

2009 System z Expo

*October 5 – 9, 2009 – Orlando, FL*



**Session Title: Connectivity between DB2  
VM/VSE clients and DB2 LUW  
(Linux/UNIX/Windows) servers**

**Session ID: ZEO07**

**Speaker Name: Wilhelm Mild**

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## Agenda

Data-consolidation – more important than ever

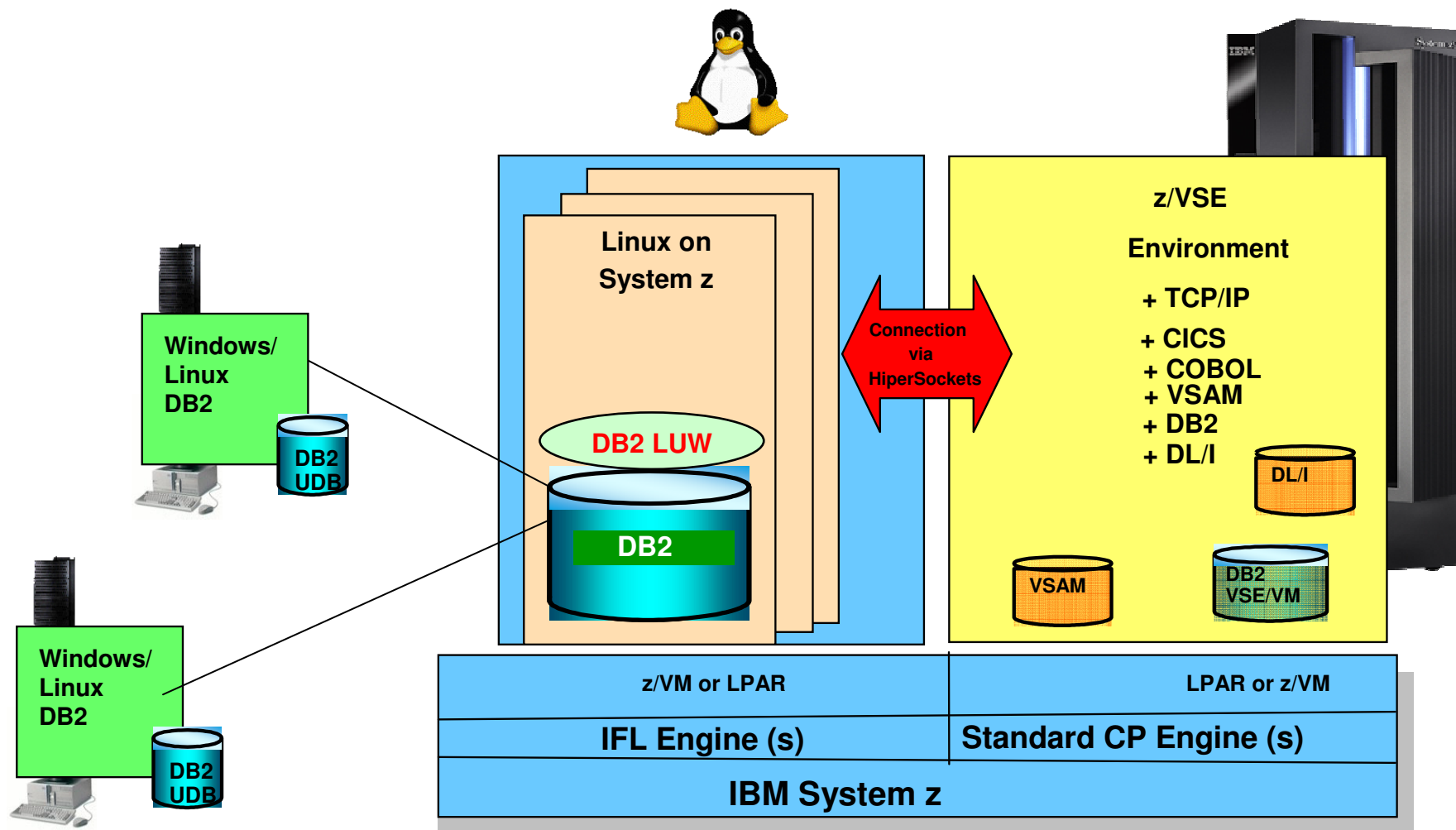
Decisions for a future oriented Data store

Experiences from last projects / Redbook

A good solution is not standard in detail

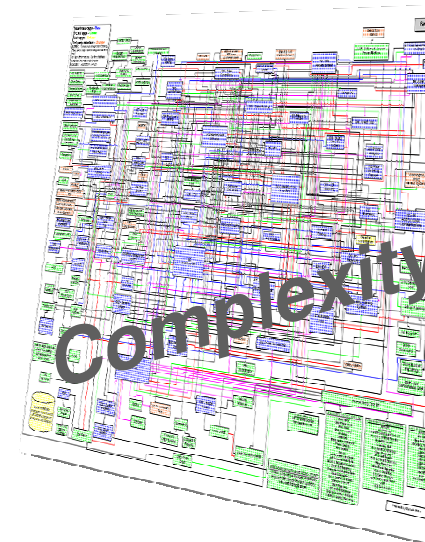
# The big Data store

## Data Integration – the Base for the future and BI



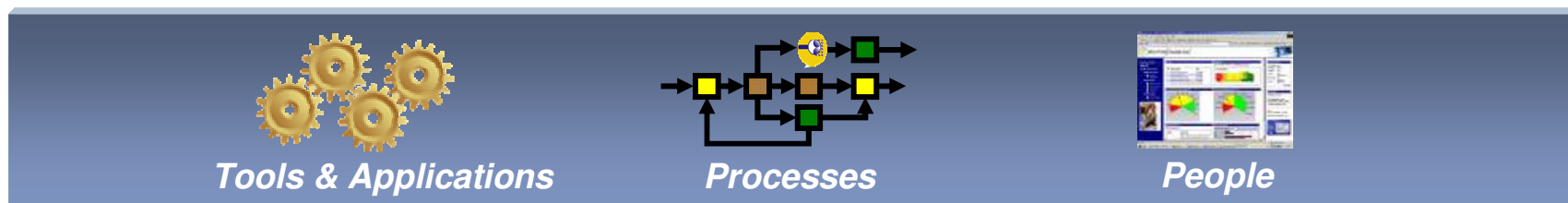
## The road to information availability is filled with challenges

- 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.



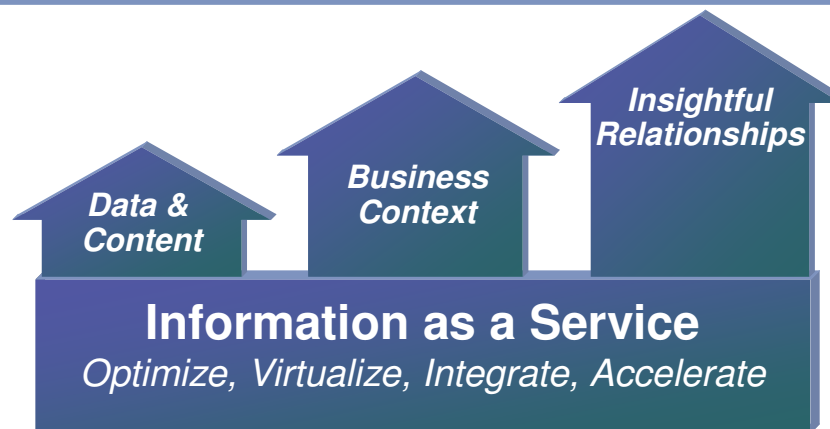
# Information as a Service

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



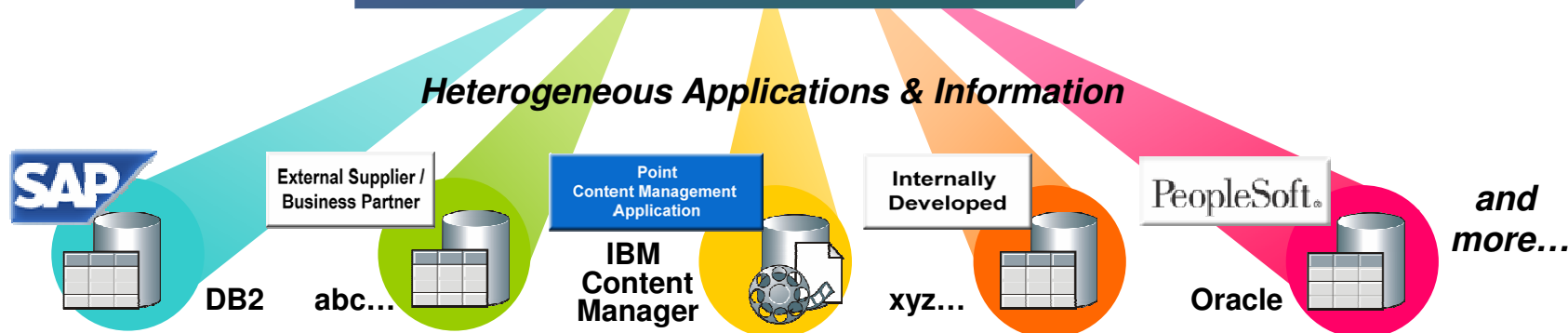
## Standards-based

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



## Extracted or Real-time Insight

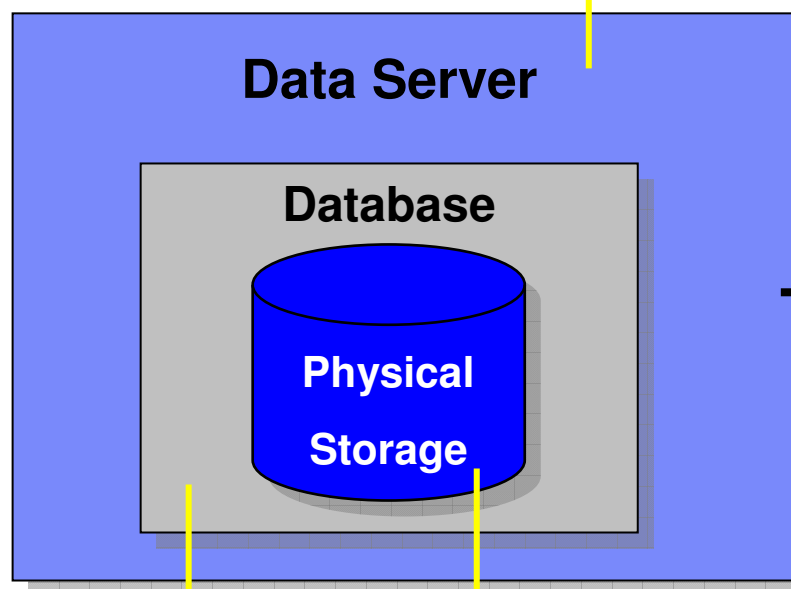
- Master Data
- Entity Analytics
- Information Warehouses
- Industry Data Models



# A New Generation Data Server for A New Generation of Applications

## Data Server

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



### Database

Logical View of storage

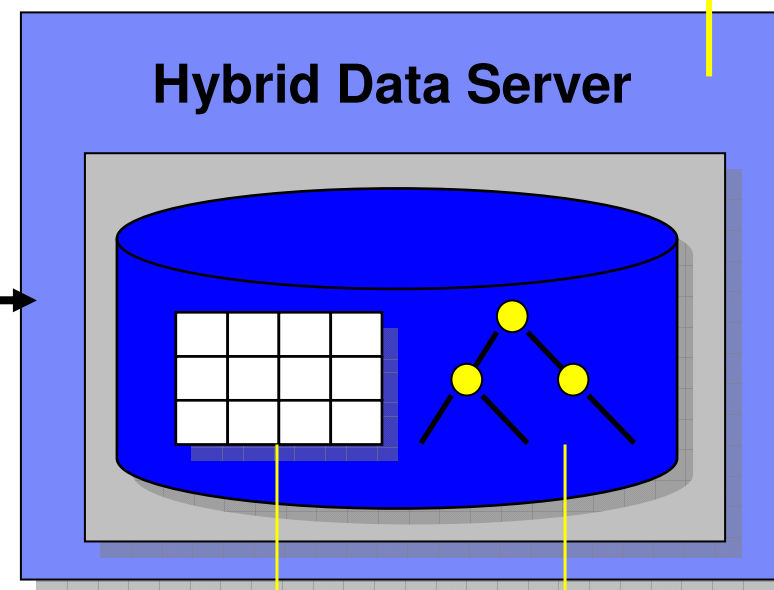
- *Tables*
- *Views*

### Physical storage

Database Files

## Hybrid Data Server

DB2 supports both relational and pureXML<sup>®</sup> storage and provides all the necessary services to support both data structures.



### Relational Storage

Data stored in a row and column format

### pureXML<sup>®</sup> Storage

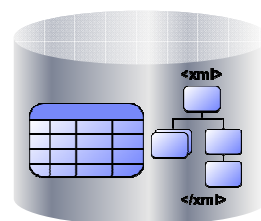
Data stored in a pre-parsed hierarchical format, not as a single text object (CLOB)

## 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"

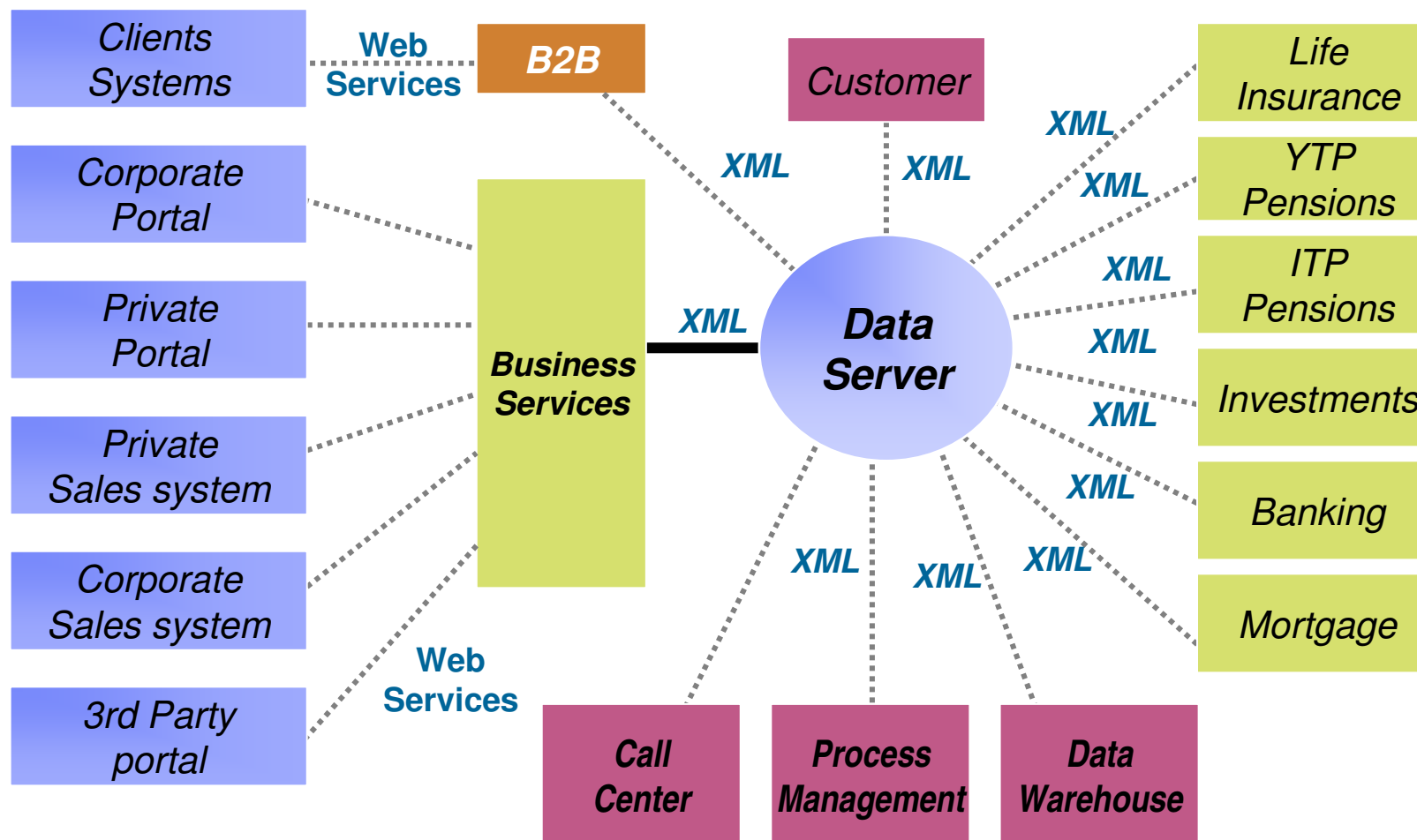
New XML applications benefit from:

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



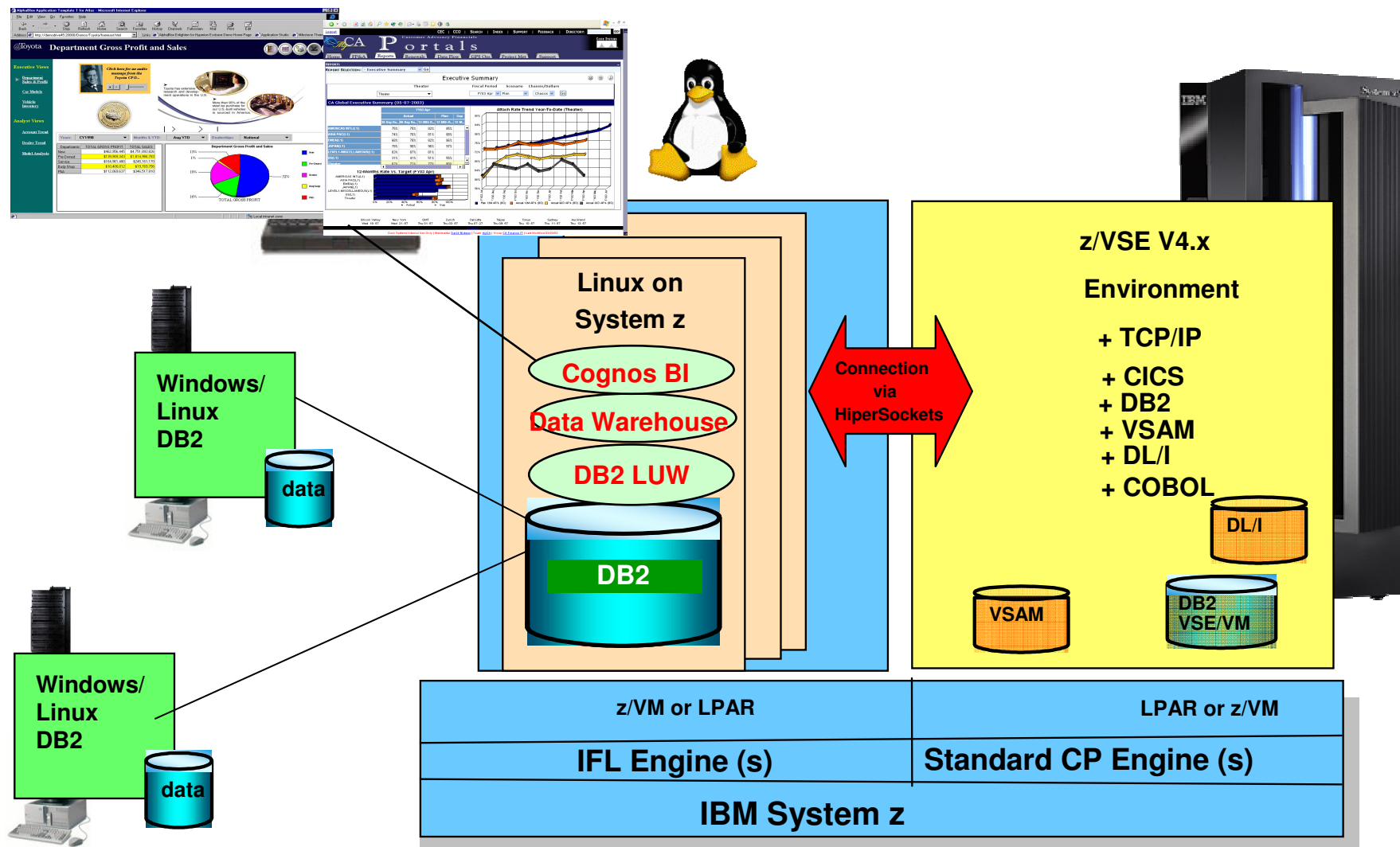
# Powering a Flexible Approach

## *XML and SOA are the Keys*



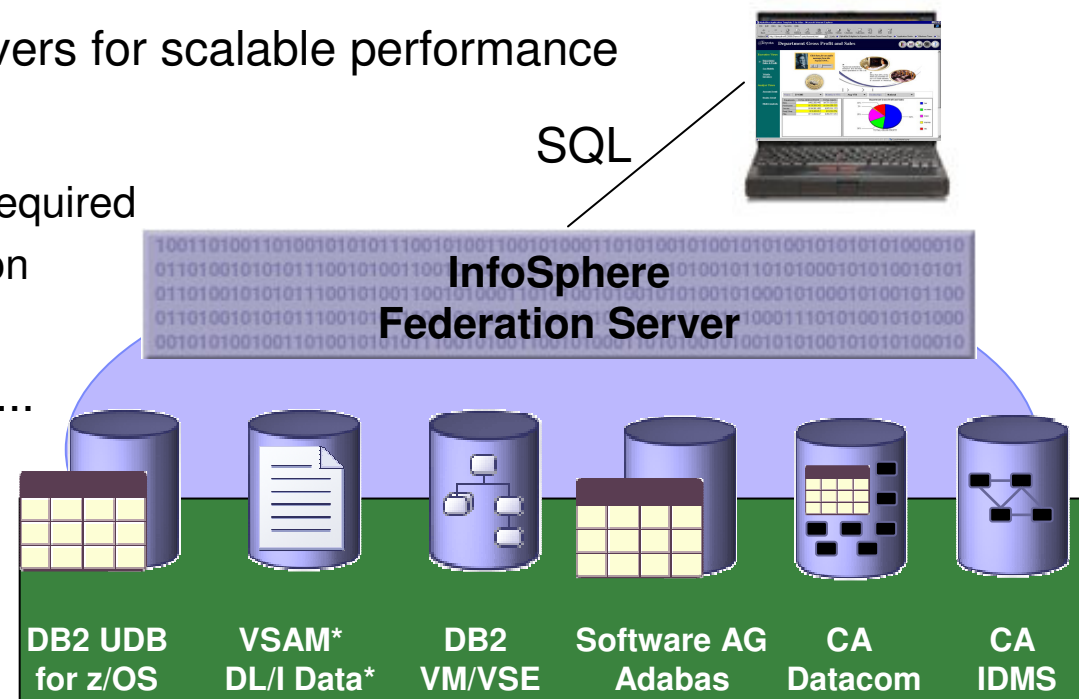
# Top Scenario: Linux on System z as data hub

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



# Agenda

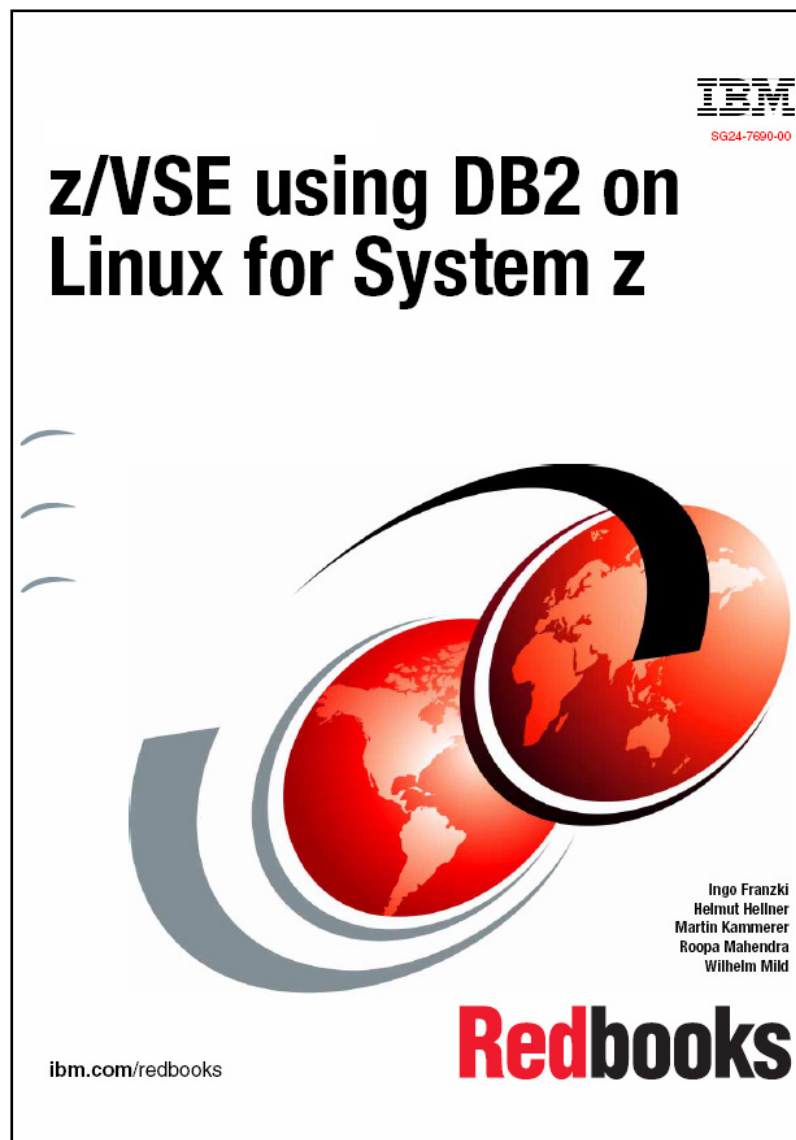
Data-consolidation – more important than ever

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A good solution is not standard in detail

## New Redbook in work !



# DB2 Redbook

- **Overview-**
  - **Strategical Decision**
  - **Advantages (Business Requirements)**
  - **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**

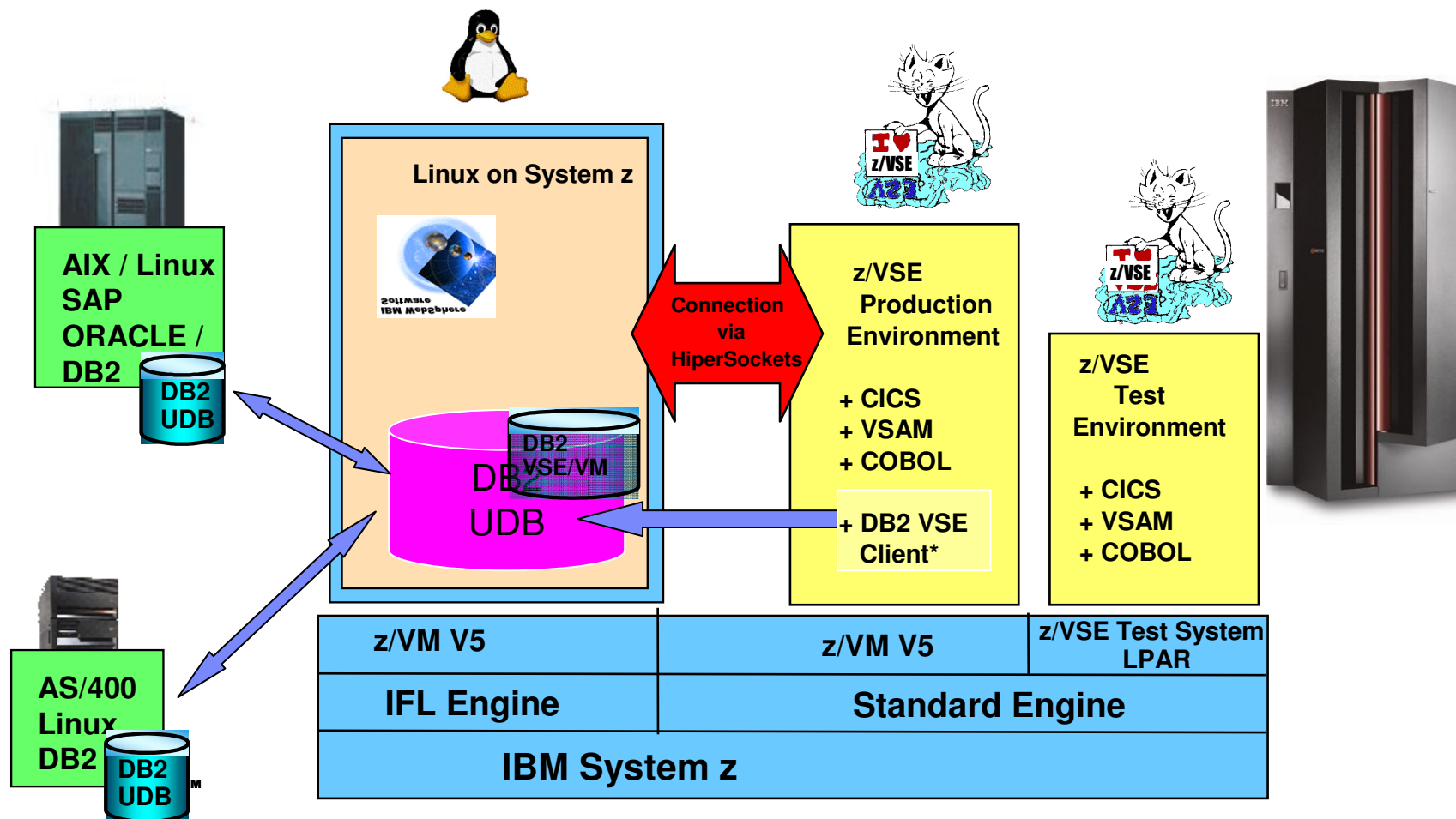
- **DBMS Migration**
  - **Data Migration**
  - **Packages Migration**
  - **Application considerations**
  - **Transition / Coexistence environment**
- **Monitoring and tuning**
  - **DB Monitoring**
  - **AR VSE**
  - **Appl. Monitoring (DB)**
  - **Connections / Interfaces**
  - **Network monitoring**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

# DB2 Redbook

## ■ Overview

- Strategic 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)
- 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 for large data
- 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‘!

## 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)

## 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 adaptations (ASCII-EBCDIC, HEX-Sort)
- Dynamic SQL uses functionality of the server

#### – Transition / Coexistence Environment

- with Replication or ,Federation‘, a coexistence is possible

## 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

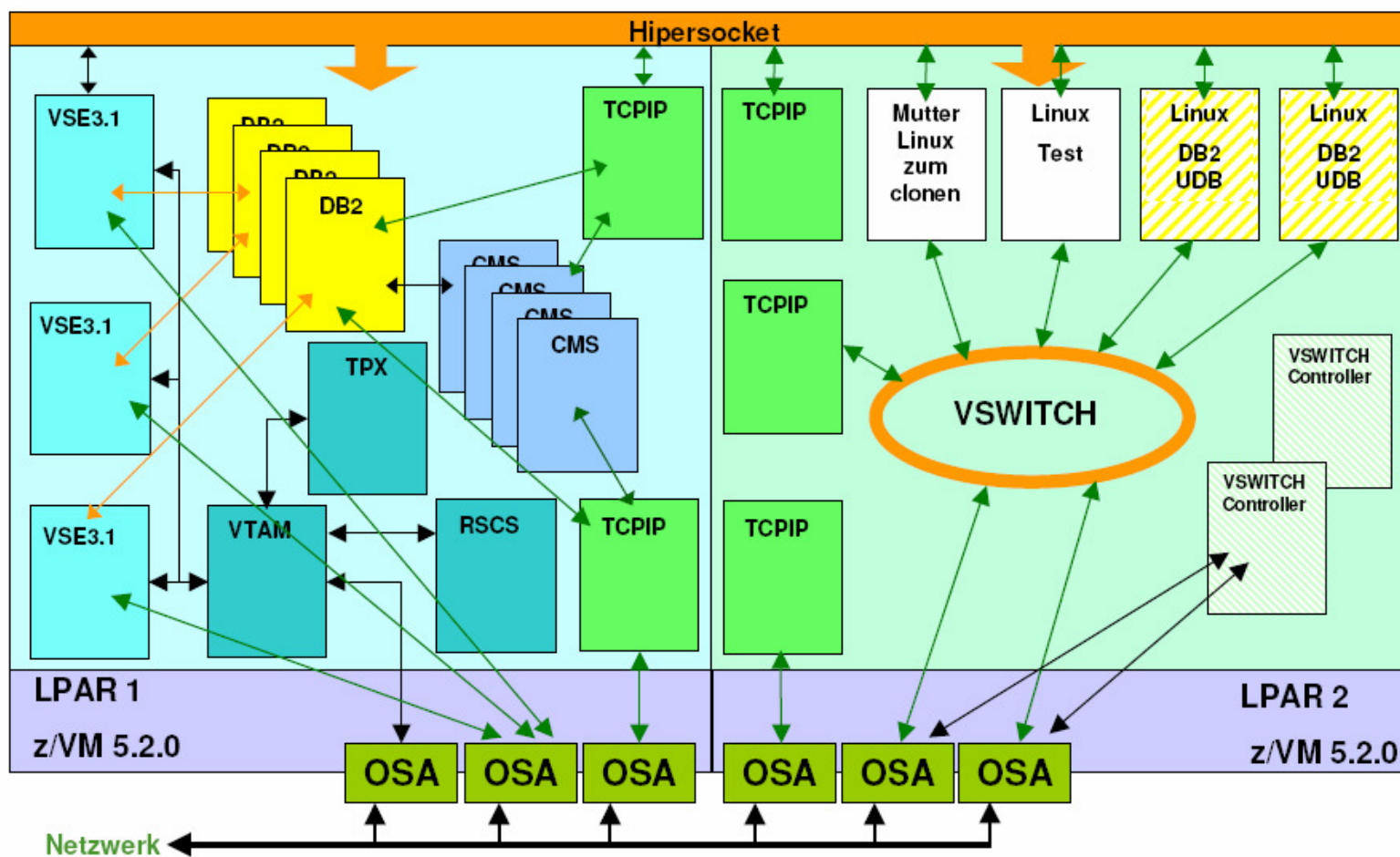
## Customer success samples with DB2 on Linux on System z

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

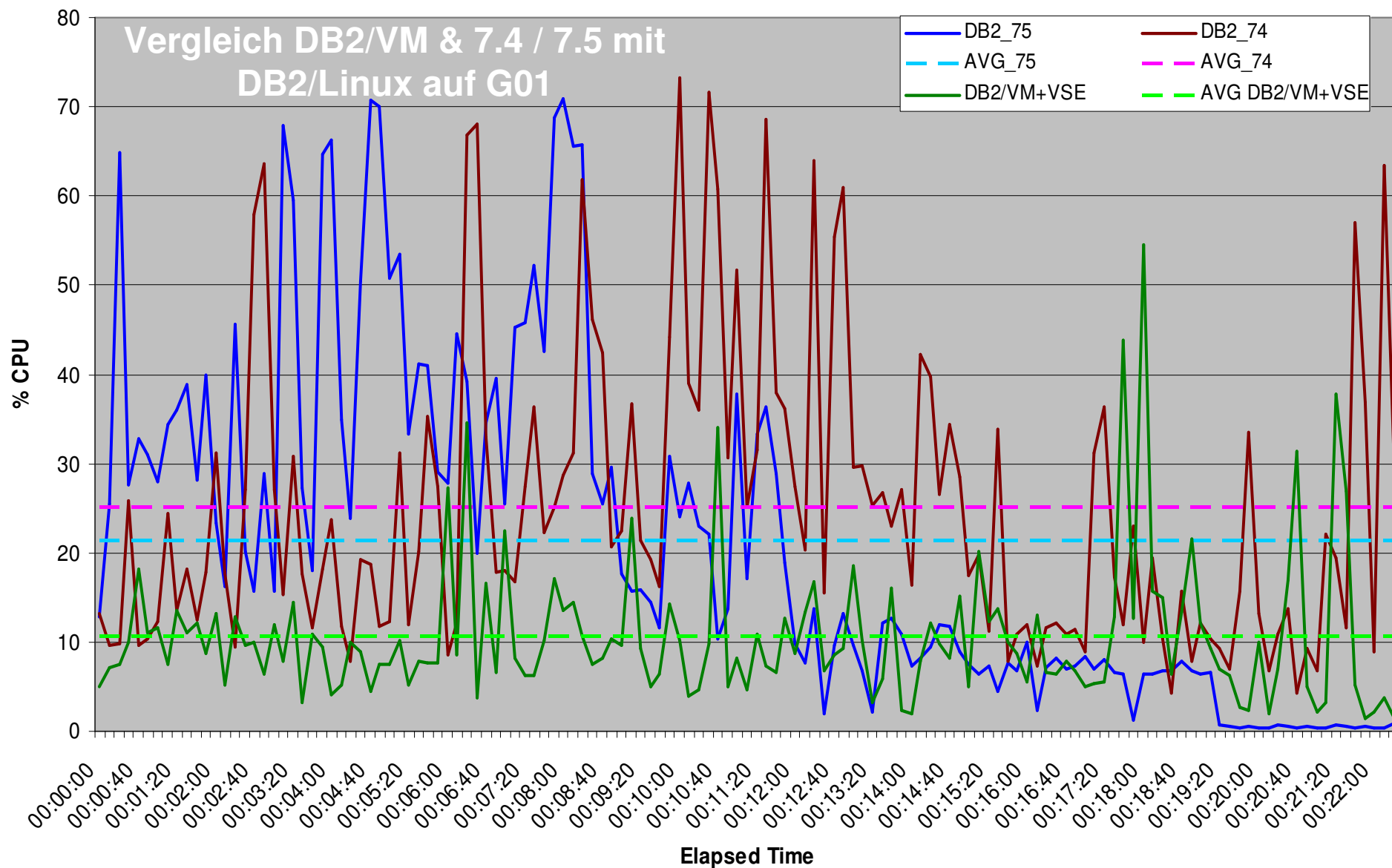
# Customer implementation(1): Public sector customer, Germany

## EDV-Umgebung

z9 BC (2096-G01)

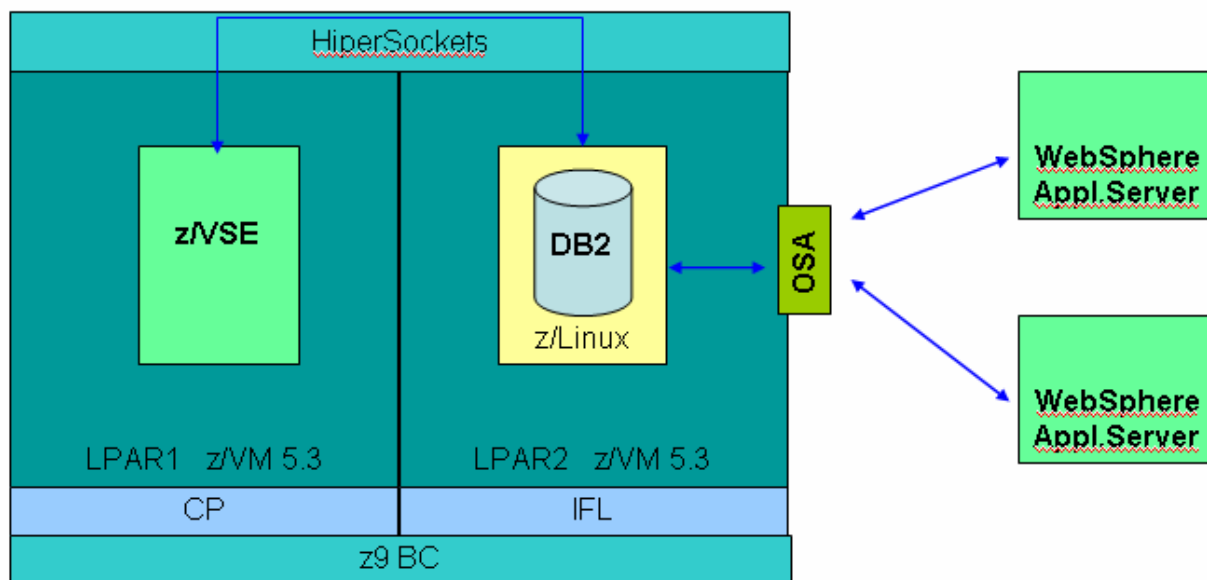


### DB2/VM & VSE CPU Usage



## Customer implementation(2): Internat. Publication distributor, Germ.

### Ausschnitt der IT – Landschaft nach Beendigung des Projekts

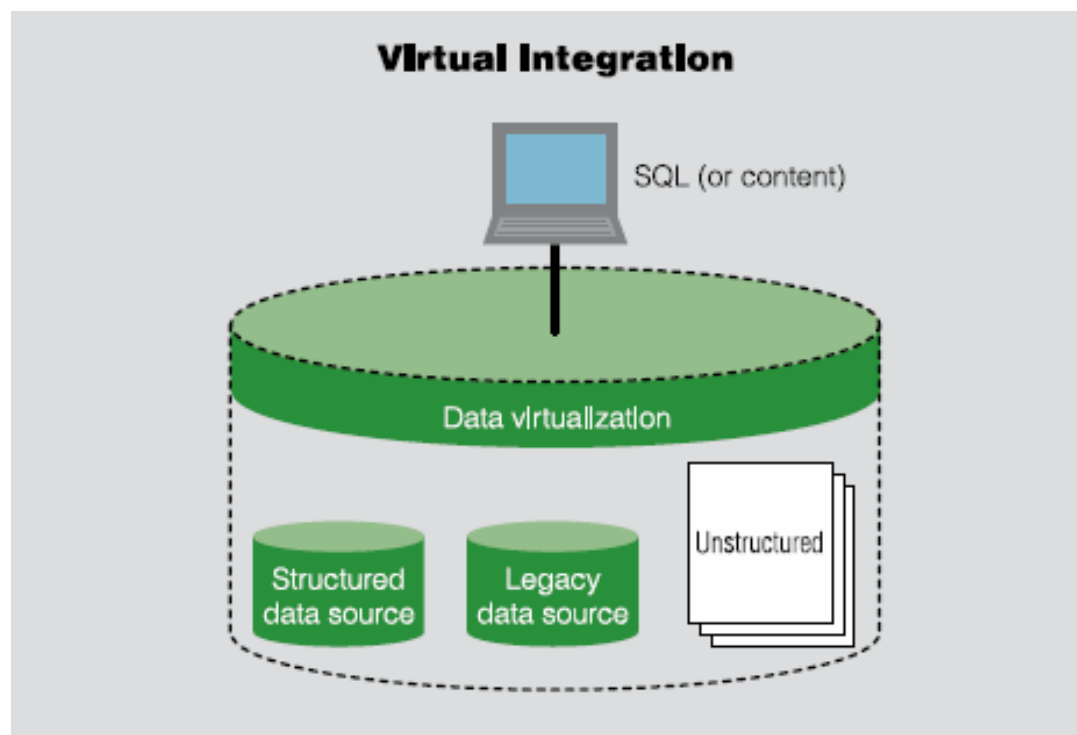


GSE Frühjahrstagung Bonn  
 z/VSE mit CICS und DB2 / z/VM mit Linux on System z  
 07.04. - 09.04.2008





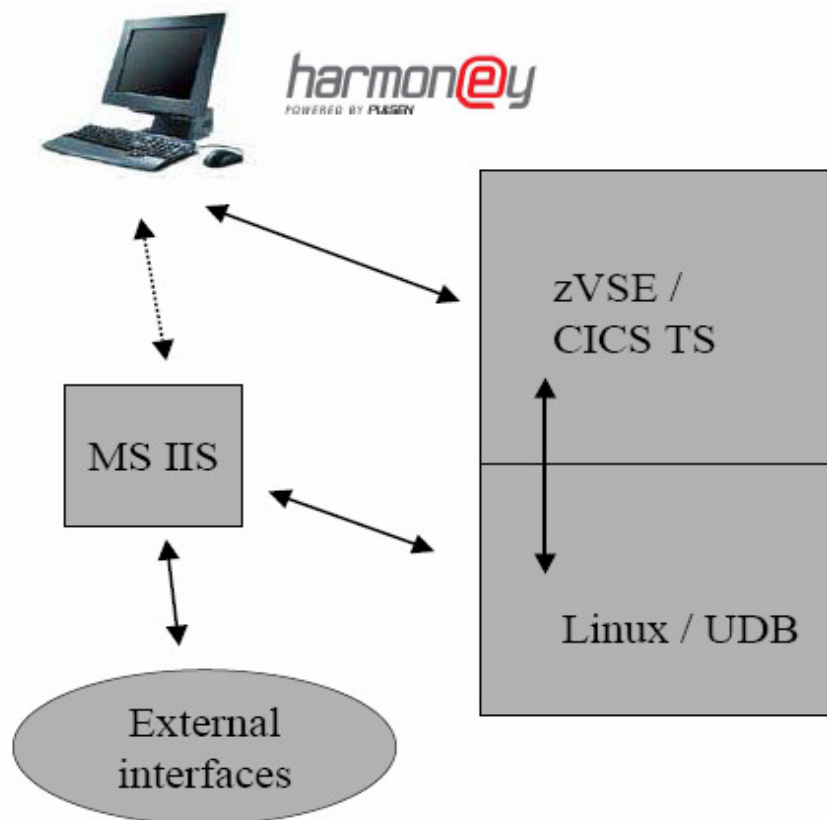
# Federated Database design



# Customer Reference (2): Pulsen, Sweden



## Technical Platform



User interface – Windows/.Net

Data transfers between client and host in XML

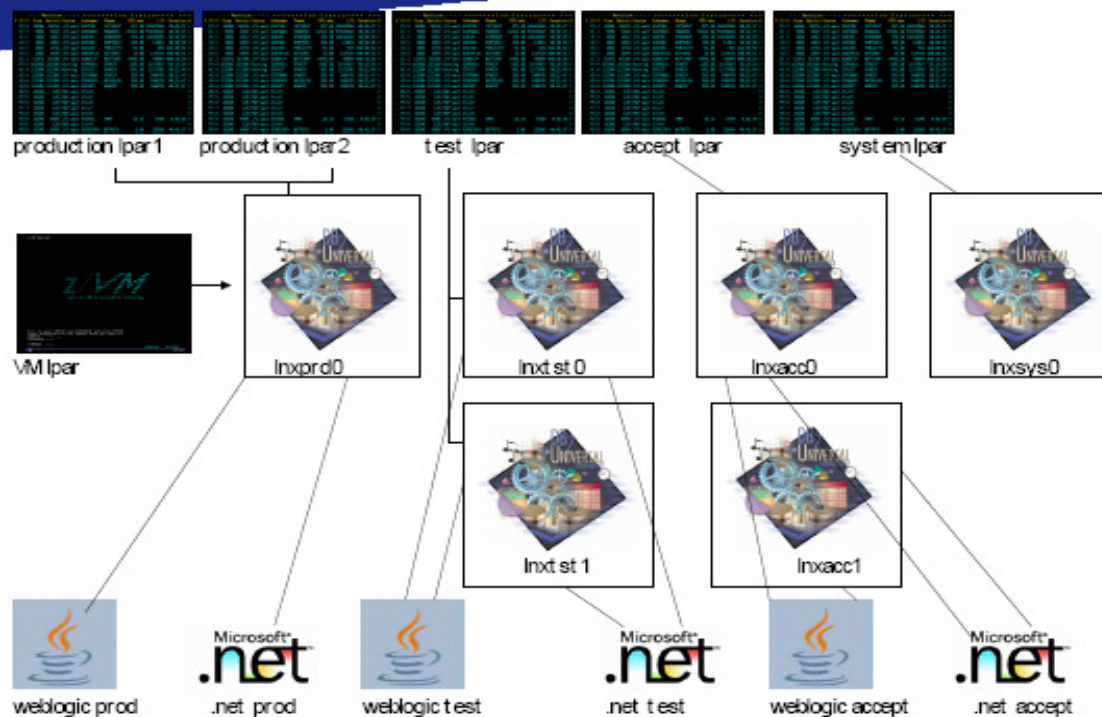
CICS Web Services

DBM - DB2 UDB under Linux

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

# Customer Reference (3): Securex, Belgium

## DB2 linux



Other





## 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

WESSELS+MÜLLER  
FAHRZEUGTEILE UND MEHR

# 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
<b>Summe</b>	<b>2:27:07</b>	<b>17,29</b>	<b>25,26</b>	<b>2:15:11</b>	<b>46,7</b>	<b>21,38</b>
<b>Abweichung</b>				<b>-8%</b>	<b>2,70</b>	<b>-15%</b>
<b>% mehr CPU Trad.</b>					<b>4,2%</b>	
<b>% CPU IFL</b>						<b>21,38</b>
<b>Max CPU IFL</b>						<b>31,5</b>

# Performance-Erkenntnisse

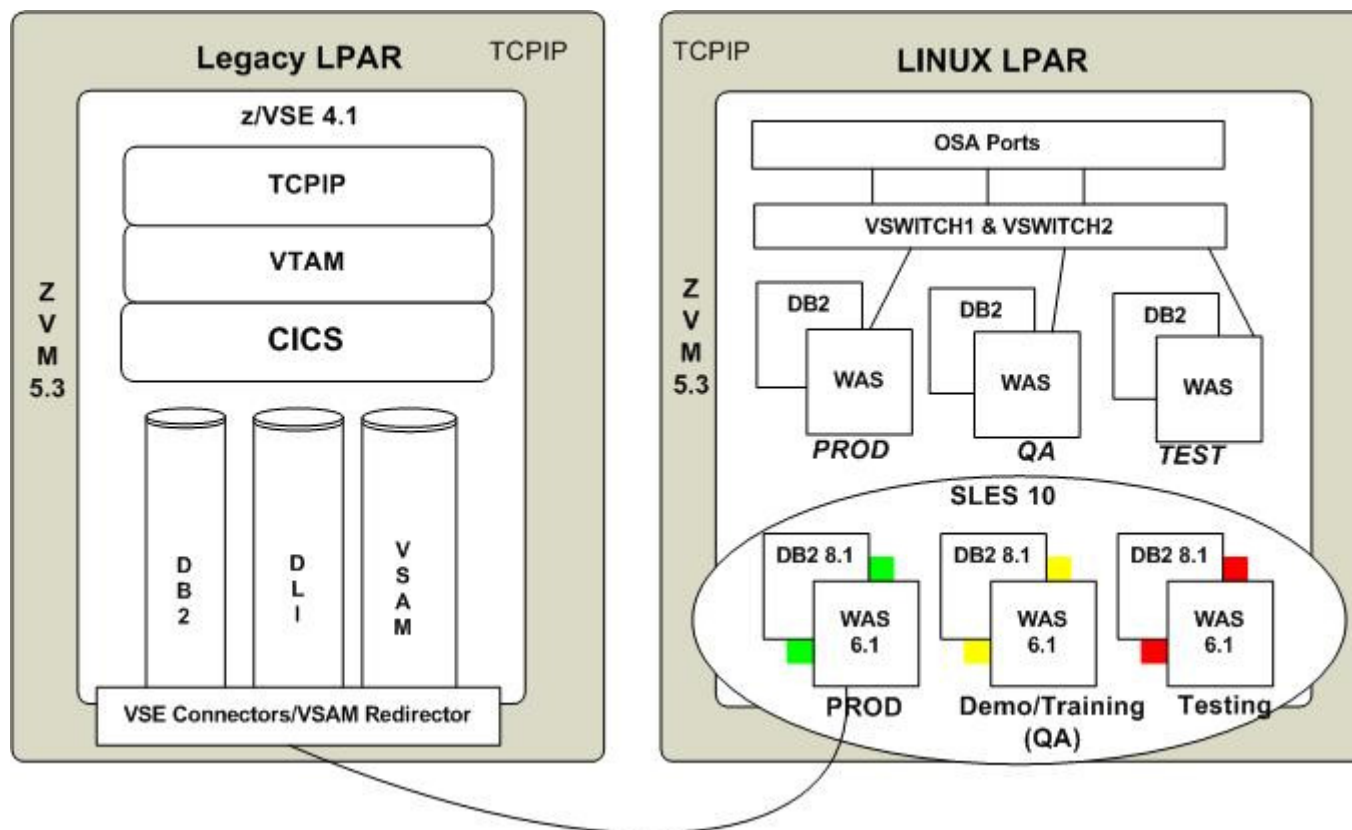
Werte des PoCs für Produktionsevaluierung – CPU

	VSE01	TCPIP	CICS01	Batch Part.	zLINUX	SQLMACH
	30%	0%	25% - 30%	0	1,60%	20% - 25%
10:00 Uhr	30%	0%	25% - 30%	0	3% - 6%	20% - 25%
10:19 Uhr	45%	5%-10%	35% - 40%	0	15% - 25%	10% - 15%
11:08 Uhr	70%	10% - 15%	35% - 40%	10% - 15%	38%	
11:12 Uhr	83%	15% - 25%	35% - 40%	20% - 25%	49%	
	<b>SOS</b>					
11:15 Uhr	60%	10% - 15%	35% - 40%	10% - 15%	38%	
11:17 Uhr	50%	5%-10%	35% - 40%	0	15% - 25%	



# Customer Reference (5): Supreme Court, USA

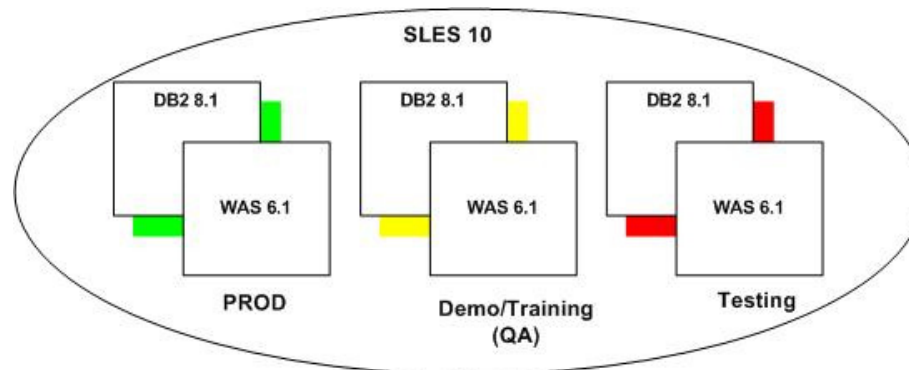
## The Magistrate Environment Today



**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)

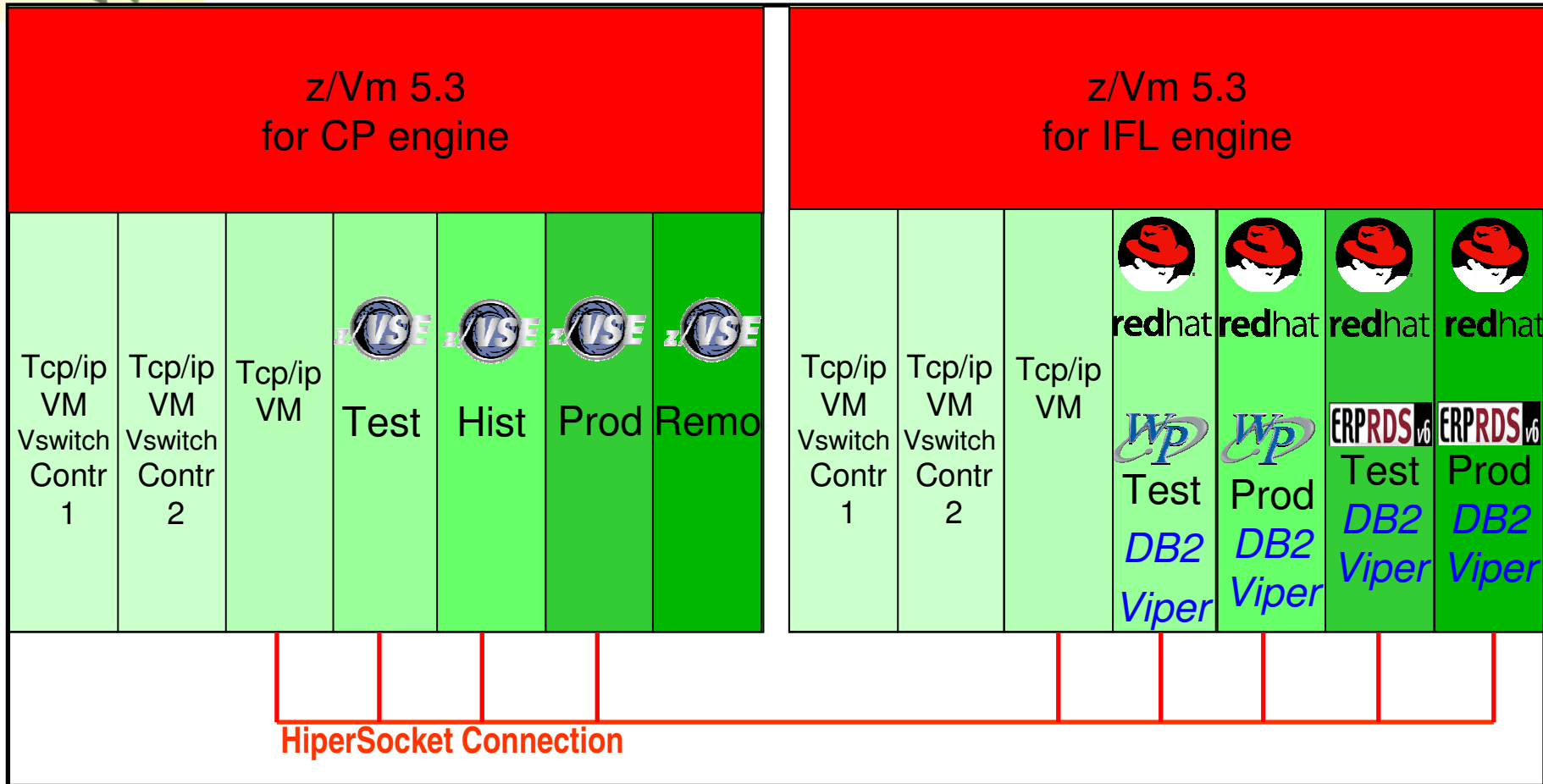
- **Have a good monitor and know what it's telling you**
  - **Helps with sizing and tuning**
  - **Quickly pinpoints out potential or growing problems areas**
  - **Virtual Disk works great for swap volumes**
  - **Shows management they are getting their money's worth**



Customer Reference (6): Olio Carli, Italy



# Internal Connections



the leading producers of premium olive oil sold directly to consumers

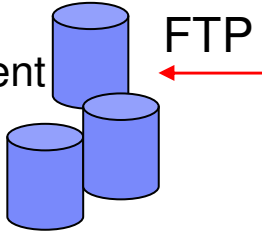


Email from batch or cics

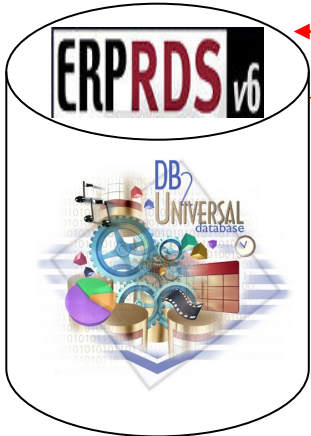


AFP / PSF via ipaddress

300 files every day transferred to different operating systems (Zlinux, linux, microsoft)



FTP



Db2 udb z/linux applications

Vsam redirector Server via hipersocket to z/linux DB2 and via vswitch Osa QDIO to Sql Server



**Olivo Carli**

the leading producers of premium olive oil sold directly to consumers



Virtual Tape



CICS TS web SOA via hipersocket

**redhat**  
**version 5**  
 z/Linux  
 Java Application running on Tomcat



Z/Vse Health checker



Every day 240,000 cics transactions from 400 telnet connections

## More information

- DB2/Linux on System z

[http://www.ibm.com/developerworks/linux/linux390/perf/tuning\\_rec\\_database.html](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>

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