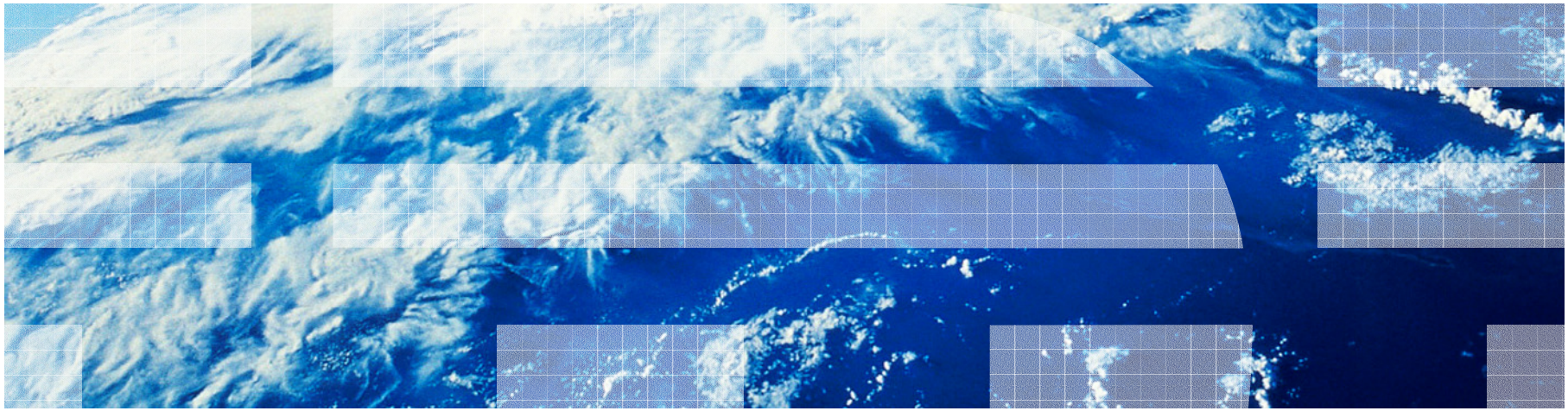
Wilhelm Mild – IT Architect

17 May 2010

z/VSE applications and DB2 on Linux on System z



Agenda

Data-consolidation – more important than ever

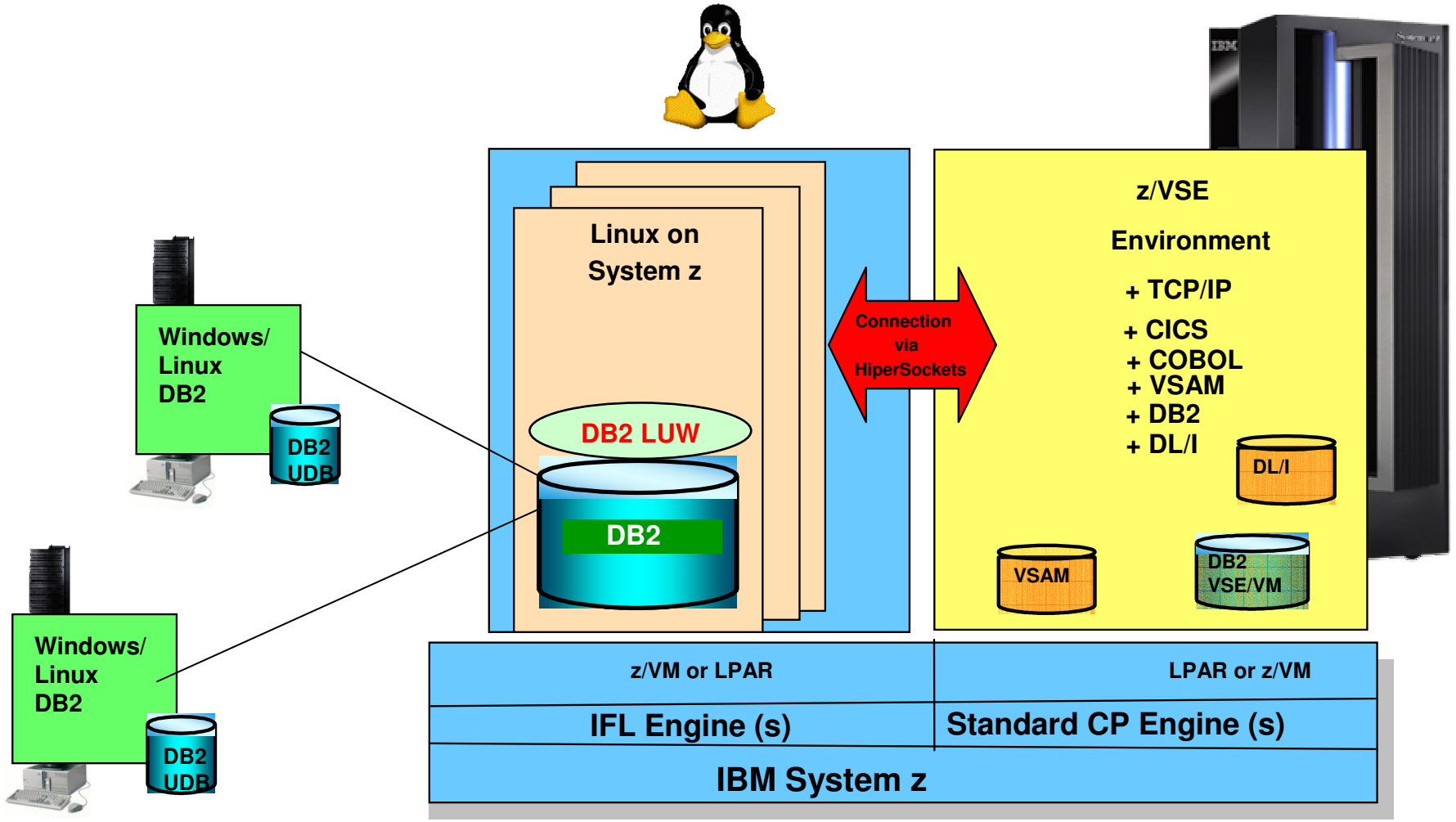
Decisions for a future oriented Data store

Experiences from last projects / Redbook

A good solution is not standard in detail

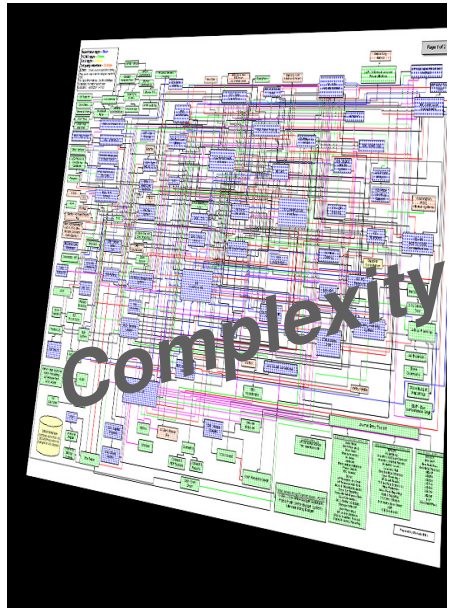
The big Data store

Data Integration – the Base for the future and BI



The road to information availability is filled with challenges

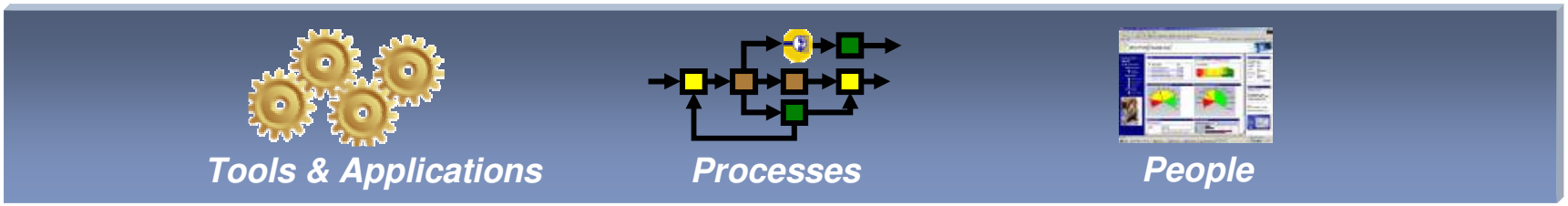
- What are the top business challenges?
  - Streamline and improve efficiency of business processes
  - Better understand and meet customer expectations
  - Increase employee productivity



- Key challenges to making information available:
  - **Volume**: Data & content are doubling each year
  - **Variety**: It's not just the transaction data, it's e-mails, document libraries, etc.
  - **Velocity**: The pace of business and business users who need information *now*, in real time
  - **Complexity**: The average $1B company has 40 financial systems; 78% of all companies have 2 or more repositories, 25% have more than 15 repositories.

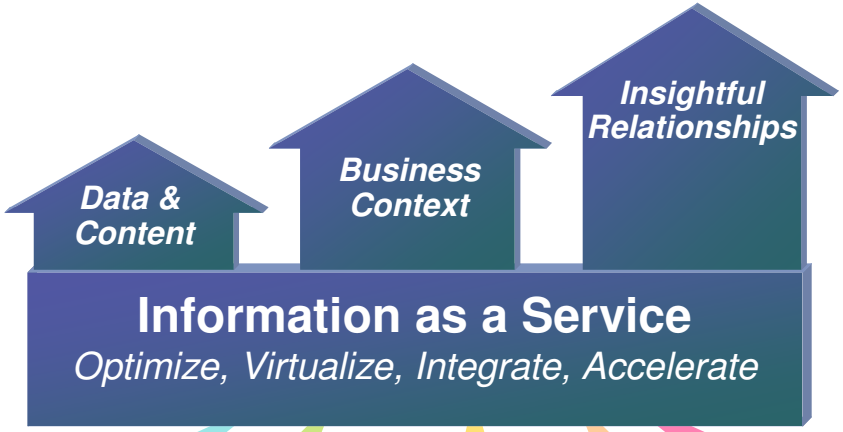
Information as a Service

From a project based approach to a Service Oriented Architecture based on business needs



Standards-based

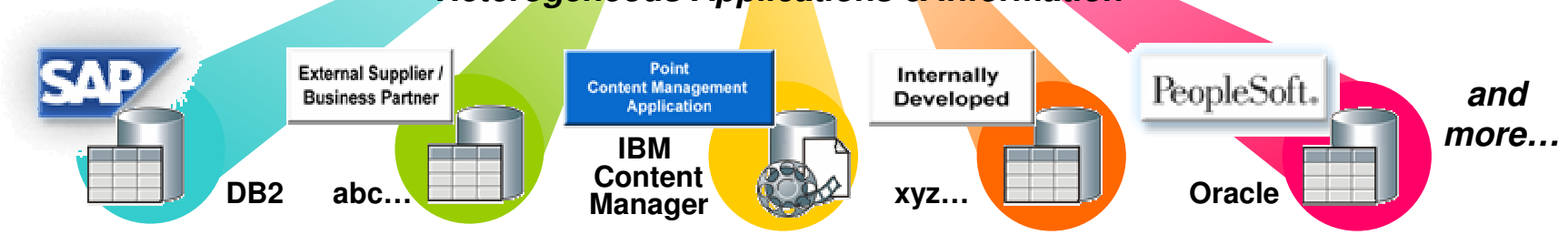
- *SQL*
- *XQuery*
- *JCR*
- *JDBC*
- *Web Services...*



***Extracted or Real-time* Insight**

- *Master Data*
- *Entity Analytics*
- *Information Warehouses*
- *Industry Data Models*

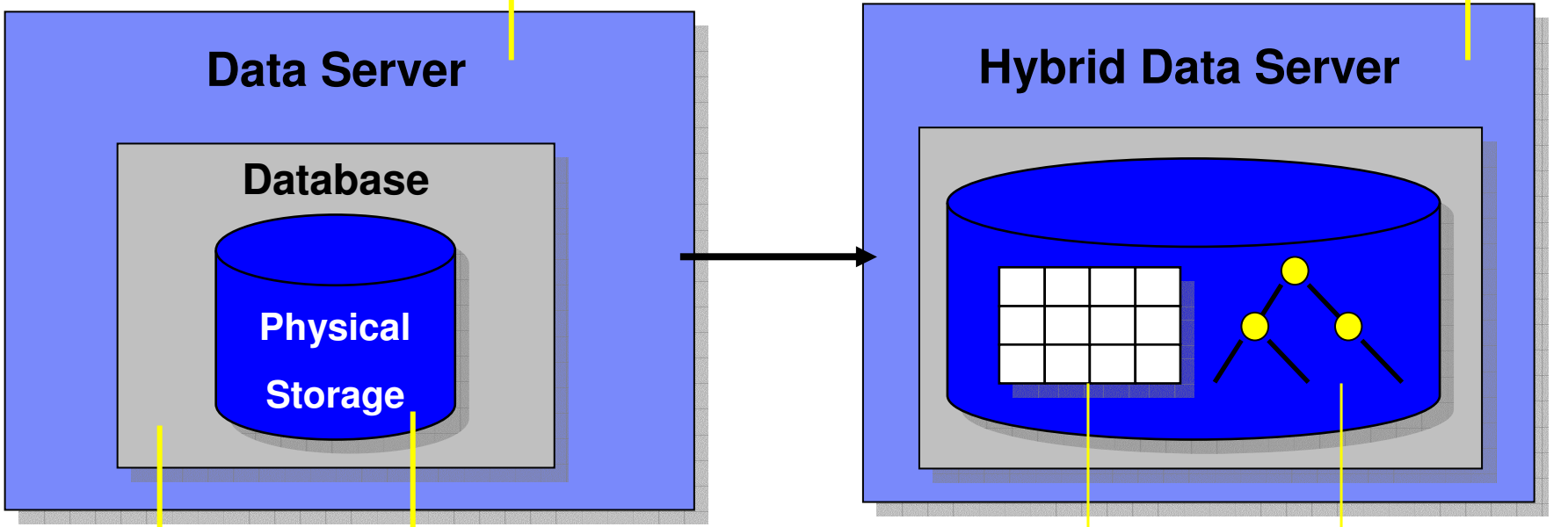
Heterogeneous Applications & Information



A New Generation Data Server for A New Generation of Applications

Data Server
Services that manage, secure and provide access to the database.

Hybrid Data Server
DB2 supports both relational and pureXML® storage and provides all the necessary services to support both data structures.



Database
Logical View of storage
- *Tables*
- *Views*

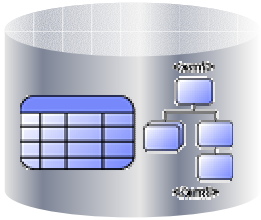
Physical storage
Database Files

Relational Storage
Data stored in a row and column format

pureXML® Storage
Data stored in a pre-parsed hierarchical format, not as a single text object (CLOB)

DB2 9 XML integration is seamless

Offers the Best to Both SQL and XML Worlds



SQL Person "I see a world class RDBMS that also supports XML"

DB2 with XML Support

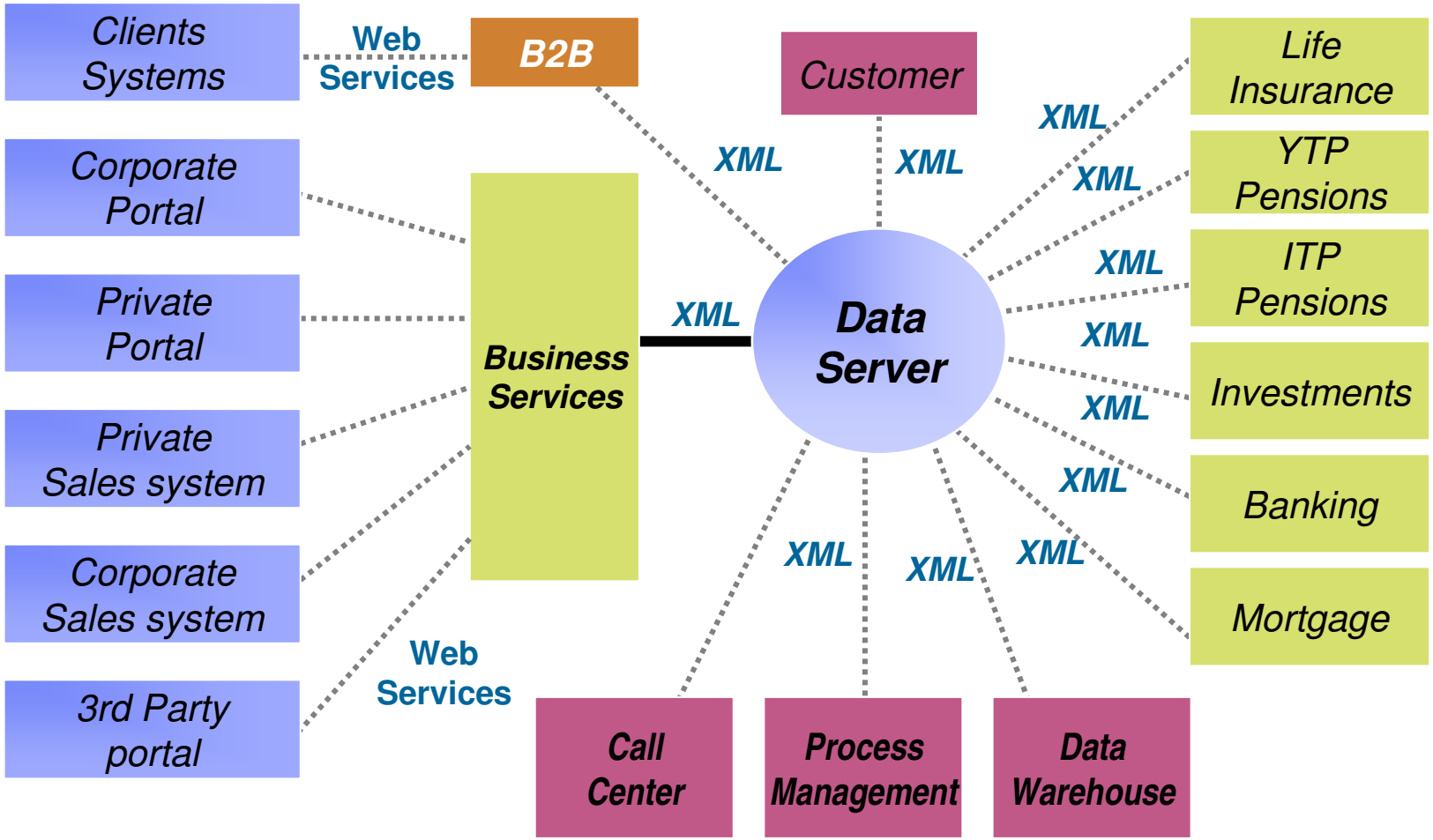
XML Person… "I see a world class XML repository that also supports SQL"

New XML applications benefit from:

- Ability to seamlessly leverage relational investment
- Proven Infrastructure that provides enterprise-class capabilities

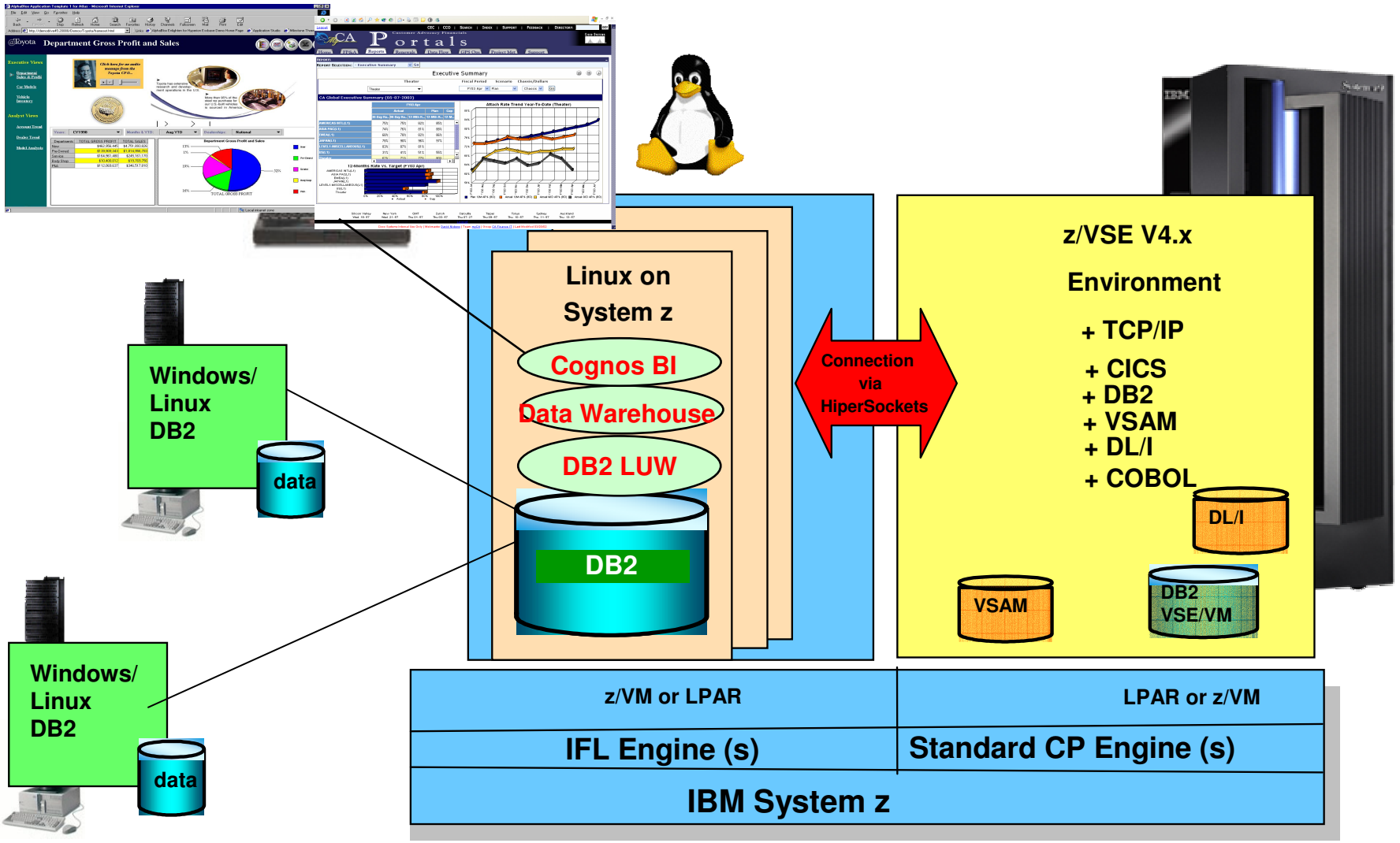
Powering a Flexible Approach

XML and SOA are the Keys



Top Scenario: Linux on System z as data hub

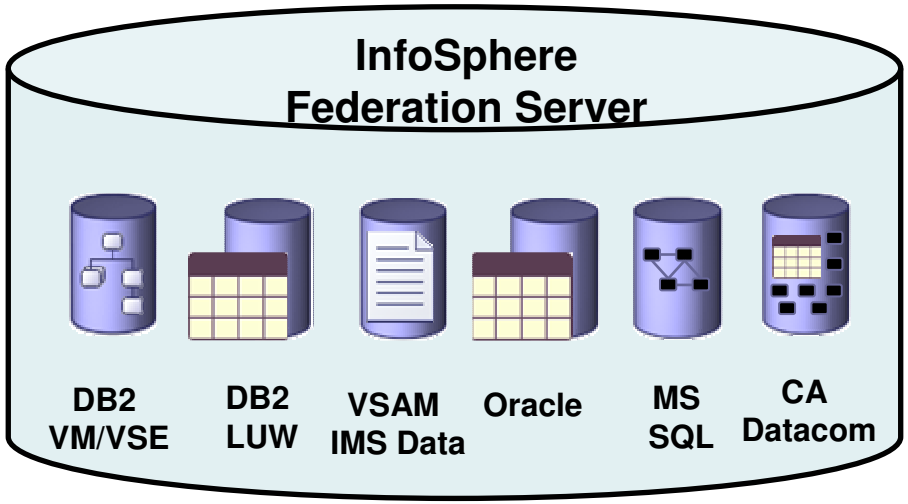
Consolidate, Integrate, Evaluate, Decide, Base for Business Intelligence (BI)



IBM InfoSphere Federation Server

- Integrating at the data layer – Federation of data
  - Read from and write to federated mainframe data sources using SQL
  - Standards-based access via JDBC, ODBC, or Call Level Interface
    - Including for VSAM
  - Multithreaded with native drivers for scalable performance
  - Metadata-driven means...
    - No mainframe programming required
    - Fast installation & configuration
    - Ease of maintenance
  - Works with existing and new...
    - Mainframe infrastructure
    - Application infrastructure
    - Toolsets

SQL



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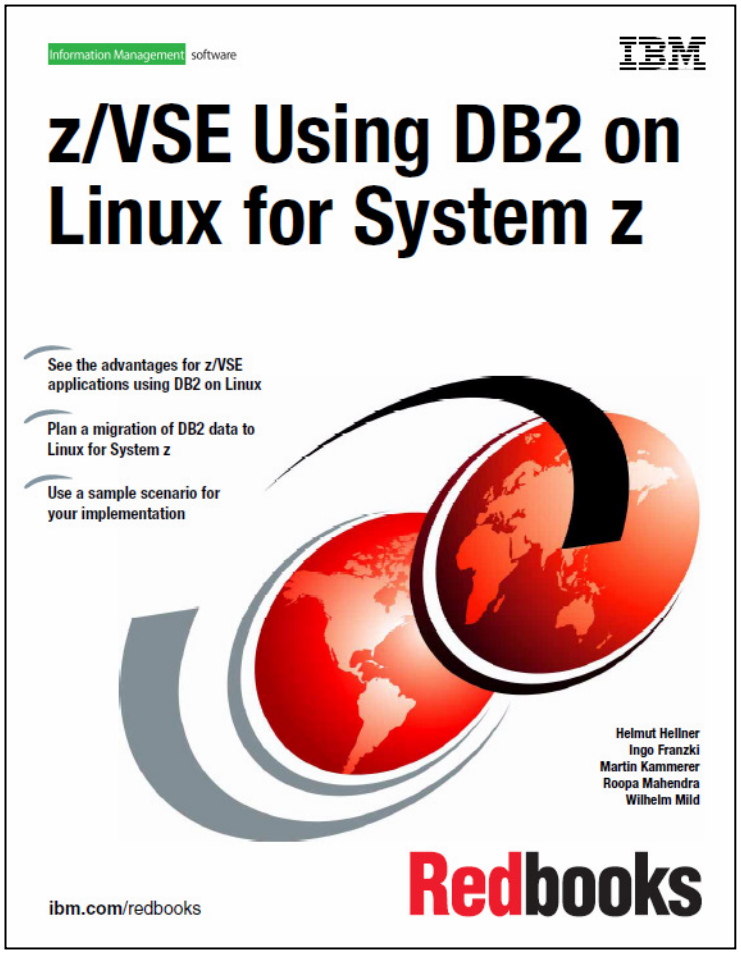
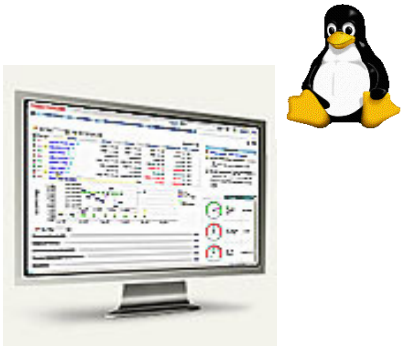
A good solution is not standard in detail

From Planning to the Implementation and tuning





SG24-7690

DB2 Redbook

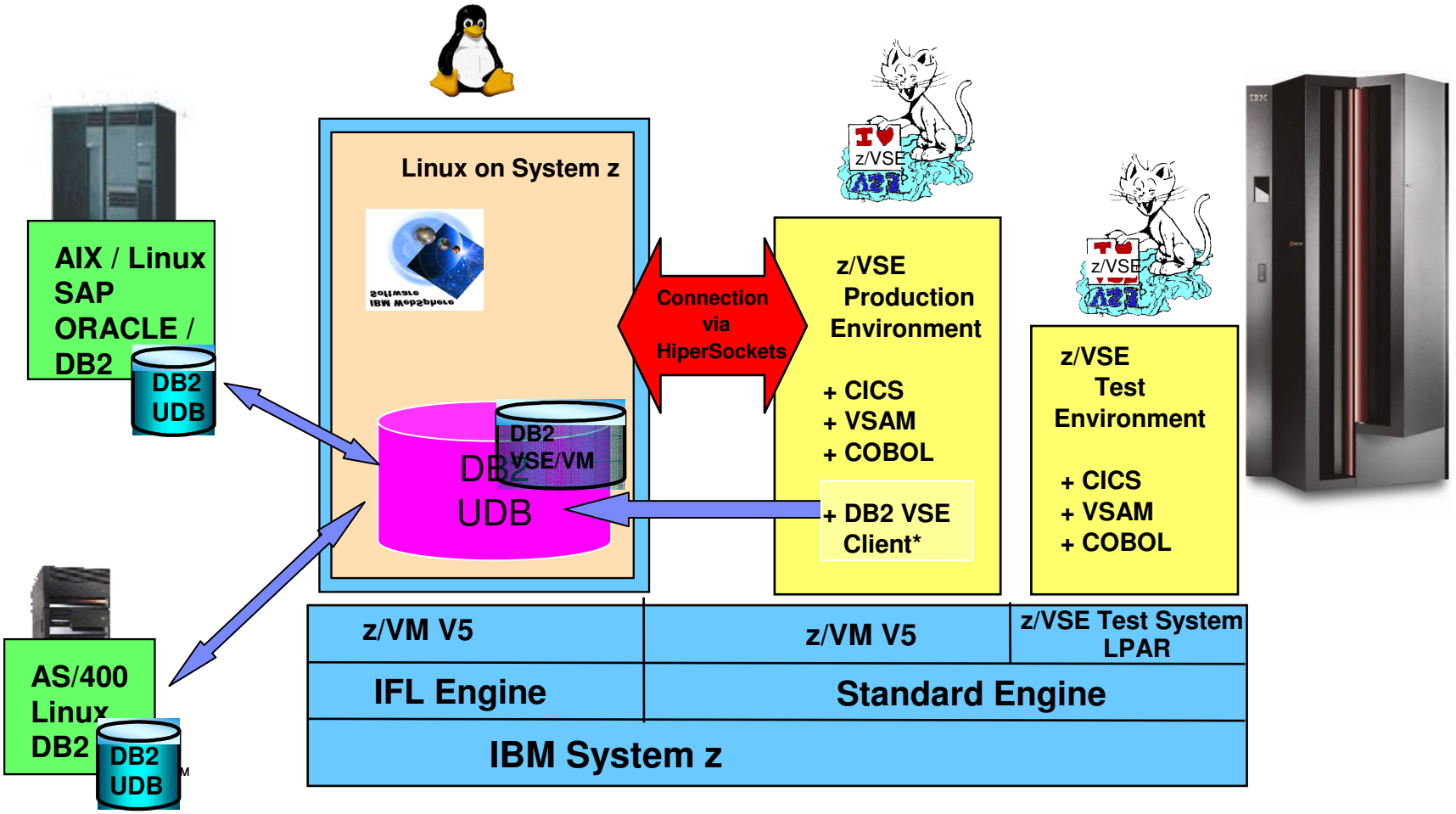
- Overview-
  - Strategical Decision
  - Advantages (Business Requiremnts)
  - Possible architectures
  - Technical overview(DB2 VM&VSE)
- Planning
  - Capacity Planning
  - Storage planning
  - Network
  - Database- DB2 Linux (LVM)- DB2 VM/VSE
  - The Transition phase
- Setup and Customization
  - DB2 Linux on System z
  - DB2 VSE (AR, AS)
  - DRDA Communication

- DBMS Migration
  - Data Migration
  - Packages Migration
  - Application considerations
  - Transition / Coexistence environment
- Monitoring and tuning
  - DB Monitoring
  - AR VSE
  - Appl. Monitoring (DB)
  - Connections / Interfaces
  - Network monitoring
  - System monitoring/tuning
  - Tuning considerations

DB2 Redbook

- **Overview**
  - Strategical Decisions
    - The decision for a modern Data Management System can enhance your business value substantially
  - Advantages (Business Requirements)
    - Business processes can be simplified a lot
  - Possible architectures
    - Data stores can be homogenous or heterogeneous,
  - Technical prerequisites
    - DB2 Server for VM&VSE (Server & Client)
    - DB2 Server for VM and VSE Client Editions

DB2 Szenarios – with DB2 LUW on Linux on System z

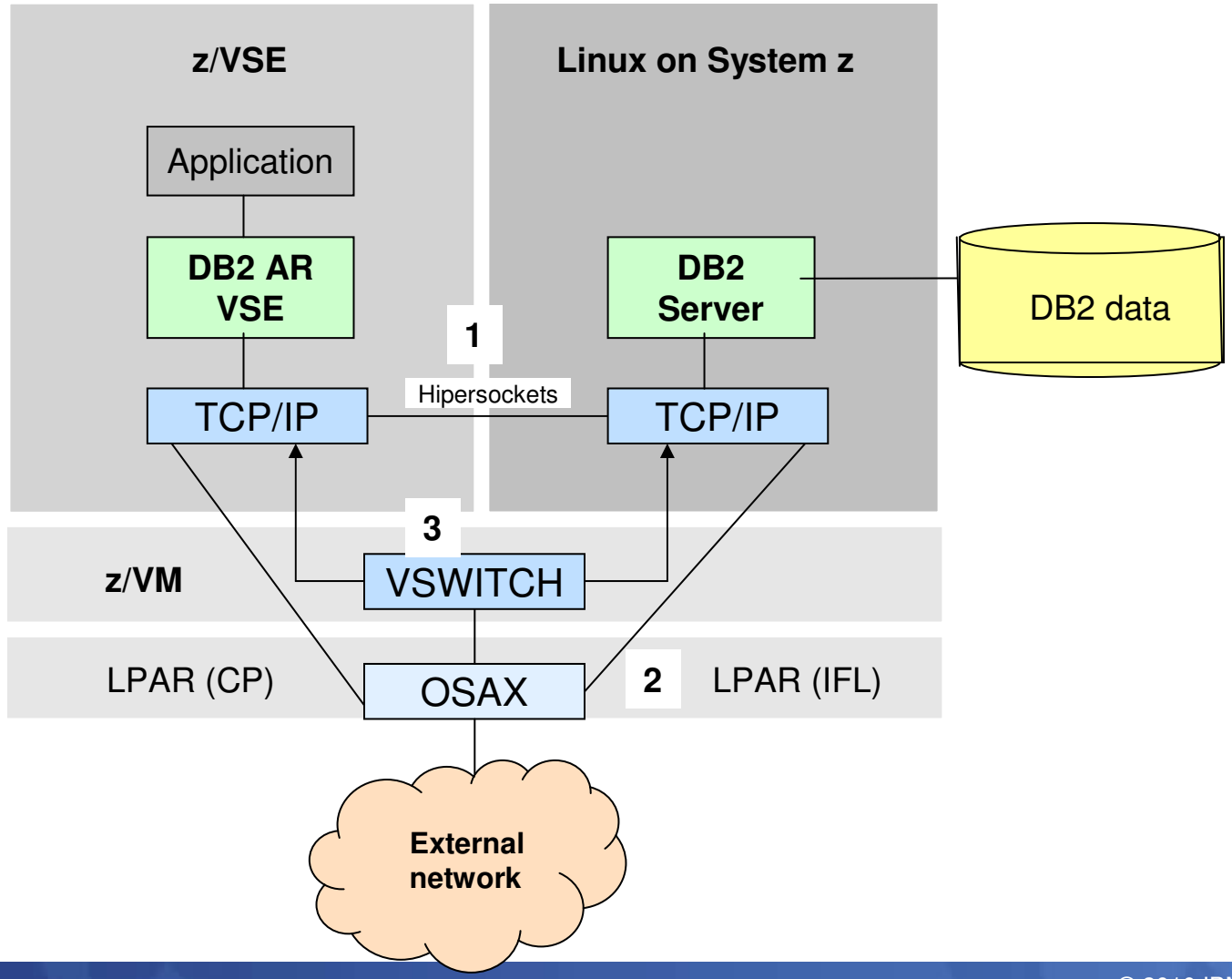


(*) DB2 VSE Client – the client functionality only, can be obtained with DB2 Server for VSE & VM 7.5 **Client Edition**

DB2 Redbook

- **Planning**
  - Capacity Planning
    - CPU load depends on many factors (parallel workload, IP traffic, application design)
    - z/VM virtualization increases flexibility and connectivity
  - Storage planning
    - The most advanced possibilities of the System z Architecture
      - use LVM (in Linux) or striped storage function (in DS8000)
      - use ECKD for system and FCP/ SCSI disks for large databases
    - High Availability
      - Mirroring / Redundant Connections
  - Database Planning on Linux
    - use LVM, Container Striping, PAV
  - Network
    - Hipersockets the fast communications
    - Shared OSA and VSWITCH the alternative Communication
  - Transition Phase
    - ‚Step by Step' always better instead of ‚Big Bang'!

Network alternatives

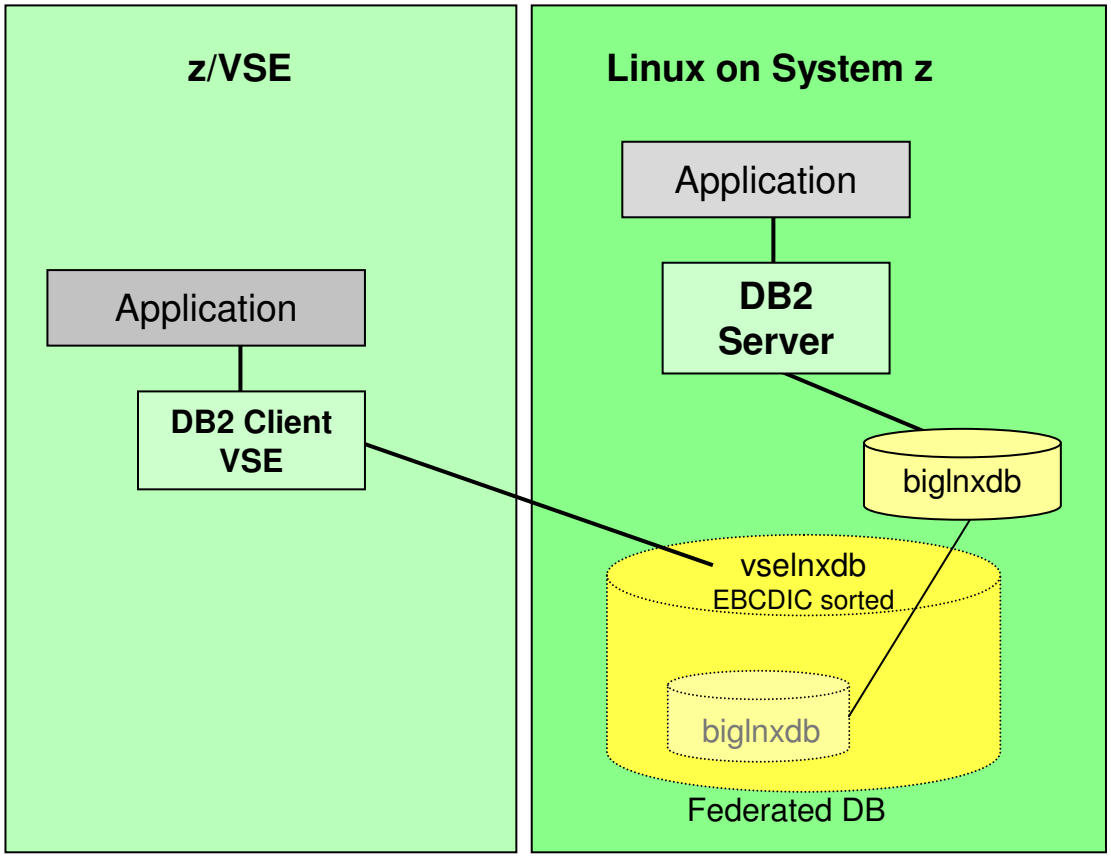


DB2 Redbook

- **Setup and Customization**
  - DB2 Linux on System z
    - Database-Definitions need to be adopted for the workload
      - Codepage (SBCS / Unicode)
      - EBCDIC versus ASCII Sort order ‘Collating Sequence’
      - Federation to implement complex requirements
  - DB2 VSE (Application Requestor)
    - Client Edition (AR only!) or Server & Client for VM/VSE ?
  - DRDA Communication
    - DRDA Performance is dependant on the application
    - Connection Pooling / Buffered Insert helps
    - TCP/IP Setup tuning for the workload (MTU, Window size)

Federated access for EBCDIC considerations

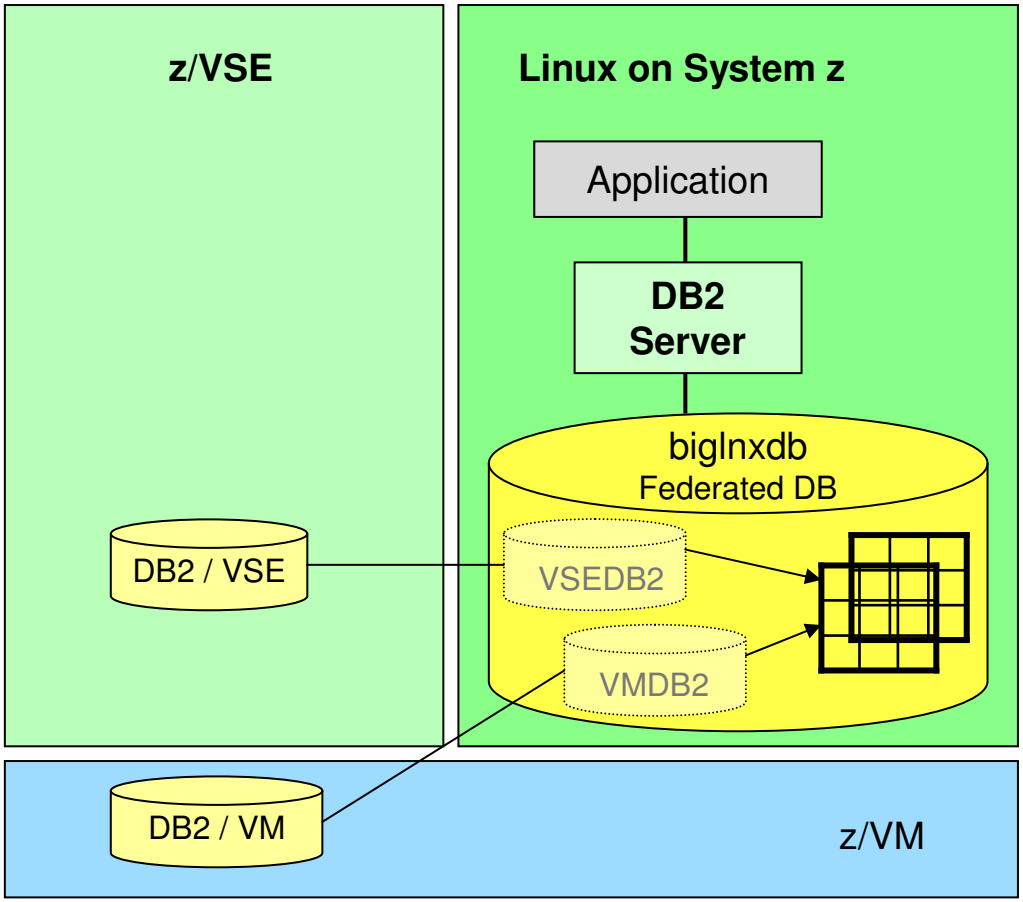
1) Linux applications can access the database as ASCII database
2) z/VSE applications access the database via vselnxdb as EBCDIC collated database



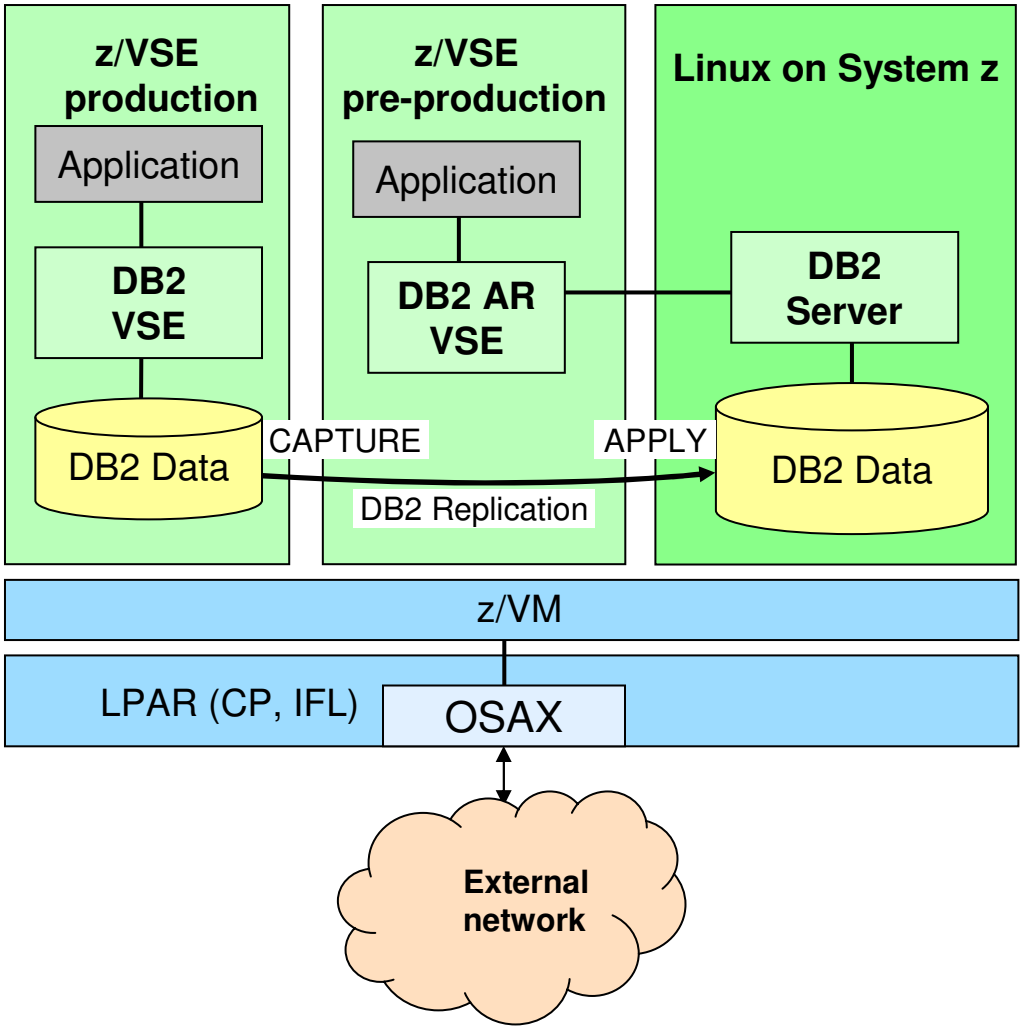
DB2 Redbook

- **DBMS Migration**
  - Data Migration
    - Data Migration: small effort / repeatable solution recommended
    - Federation is very effective
  - Package Migration
    - Bind Files build! (CICS or ‚Batch Binder‘)
    - Export of DB2/VM&VSE Packages and Import in DB2 Linux possible (not recommended)
  - Application Considerations
    - Applications may need adaptions (ASCII-EBCDID, HEX-Sort)
    - Dynamic SQL uses functionality of the server
  - Transition / Coexistence Environment
    - with Replication or ‚Federation‘, a coexistence is possible

Data migration to DB2 Linux with DB2 federation feature



DB2 Coexistence pre-production scenario



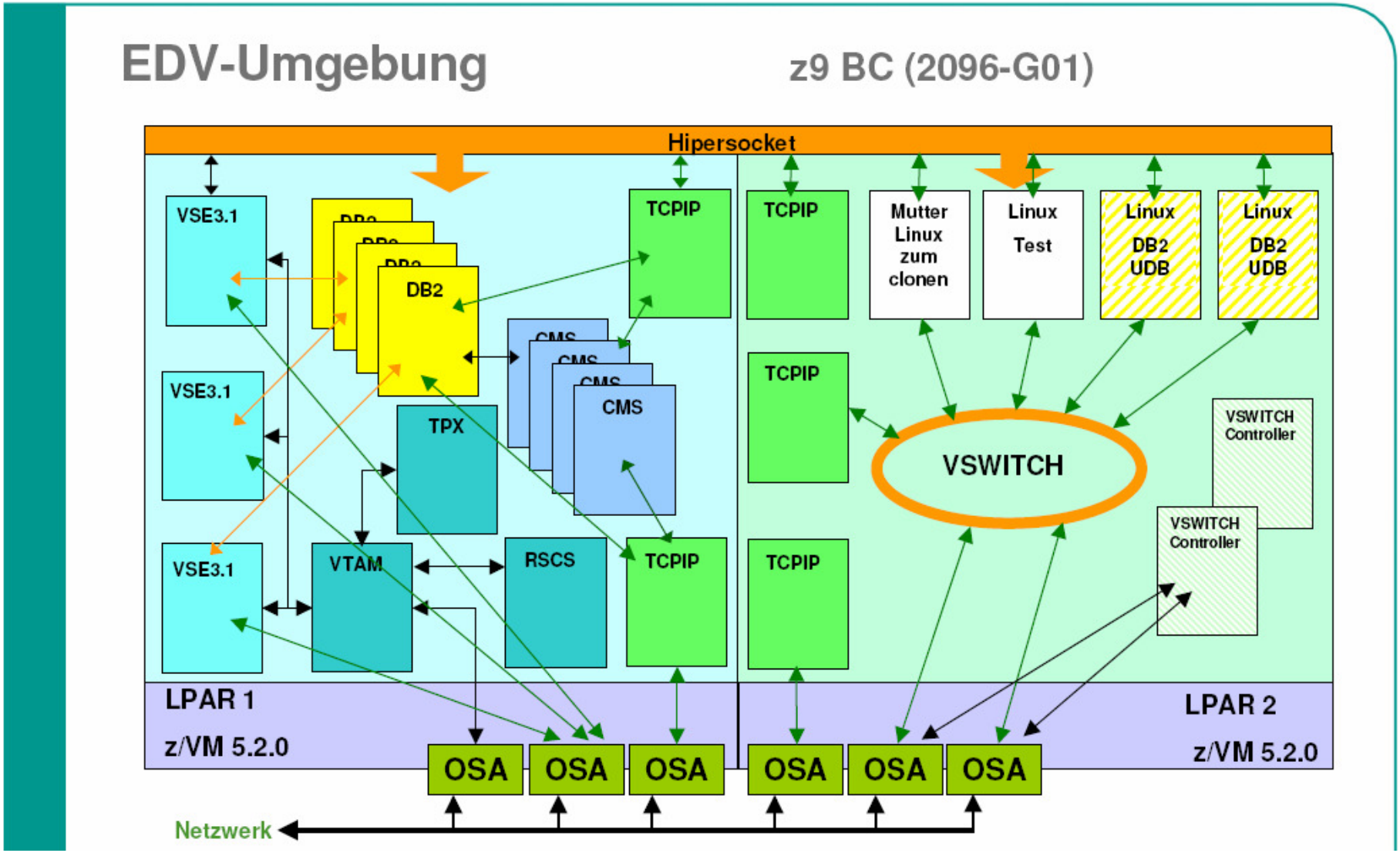
DB2 Redbook

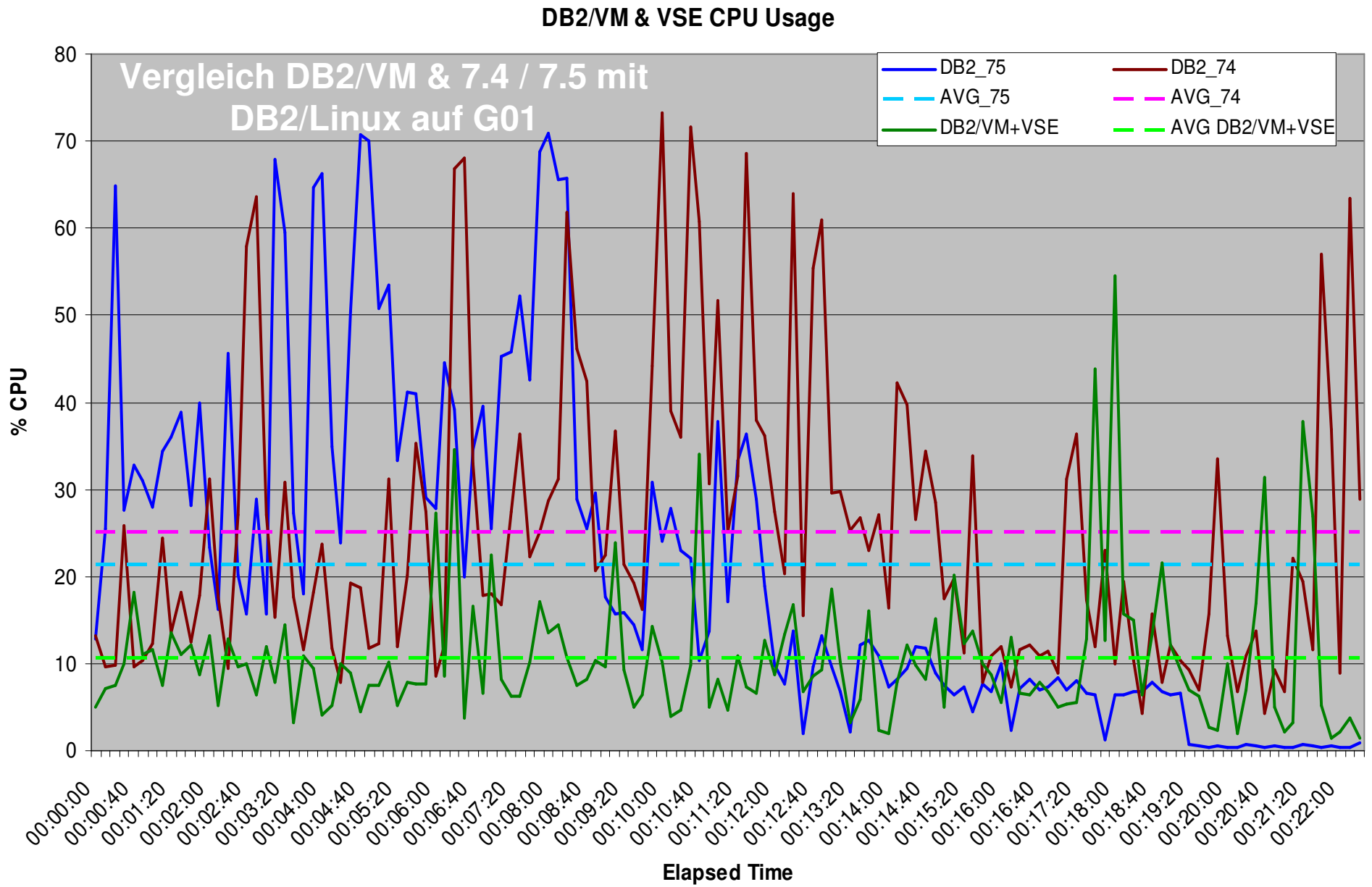
- **Monitoring and Tuning**
  - Monitoring is prerequisite for Tuning
  - DB Monitoring
    - Status-quo of the DB2/VM or DB2/VSE Servers !!!
    - Monitor–Tools necessary
    - DB2/Linux – Snapshots, DB2 Expert, Omegamon XE
  - Application Monitoring (DB)
    - CICS Monitor is recommendable
  - Network Monitoring
    - Network monitors help a lot
    - Troubleshooting – analyze DB2 behavior with Network tools

Customer success samples with DB2 on Linux on System z

- US:
  - Supreme Court of Virginia
- Germany:
  - Wessels & Müller
  - Public Sector
- Slovenia:
  - Impol / Alcad
- Belgium:
  - Securex
- Sweden:
  - Pulsen
- Italy:
  - Olio Carli.

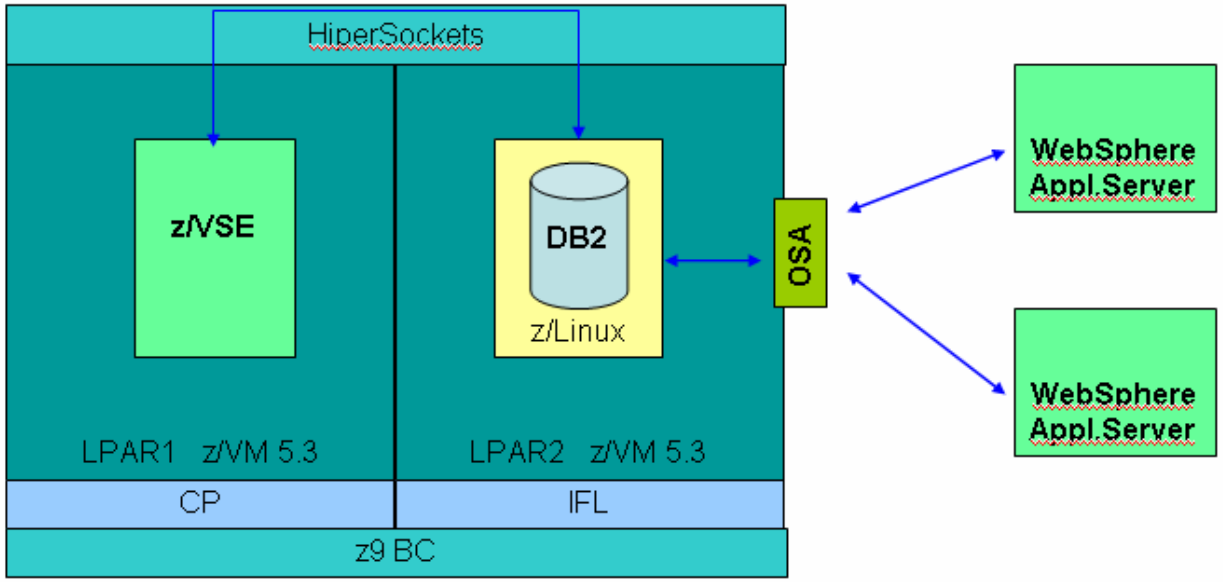
Customer implemetation(1): Public sector customer,Germany





Customer implemetation(2): Internat. Publication distributor, Germ.

Ausschnitt der IT – Landschaft nach Beendigung des Projekts



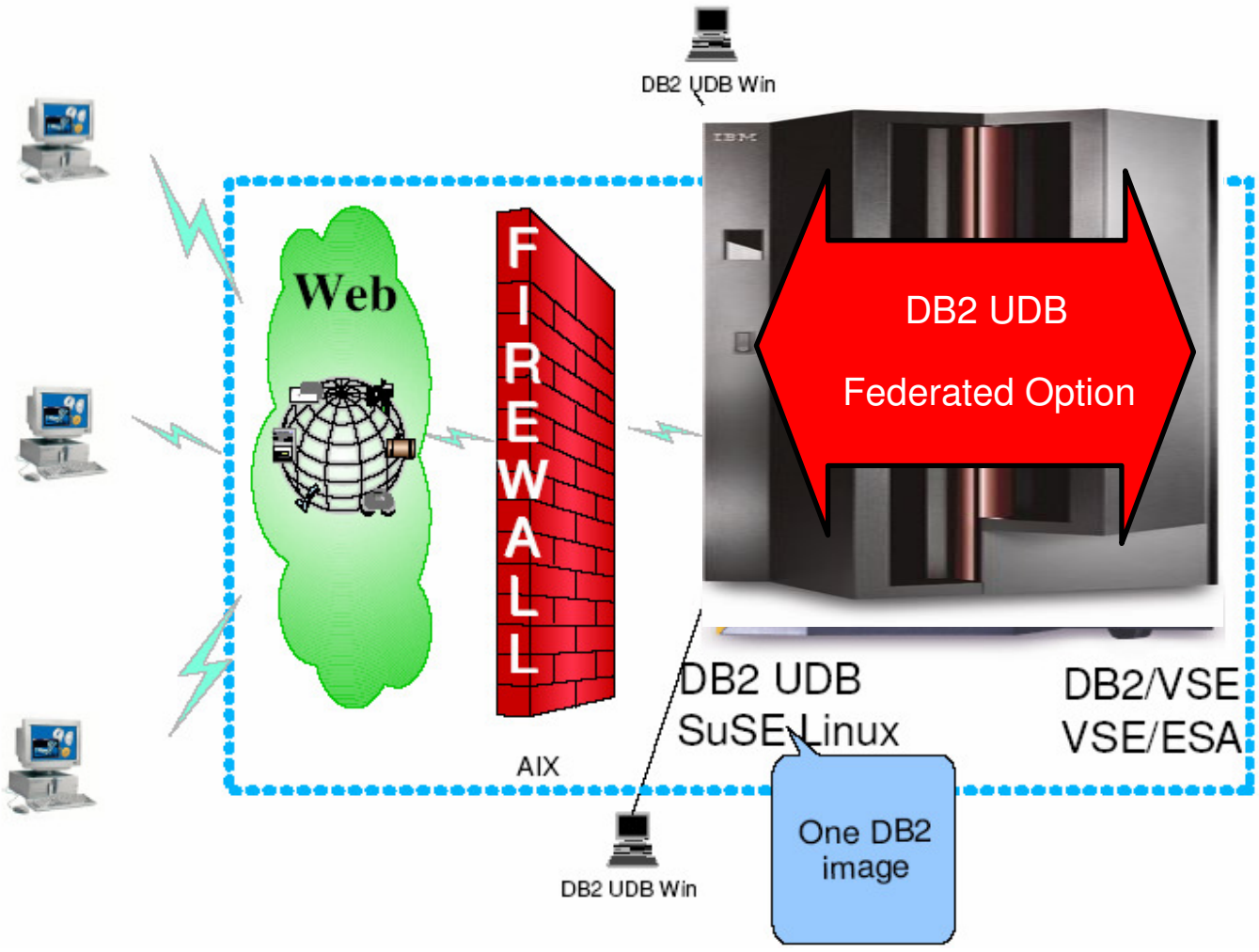
GSE Frühjahrstagung Bonn
z/VSE mit CICS und DB2 / z/VM mit Linux on System z
07.04. - 09.04.2008

VSE Customer References(1) Impol /ALCAD Slovenia

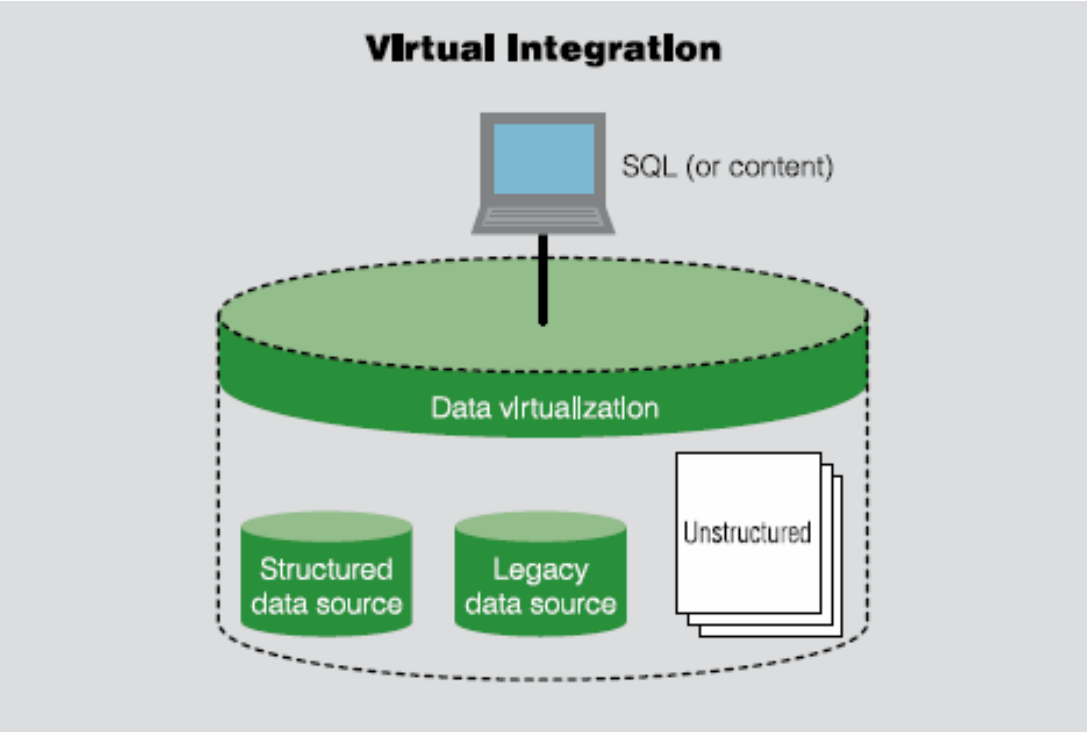
Design, Applications and Solutions

Alcad

Database design



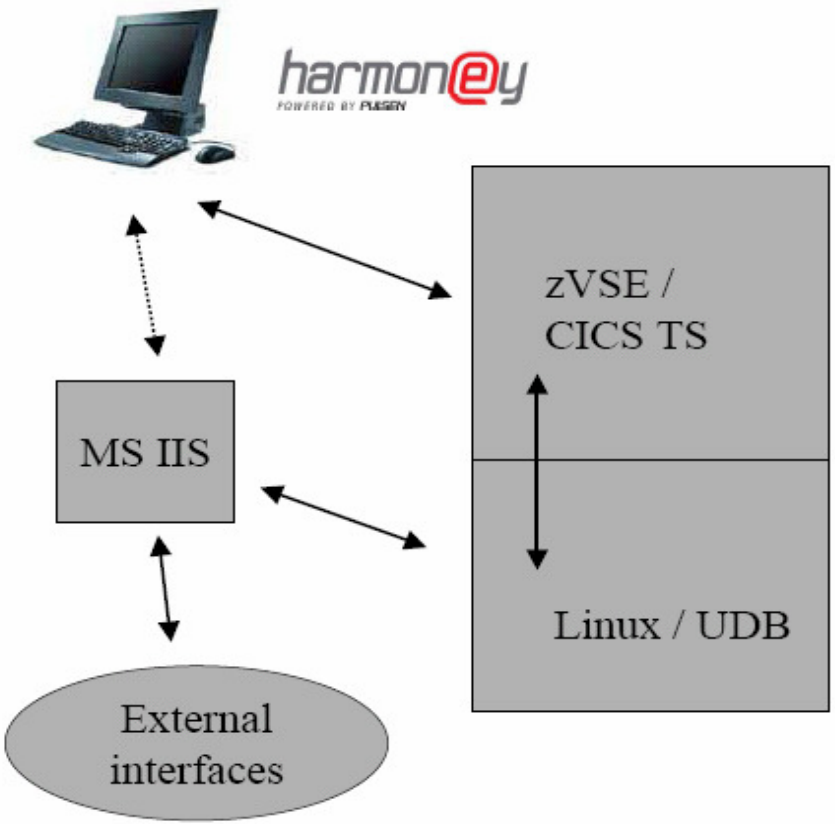
Federated Database design



Customer Refrence (2): Pulsen, Sweden

PULSEN

Technical Platform



User interface – Windows/.Net

Data transfers between client and host in XML

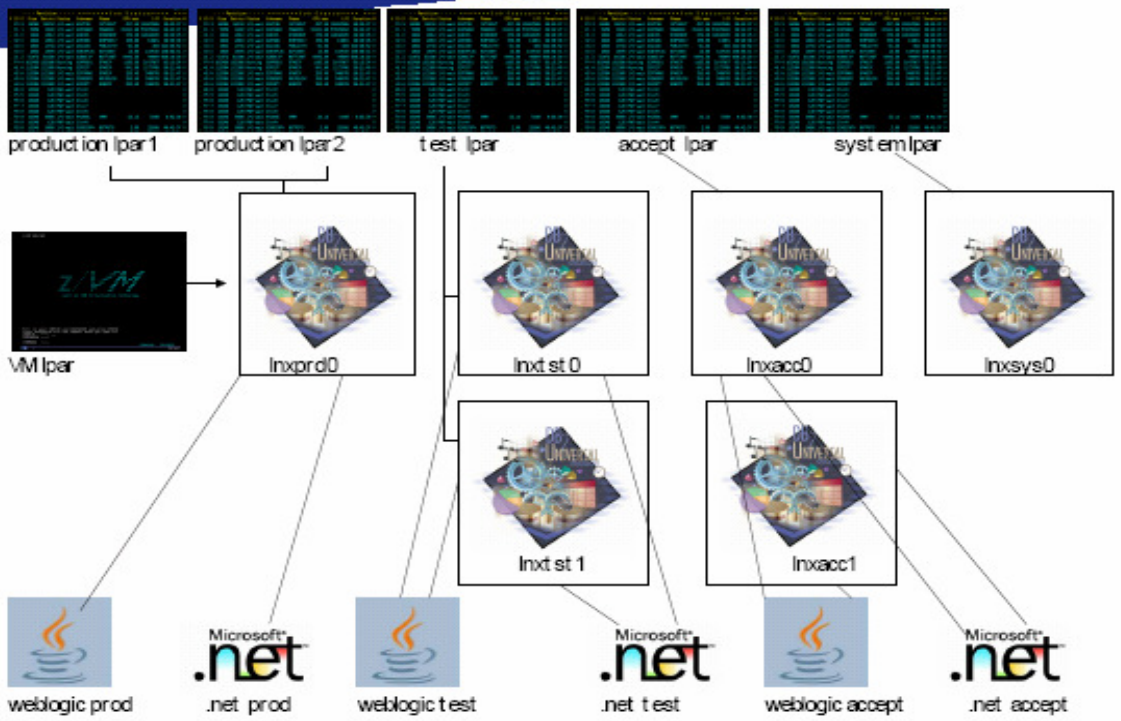
CICS Web Services

DBM - DB2 UDB under Linux

Business logic in z9BC, partly "traditional" PL/1 programs, partly Stored Procedures / UDFs in UDB

Customer Refrence (3): Securex, Belgium

DB2 linux



Other

QUEST SOFTWARE · sas · Health Center · webMethods · DbVisualizer

securex

Kennzahlen der Produktion

- 50 – 100 CICS-Transaktionen pro Sekunde
- Bis 2,5 Millionen pro Tag
- Antwortzeiten < 0,1 Sekunden
- Datenbank (DB2) LUWs 2,5 – 3 Millionen
- File I/O pro Tag bis 100 Millionen (VSAM)
- ca. 2200 Sessions am CICS
- ca. 2800 aktive Programme
  - ca. 300 Online – 90% mit DB-Zugriff
  - ca. 2500 Batch – ca.1000 mit DB-Zugriff

Performance-Erkenntnisse

Werte des PoCs für Onlinetest

	Guest Sharing			DB2 UDB Linux		
Online				DRDA 7.4		
Transaktion	Resp.-Zeiten		CPU-Verbr.	Resp.-Time		CPU-Verbr.
	Durchschnitt	Maximal	Durchschnitt	Durchschnitt	Maximal	Durchschnitt
KD02	0,038	0,387	0,001	0,024	0,058	0,001
ARIS	0,157	0,792	0,007	0,191	0,310	0,017
KD02	0,054	0,742	0,001	0,026	0,050	0,004
ARIS	0,174	0,392	0,007	0,237	0,390	0,025
KD02	0,059	0,742	0,001	0,024	0,058	0,004
	0,0964	0,6110	0,0034	0,1004	0,1732	0,0102
Abweichungen				4%	-72%	3,00

Performance-Erkenntnisse

Werte des PoCs für Batchtest

	Guest Sharing				DB2 UDB Linux		
Batch					DRDA 7.4		
Jobname	Laufzeit	CPU-VSE	CPU-DB2		Laufzeit	CPU-VSE	CPU-UDB
NL5460	01:28:39	25,4	12,5		01:26:10	42,5	8,6
STK02S	00:03:58	22,1	32,6		0:08:07	35,4	31,5
ST6180	00:06:47	9,2	16,5		0:05:32	61,9	9,1
ZL1702	00:03:25	6,15	29,4		0:03:16	28,4	29,8
ST6150 DBSU	00:02:38				0:00:14		
ST6150 Batch	00:41:40	23,6	35,3		0:31:52	65,4	27,9
Summe	2:27:07	17,29	25,26		2:15:11	46,7	21,38
Abweichung					-8%	2,70	-15%
% mehr CPU Trad.						4,2%	
% CPU IFL							21,38
Max CPU IFL							31,5

Performance-Erkenntnisse

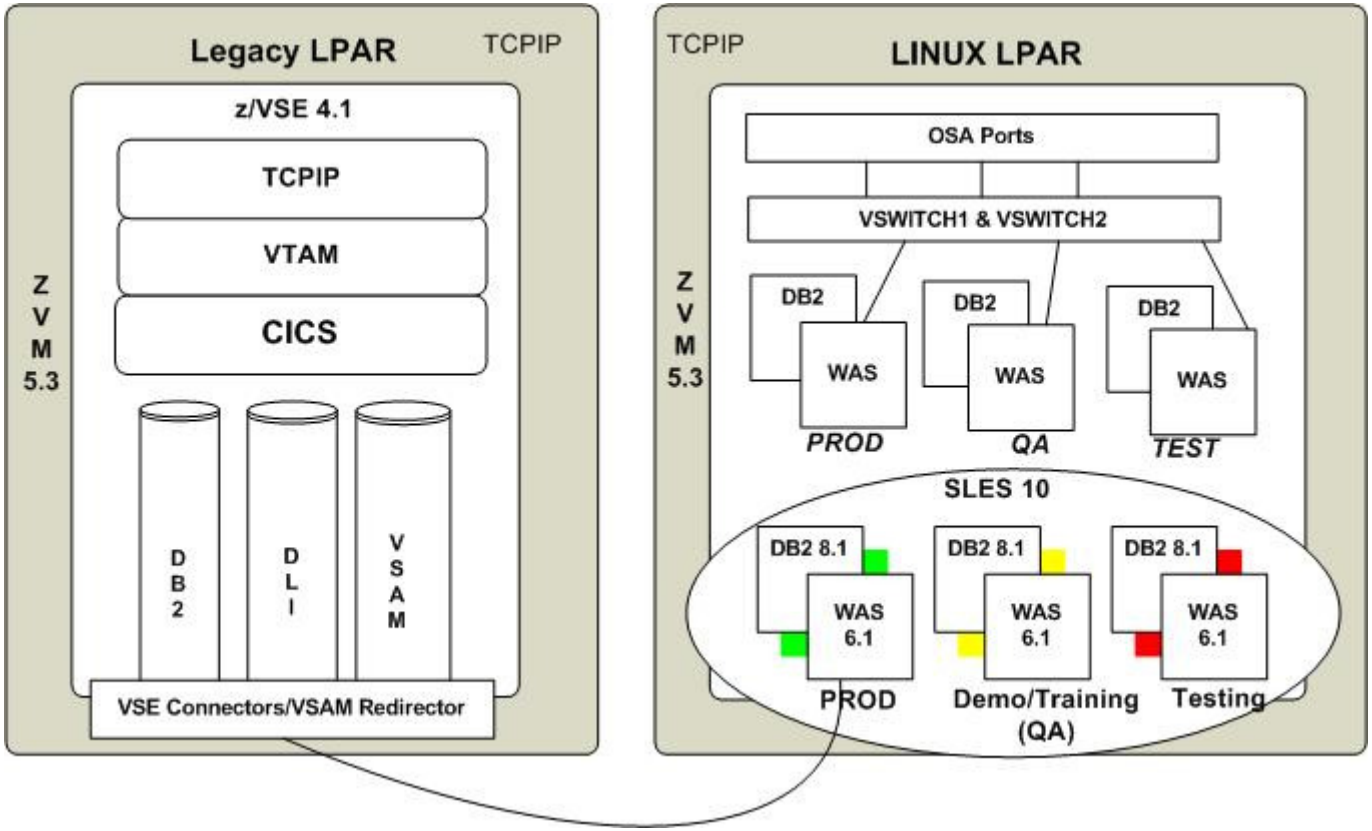
WESSELS + MÜLLER
FAHRZEUGTEILE UND MEHR

Werte des PoCs für Produktionsevaluierung – CPU

		VSE01	TCPIP	CICS01	Batch Part.	zLINUX	SQLMACH
	Guest Sharing	30%	0%	25% - 30%	0	1,60%	20% - 25%
10:00 Uhr	KD02 auf LINUX	30%	0%	25% - 30%	0	3% - 6%	20% - 25%
10:19 Uhr	ARIS auf LINUX	45%	5%-10%	35% - 40%	0	15% - 25%	10% - 15%
11:08 Uhr	Batch auf LINUX	70%	10% - 15%	35% - 40%	10% - 15%	38%	
11:12 Uhr	PRTY TCPIP vor CICS	83%	15% - 25%	35% - 40%	20% - 25%	49%	
	SOS						
11:15 Uhr	PRTY CICS vor TCPIP	60%	10% - 15%	35% - 40%	10% - 15%	38%	
11:17 Uhr	Batch Ende	50%	5%-10%	35% - 40%	0	15% - 25%	

Customer Refrence (5): Supreme Court, USA

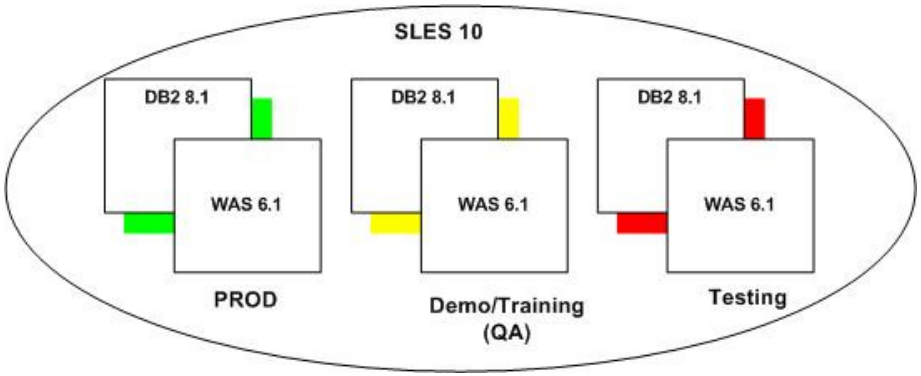
The Magistrate Environment Today



125 locations
2,800 processes per day
Direct interface with CMS application systems

The Lessons Learned (a work in progress)

- **Have a plan! Linux on System z gets along well with everyone so long as you involve them.... Network, remote apps.....**
- **Document and then document some more**
  - **WAS settings**
  - **Passwords (root, wasadmin, wasmon, db2inst1 etc etc)**
  - **FAQs – build and maintain to help the next in line**
- **Managing and controlling changes for application deployments and system fix packs?**
  - **Test / QA / Production – keeping things in sync**

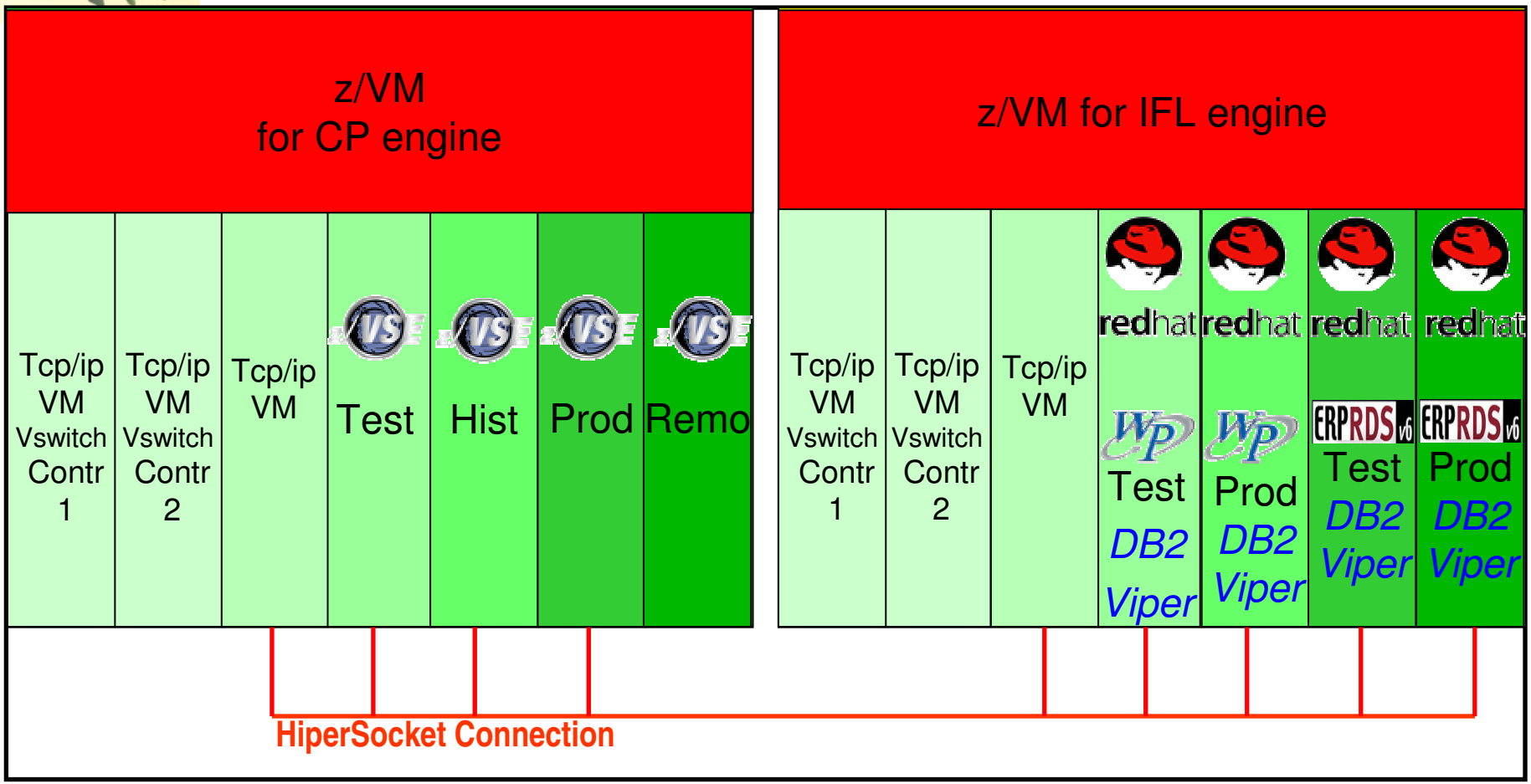


The Lessons Learned (con't)

- Have a good monitor and know what it's telling you
  - Helps with sizing and tuning
  - Quickly pinpoints out potential or growing problems areas
  - Virtual Disk works great for swap volumes
  - Shows management they are getting their money's worth

Customer Refrence (6): Olio Carli, Italy

Internal Connections



Olio Carli

More information

- DB2/Linux on System z

  http://www.ibm.com/developerworks/linux/linux390/perf/tuning_rec_database.html

  http://www.ibm.com/developerworks/data/library/techarticle/dm-0509wright/

- DB2 Server for VM and VSE

  http://www-01.ibm.com/software/data/db2/vse-vm/

- Documentation

  http://www-01.ibm.com/software/data/db2/vse-vm/directory.html#VSE7.5

  http://www-01.ibm.com/support/docview.wss?rs=71&uid=swg27009727