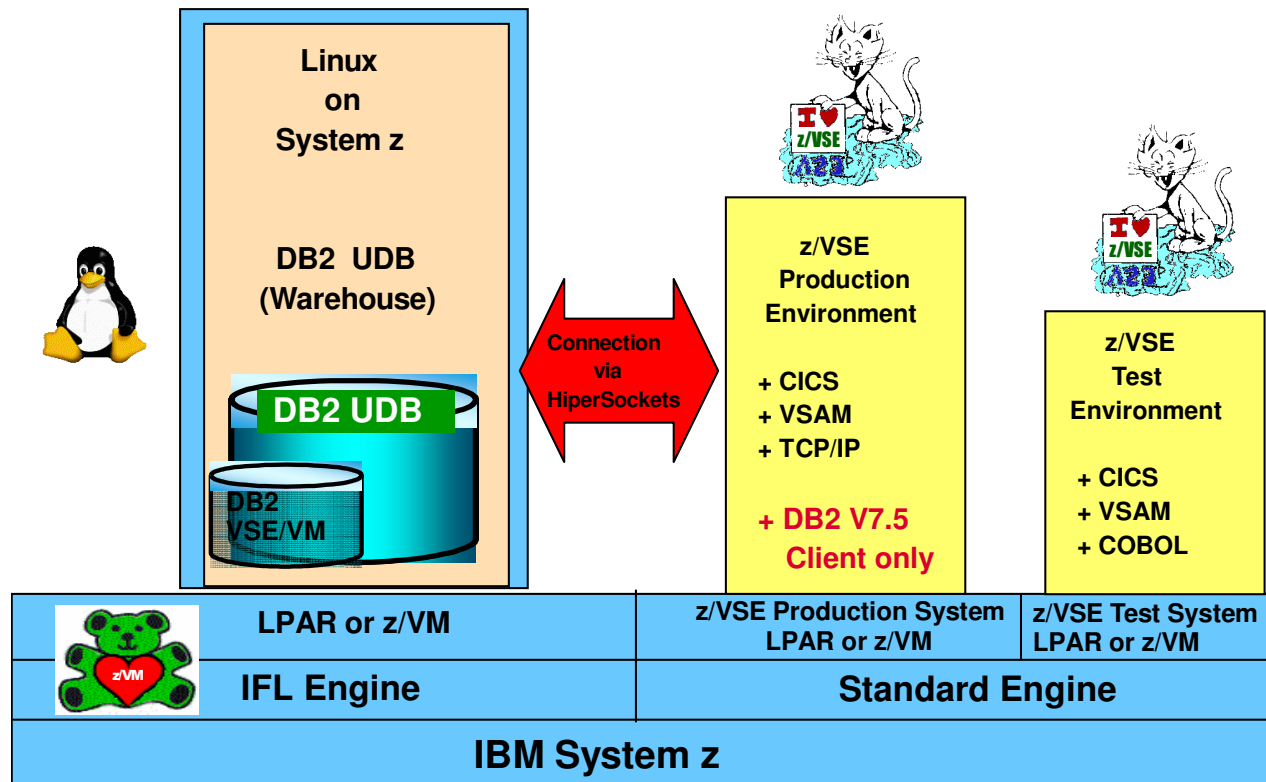
** no System z9/z10 feature exploitation

Agenda

- **IBM System z10 Enterprise Class**
- **z/VSE**
- **z/VM and Linux on System z**
-  ■ **Middleware and Systems Management Solutions**
 - DB2 for VSE and VM V7.5
 - IRMM
- **IBM/GSE European Conference for VM/VSE + Linux**
- **Summary**

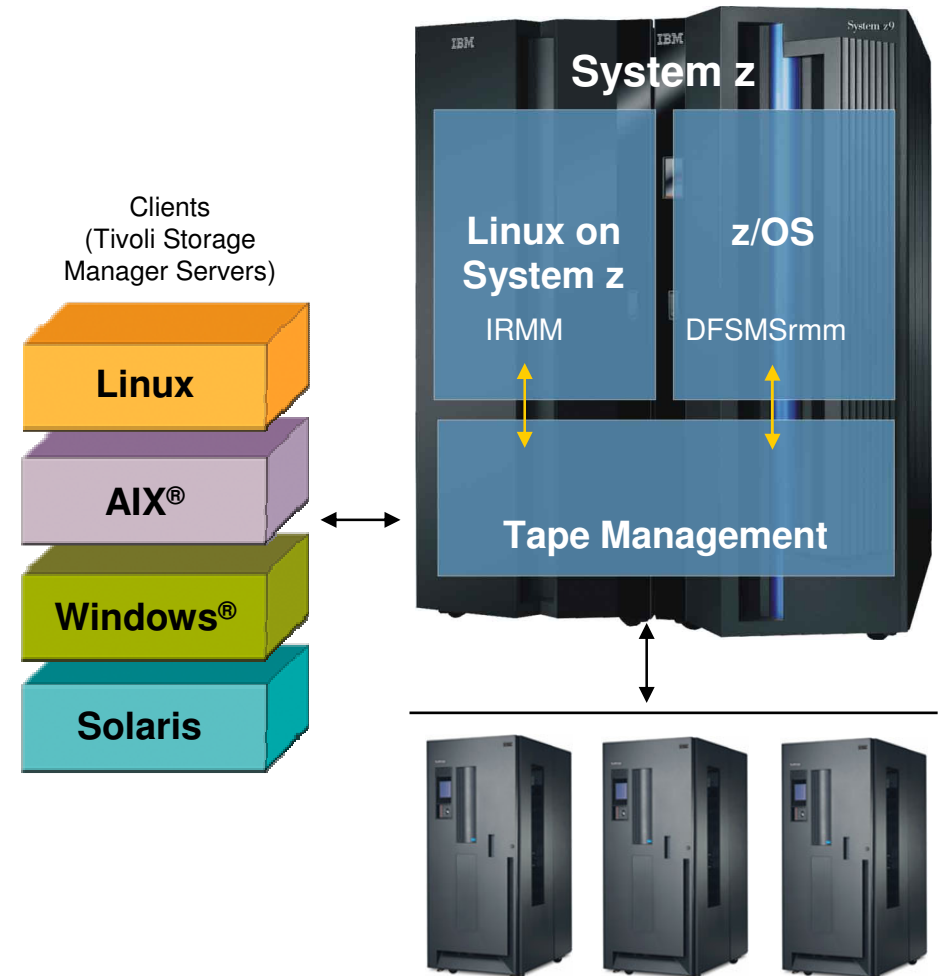
DB2 for z/VSE and z/VM V7.5

- In the past, DB2 VSE client functionality could be obtained via PRPQ P10154
- Now, DB2 offers a runtime only client edition for z/VSE and z/VM (no PRPQ required)
- Plus performance enhancements, e.g.
 - ▶ bind file support
 - ▶ reduced DRDA code path length
 - ▶ and many more ...



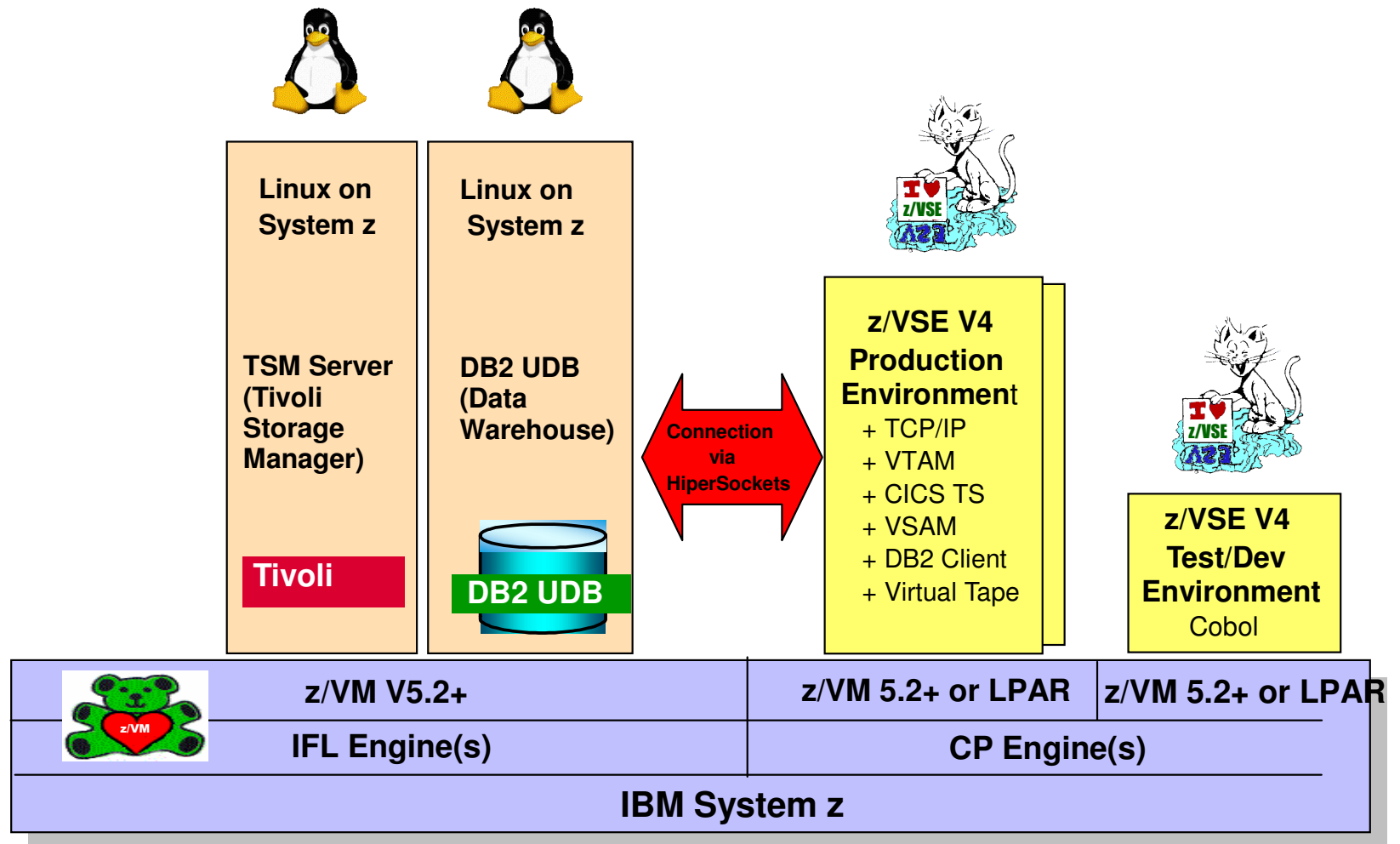
IRMM – announced Aug-7-2007, GA since Sep-14-2007

- **Integrated Removable Media Manager is:**
 - ▶ A new robust systems management product for Linux® on IBM System z™ that manages open system media in heterogeneous distributed environments and virtualizes physical tape libraries, thus combining the capacity of multiple heterogeneous libraries into a single reservoir of tape storage that can be managed from a central point
- **IRMM is designed to provide:**
 - ▶ Centralized media and device management
 - ▶ Dynamic resource sharing
- **IRMM extends IBM's virtualization strategy to tape library resources**
 - ▶ Drives and cartridge pools
- **IRMM complements Linux on System z consolidation efforts**

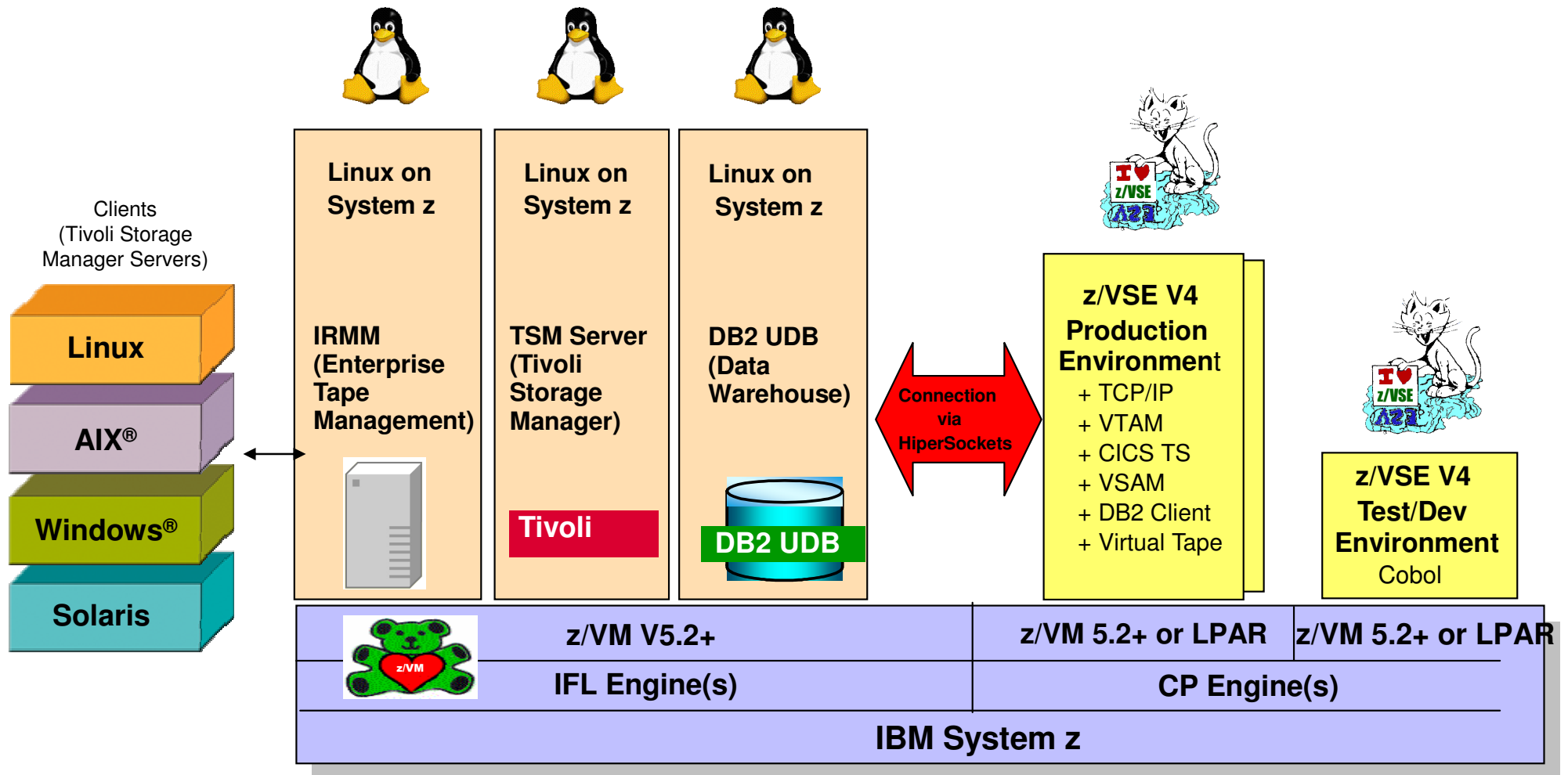


TSM in a VM/VSE and Linux Environment

Integration with z/VSE V4.1



IRMM in a VM/VSE and Linux Environment

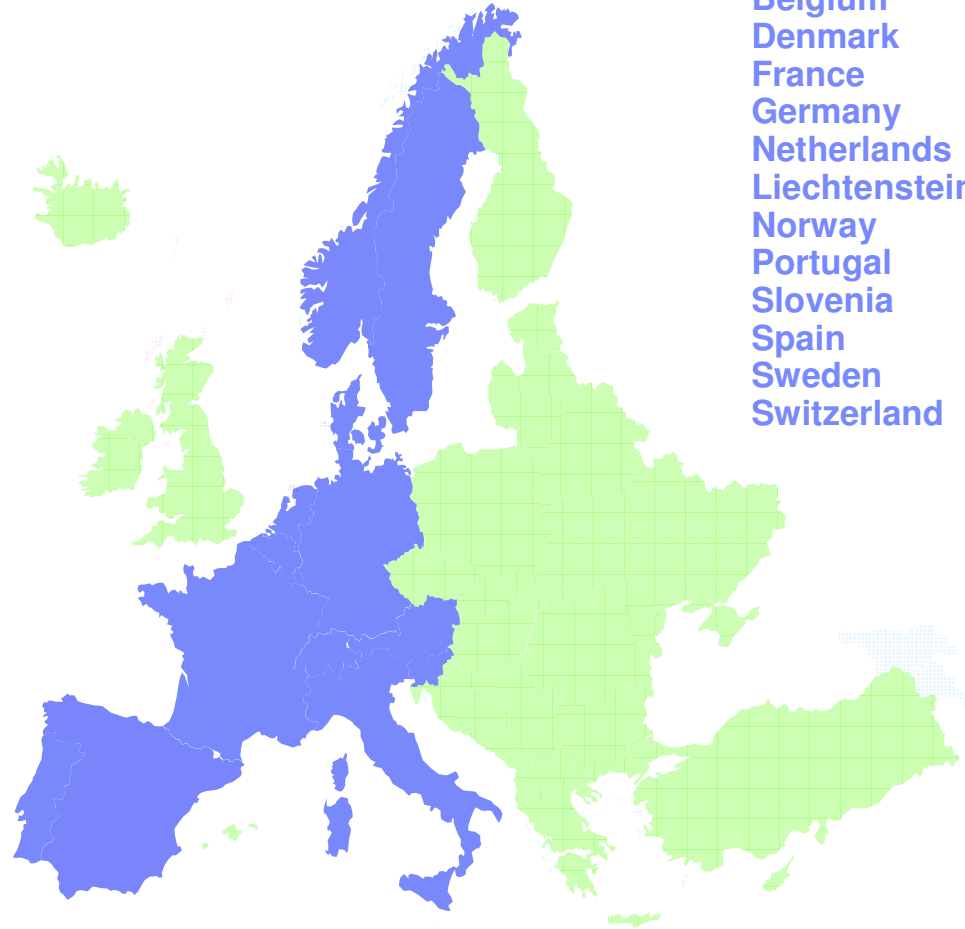


Agenda

- **IBM System z10 Enterprise Class**
- **z/VSE**
- **z/VM and Linux on System z**
- **Middleware and Systems Management Solutions**
- ■ **IBM/GSE European Conference for VM/VSE + Linux**
- **Summary**

1st European IBM/GSE Conference – Oct. 2007

for z/VM, z/VSE and Linux on System z



- Austria
- Belgium
- Denmark
- France
- Germany
- Netherlands
- Liechtenstein
- Norway
- Portugal
- Slovenia
- Spain
- Sweden
- Switzerland



183 attendees from 17 countries !

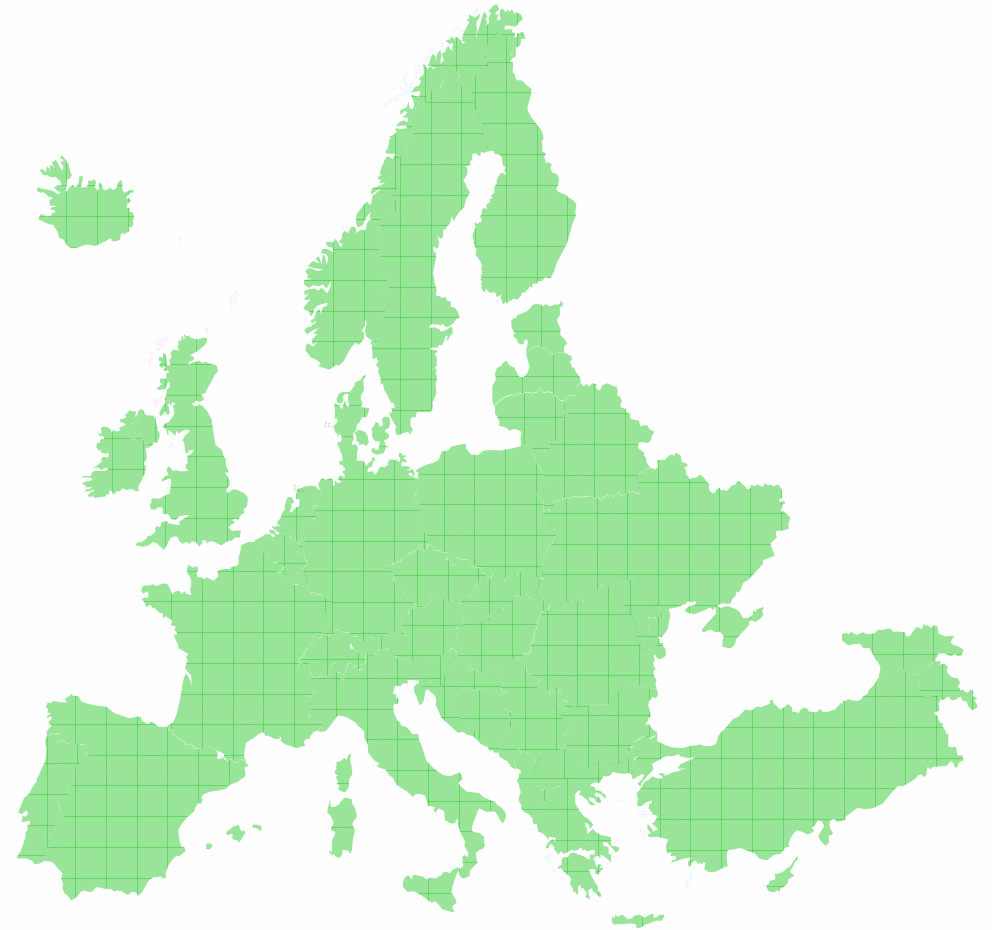
Participant's Feedback – Oct. 2007



- **Excellent agenda !**
 - **Best conference ever attended !**
 - **Must do it again !**
 - **Best format of any European conference**
 - **Should do it twice a year to allow for more attendees**
 - **It's great to see that IBM finally decided to run such a conference !**
 - **Very much liked the ISV introduction & discussion at the beginning**
 - **High quality attendees (decision maker, technical experts)**
 - **Excellent live demos with z/VM**
 - **Live demos hit the nerve and were very impressive !**
 - **Hints & tips were very helpful**
 - **Number of Linux customers seems to be much higher than we thought it would**
 - **Enjoyed the very good and direct contact to developers**
 - **Very nice and very well organized conference !**
- ➔ Overall Conference Customer Satisfaction Rating = 1.4 (excellent!)**

2nd European IBM/GSE Conference – Oct. 2008 for z/VM, z/VSE and Linux on System z

- **October 27-29, 2008**
- **Westin Hotel in Leipzig, Germany**



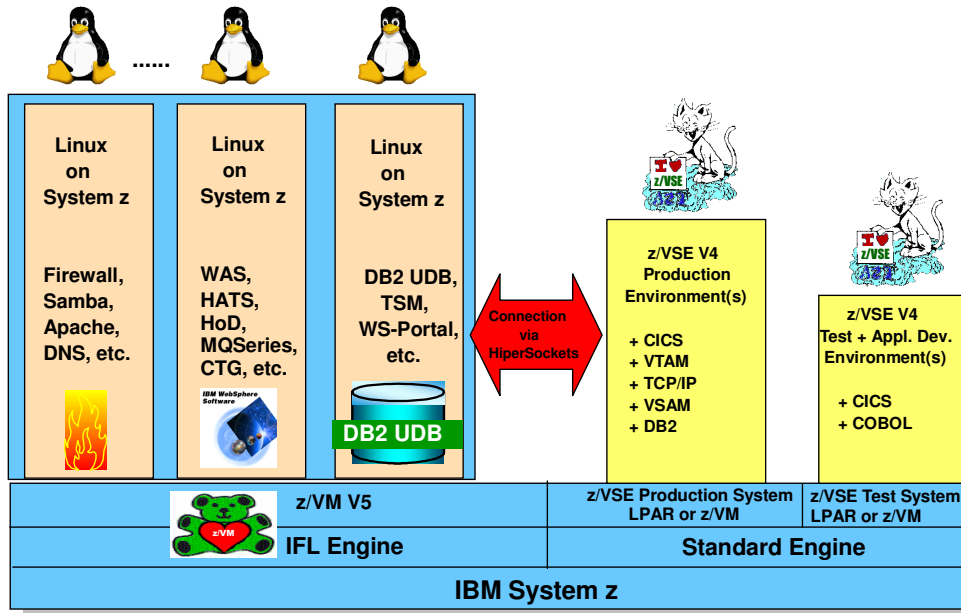
→ **Pls join our 2nd European Conference in Leipzig !**



Agenda

- **IBM System z10 Enterprise Class**
- **z/VSE**
- **z/VM and Linux on System z**
- **Middleware and Systems Management Solutions**
- **IBM/GSE European Conference for VM/VSE + Linux**
- ■ **Summary**

Summary: Exploiting the best of all Worlds with IBM System z, IBM System Storage, and IBM Middleware



z/VSE V4

- ▶ Protect core IT investments thru PIE
- ▶ Robust, secure enterprise server
- ▶ Cost-effective solutions
- ▶ Interoperability with network / servers
- ▶ Highly improved price / performance

z/VM V5

- ▶ Highly flexible, industrial strength
- ▶ Advanced virtualization
- ▶ Multiple z/VSE and Linux images
- ▶ Designed to exploit System z9

Linux on System z

- ▶ Large portfolio of new applications
- ▶ Platform for IBM middleware
- ▶ Infrastructure Simplification
- ▶ Massive scalability / consolidation



Thank You !



Questions?