IBM System z Technical University

October 4–8, 2010 — Boston, MA

z/VSE Trends and Directions

incl. Software Pricing and zEnterprise System

Session ID: zDG01

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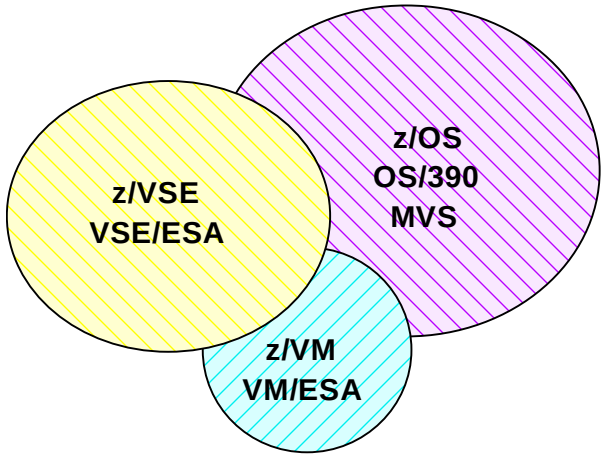
Agenda

- **z/VSE Status & Support**
- **z/VSE Strategy**
- **z/VSE Modernization Options**
- **z/VSE Software Pricing**
- **z/VSE Functional Enhancements**
  - **z/VSE V4.2.2**
  - **z/VSE V4.3**
  - **IPv6/VSE**
- **Wrap-up**

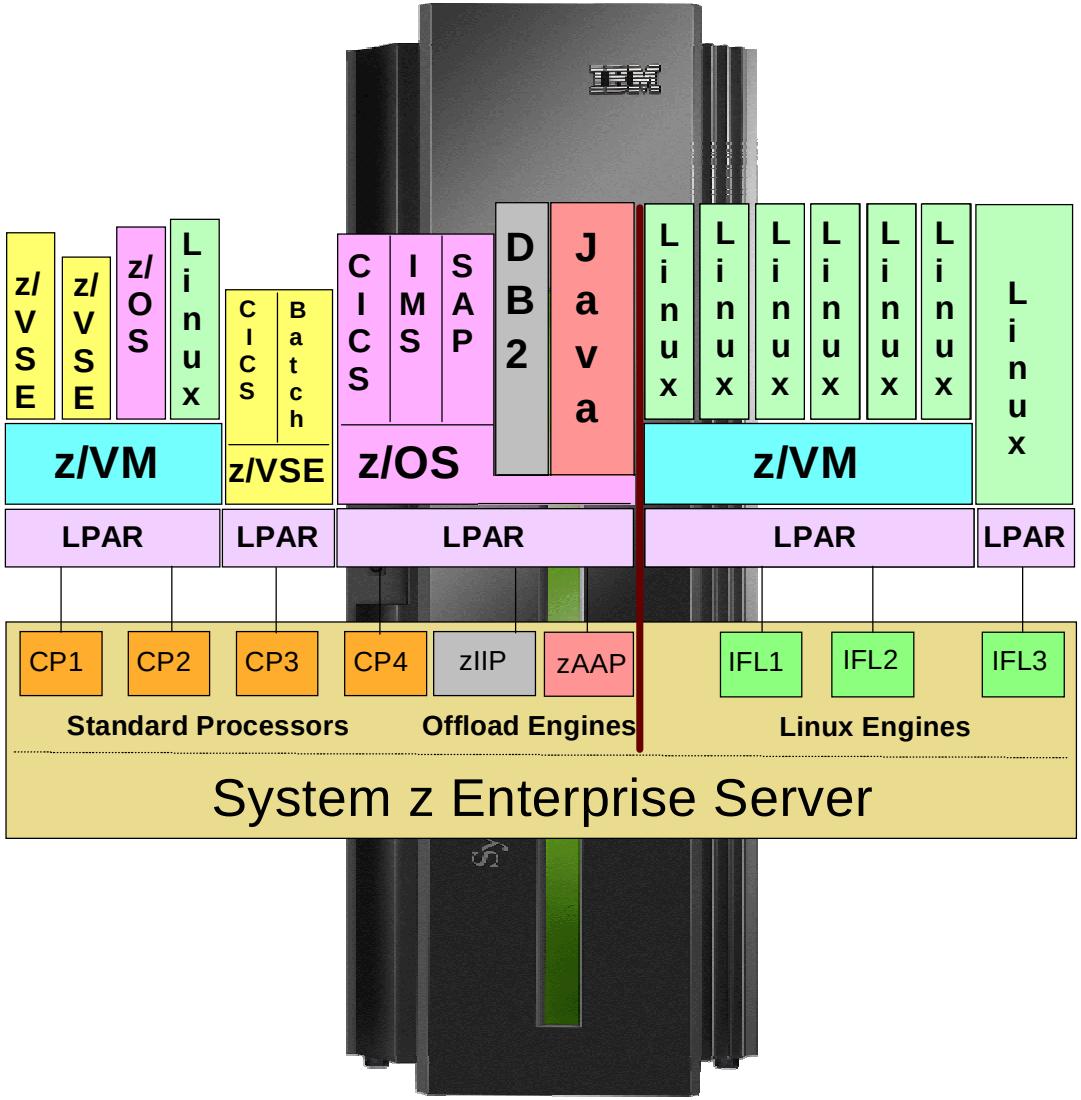
45th Anniversary - Happy Birthday z/VSE

Operating Systems on IBM System z

- **33% of worldwide traditional mainframe operating system installs are z/VSE or VSE/ESA**



- **VSE* population is 40% in US, 40% in Europe, 20% in RoW**
- **Worldwide 50% run VSE under z/VM, in Europe 90+% are VSE under z/VM**
- **IFLs play an important role in VSE‘s strategy**
- **zIIP/zAAP have no meaning to VSE**



(*) The term “VSE” stands for both, VSE/ESA and z/VSE.

z/VSE Evolution
z/VSE Success Factors

Future

NEW

z/VSE V4.3 Nov 26, 2010
- **Virtual storage (24-bit) constraint relief**
- **4-digit device addressses, IPv6/VSE**
- **Security / Crypto / Networking enhancements**

End of Service effective since July 31, 2009

z/VSE V4.2 Oct 17, 2008
- **More tasks, more memory, LDAP client**
- **PAV, SVC, EF, SCRT on z/VSE**
- **SoD** for CICS/VSE, RBD V7 extension, WMQ V3**

Pricing

z/VSE V4.1 March 16, 2007
- z/Architecture only
- 64-bit real addressing
- MWLC full & subcapacity pricing

Rebranding

z/VSE V3.1* March 4, 2005
- zSeries features, FCP/SCSI
- 31-bit mode only

VSE/ESA V2.7 March 14, 2003
- enhanced interoperability
- ALS2 servers only

VSE/ESA V2.6 Dec 14, 2001
- last release to support pre-G5 servers

VSE/ESA V2.5 Sept 29, 2000
- interoperability
- e-business connectors

VSE/ESA V2.4 June 25, 1999
- CICS Transaction Server for VSE/ESA
- e-business

Strategy

Protect
Integrate
Extend

Capacity
Quality
z/OS Affinity
Interoperability

- 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 Support Status

VSE Version and Release	*Marketed*	*Supported*	*End of Support*
z/VSE V4.2[2]	**Yes**	**Yes**	**tbd**
z/VSE V4.1[2]	No	**Yes**	**04/30/2011**
z/VSE V3.1[1]	No	No	07/31/2009
VSE/ESA V2.7	No	No	02/28/2007

[1]) z/VSE V3 supports 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 exploit select features of IBM System z10, System z9, and zSeries hardware.

[2]) z/VSE V4 is designed to exploit 64-bit real memory addressing, but will not support 64-bit virtual memory addressing

z/VSE Support for IBM Mainframe Servers

IBM Servers	**z/VSE V4.3 Plan**	**z/VSE V4.2**	z/VSE V4.1
IBM zEnterprise 196	**Yes**	**Yes**	Yes
IBM System z10 EC & z10 BC	**Yes**	**Yes**	Yes
IBM System z9 EC & z9 BC	**Yes**	**Yes**	Yes
IBM eServer zSeries 990 & 890	Yes	Yes	Yes
IBM eServer zSeries 900 & 800	Yes	Yes	Yes

Reminder:

- **z/VM V6 requires System z10 technology (or higher)**
- **Novell SLES 11 requires System z9 technology (or higher)**

IBM zEnterprise System - Best in Class Systems and Software Technologies:

A system of systems that unifies IT for predictable service delivery

Unified management for a smarter system: zEnterprise Unified Resource Manager

- Part of the IBM System Director family, provides platform, hardware and workload management
- Unifies management of resources, extending IBM System z® qualities of service across the infrastructure

The world's fastest and most scalable system: IBM zEnterprise™ 196 (z196)

- Ideal for large scale data and transaction serving and mission critical applications
- Most efficient platform for Large-scale Linux® consolidation
- Leveraging a large portfolio of z/OS®, z/VSE™, and Linux on System z applications
- Capable of massive scale up, over 50 Billion Instructions per Second (BIPS)

Scale out to a trillion instructions per second: IBM zEnterprise BladeCenter® Extension (zBX)

- Selected IBM POWER7™ blades and IBM System x® Blades[1] for tens of thousands of AIX® and Linux applications
- High performance optimizers and appliances to accelerate time to insight and reduce cost
- Dedicated high performance private network

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

z/VSE Support for IBM zEnterprise 196

§ z196 compatibility support

- z/VSE V4.1, V4.2, and z/VSE V4.3 (GA 4Q2010) support z196 since GA on 9/10/2010
  - Refer to the z/VSE subsets of the 2817DEVICE Preventive Service Planning (PSP) bucket
  - z/VSE PTFs are required for MWLC Subcapacity pricing customers
- Crypto Express3 requires z/VSE V4.2 as a minimum level

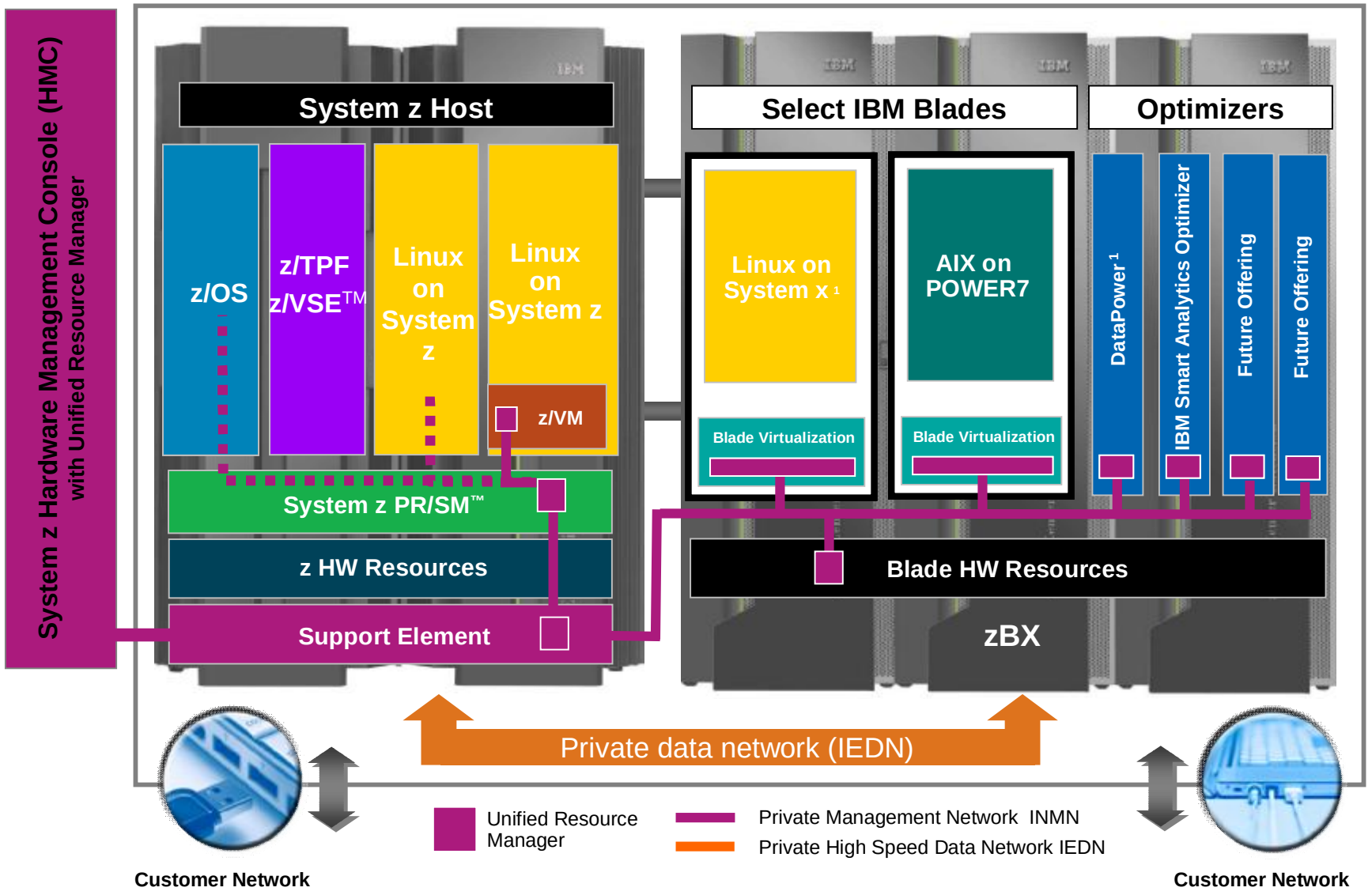
§ z196 exploitation

- Static power save mode for use with SCRT (planned)
- Up to 32 HiperSockets
- With z/VSE V4.3:
  - 1 MB frames for data spaces
  - Dynamic add of CPs
  - Crypto AP interrupts
  - Fast Path to Linux on System z in a z/VM-mode LPAR

§ zBX environment

- z/VSE V4 can participate in a data network using z/VM's VSWITCH support

Putting zEnterprise System to the Task



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  - IPv6/VSE
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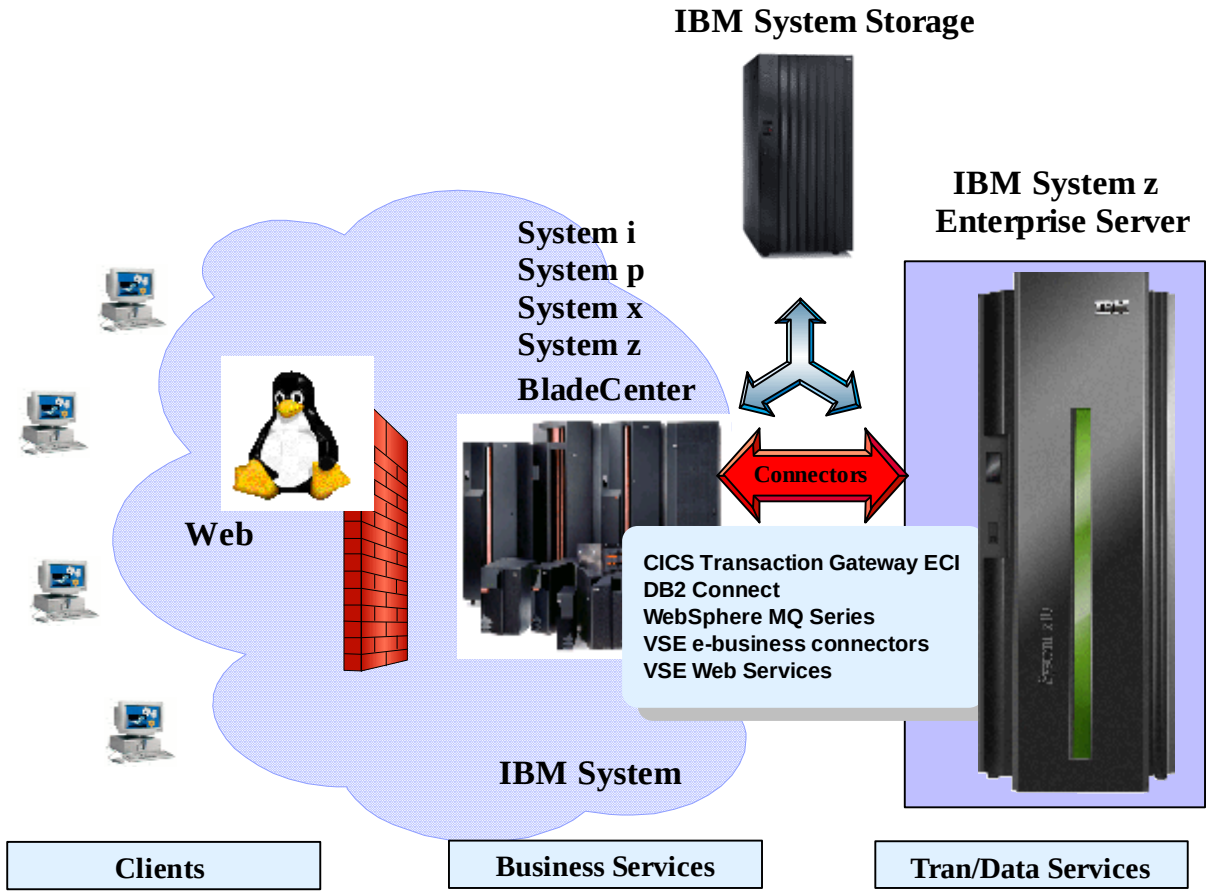
z/VSE Strategy

alias

- § 3-tier Strategy
- § Hybrid Strategy
- § Connector Strategy
- § Migration Strategy
- § Coexistence Strategy
- § Linux Surround Strategy
- § **PIE Strategy**

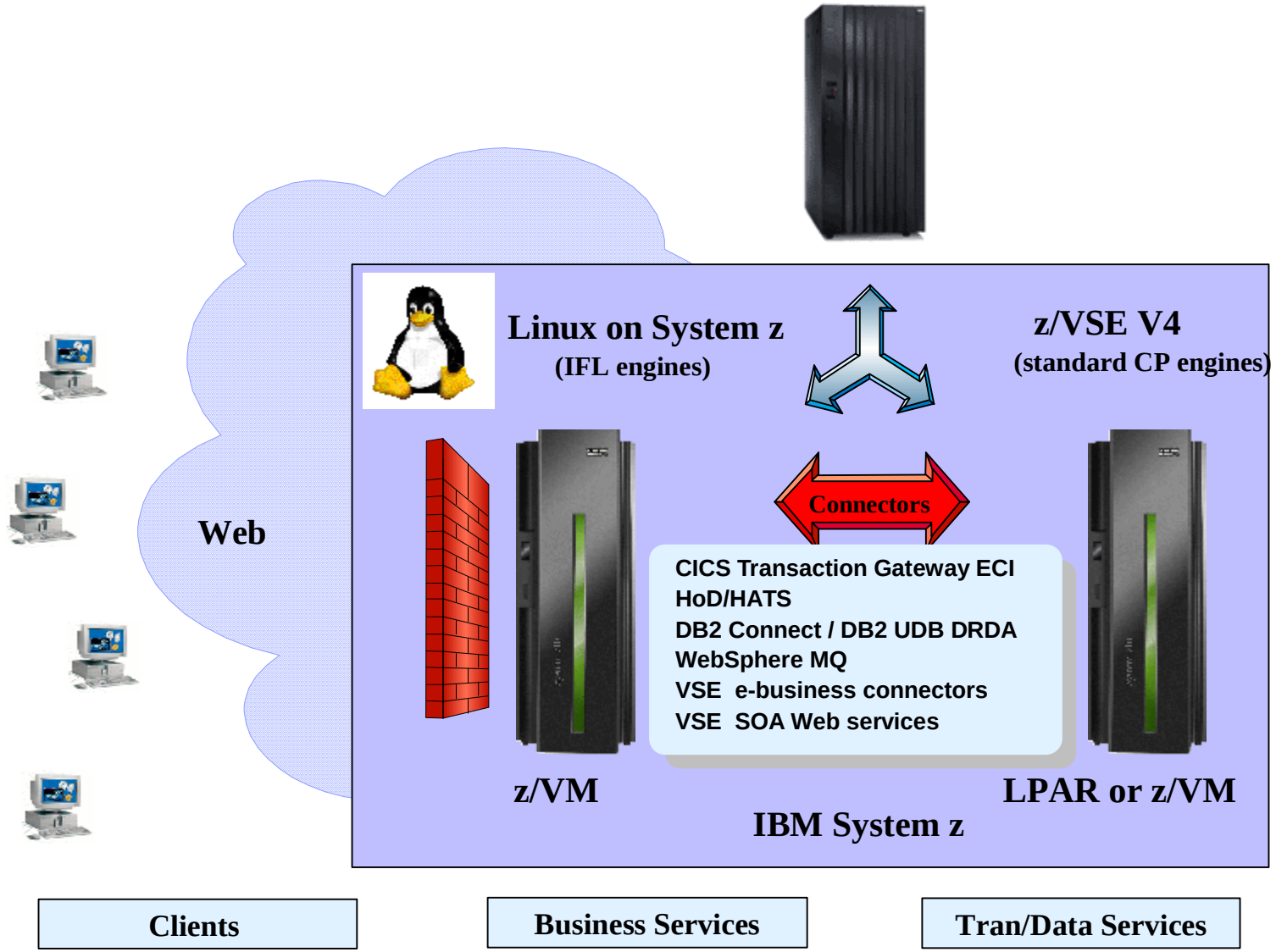


Protect existing VSE investments

Integrate using middleware and VSE connectors

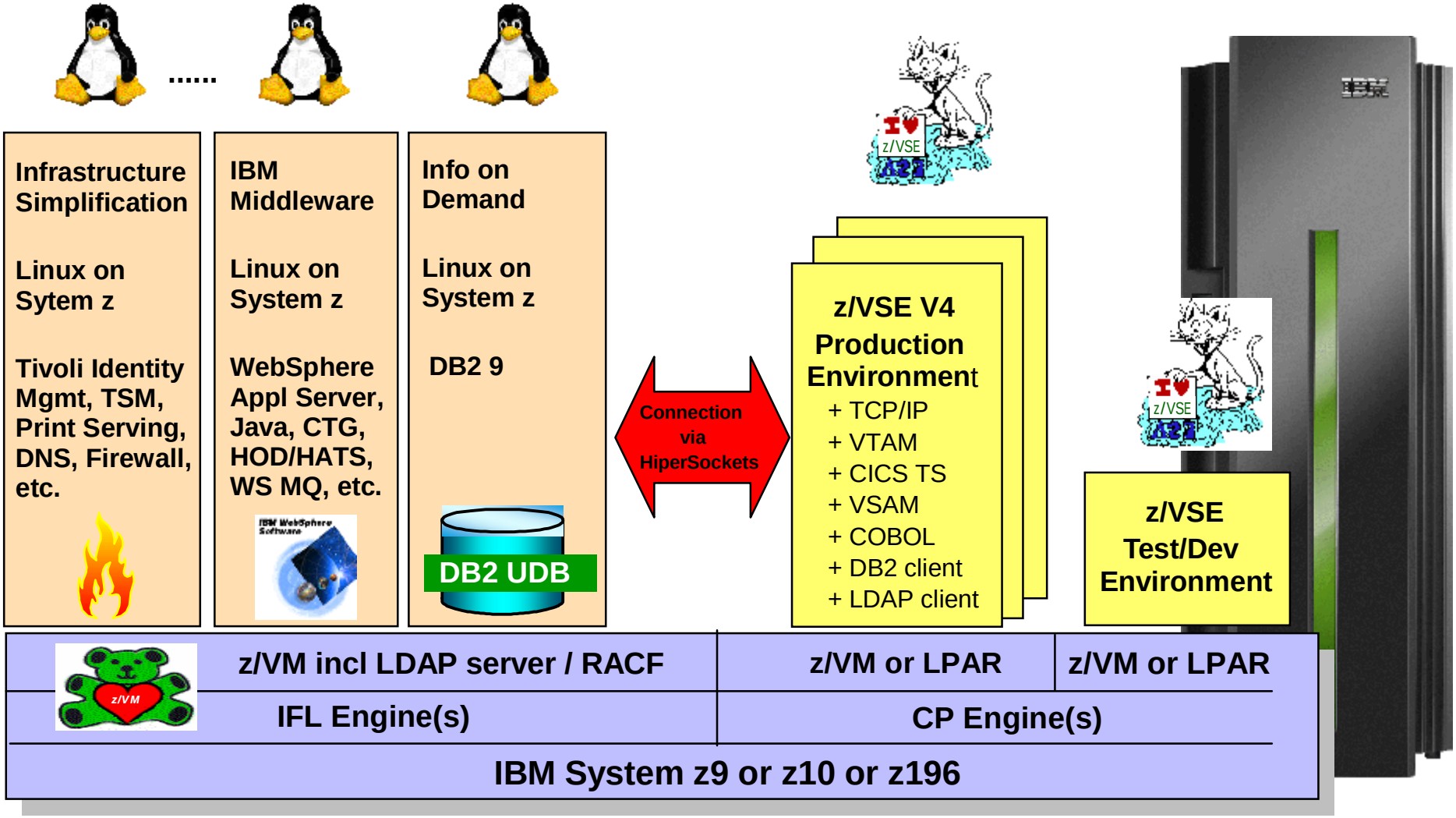
Extend with Linux on IBM System z technology & solutions

Think ***inside*** the Box

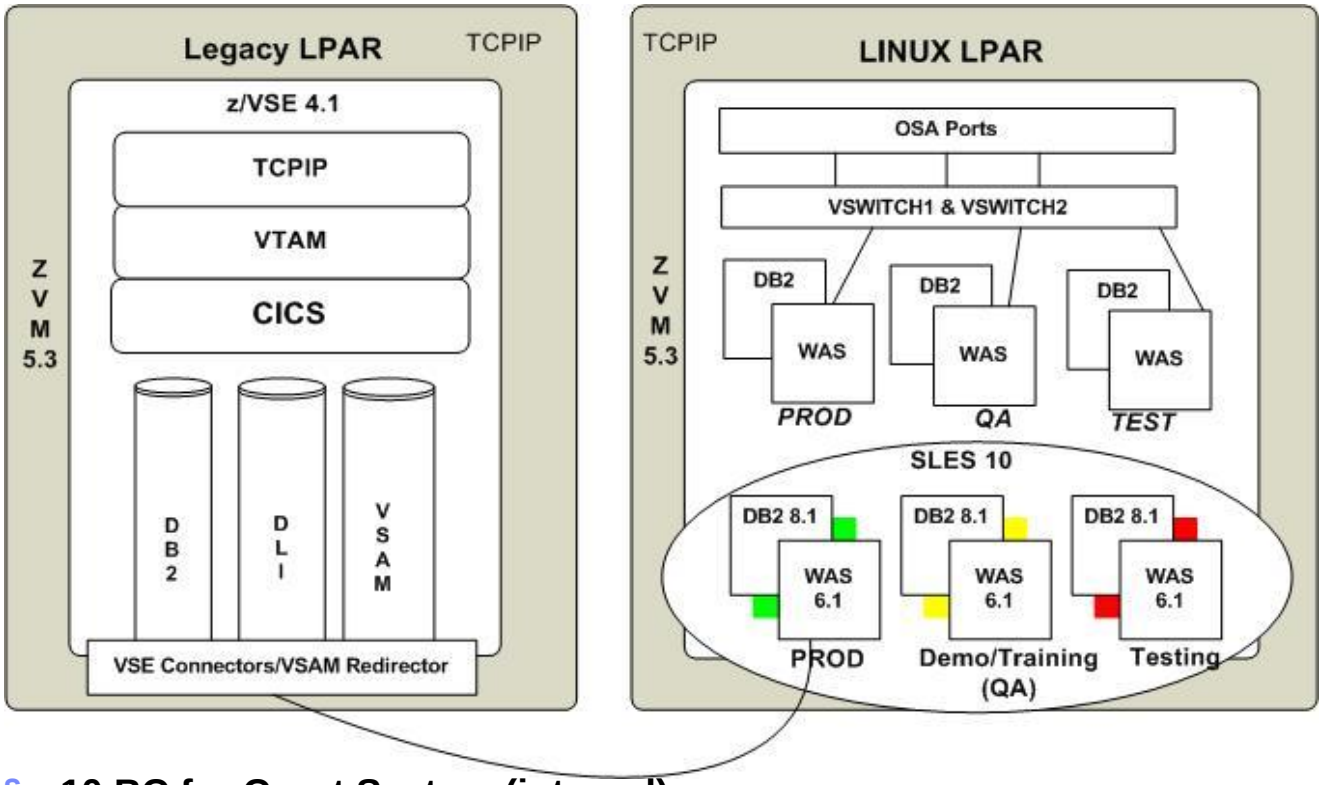


z/VSE Vision

Hybrid environment leveraging z/VSE, z/VM, and Linux on System z



Customer Example: Supreme Court of Virginia



- 1 + 1 z10 BC
- 2 + 2 CPs
- 5 + 5 IFLs
- 48 + 32 GB memory
- 2 + 2 z/VM V5 LPARs
- 7 + 4 z/VSE V4 guests
- 41 + 14 SLES 10 guests

§ **z10 BC for Court System (internal)**
- Serves 325 courts, 5.000+ users, 4 million cases (2007)
- Integrating z/VSE, DB2/UDB and WebSphere applications
- eMagistrate* system serves 125 locations, 2.800 trans per day

2007 ComputerWorld Honors Program Laureate

§ **z10 BC for Internet**
- eCommerce application integrating z/VSE and WebSphere appls

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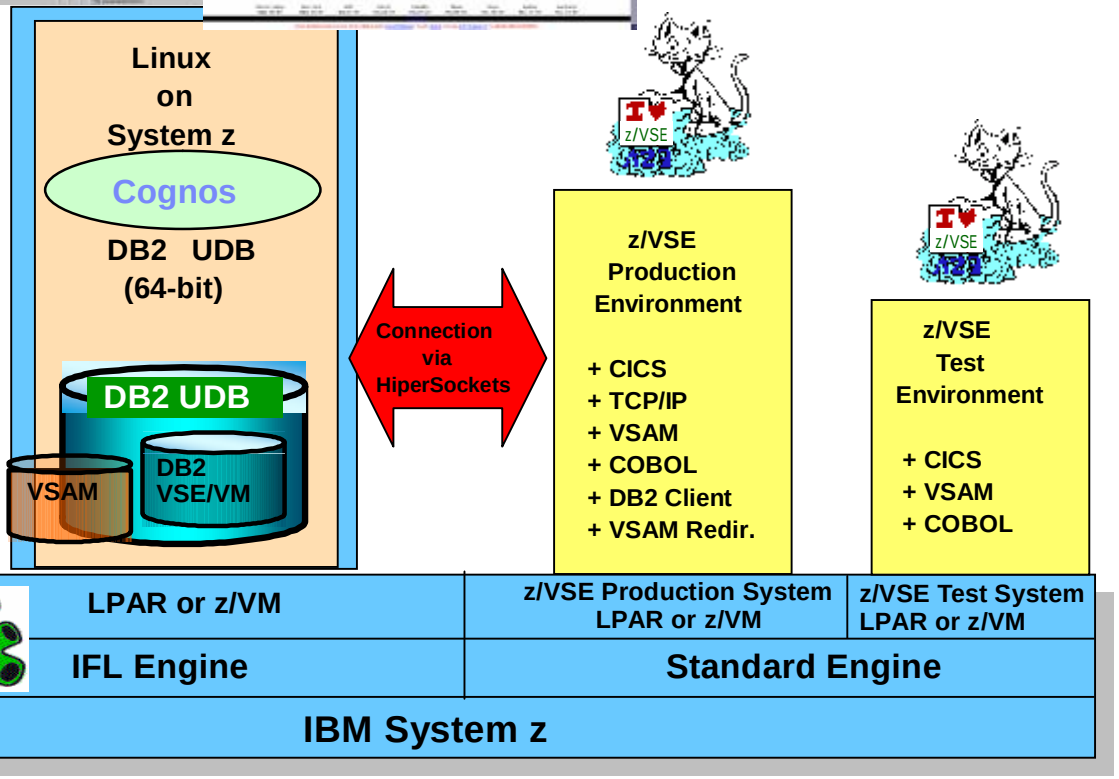
  - **IPv6/VSE**
- **Wrap-up**

z/VSE SOA and Interoperability

Connector Functions	z/VSE V4.3	z/VSE V4.2	z/VSE V4.1
z/VSE Connectors (no additional charge)			
VSAM, POWER, Librarian, ICCF lib, console	Yes	Yes	Yes
VSAM Redirector	Yes	Yes	Yes
SOA Web Services, i.e. SOAP and XML	Yes	Yes	Yes
z/VSE Script and DL/1	Yes	Yes	Yes
DB2 Stored Procedures for VSAM and DL/1	Yes	Yes	Yes
VTAPE interface to IBM Tivoli Storage Manager (TSM)	Yes	Yes	Yes
LDAP client (LDAP server on another platform required)	Yes	Yes	
SNMP agent	Yes		
Linux Fast Path from z/VSE to Linux TCP/IP in z/VM-mode LPAR	Yes		
IBM Middleware (priced)			
CICS Transaction Gateway ECI	Yes	Yes	Yes
Host on Demand / Host Application Transformation	Yes	Yes	Yes
DB2 Connect / DB2 UDB (DB2 Server for z/VSE V7.5 Client)	Yes	Yes	Yes
WebSphere MQ (z/VSE Client no charge)	Yes	Yes	Yes

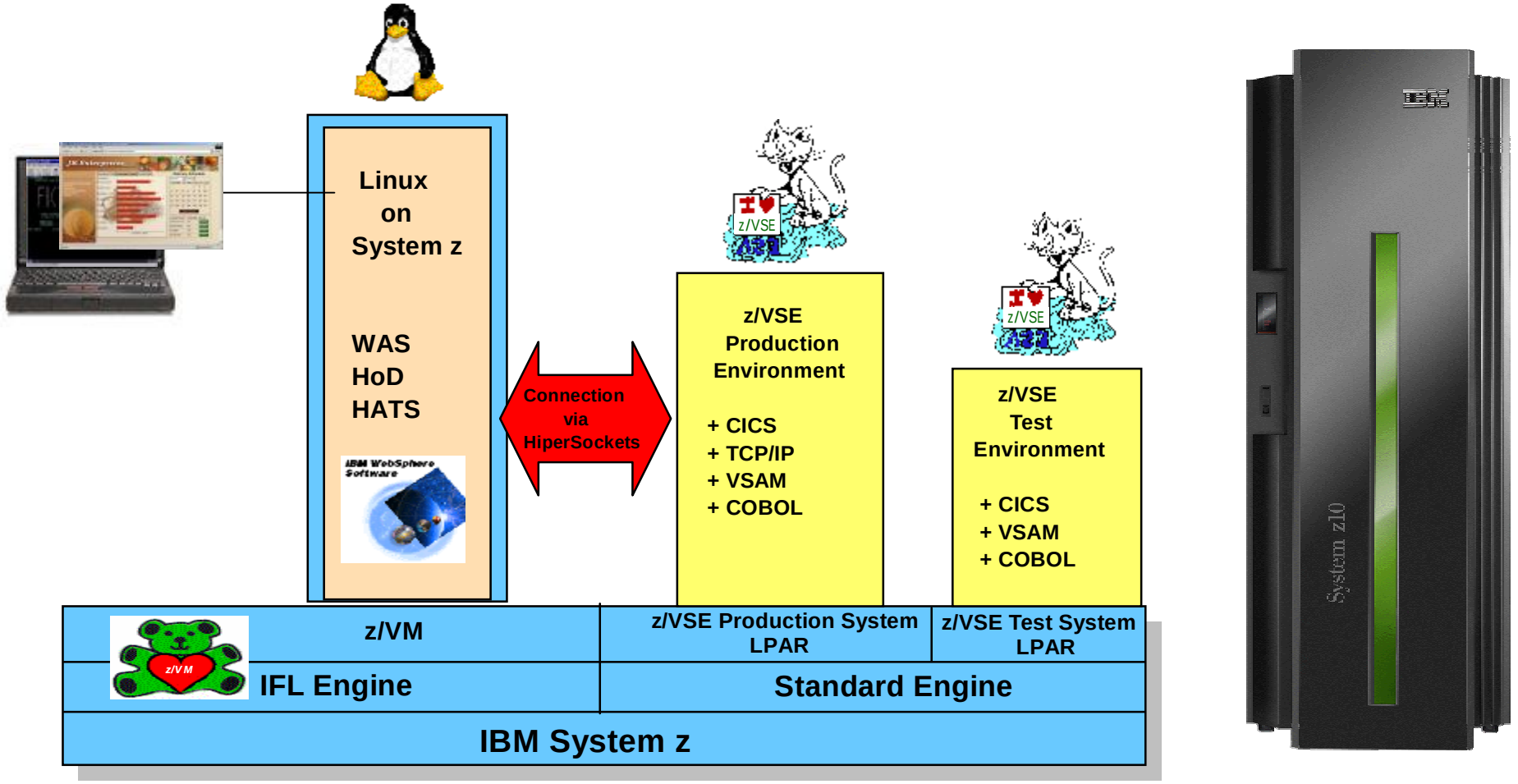
Scenario 1: DB2 LUW for z/VSE Customers

Data consolidation & data warehouse solutions with DB2 UDB on System z



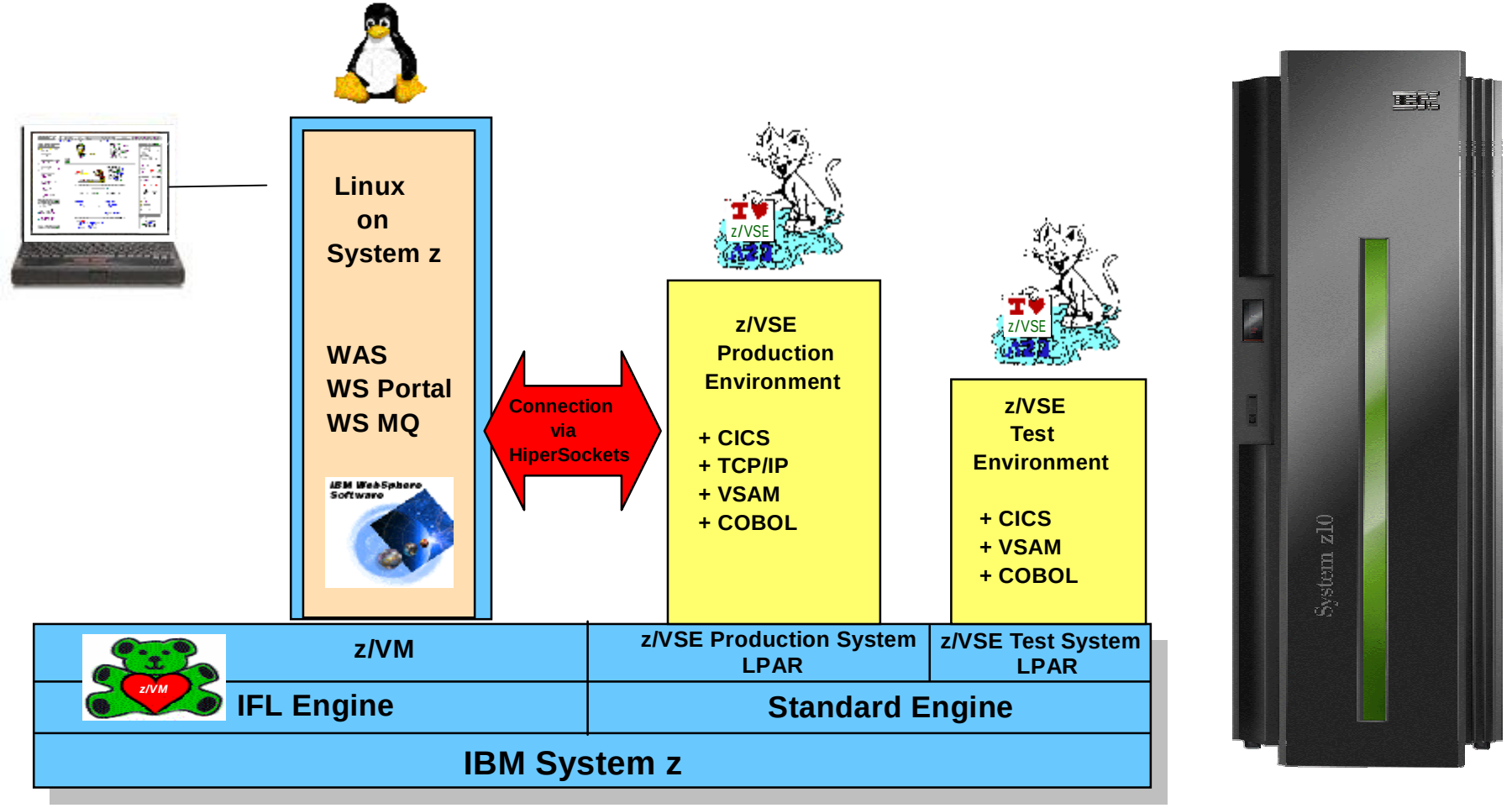
Scenario 2: “Webification“ for z/VSE Applications

Web enable existing applications with Inter/Intranet frontend



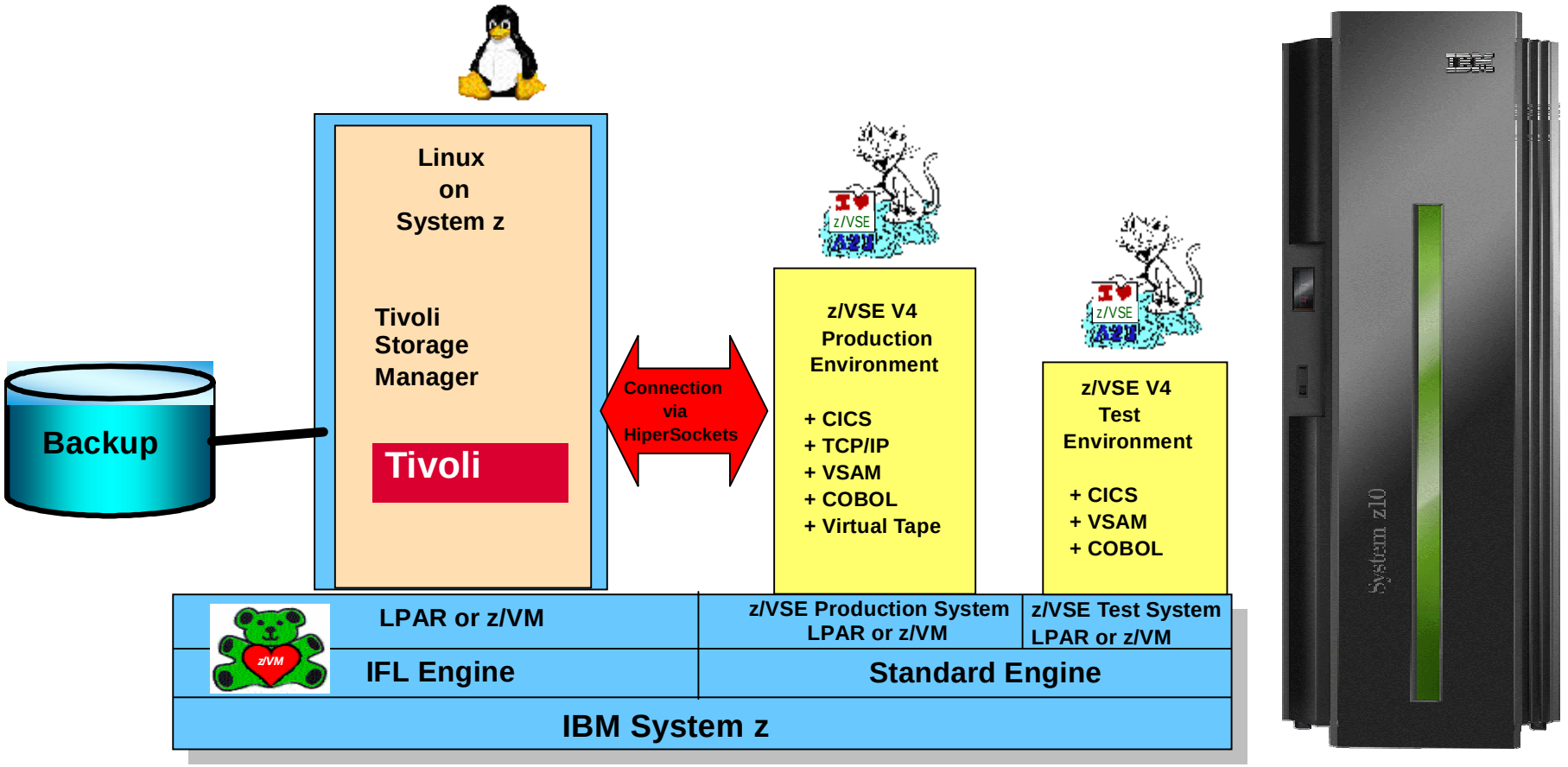
Scenario 3: WebSphere Portal for z/VSE Customers

A portal for administration & integration of employees/customers/providers



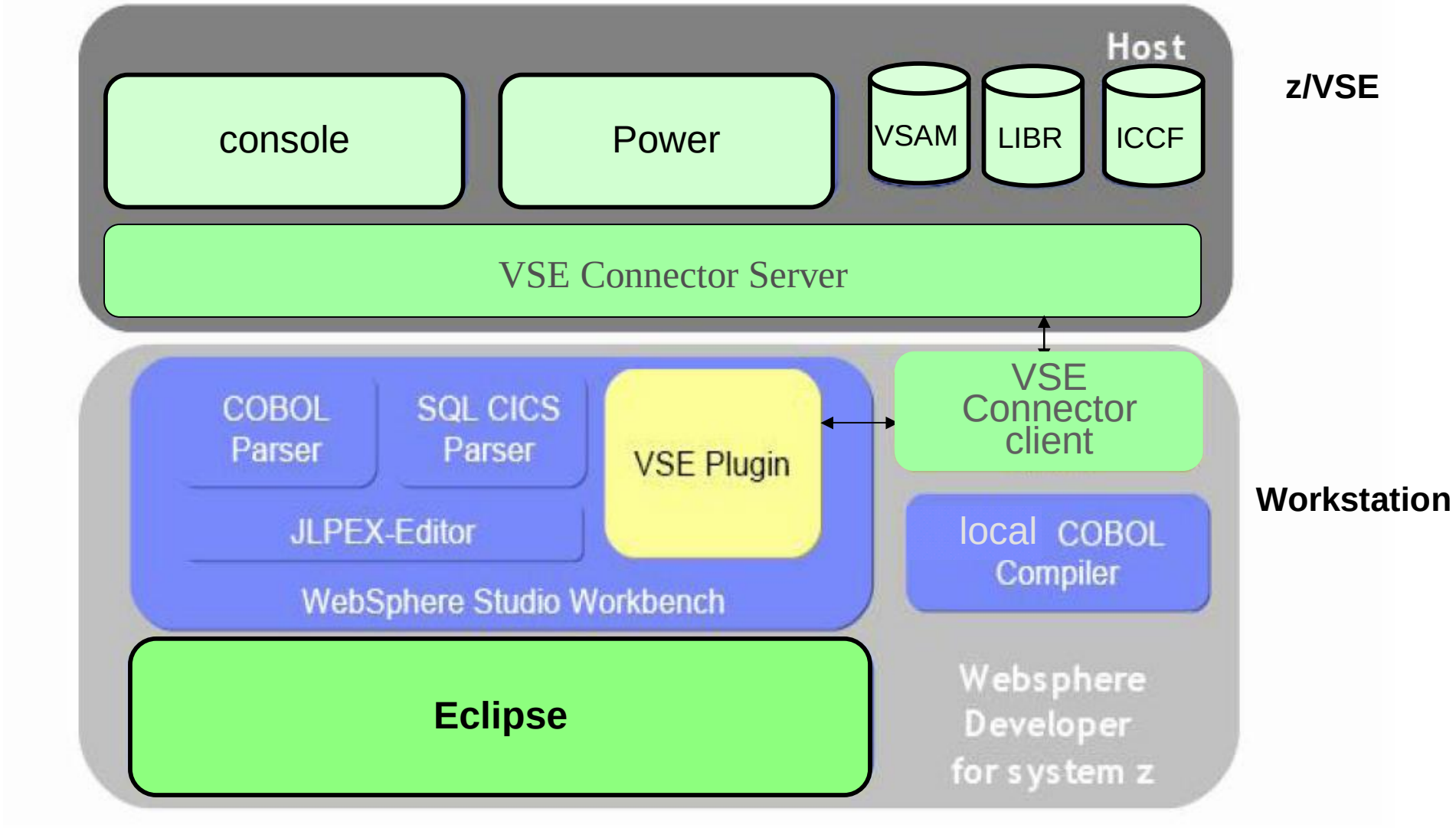
Scenario 4: Backup / Restore Concept for z/VSE

Integrate z/VSE with TSM on Linux on System z



Scenario 5: Application Development

Modern Appl Dev with Eclipse and Rational Developer (RDz) for System z

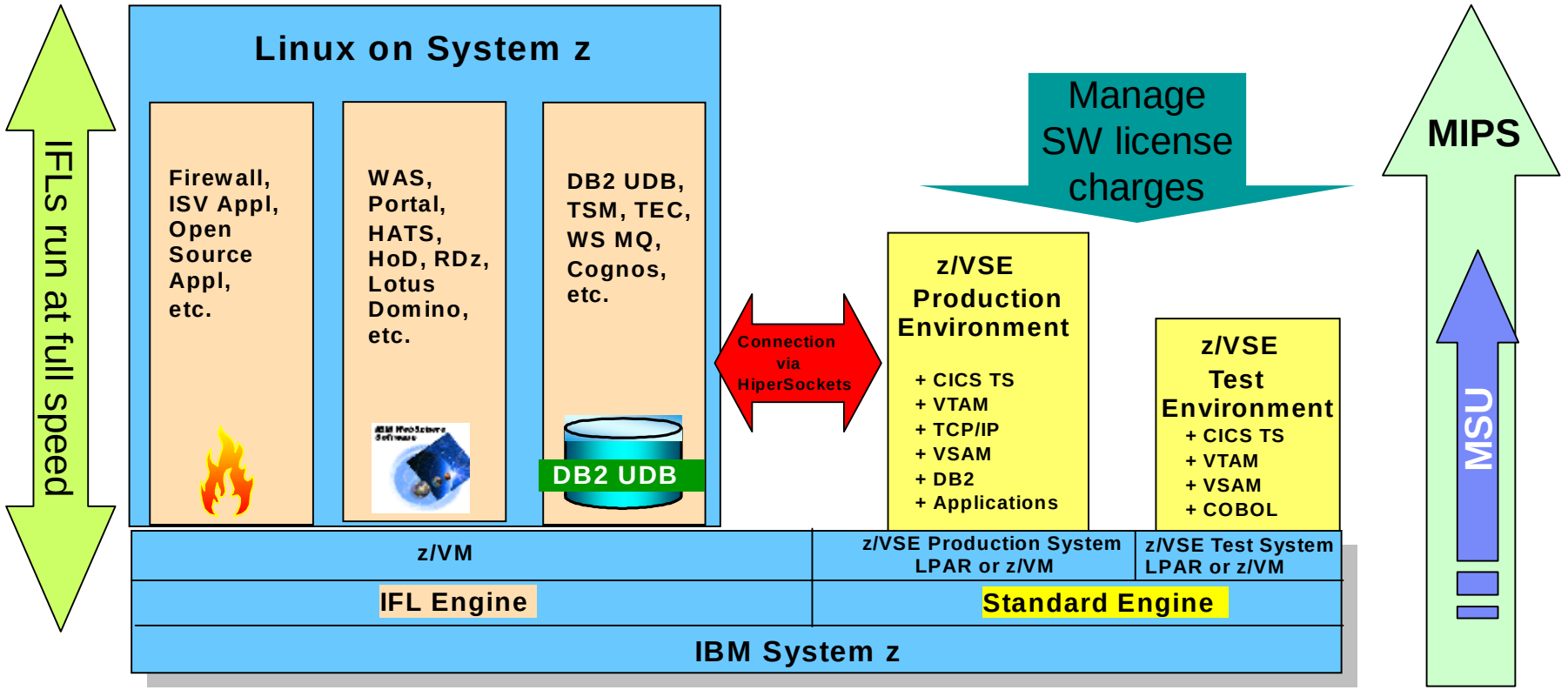


Combine the Scenarios, Manage Software Cost

Protect existing z/VSE investments

Integrate using middleware and z/VSE connectors

Extend with Linux on IBM System z technology & solutions



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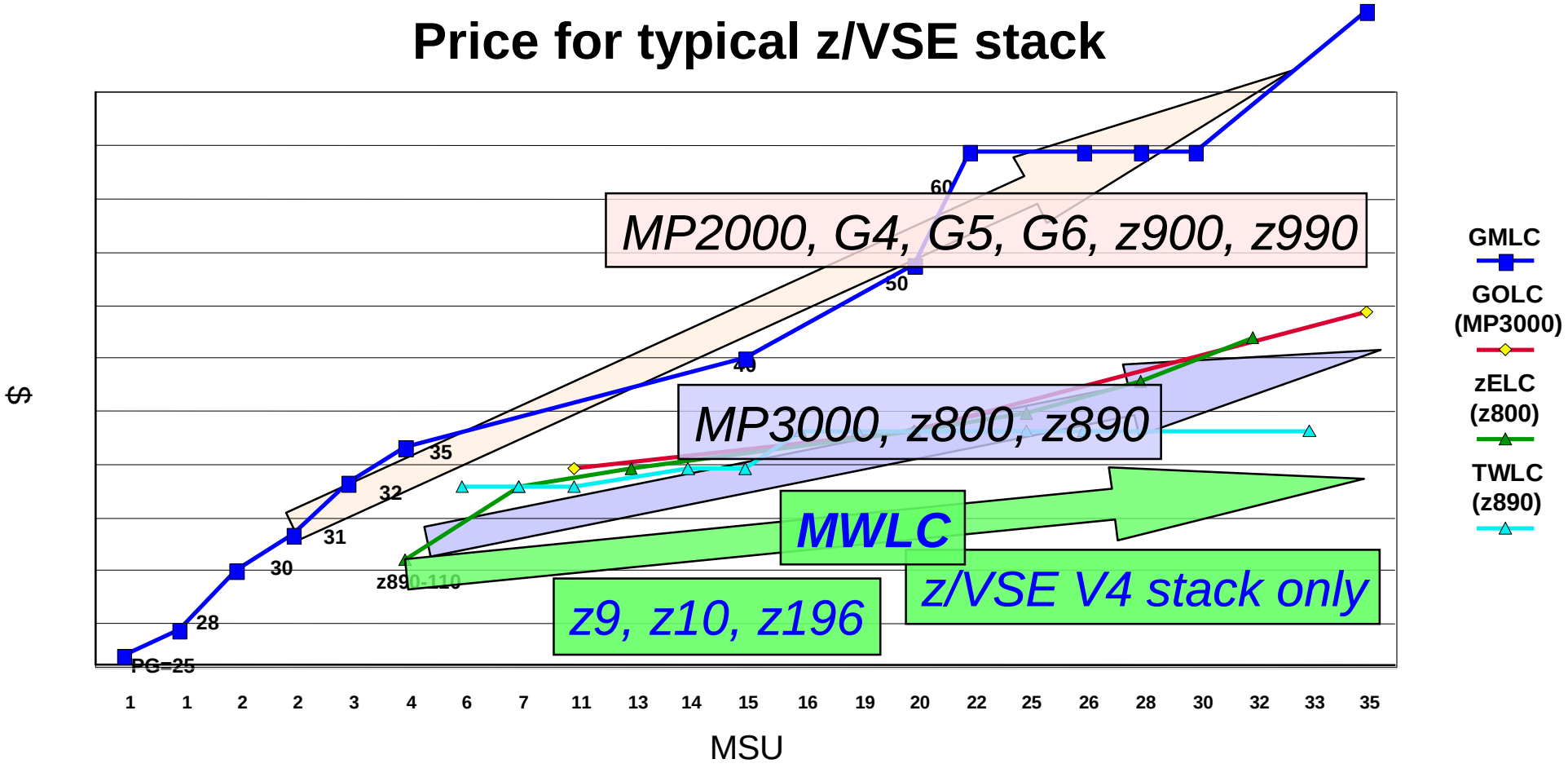
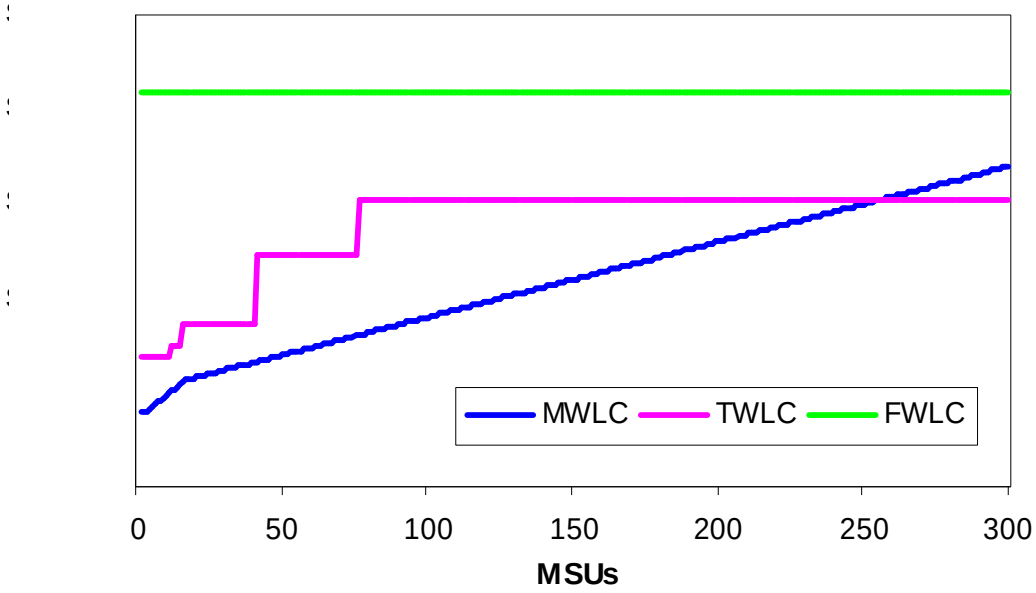
MWLC – Midrange Workload License Charge



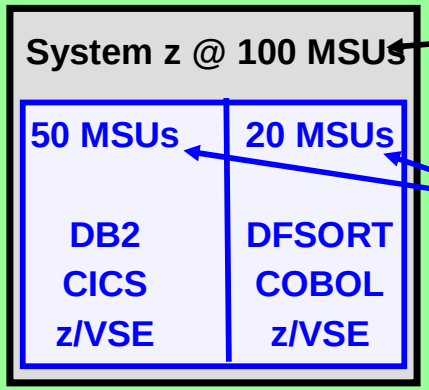
§ *"I just got our April software bill from IBM for the first month on our z9 under z/VSE 4.1 and MWLC. We were paying $22,965 per month on our z800 under z/VSE 3.1.2. The April bill is for the same software and it is $12,318: a difference of $10,647 per month."* **Mike Moore, IT Manager, Alabama Judical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

Improved TCO through new Pricing Metric and Sub-Capacity Pricing with z/VSE V4

- **z/VSE price/performance through new pricing metric**
  - Midrange Workload License Charge (**MWLC**)
  - MWLC requires current HW (System z9* or z10* or z196) and current SW (z/VSE V4)



- **Additional price/performance through sub-capacity option**
  - Some hardware footprint **consolidations** more attractive now
  - Presence of z/VSE V3 or VSE/ESA™ forces full-capacity pricing

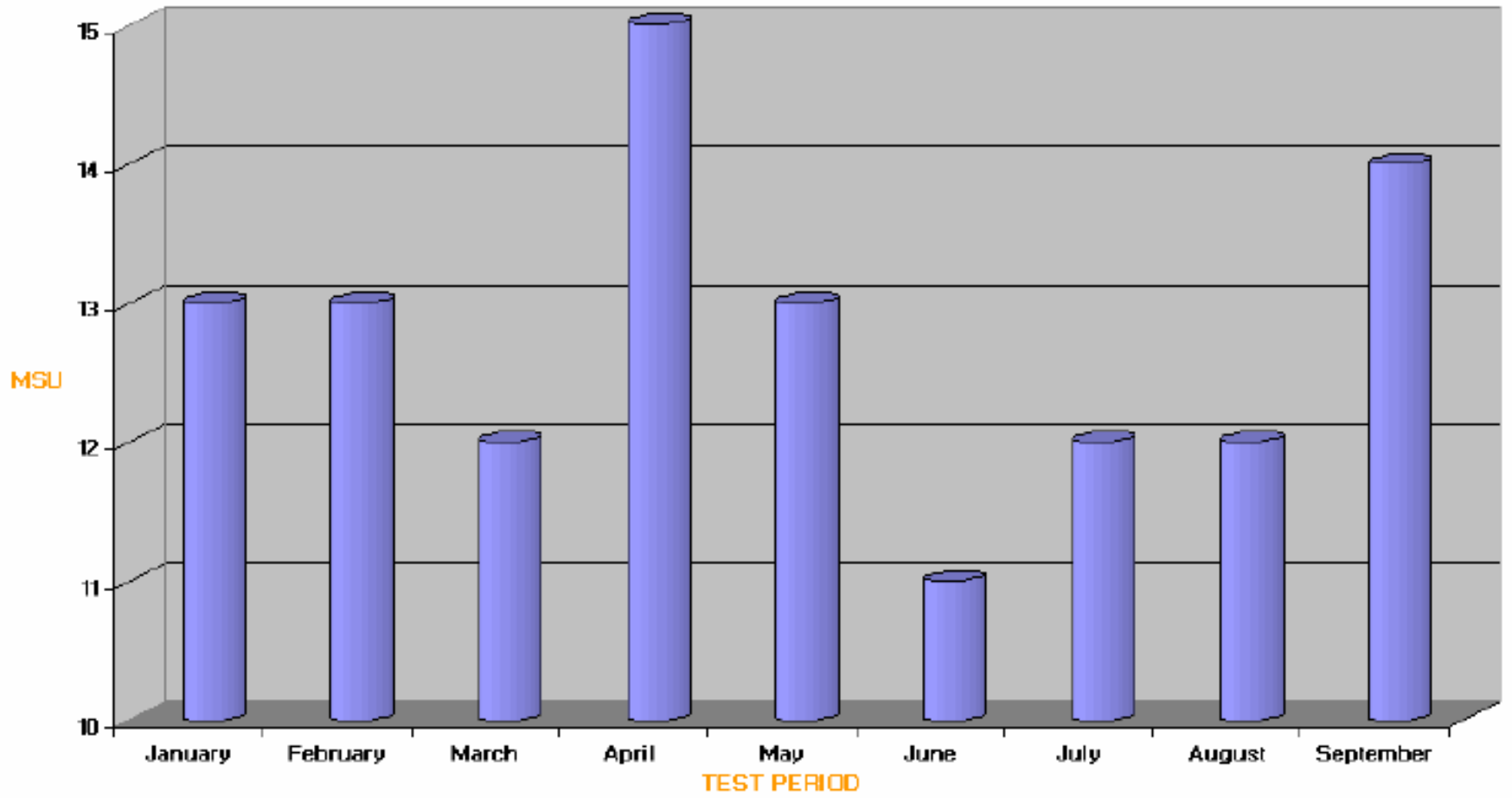


Full-capacity pricing metrics rely on the total rated capacity of the MACHINE where a product executes.

Sub-capacity pricing metrics rely on the utilization of the LPAR(s) where a product executes.

(*) z9 BC A01 and z10 BC A01 are priced zELC, not MWLC.

Sub Capacity Reporting Tool: Sample Report



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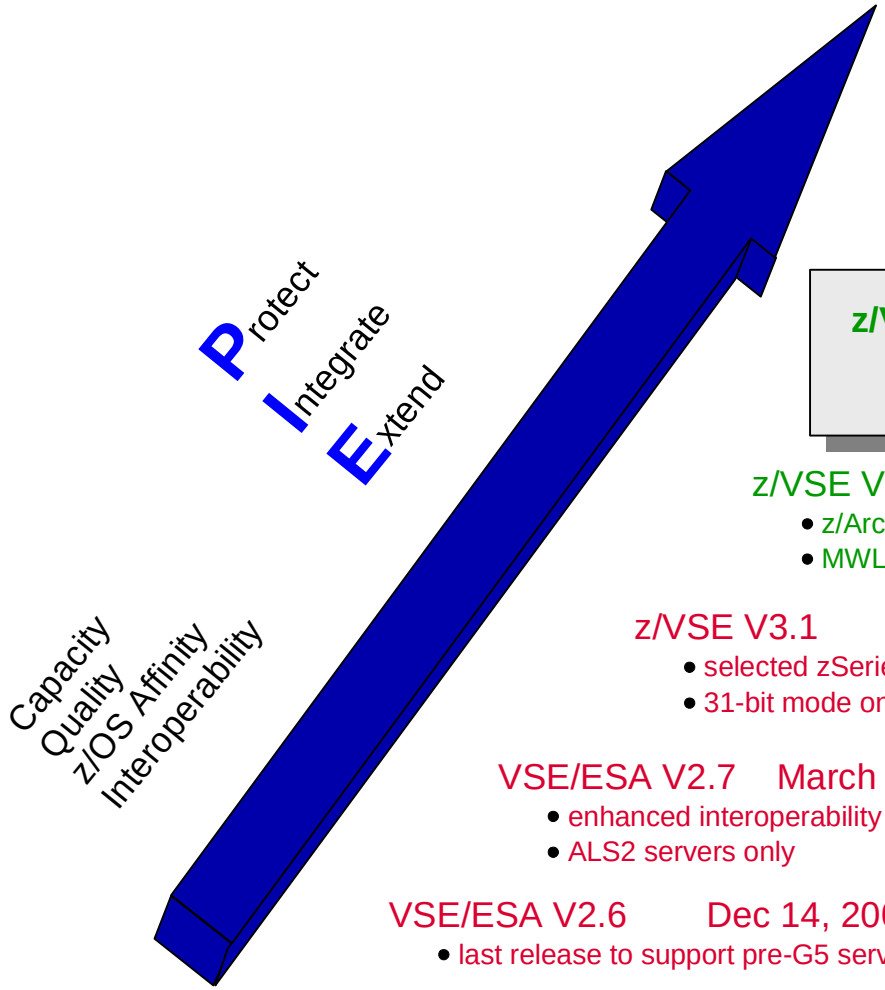
z/VSE Evolution



z/VSE V4.3 Nov 26, 2010
- **Preview October 20, 2009**
- **Update with z196 announcement**

z/VSE V4.2.2 April 30, 2010
- **Crypto Express3**
- **IPv6/VSE* (May 28, 2010)**

z/VSE V4.2 Oct 17, 2008
- **More tasks, PAV, LDAP Client, SVC**
- **SoD** for CICS/VSE, EGL, WMQ**

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VSE/ESA V2.6 Dec 14, 2001
- last release to support pre-G5 servers

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* IPv6/VSE is a registered trademark of Barnard Software, Inc.

z/VSE V4.2.2 Contents – available since April 30, 2010

- **Servers**
  - IBM zEnterprise System (z196)
  - IBM System z10 Enterprise Class (z10 EC) and z10 Business Class (z10 BC)
  - IBM System z9 Enterprise Class (z9 EC) and z9 Business Class (z9 BC)
  - IBM eServer zSeries 990, 890, 900, and 800
- **Scalability**
  - Up to 512 tasks (2x z/VSE V4.1)
  - Up to 32 GB real processor storage (4x z/VSE V4.1)
  - Turbo dispatcher enhancements (CP balancing)
  - Parallel Access Volume (PAV) feature of IBM System Storage DS8000 & DS6000 series
  - IBM System Storage DS8000 Space Efficient Flashcopy
- **Security**
  - Lightweight Directory Access Protocol (LDAP) sign-on support using a z/VSE LDAP client
  - IBM System z10 extensions to CP Assist for Cryptographic Function (CPACF)
  - SOA Message Layer and Transport layer security
  - IBM System Storage TS1130 and TS1120 're-keying' function
  - Basic Security Manager (BSM) improvements
  - Support for Crypto Express3
  - Encryption Facility for z/VSE V1.2 as an optional priced feature supporting OpenPGP format

z/VSE V4.2.2 Contents ...

- **Enhanced storage options**
  - IBM System Storage SAN Volume Controller (SVC) access to FCP-attached SCSI disks
  - IBM System Storage TS3400 Tape Library
  - IBM System Storage TS1130 Tape Drive
  - DS8000 Full Disc Encryption
  - IBM Virtualization Engine TS7700 Release 1.5
    - including support for IBM System Storage TS7720 Virtual Tape System
- **Delivering on former Statements of Direction**
  - IBM Rational COBOL Runtime for z/VSE V7.5
  - IBM Rational Business Developer Extension for z/VSE V7.5.1
  - IBM WebSphere MQ for z/VSE V3.0
- **Reemphasizing the former Statement of Direction**
  - z/VSE V4.2 will be the last release to offer CICS/VSE V2.3 and DL/I V1.10
- **Pricing**
  - MWLC (full- or sub-capacity options) eligible on z196, z10 EC, z10 BC, z9 EC, z9 BC
  - Sub-capacity measurement granularity for workload using less than 1.0 MSU
- **Migration**
  - Fast Service Upgrade (FSU) from z/VSE V4.1 and from z/VSE V3.1

z/VSE V4.3 - GA planned for 11/26/2010

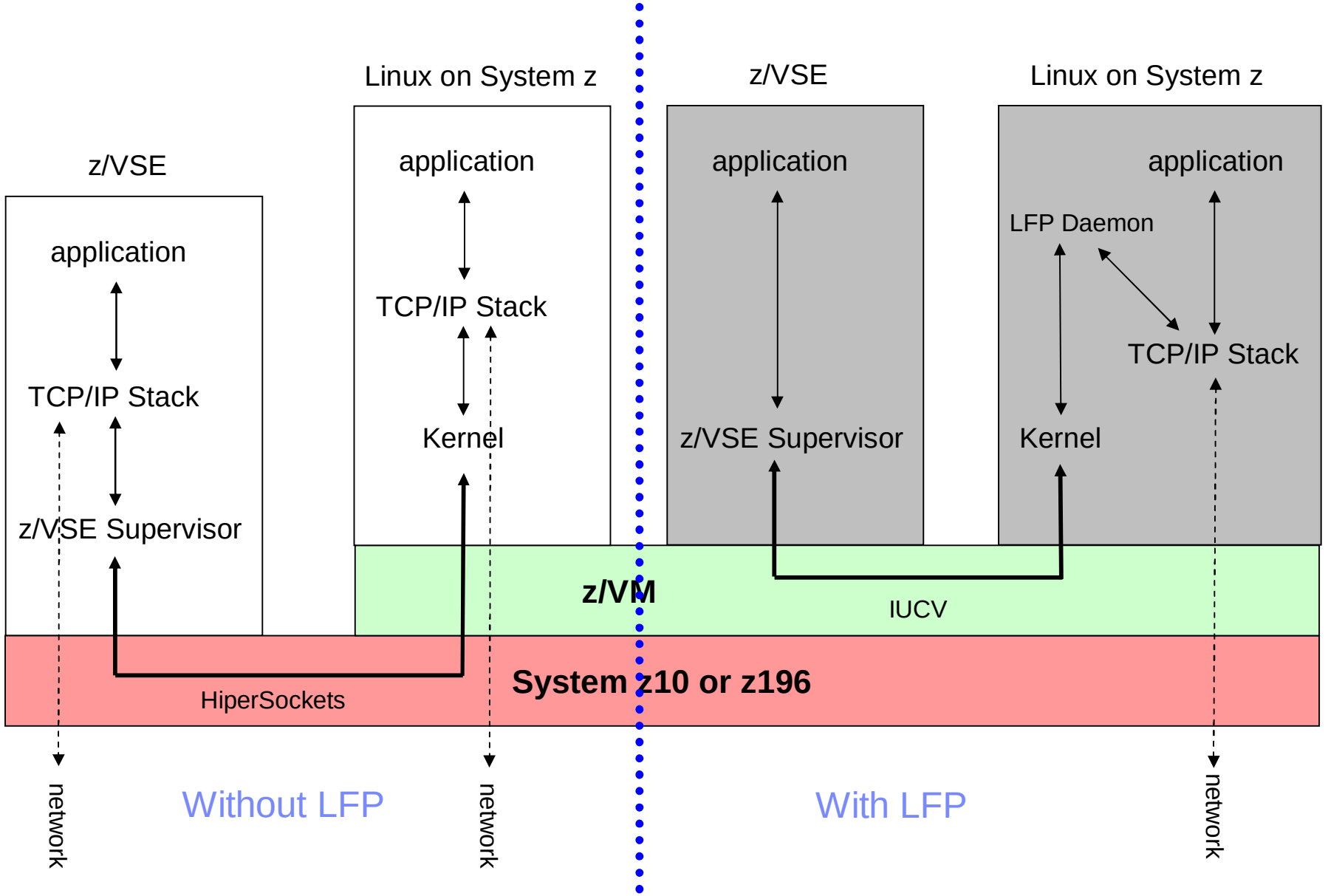
Previewed 10/20/2009, refreshed 07/22/2010, full announce 10/05/2010

Black = previewed

Blue = newly announced

- **IBM zEnterprise and System z10 technology exploitation**
  - Dynamic add of logical CPs to LPAR without Re-IPL
  - Large page (1 megabyte page) support for data spaces
  - FICON Express8 and Crypto Express3 support
  - LFP connector: Fast path from z/VSE to Linux TCP/IP in a z/VM-mode LPAR
- **Virtual storage constraint relief for workload growth**
  - Move selected system programs and buffers from 24-bit into 31-bit storage
- **Ease of use through four-digit device addresses**
  - Transparent for system, vendor, and user applications that rely on 3-digit CUUs
- **Enhanced storage options**
  - DS8000 Remote Mirror and Copy (RMC) feature support through ICKDSF
  - IBM System Storage TS7700 WORM support
  - XIV support (via PTF on top of z/VSE V4.3)
- **Networking, security, and auditability enhancements**
  - SNMP agent to retrieve z/VSE specific system and performance data
- **DOS/VS RPG II support for CICS Transaction Server (CICS TS)**
  - Allows RPG programs implemented for CICS/VSE V2.3 to run with CICS TS V1.1
- **IPv6/VSE as optional product (IPv6 solution)**
  - IBM IPv6/VSE – licensed from BSI – includes IP stack & applications for both, IPv6 and IPv4

z/VSE V4.3: Linux Fast Path (LFP)



XIV Support with Linux on System z, z/VM V5.4 and V6.1, and z/VSE V4.3

April 30, 2009

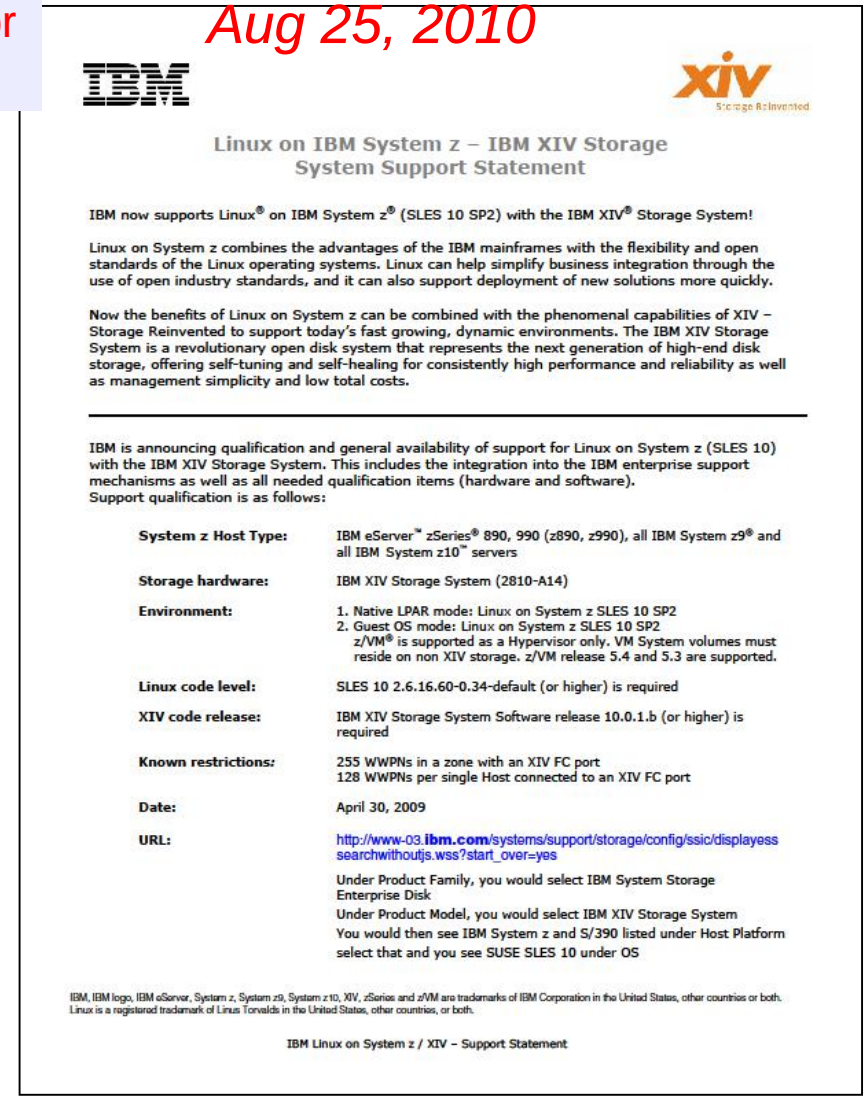
Native z/VM support for XIV (e.g., paging, spooling) is available now via service for z/VM V5.4 and V6.1 (APAR VM64708).

+ Added z/VM Support *Aug 25, 2010*

IBM is announcing qualification and general availability of support for Linux on System z (SLES 10) with the IBM XIV Storage System.

- § IBM eServer™ zSeries® 890, 990 (z890, z990), all IBM System z9® and all IBM System z10™ servers
- § IBM XIV Storage System (2810-A14)
- § Environment:
  - – Native LPAR mode: Linux on System z SLES 10 SP2
  - – Guest OS mode: Linux on System z SLES 10 SP2 z/VM® is supported as a Hypervisor only. VM System volumes must reside on non XIV storage. z/VM release 5.4 and 5.3 are supported.
- § SLES 10 SP2, RHEL 5.2, RHEL 5.3, or RHEL 5.4 is required

+ Adding z/VSE Support w/ z/VSE V4.3



IBM

xiv Storage Reinvented

Linux on IBM System z – IBM XIV Storage System Support Statement

IBM now supports Linux® on IBM System z® (SLES 10 SP2) with the IBM XIV® Storage System!

Linux on System z combines the advantages of the IBM mainframes with the flexibility and open standards of the Linux operating systems. Linux can help simplify business integration through the use of open industry standards, and it can also support deployment of new solutions more quickly.

Now the benefits of Linux on System z can be combined with the phenomenal capabilities of XIV – Storage Reinvented to support today's fast growing, dynamic environments. The IBM XIV Storage System is a revolutionary open disk system that represents the next generation of high-end disk storage, offering self-tuning and self-healing for consistently high performance and reliability as well as management simplicity and low total costs.

IBM is announcing qualification and general availability of support for Linux on System z (SLES 10) with the IBM XIV Storage System. This includes the integration into the IBM enterprise support mechanisms as well as all needed qualification items (hardware and software).
Support qualification is as follows:

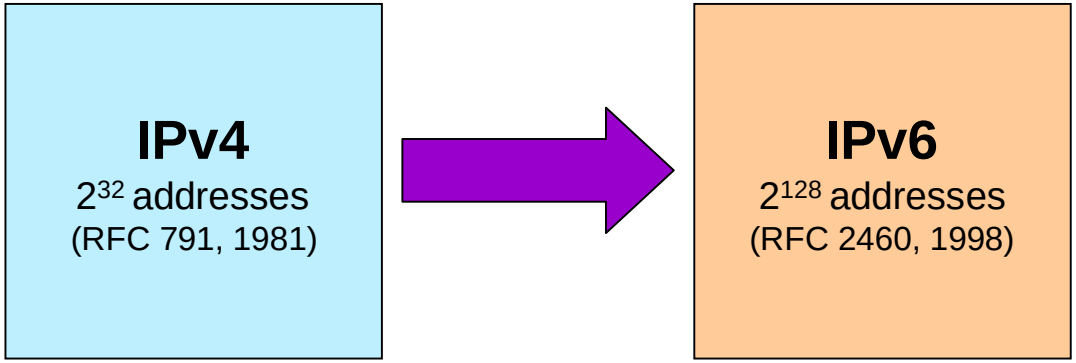
System z Host Type:	IBM eServer™ zSeries® 890, 990 (z890, z990), all IBM System z9® and all IBM System z10™ servers
Storage hardware:	IBM XIV Storage System (2810-A14)
Environment:	1. Native LPAR mode: Linux on System z SLES 10 SP2 2. Guest OS mode: Linux on System z SLES 10 SP2 z/VM® is supported as a Hypervisor only. VM System volumes must reside on non XIV storage. z/VM release 5.4 and 5.3 are supported.
Linux code level:	SLES 10 2.6.16.60-0.34-default (or higher) is required
XIV code release:	IBM XIV Storage System Software release 10.0.1.b (or higher) is required
Known restrictions:	255 WWPNs in a zone with an XIV FC port 128 WWPNs per single Host connected to an XIV FC port
Date:	April 30, 2009
URL:	http://www-03.ibm.com/systems/support/storage/config/ssic/displayessearchwithoutjs.wss?start_over=yes Under Product Family, you would select IBM System Storage Enterprise Disk Under Product Model, you would select IBM XIV Storage System You would then see IBM System z and S/390 listed under Host Platform select that and you see SUSE SLES 10 under OS

IBM, IBM logo, IBM eServer, System z, System z9, System z10, XIV, zSeries and z/VM are trademarks of IBM Corporation in the United States, other countries or both. Linux is a registered trademark of Linus Torvalds in the United States, other countries, or both.

IBM Linux on System z / XIV – Support Statement

Internet Protocol Version 6 (IPv6)

- IPv6 is the “next generation” protocol designed by the Internet Engineering Task Force (IETF) to replace the current version Internet protocol, IP Version 4 (IPv4).
- IPv6 removes the IP addressing limitation of IPv4
- IPv6 is expected to gradually replace IPv4, both coexisting for a number of years
- Availability of IPv6 support addresses long term requirements of the commercial community and government agencies
  - *IPv6 is a strategic direction and a requirement of US Government projects*
  - *US DoD, GSA, and NASA require IPv6 compliant products in all new IT acquisitions*
  - *European Commission (EU) will specify IPv6 capabilities as a core requirement*



Why is IPv6 needed ?

- **Requirement from government and governmental firms & agencies**
  - Worldwide
- **IPv4 addresses running out**
  - Completely allocated by 2H 2011
  - Already difficult to obtain IPv4 address blocks
- **Address notation(s)**
  - IPv4:
    192.168.1.1
  - IPv6 uses 16-byte addresses (several choices, all are equivalent):
    1020:0000:0000:0000:0020:0200:300A:0213
    1020:0:0:0:20:200:300A:213
    1020::20:200:300A:213
- **Begin planning for IPv6 now!**
- **No Drop Dead Date**
  - It's not like Year 2000
- **IPv6 can co-exist with IPv4**
  - IPv6 is NOT backward compatible

IBM IPv6/VSE® Version 1 Release 1

Allow z/VSE users to participate in an IPv6 network

- **New product:** 5686-BS1
- **Announcement:** April 06, 2010
- **Availability:** May 28, 2010
- **Minimum requirement:** z/VSE V4.2 (DY47077)
- **Pricing:** Enabled for sub-capacity pricing

- **IPv6/VSE is designed to provide**
  - TCP/IP stack
  - IPv6-enabled and IPv4-enabled applications
  - IPv6 and IPv4 APIs (IBM's EZA socket APIs)

- **IPv6/VSE supports both, the IPv6 and IPv4 protocol**
  - TCP/IP for VSE/ESA V1.5 only supports the IPv4 protocol
  - Both stacks can be run concurrently within one z/VSE system
  - Existing IPv4 applications continue to run unchanged

Note: IPv6/VSE is a registered trademark of Barnard Software, Inc.

IPv6/VSE Functionality

§ IPv6 TCP/IP stack

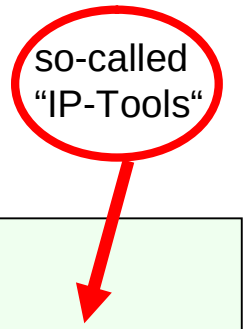
– Runs in a separate partition using its own stack ID

§ IPv6/VSE dual stack support

– Allows IPv6-enabled applications to access the IPv4 and IPv6 networks simultaneously in either batch or CICS environment

§ IPv6- and IPv4-enabled utility applications

– Running external to the IPv6/VSE stack partition for greater stability & performance



- FTP server (POWER queues, VSAM catalogs, SAM file, z/VSE libraries, etc.)
- Batch FTP client (access to remote host FTP servers)
- TN3270E server (TN3270/TN3270E terminal and TN3270E printer sessions)
- NTP server (Network Time Protocol server)
- NTP client (sync TOD clock with external server)
- System logger client (log selected console messages to a Linux syslog-ng daemon)
- Batch email client (send email to a SMTP server)
- Batch LPR (Line Printer Requestor)
- Batch remote execution client (job in z/VSE can trigger a script to run on a remote host)
- Batch PING (ping a remote host)
- GZIP data compression (simple GZIP data compression)
- REXX automation (uses z/VSE REXX EXECs for automation)

New SoD with z/VSE V4.3 Announcement

Statement of Direction:

z/VSE intends to provide 64-bit virtual addressing for user applications.

64-bit virtual addressing further exploits the z/Architecture capabilities (64-bit real addressing) introduced with z/VSE 4.1.

z/VSE intends to provide APIs to manage 64-bit virtual memory objects. Memory objects are "chunks" of virtual storage obtained by a program. They may help clients to keep more data in memory for growing workloads and improve performance.

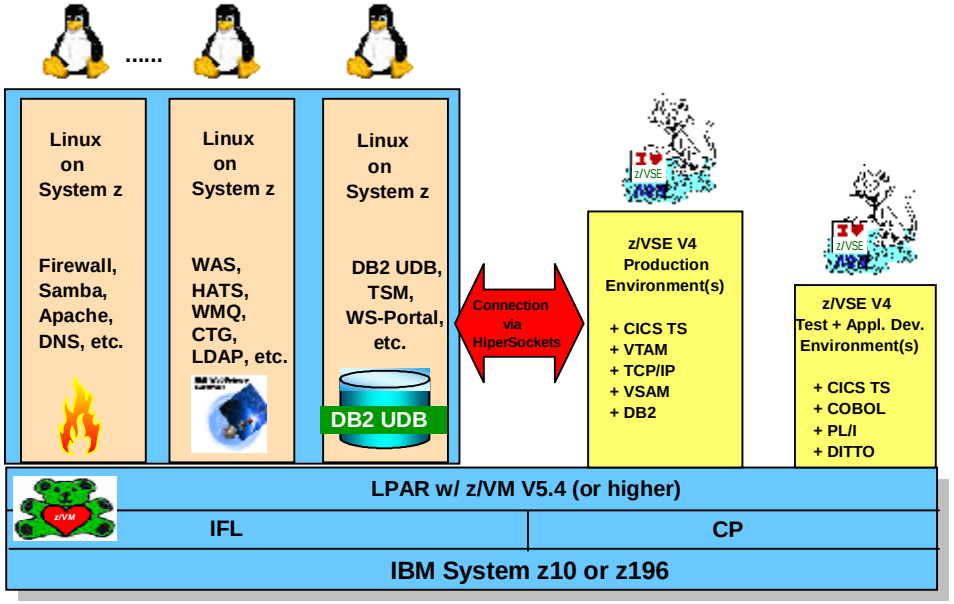
Note: All statements regarding IBM's plans, directions, and intent are subject to change or withdrawal without notice.

Agenda

- z/VSE Status & Support
- z/VSE Strategy
- z/VSE Modernization Options
- z/VSE Software Pricing
- z/VSE Functional Enhancements
  - z/VSE V4.2.2
  - z/VSE V4.3
  - IPv6/VSE
- Wrap-up

z/VSE "PIE" Strategy enables Customer Growth

with IBM System z, IBM System Storage, and IBM Middleware



§ z/VSE

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

§ z/VM

- Highly flexible, industrial strength
- Advanced virtualization
- Multiple z/VSE and Linux images
- Designed to exploit System z10 and zEnterprise

§ Linux on System z

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

For more information, please see the z/VSE web site:
http://www-03.ibm.com/servers/eserver/zseries/zvse/