IBM.
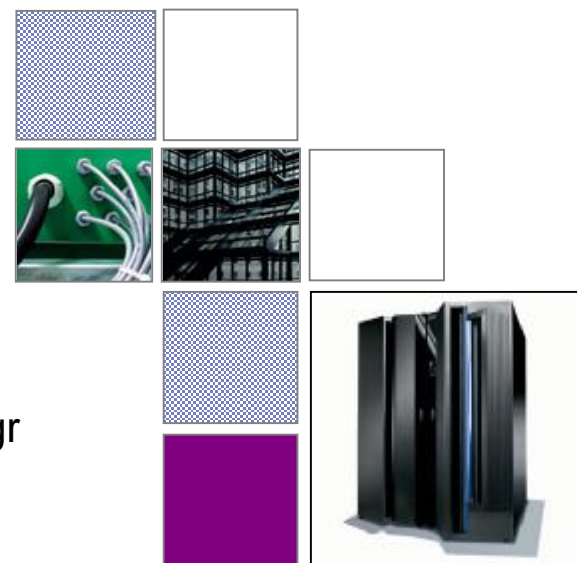
Hard- and Software News
zSeries, z/VM, z/VSE, Linux on zSeries

Dr. Klaus Goebel
z/VSE Systems Mgr & Linux Techn Support Mgr
GSE Garmisch, Oct. 2005

July 2005 Announcement Overview
from a VM/VSE and Linux Perspective

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DB2 Universal Database	Lotus*	Virtualization Engine
Domino	OnForever*	X-Architecture
Enterprise Storage Server*	Parallel Sysplex*	xSeries*
e-business logo*	POWER	z/OS*
GDPS*	POWER5	z/VM*
Geographically Dispersed Parallel	Predictive Failure	zSeries*
Sysplex	Analysis*	System z9*
	pSeries*	

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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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Agenda

§ **IBM Systems Agenda**

- – IBM System z9

- – Holistic Approach

§ **Linux on System z9 and zSeries**

- – IBM Virtualization Engine

- – IBM Director

§ **z/VM**

- – z/VM V5.2

§ **z/VSE**

- – z/VSE V3.1

- – Usage Scenarios with VM/Linux

§ **Summary**

The IBM Systems Agenda for On Demand Business
Announced July 26, 2005

|		
	Virtualize Everything	**The move toward "virtualizing everything" offers an improved approach to systems design, development and delivery which will dramatically enhance the ability to simplify.**
	Commit to Openness	**Don't just design and build based on open and industry standards, but share in such a way that systems integrate better and more easily.**
	Collaborate to Innovate	**Opportunities to collaborate extend from within a department to the entire company — even beyond to industry-based communities and customers.**

ON DEMAND BUSINESS

The Mainframe Charter – Providing a Strategic Framework

It is our intention to…
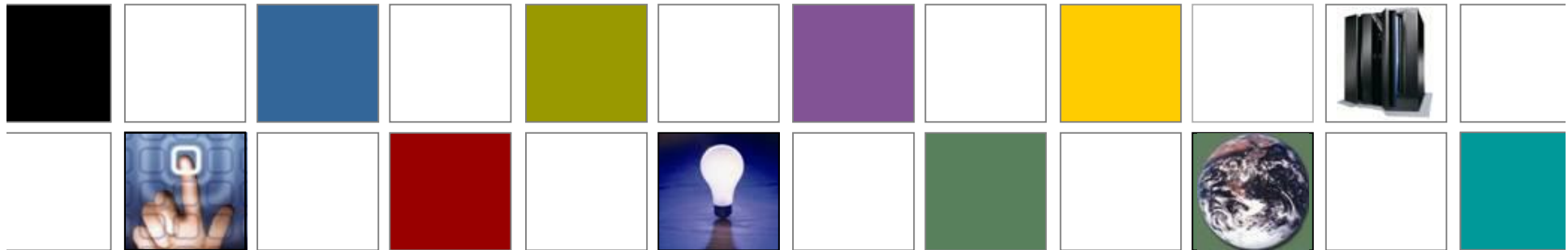
Innovation

- 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.*

Community

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

* Excerpted from the Mainframe Charter – August 2003

ON DEMAND BUSINESS*

IBM System z9™ ─ Redefines the Role of the Mainframe
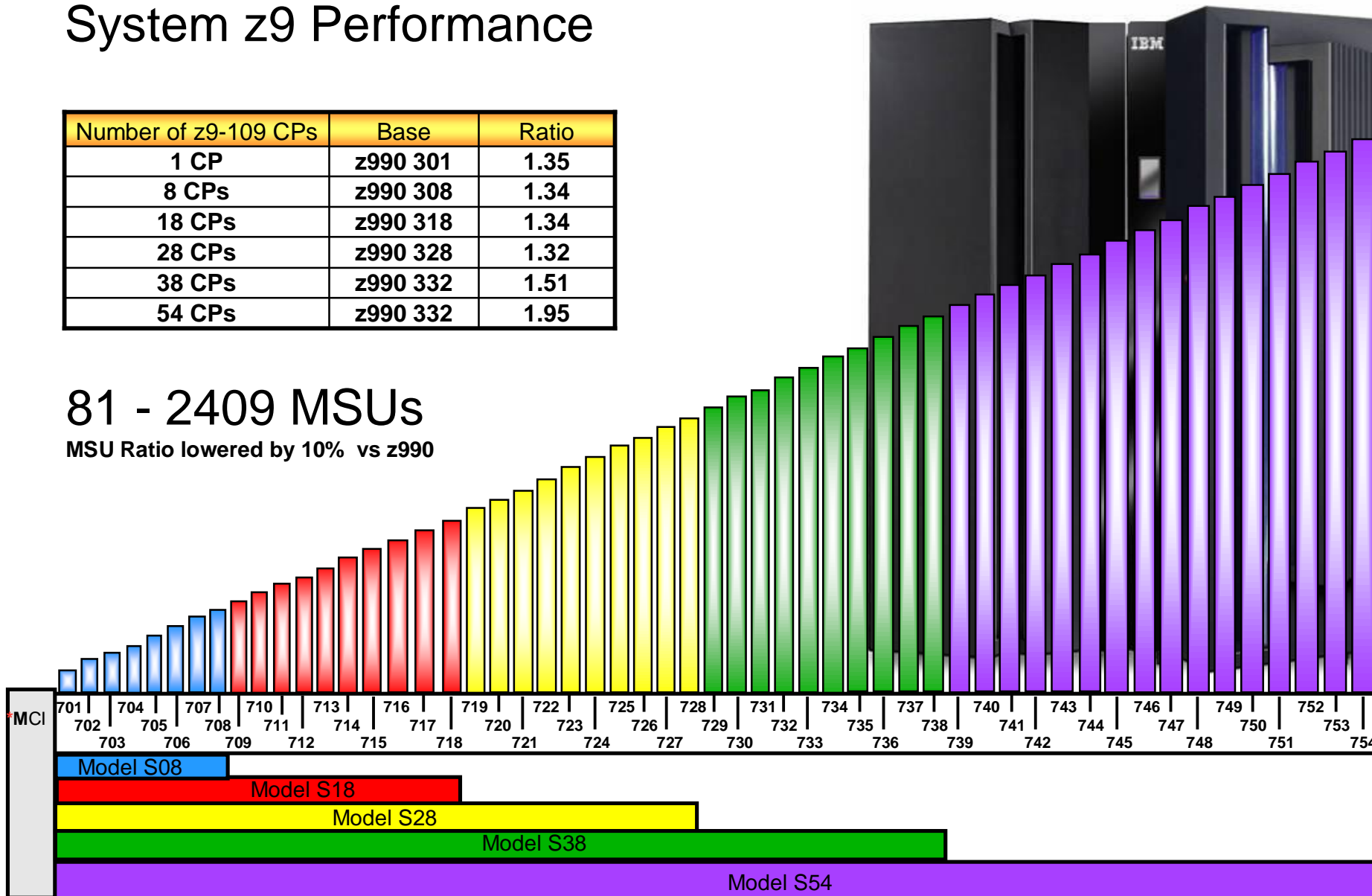## *Delivering the IBM Systems Agenda*

§ 5 Models - S08, S18, S28, S38 and S54
§ Processor Units (PUs)
  – 12 (16 for Model S54) PUs per book
  – 2 SAPs per book, standard
  – 2 spares per server
  – 8, 18, 28, 38 or 54 PUs available
    • CPs, IFLs, ICFs, zAAPs, optional SAPs
§ Improved performance over the z990
§ Up to 512 GB of central processor storage
§ Up to 4 Logical Channel SubSystems (LCSSs)
  – Up to 1024 channel paths / Up to 15 LPARs per LCSS
§ Up to 60 LPARs
  – LPAR Mode only - No basic mode
§ FICON Express2/FICON Express
  – Up to 84 features / 336 channels (FICON Express2)
§ Up to 1024 ESCON® channels
§ N_Port ID Virtualization
§ OSA-Express2/OSA-Express
  – Up to 24 features
  – Fast Ethernet, 1000BASE-T Ethernet, Gigabit Ethernet, 10 Gbit Ethernet
§ Up to 8 configurable Crypto Express2
§ IPL from FCP-attached SCSI disks
§ Up to 16 HiperSockets

System z9 Performance

Number of z9-109 CPs	Base	Ratio
1 CP	z990 301	1.35
8 CPs	z990 308	1.34
18 CPs	z990 318	1.34
28 CPs	z990 328	1.32
38 CPs	z990 332	1.51
54 CPs	z990 332	1.95

81 - 2409 MSUs

MSU Ratio lowered by 10% vs z990

*MCI

701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754

Model S08
Model S18
Model S28
Model S38
Model S54

IBM's holistic Approach to Systems Design
Computing leadership for the On Demand Business

This approach is designed to:

§ **Bring together industry-leading technologies**
  – Servers
  – Operating systems and middleware
  – Storage and networking technologies

§ **Build in resiliency and security across the entire system**

§ **Support key imperatives for On Demand Business**
  – Virtualization
  – Commitment to openness
  – Collaborate to Innovate

Quality-of-service requirements drive platform selection

Networking

Storage

Middleware

Operating systems

Server
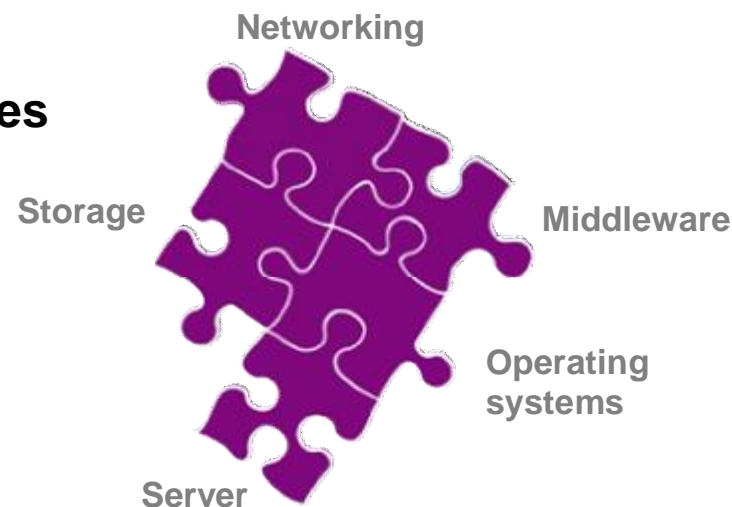
Holistic system design is at the heart of the IBM System z9 today

IBM is committed to deliver advanced IT resources that support open standards and work better together to meet client needs.

A holistic Approach to System z9 Operating System Software

§Our System z9 operating systems reinforce our leadership in:

- **Innovative systems-wide business resiliency and security:**
  - z/OS UNIX® System Services maintenance may require fewer IPLs
  - z/OS can help to improve security of data by leveraging ICSF key management for planned secure encryption facility*
  - z/VSE support of integrated security features
 - z/VM 5.2 improves FCP channel sharing with support for N_Port ID Virtualization
- **Virtualization, flexibility and workload management capabilities based on your priorities:**
  - z/VM enhanced exploitation of large real memory which may provide constraint relief and cost savings
  - z/OS TCP/IP networking performance optimized with TCP/IP Sysplex Load Balancing Advisor
  - z/VM offers enhanced performance assists for guests
  - Linux for System z9 is planned to utilize IBM Director for heterogeneous systems management capabilities and simplification for virtual server environment*
- **Extending investments in data and application assets:**
  - z/OS 1.7 offers easier integration of new applications with C/C++ enhancements and simplified application security with application-transparent Transport Layer Security
  - z/VM 5.2 provides improved performance of SCSI disk I/O
  - z/VSE 3.1 provides connectors and Web services based on open and industry standards
  - z/TPF affinity to Linux-based development
  - Linux for System z9 portfolio of applications grows with over 700 applications from over 260 Independent Software Vendors

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ON DEMAND BUSINESS
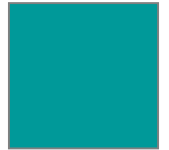
System z9 Operating System Software

Operating System	ESA/390 (31-bit)	z/Arch (64-bit)
z/OS Version 1 Release 4, 5, 6, 7	No	Yes
Linux, 64-bit distribution	No	Yes
Linux, 31-bit distribution	Yes	No
z/VM Version 5 Release 1, 2	No	Yes
z/VM Version 4 Release 4	Yes	Yes
z/VSE™* 3.1, VSE/ESA™ 2.6, 2.7	Yes	No
z/TPF Version 1	No	Yes
TPF Version 4 Release 1 (ESA mode only)	Yes	No
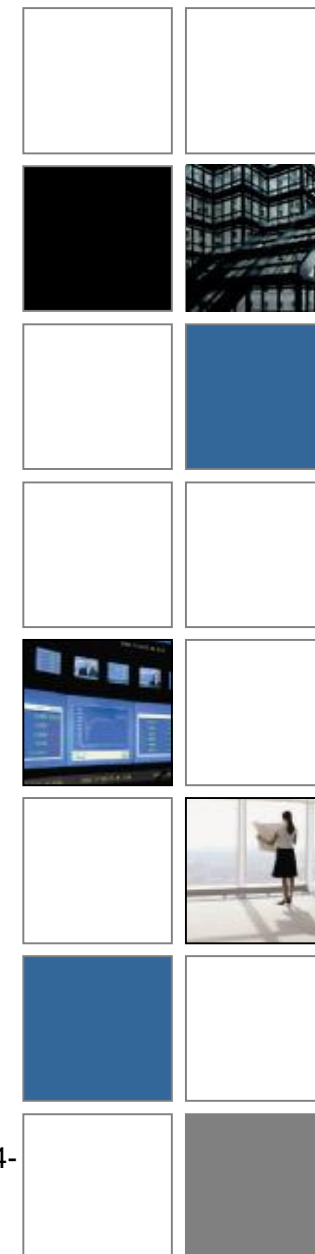
*z/VSE can execute in 31-bit mode only. It does not implement z/Architecture™ and specifically does not implement 64-bit mode capabilities. z/VSE is designed to exploit select features of IBM System z9 and eServer zSeries hardware.
Note: Please refer to the latest PSP bucket for latest PTFs for new functions/features.

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– Holistic Approach

§ **Linux on System z9 and zSeries**

– IBM Virtualization Engine

– IBM Director

§ **z/VM**

– z/VM V5.2

§ **z/VSE**

– z/VSE V3.1

– Usage Scenarios with VM/Linux

§ **Summary**

Linux on IBM System z9

§ General Availability (GA) of System z9 was on Sept. 16, 2005

§ At GA time, all supported releases of Linux and z/VM support IBM System z9 :
  – z/VM 4.4 and 5.1
  – z/VM 5.2 to GA in 12/2005
  – Novell: latest Service Packs of SLES 8 and SLES 9
  – Red Hat: latest Updates of RHEL 3 and RHEL 4

§ Further exploitation of IBM System z9 features/functions is planned with an upcoming Linux Code Drop :
  – More high-availability functions
  – MSS (Multiple Subchannel Sets) support
  – NCP CDLC (Channel Data Link Control) support via OSA Express
  – FCP NPIV (N_Port ID Virtualization)
  – FCP program-directed Re-IPL support
  – Crypto Fast Path support in z90crypt device driver
  – 10 Gbit Ethernet performance improvements

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Linux on IBM System z9
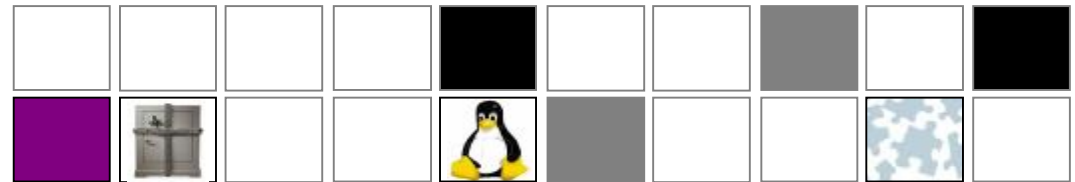
§ Business Resiliency and Security

– Geographically Dispersed Multiplatform Resiliency (e.g., GDPS)

– Additional secure crypto algorithms supported by high performance cryptographic co-processor

– Enhanced system and storage scalability

§ Systems Management

– Virtualization Engine enablement
  • IBM Director (SOD)
– Enhancements for virtual networking, virtual Fibre Channel, virtual processor accounting

§ Business Integration

– Network integration of SNA and NCP protocols
  • IBM Communication Controller, IBM Communication Server
– Improvements in OSA layer 2 networking support for virtualized network adapter

§ Enhance your Linux investment with System z9 and z/VM

– Linux can benefit from the more powerful IFLs on z9-109
  • More virtual servers *or* more users *or* more throughput for same IFL price

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IBM Middleware for Linux on System z9 and zSeries

	Red Hat RHEL 3 (10/03)		Red Hat RHEL 4 (2/05)		SUSE SLES 8 (11/02)		SUSE SLES 9 (08/04)
	z (31 bit)		z (64 bit)		z (31 bit)		z (64 bit)
Java SDK	V1.3.1 V1.4.2 Avail		V1.4.2 Avail		V1.3 V1.4 Avail		V1.3.1 V1.4.2 Avail
WebSphere Application Server	V5.1 Avail		V5.1.1 V6.0.1 Avail		V5.0 V6.0 Avail		V5.1.1 V6.0 Avail
WebSphere MQ Base	V5.3 V6.0 Avail				V5.3 Avail		V5.3 V6.0 Avail
WebSphere Portal Enable	V5.1 Avail		V5.1.0.1 Avail		V5.0.2 Avail		V5.1.0.1 Avail
WebSphere Commerce BE	V5.6 Avail				V5.5 Avail		V5.6.0.2 Avail
Rational Clear Case			V2003 Avail		V2003 Avail		V2003 Avail
Rational Clear Quest	V2003 Avail		V2003 Avail		V2003 Avail		V2003 Avail
Lotus Domino					V6.5 V7.0 Avail		V7.0 Avail
DB2 UDB	V8.1.4 Avail		V8.2.2 Avail		V8.2.1 Avail		V8.2.1 Avail

Linux Product Matrix can be downloaded from:

Status 3Q 2005

ibm.com/software/os/linux/software/index.jsp

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IBM Virtualization Engine™

Virtual resource access

**Programmatic Interface:
SOA, Resource modeling**

**Virtual view: VE Console,
IBM TotalStorage
Productivity Center**

Virtual resource management

**Workload & performance managers: EWLM
Resource management, modeling, mapping: IBM Director,
RDS, Resource modeling**

Virtual resources

Resource virtualizers:
**Partitioning, virtual machines, I/O,
networks, SVC, VTS, SAN File System**

IBM Server Systems
**IBM System z9, zSeries 800, 890, 900,
990; xSeries 445, 455, 460, 366, 365;
p5, i5, IBM BladeCenter, IBM
OpenPower**

**IBM Storage
Systems**
**DS4000, DS6000,
DS8000;
3584, 3494, 3592**

Virtual planning tools

IBM Virtualization Engine
and Infrastructure Services

Virtual access

Virtual management

Virtual resources

- There are a number of VE V2 enhancements relevant to Linux on System z9 and zSeries, e.g.

  - SAN Volume Controller

  - IBM Director

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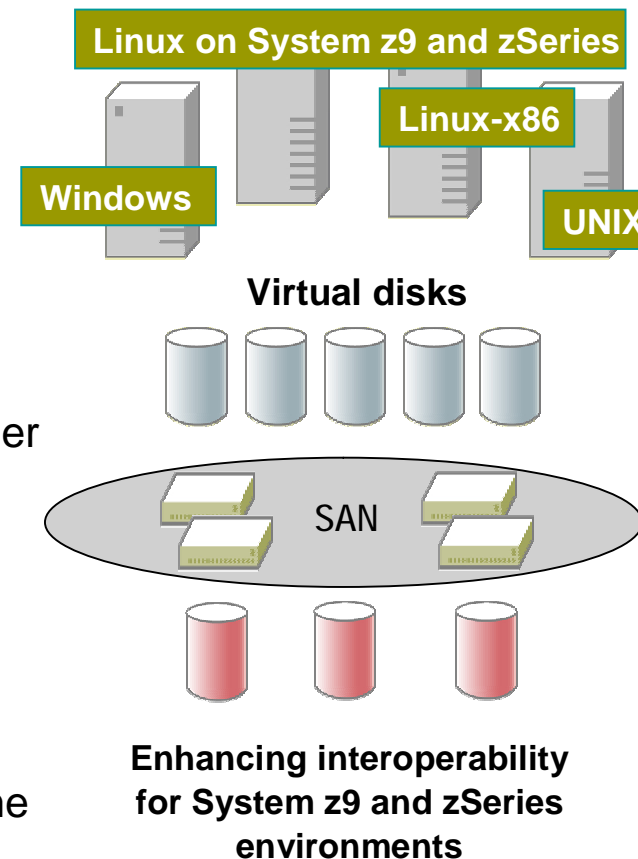
ON DEMAND BUSINESS

IBM TotalStorage SAN Volume Controller

§ <u>Statement of Direction:</u> Support for Linux operating environments implemented on IBM System z9 and zSeries platforms with storage managed by SAN Volume Controller.

§ This capability is intended to:

– Enable System z9 and zSeries servers to utilize open systems storage pools created by SAN Volume Controller

– Create a tiered storage environment for Linux operating environments in System z9 and zSeries environments

– Simplify volume management by combining mainframe and open systems storage environments into a single pool, managed from a central point

– Expand the host environments managed by SAN Volume Controller

– Improve application availability by enabling changes to the storage infrastructure without disrupting the applications running on the hosts

Linux on System z9 and zSeries

Linux-x86

Windows

UNIX

Virtual disks

SAN

Enhancing interoperability for System z9 and zSeries environments

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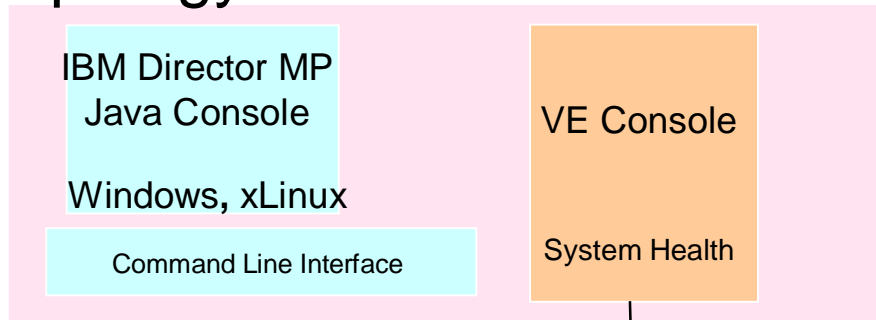
ON DEMAND BUSINESS

IBM Director

§ IBM Director is well-established for xSeries and for Blades

§ IBM Director for iSeries, pSeries and zSeries

- Based on the Intel Director product

- New with Virtualization Engine (R1 for iSeries/pSeries, R2 for zSeries)

§ Suite of tools and utilities for central system management with heterogeneous end points:

- Monitor & Alert – HW Status, inventory, event action plans,...

- Deployment Manager

- Optimize - Capacity Planning

- Maintain & Update

§ IBM Director functions integrate into other system management tools

– Provides remote interfaces based on the DMTF CIM standard

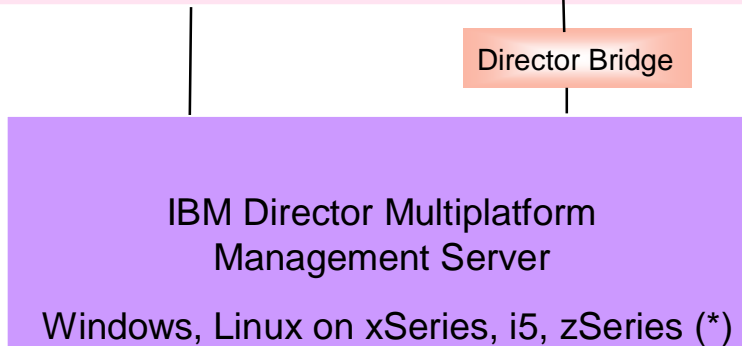– Provides direct interfaces via Command Line Interface

Statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only

IBM Director – 3-Tier Topology

Director Multiplatform
Console

**IBM Director MP
Java Console**

Windows, xLinux

Command Line Interface

VE Console

System Health

Director Bridge

Director Multiplatform
Management Server

**IBM Director Multiplatform
Management Server**

Windows, Linux on xSeries, i5, zSeries (*)

(*) Statement of Direction

Director Multiplatform
Agents

IBM Director MP Agent Windows	IBM Director MP Agent xLinux	IBM Director MP Agent AIX	IBM Director MP Agent Power Linux	IBM Director MP Agent i5/OS	IBM Director MP Agent zSeries (*)

Statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only

ON DEMAND BUSINESS

IBM Director on zSeries – Tasks Overview

§ **Base Management**

Monitor & Alert Linux on zSeries

• **Deployment**

Virtual server deployment – deploy z/VM Linux guest systems

Server Complex - Manage Virtual Server Multi-tier workload

§ **Optimize – Capacity Management**

xSeries only

§ **Maintain & Update**

Software Distribution
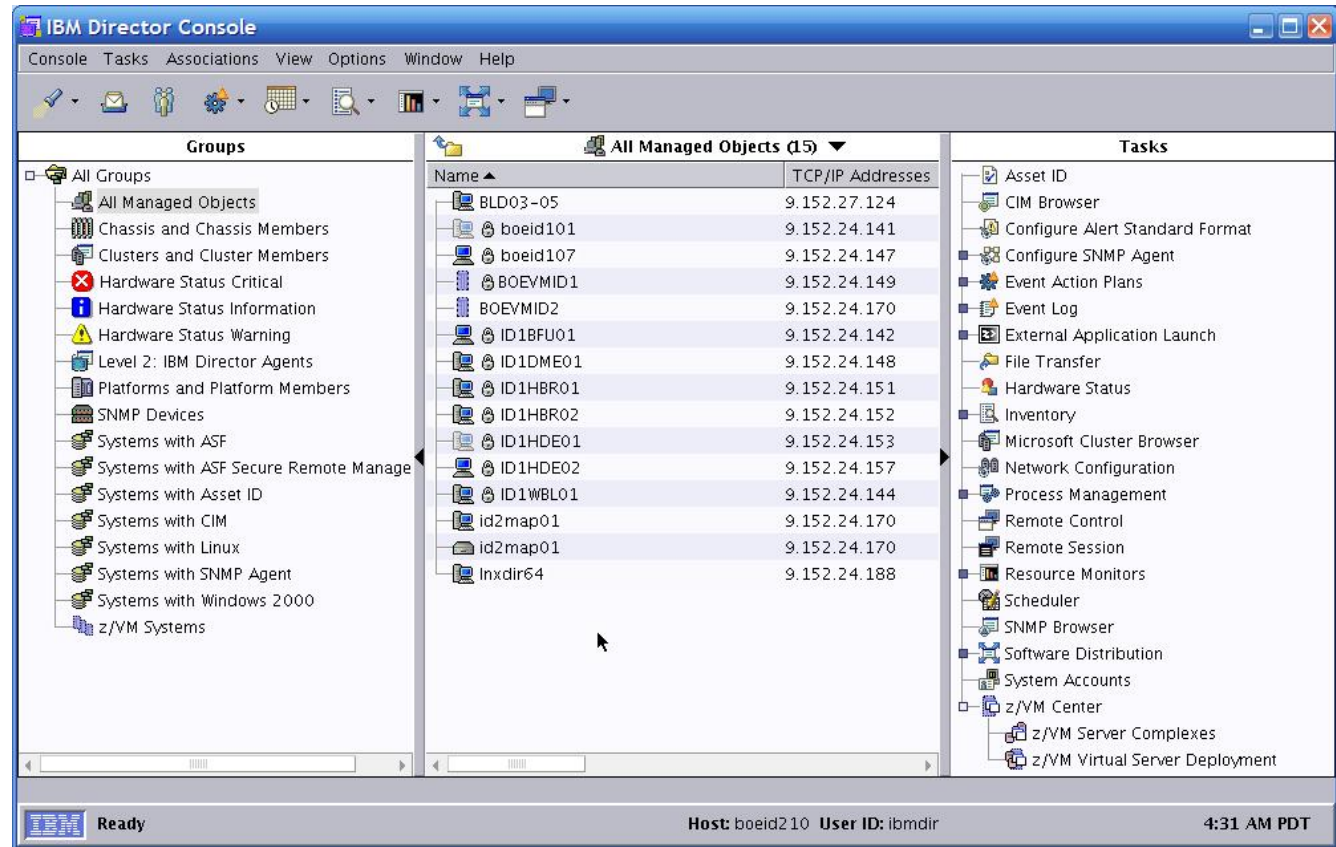
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§ **z/VSE**

– z/VSE V3.1

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§ **Summary**

Recent VM Release History

z/VM Version 5: High-Value Virtualization Technology

- « Generating new business with Linux on zSeries
- « Enabling growth for existing VM customers

VM/ESA V2
R4
7/99
6/03

z/VM V3
2/01
R1
12/05

z/VM V4
7/01 R1 6/03
10/01 R2 12/03
5/02 R3 5/05
8/03 R4 9/06

z/VM V5
9/04 R1 9/07
12/05 R2 4/09

Future enhancements:
- Hardware and I/O
- Systems management
- Linux/VM synergies
- High availability
- Virtualization
- Networking
- Security

Service discontinued　Withdrawn from marketing　Currently marketed

mm/yy Release GA date (top)
mm/yy Service discontinuance date (bottom)

ON DEMAND BUSINESS

z/VM V5.2 Overview

§ **Business Resiliency and Security**

- Crypto Express2 supported as an accelerator card for Crypto sharing among Linux guests

- Enhanced dynamic routing capabilities with new MPRoute server

- Dynamic addition / deletion of an LPAR name

§ **Workload Management**

- Enhanced exploitation of large real memory that can provide constraint relief and cost savings

- Enhanced performance assists for z/VM guests for OSA-Express, FCP, and HiperSockets

- Improved ease of use for creating and managing Linux or other virtual images

- Simplified user administration with the coordination of DirMaint™ and RACF changes

- Improved directory management performance

§ **Business Integration**

- Improved problem determination for Guest LANs and Virtual Switches

- Improved performance of SCSI disk I/O

- N_Port ID Virtualization support

- Upgraded SSL server support for Red Hat and additional SUSE LINUX distributions

z/VM Release Support for IBM System z9

§ Support for the z9-109 will be included in the general availability release of z/VM V5.2 on December 16, 2005

§ Compatibility support is available for z/VM V5.1 and V4.4 coincident with availability of the z9-109 since September 16, 2005*
  – Required PTFs (APARs) for z/VM V5.1 and V4.4 compatibility support:
    • CP: VM63646, VM63722, VM63744
    • CMS (IOCP): VM63740
    • EREP: VM63743
    • HCD/HCM: VM63721
    • OSA/SF: OA11650

§ The following z/VM V5.2 support for the z9-109 is also available for z/VM V5.1 and V4.4:
  – Multiple Logical Channel Subsystems support
  – Internal and external spanned channel support
  – Extended channel data measurement support
  – Support for configurations with up to 60 LPARs

* Planned availability for the z9-109 S54 is November 2005

ON DEMAND BUSINESS

Enhanced z/VM Support for Large Real Memory
Constraint Relief for Memory-Intensive Virtual Server Environments

§ **z/VM V5.2 Control Program (CP) offers improved performance and scalability for environments with high demand on storage below 2 GB**
   – I/O data can now be transferred from buffers located anywhere in memory
   – QDIO structures may now reside above the 2 GB address line
   – Most CP control blocks may now reside above the 2 GB address line

§ **Storage above 2 GB address line is included in dumps**
   – CP hard and soft abend dumps and SNAPDUMPs
   – Standalone z/VM dumps or VMDUMPs of z/Architecture virtual machines

§ **TCP/IP for z/VM exploitation of 64-bit Diagnose 98**
   – Enhanced QDIO device driver uses I/O buffers above 2 GB when possible
   – Helps reduce chance of server failure due to lack of buffer space

§ **Block I/O (Diagnose 250) support**
   – Virtual machines can specify parameter addresses and I/O buffers above the 2 GB address line
   – IBM is working with its Linux distribution partners to exploit this function in future Linux on System z9 and zSeries distributions or service updates

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§ **Summary**

ON **DEMAND BUSINESS**

z/VSE V3.1 Overview

§ **Business Resiliency and Security**

- Basic Security Manager
- Crypto Express2
- CPACF

* z/VSE can execute in 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 z9 and zSeries hardware.

§ **Workload Management**

- Up to 60 LPARs, MSS
- FCP-SCSI disk support
  - High I/O rate
  - Shared disk storage

§ **Business Integration**

- OSA Express2, including GbE, 10 GbE, and 1000BASE-T
- HiperSockets for fast communications with Linux on System z9
- OSA-ICC for simplification

| Plus . . . | Interoperability: | • VSE connectors
• VSE Web services
• IBM Middleware | IBM TotalStorage: | • DS8000 & DS6000 disk
• Advanced Copy Support
• Virtual Tape Server
• 3494 Tape Library |

ON DEMAND BUSINESS
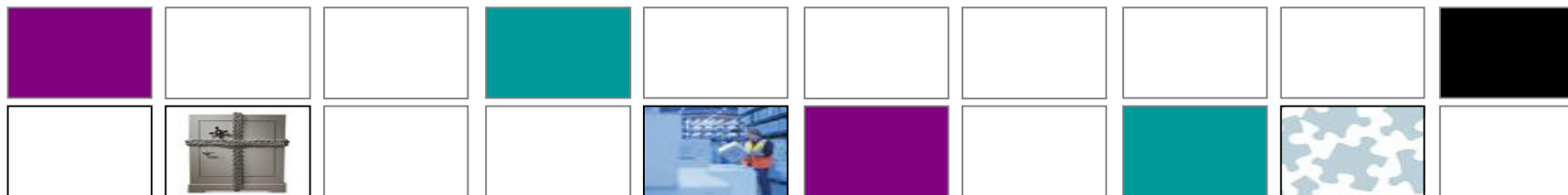
VSE Release Support Status

VSE Version and Release	Marketed	Supported	End of Support
z/VSE V3.1	**Yes**	**Yes**	**tbd**
VSE/ESA V2.7	No	Yes	2/2007
VSE/ESA V2.6	No	Yes	3/2006
VSE/ESA V2.5	No	No	12/2003

Note 1: VSE/ESA V2.7 has been marketed in parallel with z/VSE V3.1 until 9/2005.

Scenario 1: DB2 UDB (64-bit) for VSE Customers

NEW:

DB2 Client for VSE (PRPQ P10154)

VSAM Redirector

Linux on zSeries

DB2 UDB V8.2 (64-bit)

DB2 UDB

Connection via HiperSockets

z/VSE V3.1 Production Environment

+ CICS
+ TCP/IP
+ VSAM
+ COBOL
+ DB2 Client

z/VSE V3.1 Test Environment

+ CICS
+ VSAM
+ COBOL

z/VM V5	z/VSE Production System LPAR	z/VSE Test System LPAR
IFL Engine	Standard Engine	

IBM eServer zSeries

ON DEMAND BUSINESS
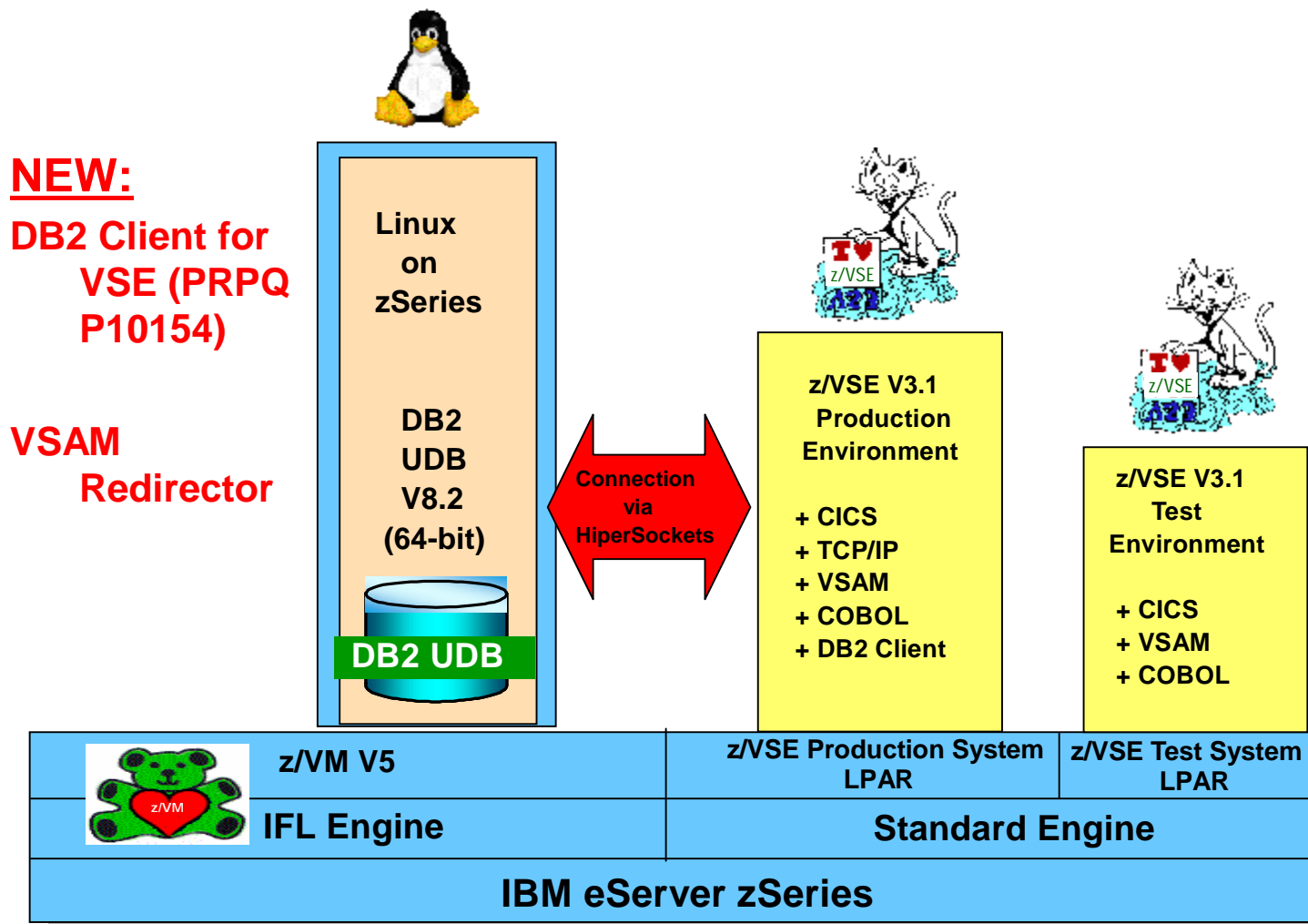
Scenario 2: „Webification" for VSE Customers
Web-enable existing applications through an Inter/Intranet Frontend

Linux on zSeries

WAS
HoD
HATS

IBM WebSphere Software

Connection via HiperSockets

z/VSE V3.1 Production Environment

+ CICS
+ TCP/IP
+ VSAM
+ COBOL

z/VSE V3.1 Test Environment

+ CICS
+ VSAM
+ COBOL

z/VM V5

IFL Engine

z/VSE Production System LPAR

z/VSE Test System LPAR

Standard Engine

IBM eServer z890

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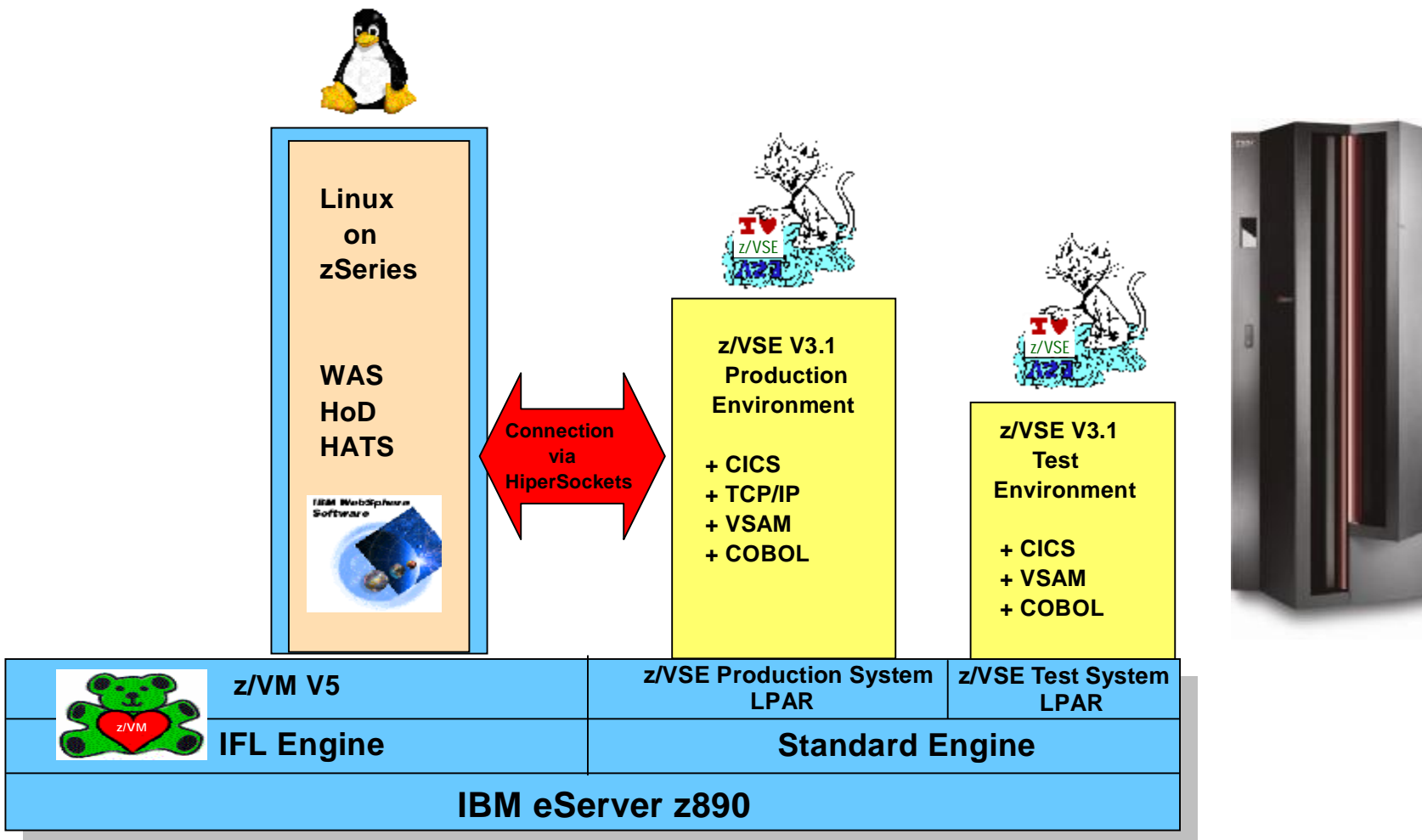
Scenario 3: WebSphere Portal for VSE Customers
A Portal for Administration & Integration of Employees/Customers/Suppliers

NEW:

**MQ Client
for VSE,
free of
charge**

**Linux
on
zSeries**

**WAS
WS Portal
WS MQ**

**Connection
via
HiperSockets**

**z/VSE V3.1
Production
Environment**

**+ CICS
+ TCP/IP
+ VSAM
+ COBOL
+ MQ Client**

**z/VSE V3.1
Test
Environment**

**+ CICS
+ VSAM
+ COBOL**

z/VM V5	z/VSE Production System LPAR	z/VSE Test System LPAR
IFL Engine	Standard Engine	

IBM eServer z890

ON DEMAND BUSINESS
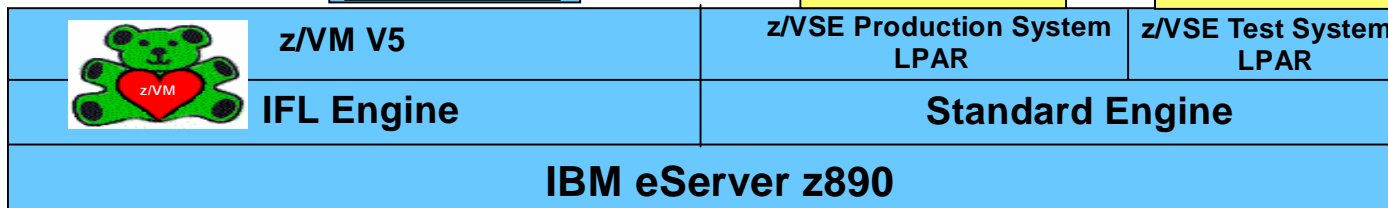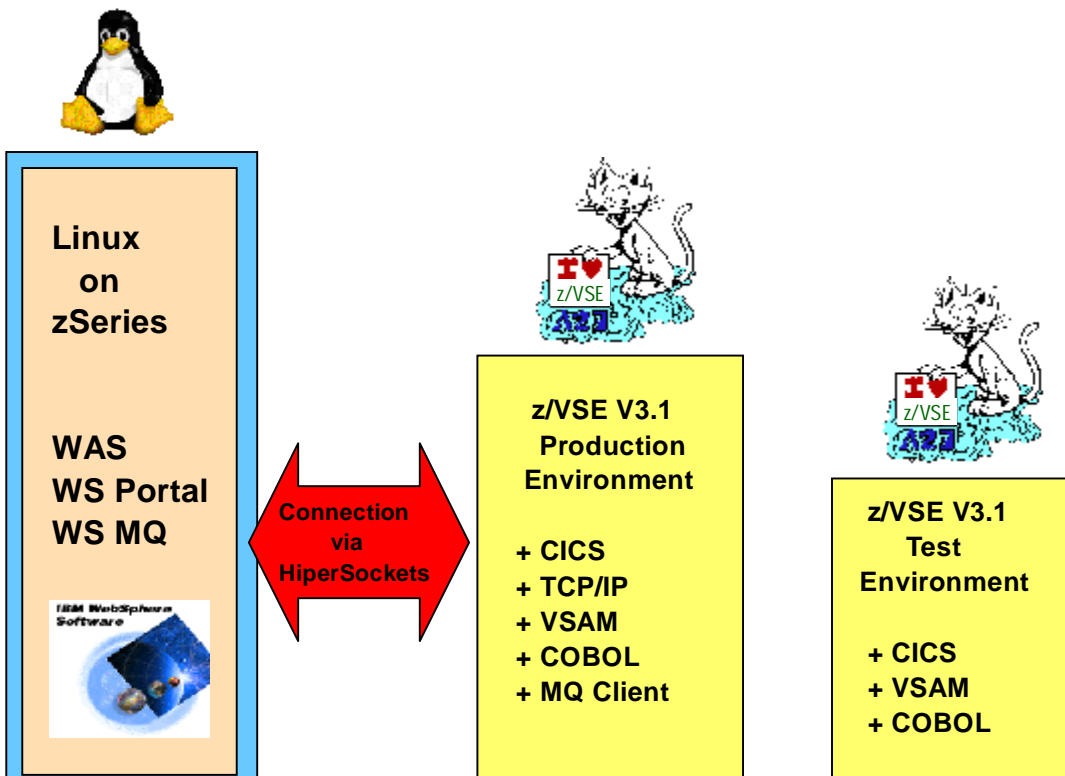
Scenario 4: Application Development for VSE Customers

Linux on zSeries

WebSphere Studio Application Developer or Rational Application Developer (RAD)+EGL for VSE

Linux on zSeries

WebSphere Application Server

Connection via HiperSockets

z/VSE V3.1 Production Environment

+ CICS
+ TCP/IP
+ VSAM
+ COBOL

z/VSE V3.1 Test Environment

+ CICS
+ VSAM
+ COBOL

z/VM V5

z/VSE Production System LPAR

z/VSE Test System LPAR

IFL Engine

Standard Engine

IBM eServer z890

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Growth Scenarios with VSE & Linux on zSeries

Linux on zSeries

Firewall e.g. StoneGate or zGuard

Linux on zSeries

WAS, HATS, HoD, MQSeries, etc.

Linux on zSeries

DB2 UDB V8.2 (64-bit)

DB2 UDB

Connection via HiperSockets

z/VSE V3.1 Production Environment

+ CICS
+ VTAM
+ TCP/IP
+ VSAM
+ COBOL
+ DB2
+ MQSeries

z/VSE V3.1 Test Environment

+ CICS
+ VTAM
+ VSAM
+ COBOL

z/VM V5

z/VSE Production System LPAR

z/VSE Test System LPAR

IFL Engine

Standard Engine

IBM eServer z890

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VSE Sub Capacity Measurement Tool

Statement of Direction as part of IBM System z9 announcement:
VSE will provide a sub capacity measurement tool.
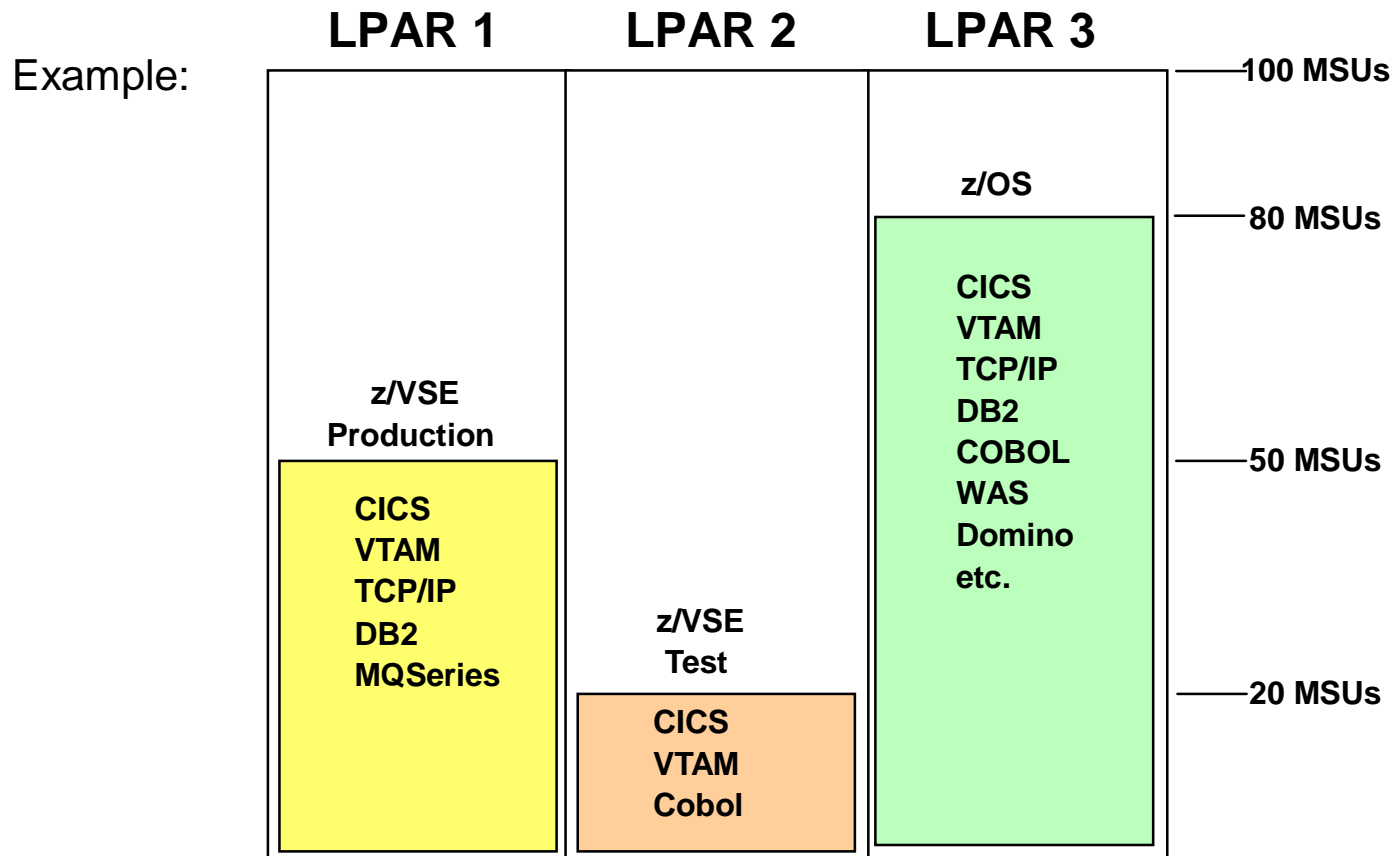
Example:

LPAR 1   **LPAR 2**   **LPAR 3**

— 100 MSUs

z/OS

— 80 MSUs

CICS
VTAM
TCP/IP
DB2
COBOL
WAS
Domino
etc.

z/VSE
Production

— 50 MSUs

CICS
VTAM
TCP/IP
DB2
MQSeries

z/VSE
Test

— 20 MSUs

CICS
VTAM
Cobol

Agenda

§ **IBM Systems Agenda**

– IBM System z9

– Holistic Approach

§ **Linux on System z9 and zSeries**

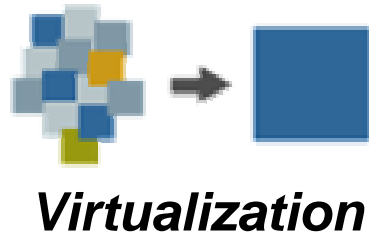– IBM Virtualization Engine

– IBM Director

§ **z/VM**

– z/VM V5.2

§ **z/VSE**

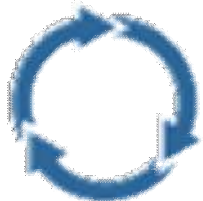– z/VSE V3.1

– Usage Scenarios with VM/Linux

§ **Summary**

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IBM Systems Agenda for On Demand Business

Virtualization

Virtualize everything using the Virtualization Engine which is a comprehensive virtualization portfolio enabling customers to virtualize resources

Openness

Commit to openness to redefine how to acquire systems, avoid being "locked in" and achieve needed integration

Collaborative Innovation

Collaborate to innovate with the capability to share information, processes and functions across the enterprise and beyond, as well as participation in industry innovation networks

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Summary: Typical Architecture for On Demand Business