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E61
Modern z/VSE solutions using Connectors and DB2 UDB on Linux

Wilhelm Mild
z/VSE Solution Architect

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DB2 Universal Database	Intelligent Miner	z/VSE
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HiperSockets	OS/390*	WebSphere*
	S/390*	xSeries
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		zSeries
		System z

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Evolution of Internet technologies

Access

Enterprise Integration

On Demand

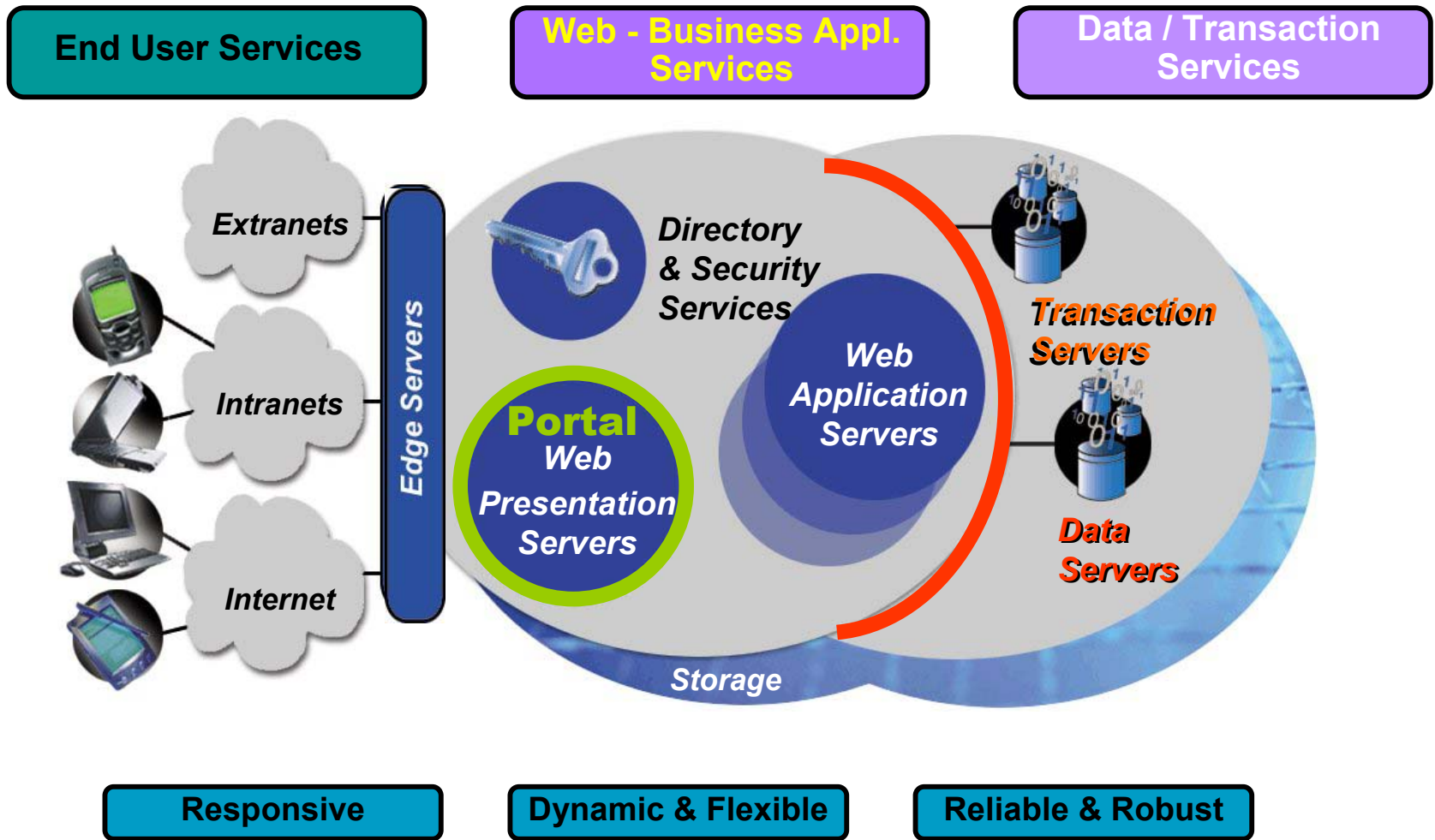*Get on the Net*

Buying not browsing

Working not surfing

Optimize operations

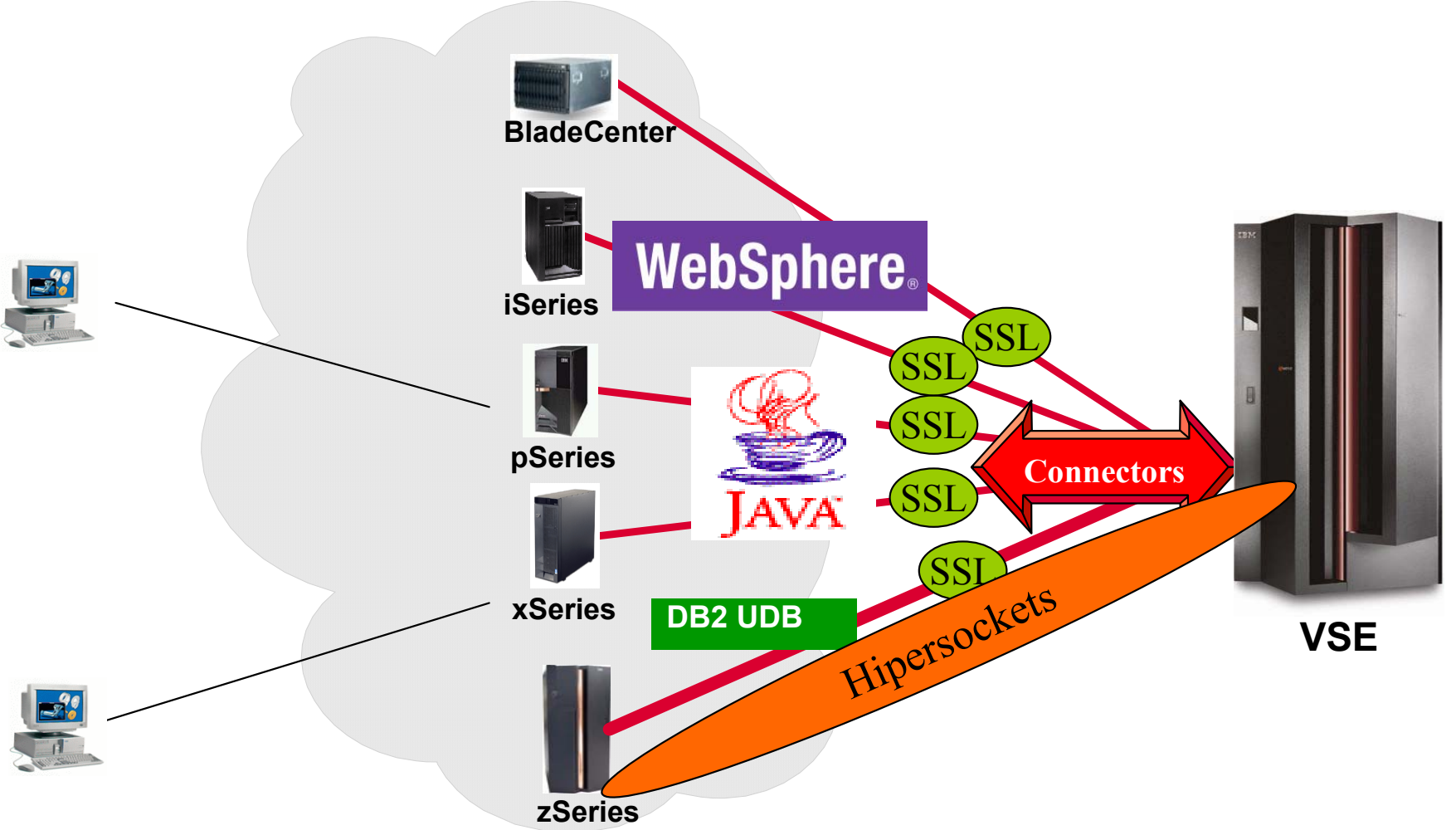*Dynamically respond to the needs of customers, employees, partners, and suppliers*

Access | Publish | Transact | Integrate Internally | Integrate Externally | Adapt Dynamically

Infrastructure
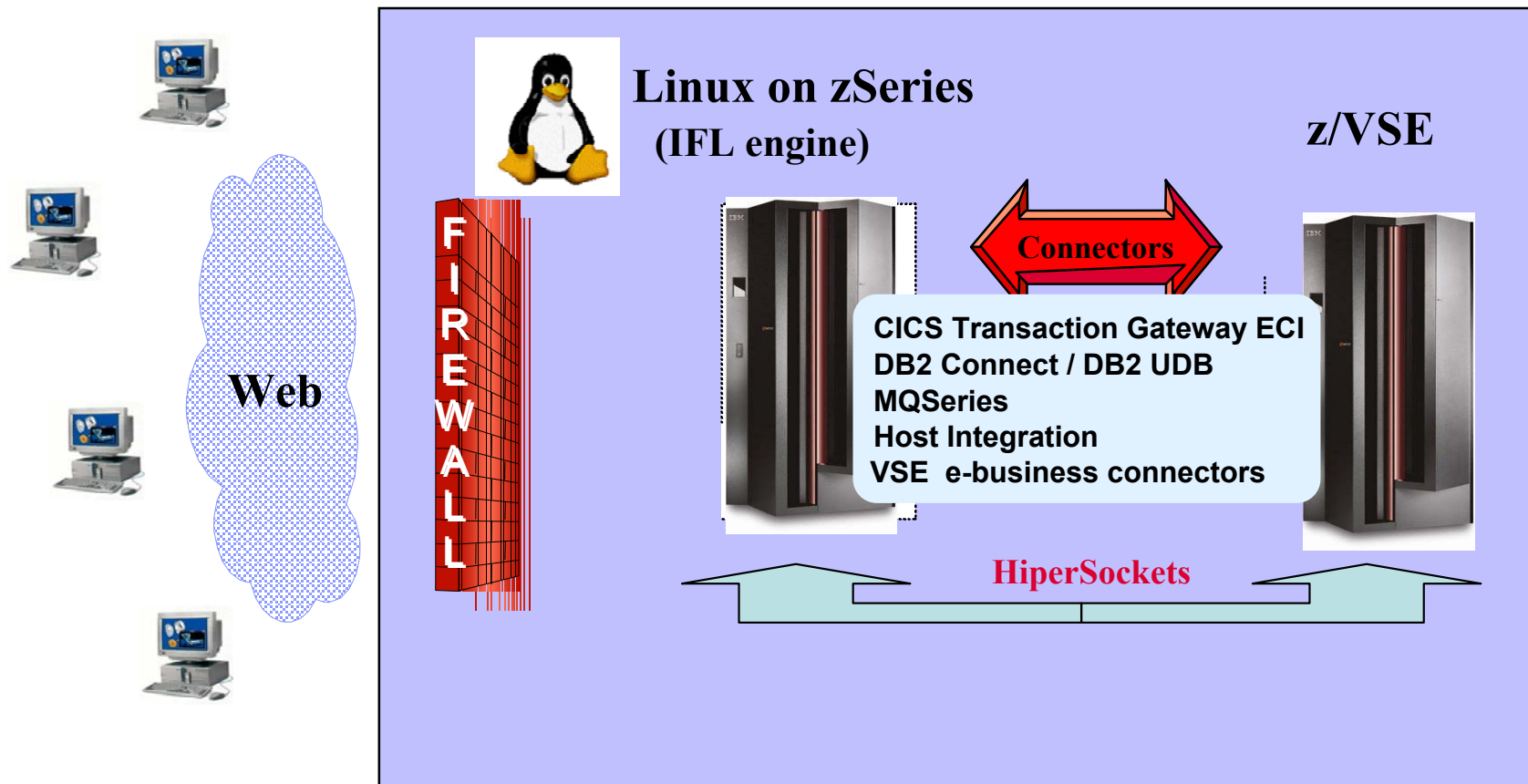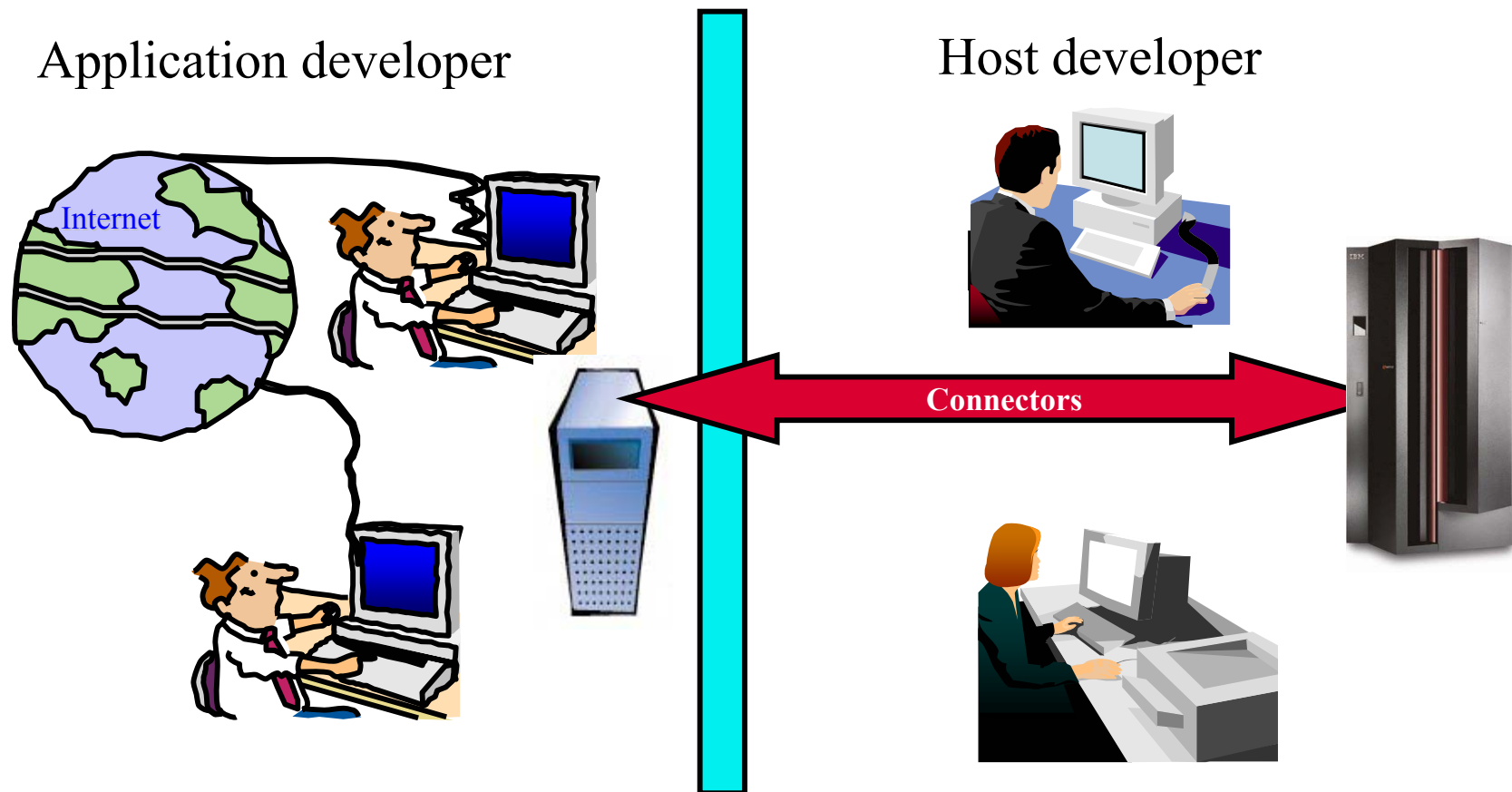
Interoperability with VSE

BladeCenter

iSeries

WebSphere®

pSeries

JAVA

xSeries

SSL

SSL

SSL

SSL

SSL

SSL

Connectors

DB2 UDB

Hipersockets

zSeries

VSE

Client	Business Services	Tran/Data Services

Integration of z/VSE with Linux on zSeries

Linux on zSeries
(IFL engine)

z/VSE

Web

F I R E W A L L

Connectors

CICS Transaction Gateway ECI
DB2 Connect / DB2 UDB
MQSeries
Host Integration
VSE e-business connectors

HiperSockets

Challenges in today's IT

► **Two Architectures, one solution**

Application developer

Host developer

Internet

Connectors

Middleware relations to z/VSE

Java Platform   **z/VSE**

Java Platform	Connector	z/VSE
IBM WebSphere App.. Server	*CICS TS Gateway*	CICS TS
MQ Series	*MQ Client*	MQ Server
DB2 UDB	*DB2 Connect*	DB2/VSAM/DLI
Host Integrator		VSAM Data
VSE e-business client	*VSE Connectors*	Libr.
		DL/I
		Console
		Power
Redirector Server		Redirector
Virt Tape Server		Virtual Tape
Web Services	*SOAP (XML)*	Web Services

zSeries

- Modern applications with Linux for zSeries

- Most modern technologies interact with VSE services

- Modernisation using real time access to data
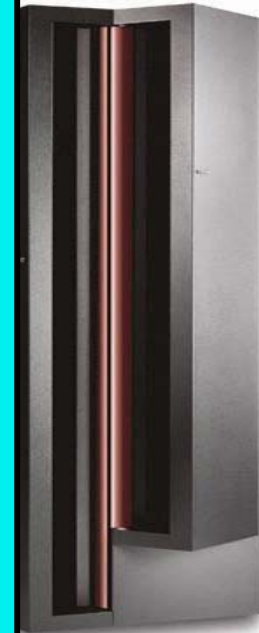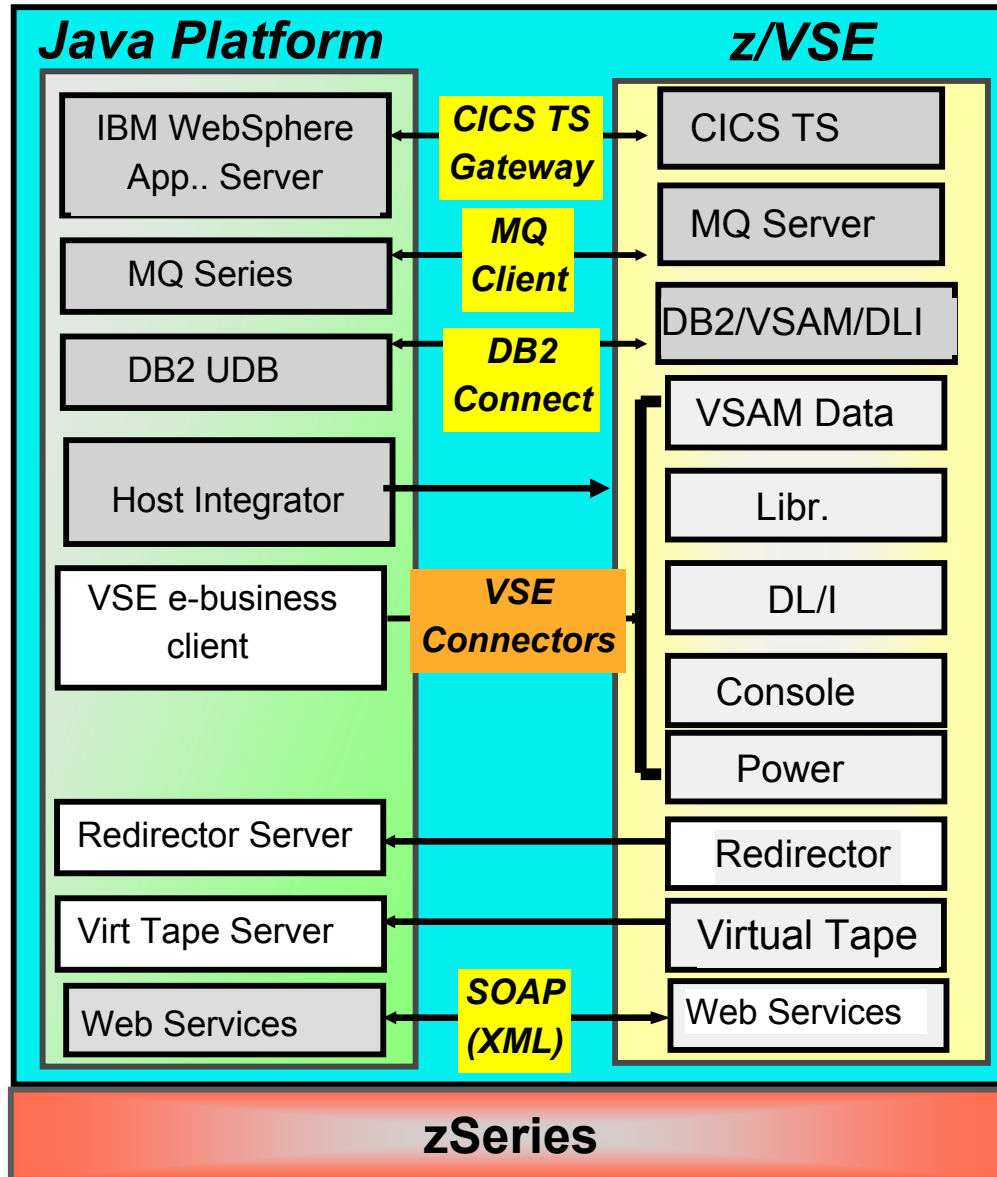
VSE Connectors(1): Real time access to z/VSE Resources with the Java–Based Connector
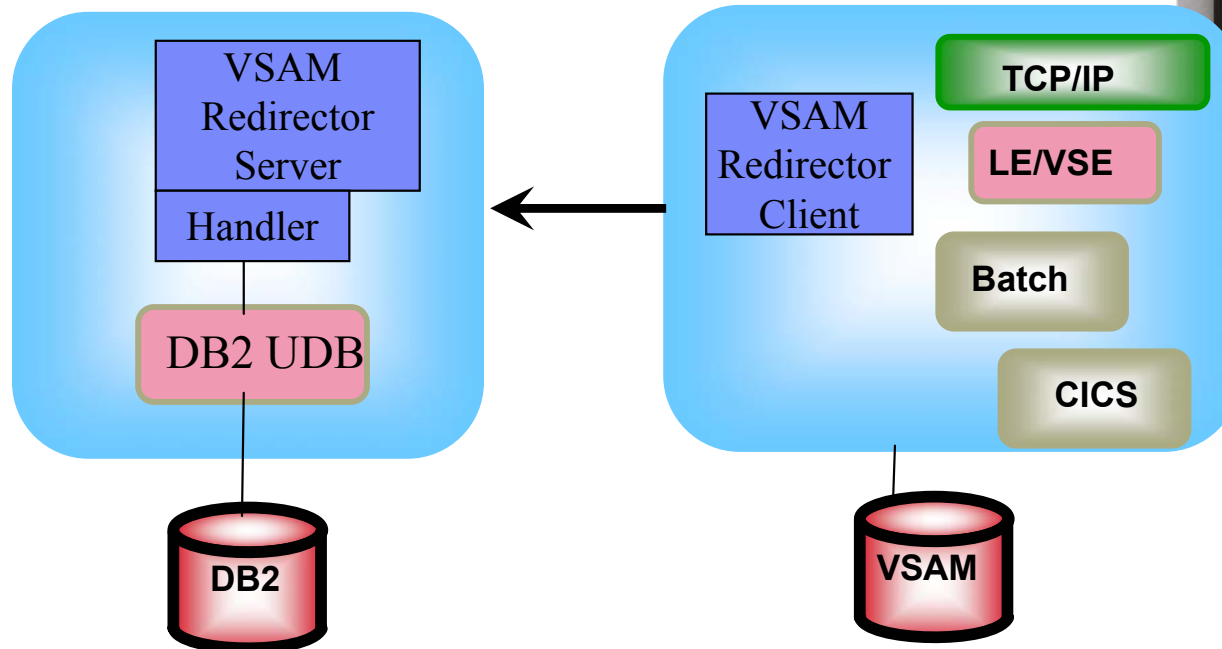
PULL- scenario

web client

z/VSE

Web Application Server

VSEScript

Java Program

Connector Client

JDBC

TCP/IP

TCP/IP

Connector Server

LIBR

Power

ICCF

Console

DL/I

VSAM

mapped files

VSAM

- HTML
- Java applet, servlet, EJB, JSP
- JDBC
- VSEScript
- specialized graphical tools (Navigator, Healthchecker, etc.)
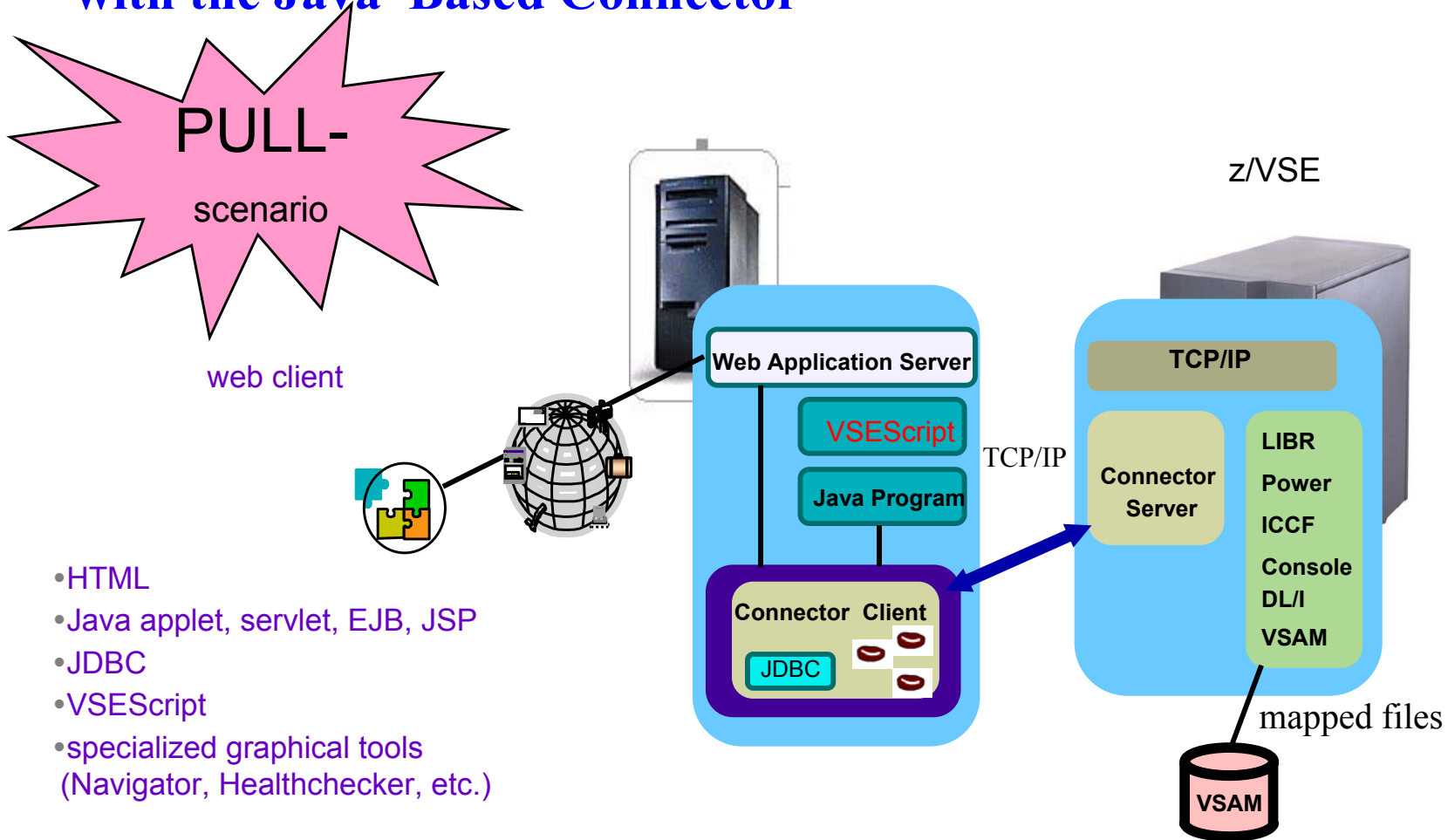
► real time access to VSE resources from remote systems ,

  ► real time access to VSAM data, Librarian

  ► monitoring and analyzing possibilities using console or statistic values

VSE Connectors(2): VSE/VSAM applications, access remote relational databases

(1) Real time access VSAM to DB2

   a) synchronization (two phase commit of VSAM and DB2)

   b) Real time access to DB2 (no VSAM access anymore)

(2) VSE local data collection for VSAM

   a) Capture Exit and Incremental FTP, processing

   b) MQ Exit and MQ Series solutions
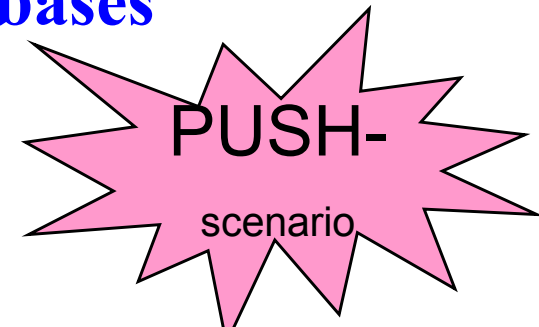
PUSH-scenario

z/VSE Server

VSAM Redirector Server

Handler

DB2 UDB

DB2

VSAM Redirector Client

TCP/IP

LE/VSE

Batch

CICS

VSAM

Agenda: Optimization of operations

(1) Common data store with distributed data

(2) Web transaction processing

(3) Application integration

(4) Service Oriented Architecture (SOA)

(5) DB2 VSE data on DB2 UDB Linux

Common data store in distributed environments (synchronous data propagation)

► customer data are redundant in both systems in different types of data stores (VSAM in VSE and relational in AIX)

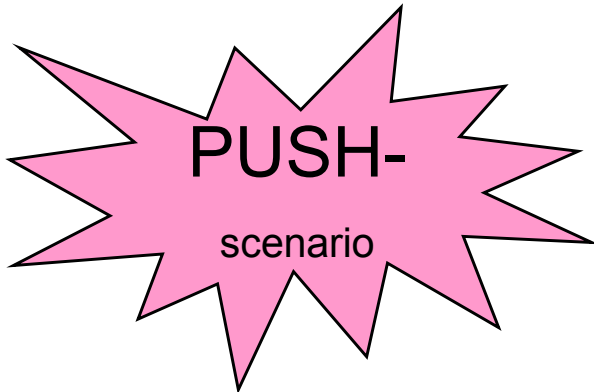► real time data synchronization is needed

► no change to VSE programs required
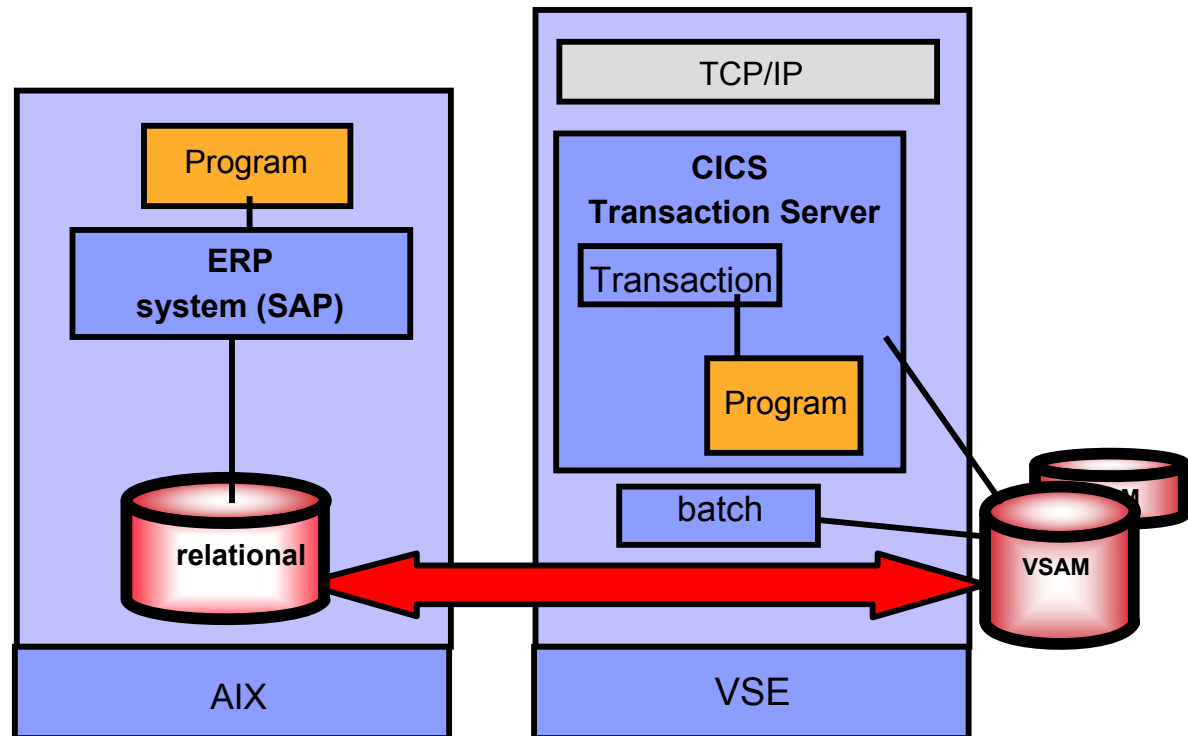
Pull out data from a VSE system from a remote site.

PULL-
scenario

| WebSphere |
| VSE Connector Client |
| Windows |

⟷

| TCP/IP |
| VSE Connector Server |
| CICS |
| **VSAM** |
| VSE |
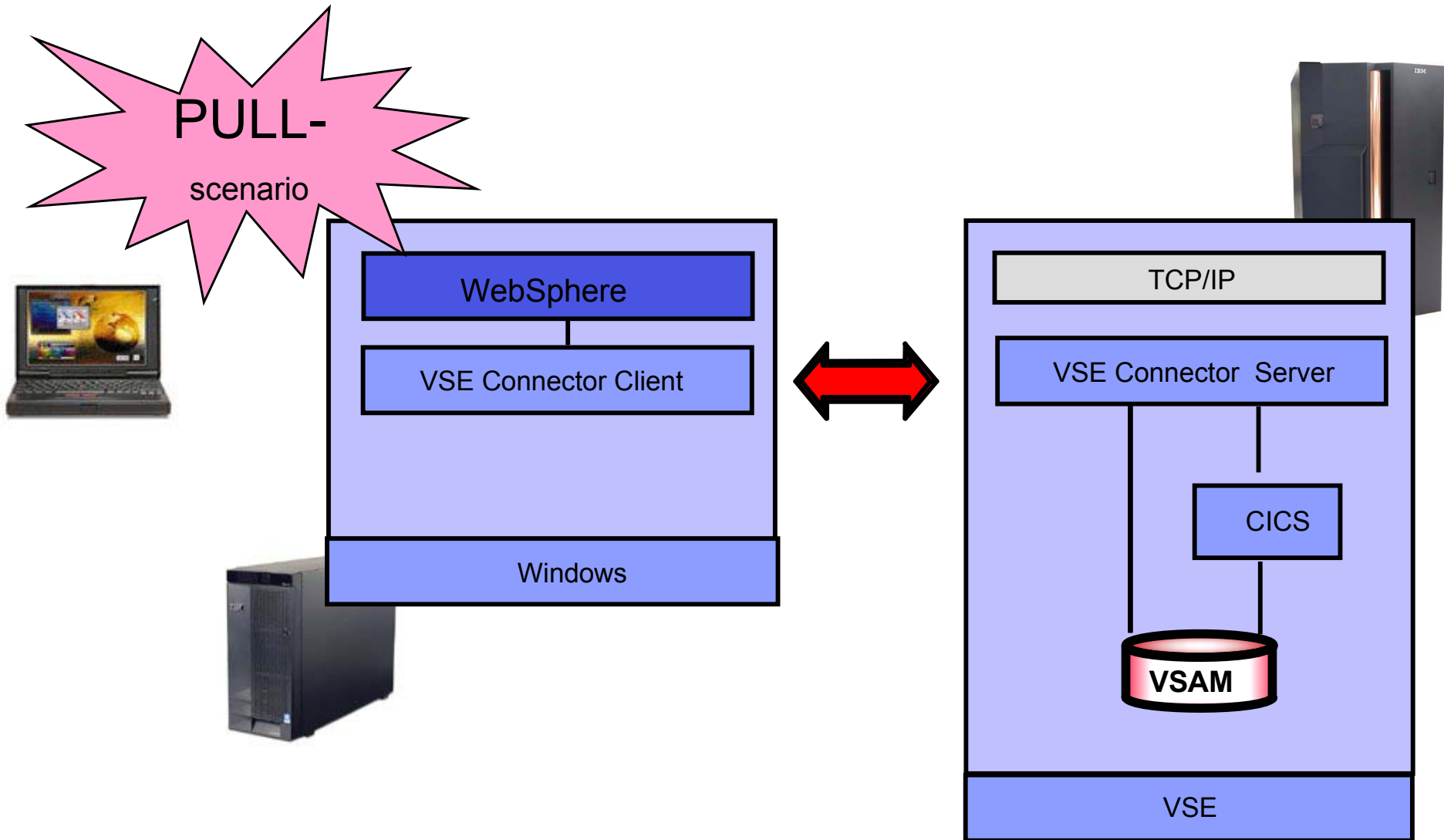
▪Integrate VSAM data into new applications

Data propagation / synchronization from VSE

VSE/VSAM Redirector

PUSH-
scenario

►Existing applications transparently access remote data

►No changes to the existing VSE applications
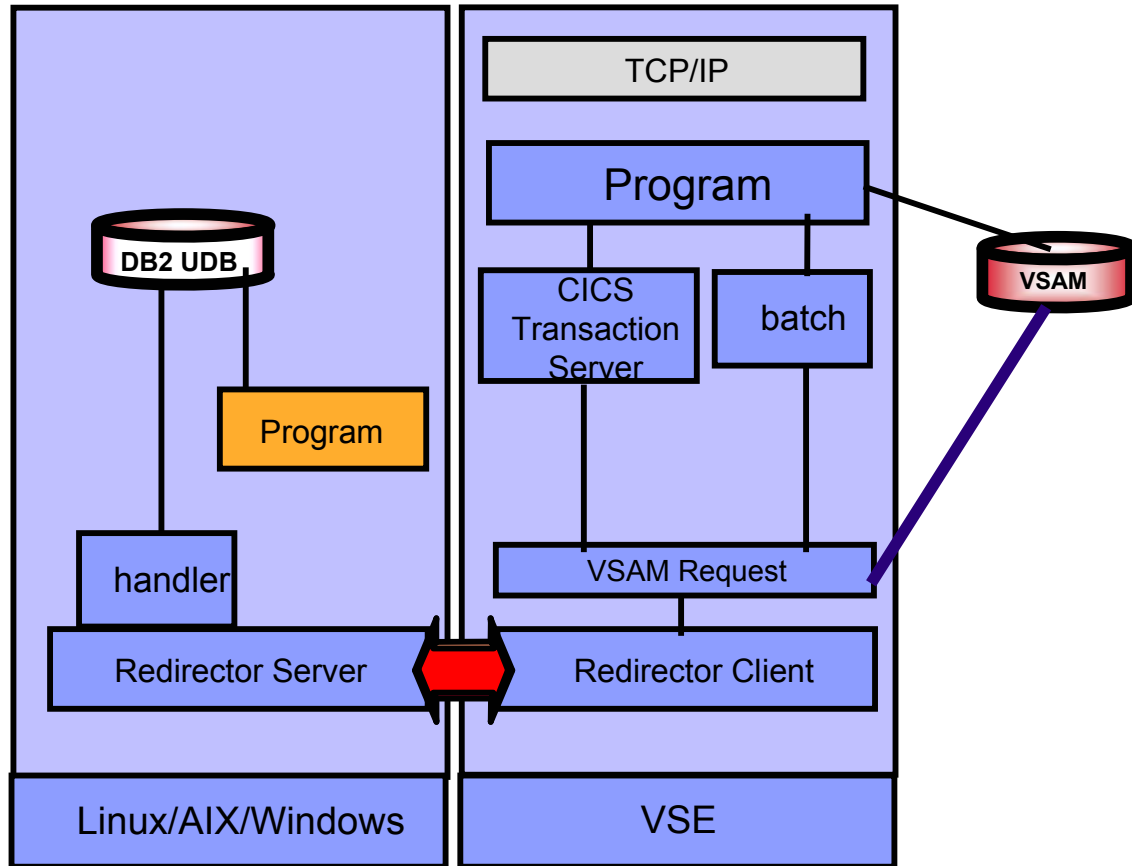
DB2 UDB	TCP/IP
	Program
Program	CICS Transaction Server / batch
handler	VSAM Request
Redirector Server	Redirector Client
Linux/AIX/Windows	VSE

VSAM

►Applications on VSE should be able to access DB2 data on Linux
►Synchronization of DB2 UDB on Linux with VSAM using VSAM Redirector.
(VSAM Redirector is part of VSE/ESA 2.6/2.7)

Final solution

common data store – Business intelligence

❑ Car manufacturer, paper manufacturer – Germany, insurance – US
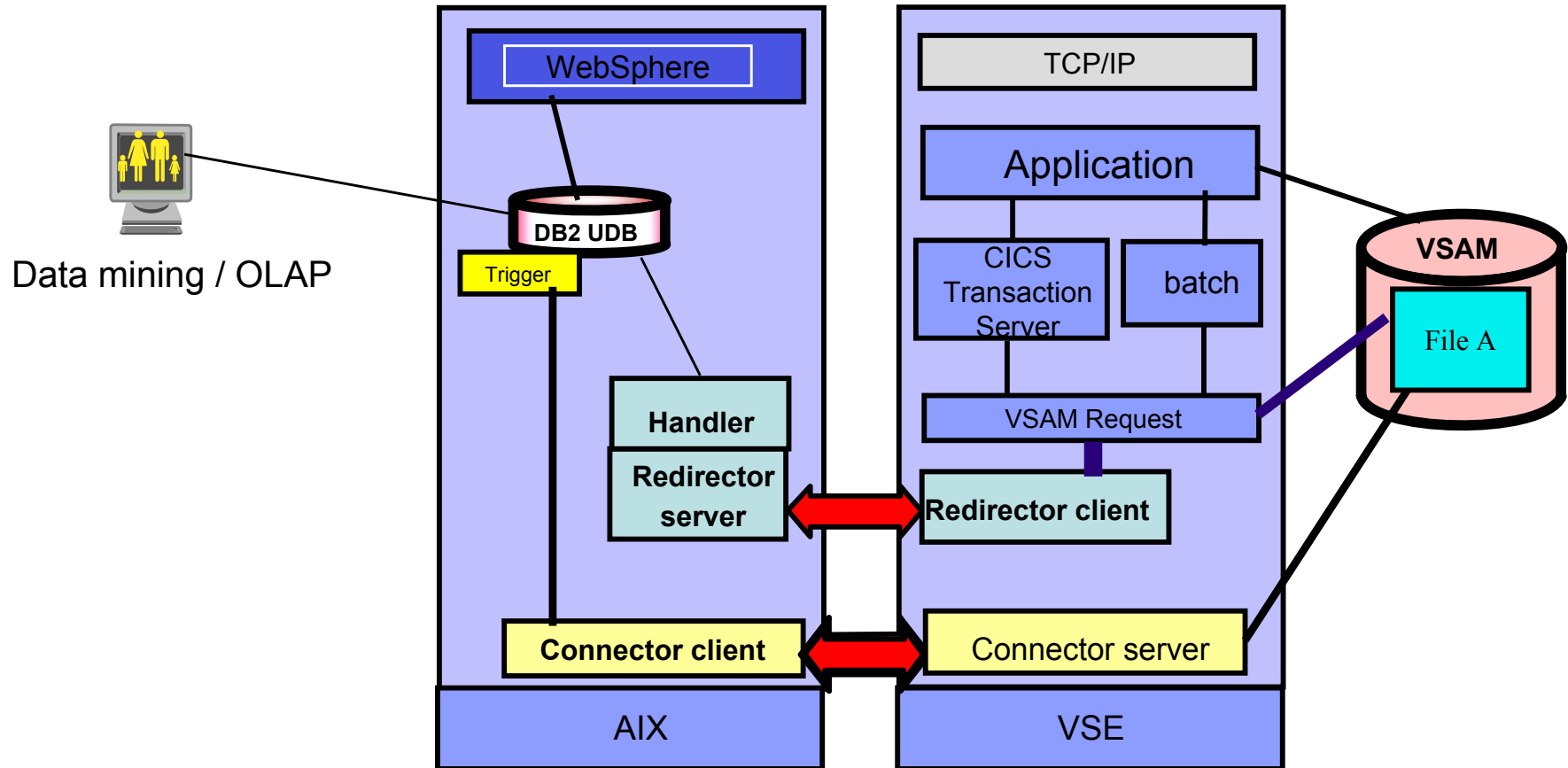
Solution with z/VSE 4.1

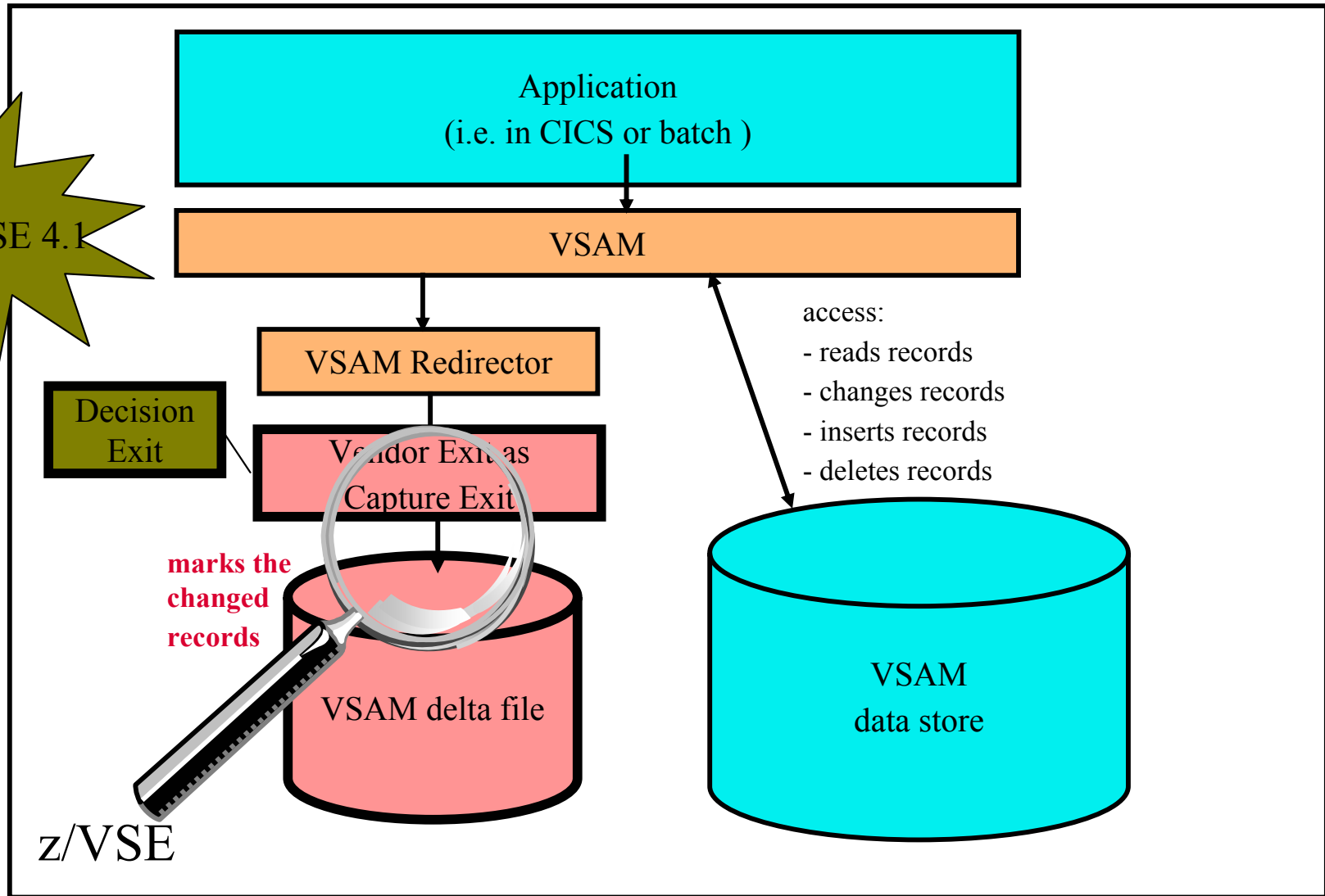## Incremental, Linux driven updates

❑ Energy supplier – Germany

► With VSAM Capture – the performance of the VSE production system protected

► The changes are processed asynchronously and not influenting the production system

```
+-------------------------+    +-------------------------+
|  +-------------------+  |    |  +-------------------+  |
|  |    WebSphere      |  |    |  |     TCP/IP        |  |
|  +-------------------+  |    |  +-------------------+  |
|                         |    |                         |
|      ( DB2 UDB )        |    |  +-------------------+  |
|                         |    |  |     Program       |  |
|                         |    |  +-------------------+  |
|                         |    |  +--------+  +-------+  |
|                         |    |  | CICS   |  | batch |  |
|                         |    |  |Transac.|  +-------+  |
|                         |    |  | Server |             |
|                         |    |  +-------------------+  |
|                         |    |  |   VSAM Request    |  |
|  +-------------------+  |    |  +-------------------+  |
|  |   SQL Loader      |  |    |  | Generic Exit      |  |
|  +-------------------+  |    |  | Capture Exit      |  |
|  | Connector client  |--+----+--| Conn. server      |  |
|  +-------------------+  |    |  +-------------------+  |
|  |      Linux        |  |    |  |       VSE         |  |
|  +-------------------+  |    |  +-------------------+  |
+-------------------------+    +-------------------------+
```
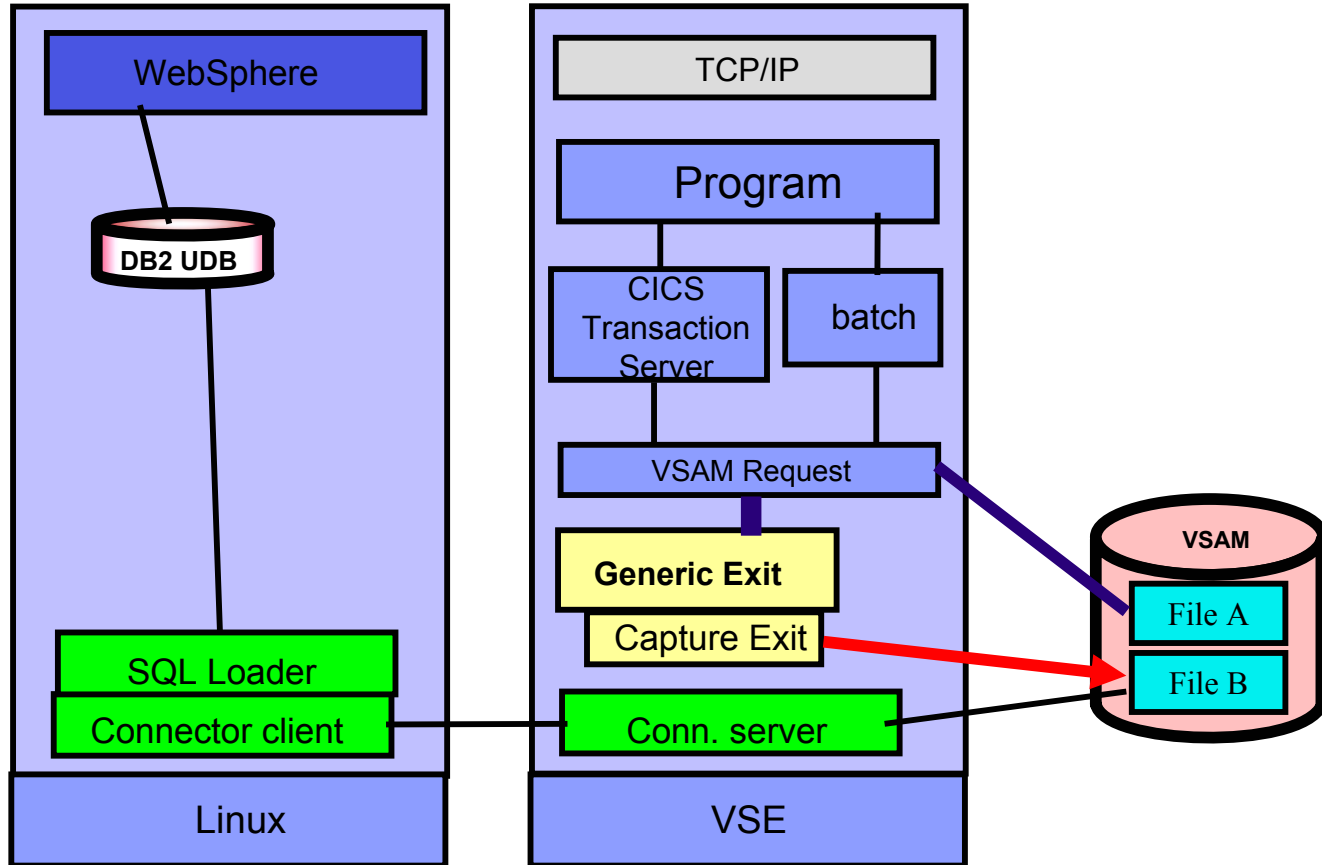
VSAM
File A
File B

► Collect the changed records in a separate VSAM file
  ► Possibility of cleansing
► Process them – with the VSE Connectors

Redirector Capture.
Architectural View

New in z/VSE 4.1

Application
(i.e. in CICS or batch)

VSAM

VSAM Redirector

Decision Exit

Vendor Exit as Capture Exit

access:
- reads records
- changes records
- inserts records
- deletes records

marks the changed records

VSAM delta file

VSAM data store

z/VSE

Data propagation / synchronization from VSE
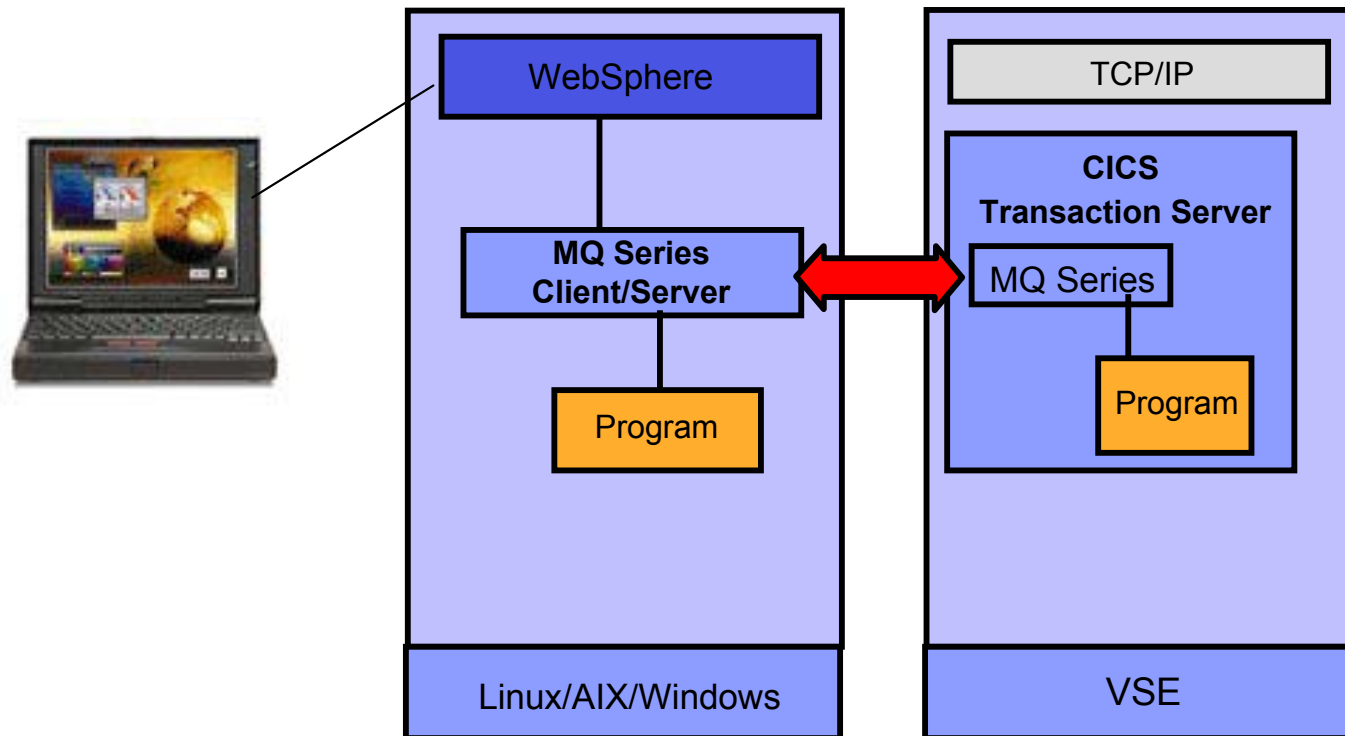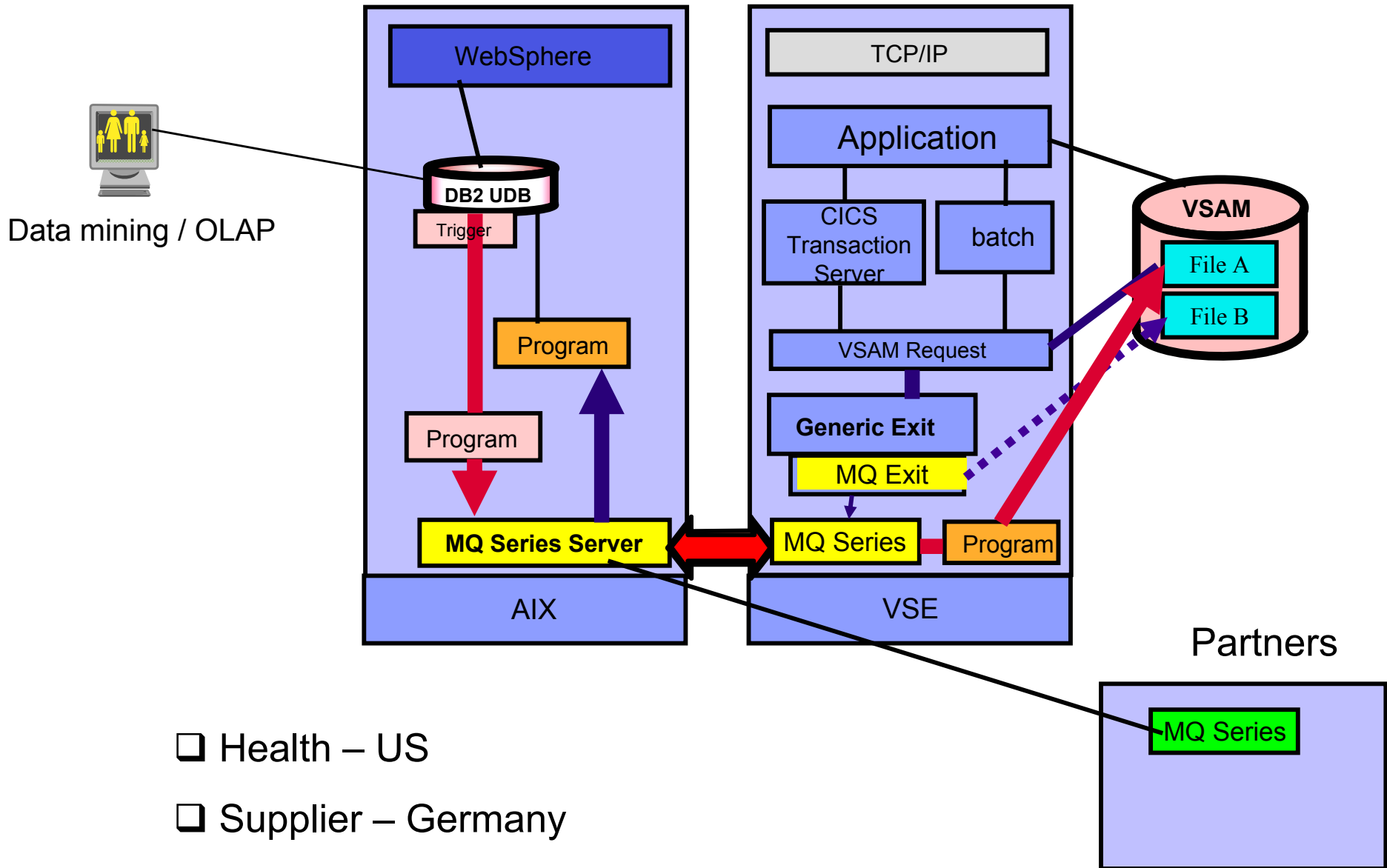## VSE/VSAM Redirector can use normalized VSAM data

►No changes to the existing VSE applications

►**The new Redirector Handler can store/retrieve 'VSAM' data in multiple DB Tables .**
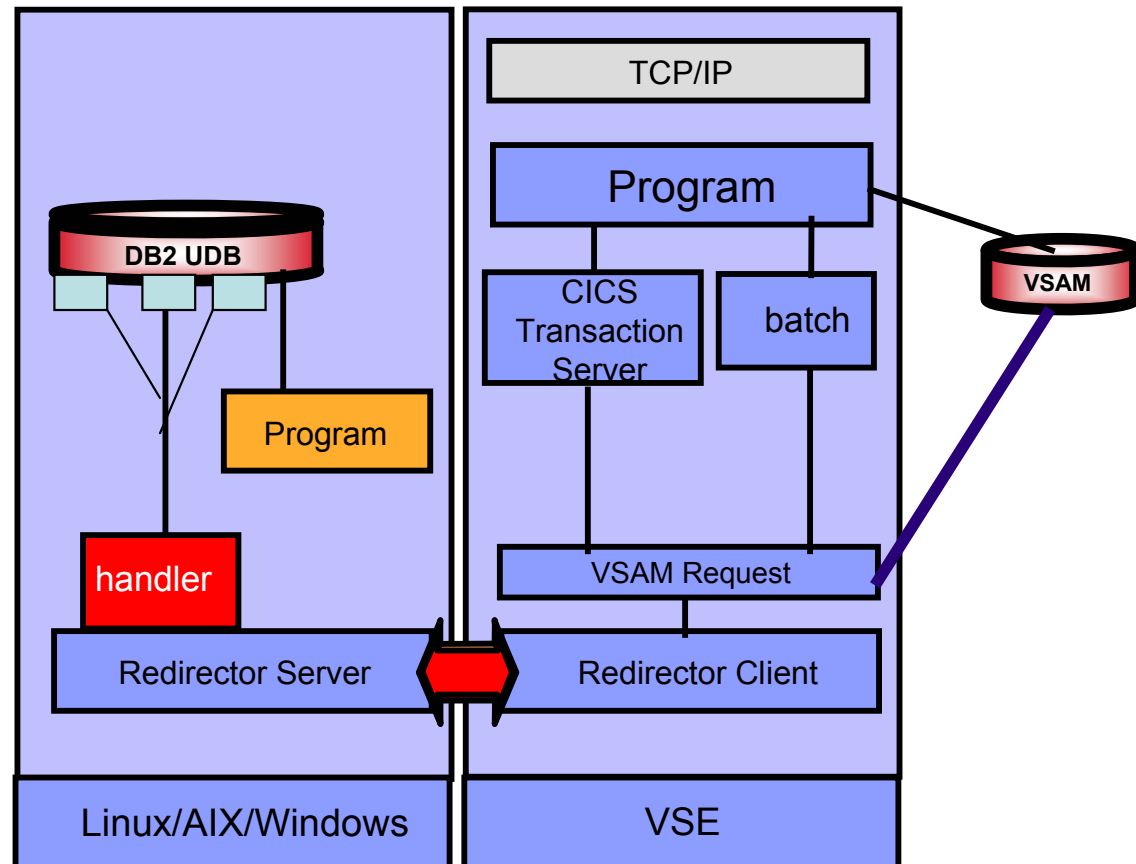
Linux/AIX/Windows   VSE

►Applications on VSE should be able to access DB2 data on Linux
►Synchronization of DB2 UDB on Linux with VSAM using VSAM Redirector.
(VSAM Redirector is part of VSE)

Asynchronous data propagation

MQ Series - Implementation

WebSphere		TCP/IP
MQ Series Client/Server	⬅➡	CICS Transaction Server — MQ Series — Program
Program		
Linux/AIX/Windows		VSE

► asynchronous data exchange using message queuing

► guaranteed and 'only once' delivery

► integration into Web Application servers (WebSphere)

► bidirectional data interchange – same interface on many platforms

Final solution

common data store – Business intelligence

Data mining / OLAP

WebSphere

DB2 UDB

Trigger

Program

Program

MQ Series Server

AIX

TCP/IP

Application

CICS Transaction Server

batch

VSAM Request

Generic Exit

MQ Exit

MQ Series

Program

VSE

VSAM

File A

File B

Partners

MQ Series

❑ Health – US

❑ Supplier – Germany

Agenda: Optimization of operations

(1) Common data store with distributed data

(2) Web transaction processing

(3) Application integration

(4) Service Oriented Architecture (SOA)

(5) DB2 VSE data on DB2 UDB Linux

(2) Web Transaction processing

(using the Websphere Software Platform and Connectors for z/VSE)

❑ Bank- Switzerland,

❑ Heating services - Germany

Browser

Browser

Web Application Server

- HTML
- Servlets,JSP
- EJB
- Web Services

DB2

CICS

Console

MQSeries

Power, Librarian

VSAM

DL/I

Web Services
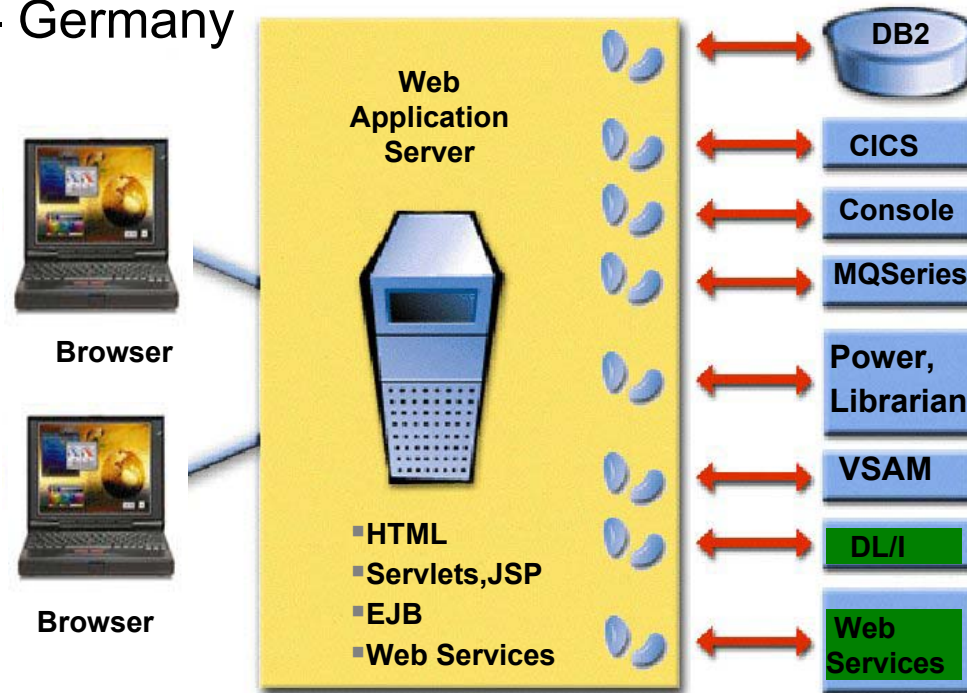
► Enable the access to core applications with web technologies

► No change to the core applications required

► Consistent development interfaces (Java based)

Integration of VSE/ESA transaction processes

IBM CICS Transaction Gateway

SSL
HTTP-S

WebSphere		TCP/IP
CICS Transaction Gateway	⇄	CICS Transaction Server
Program		CICS Application
		Data
Linux on zSeries		VSE
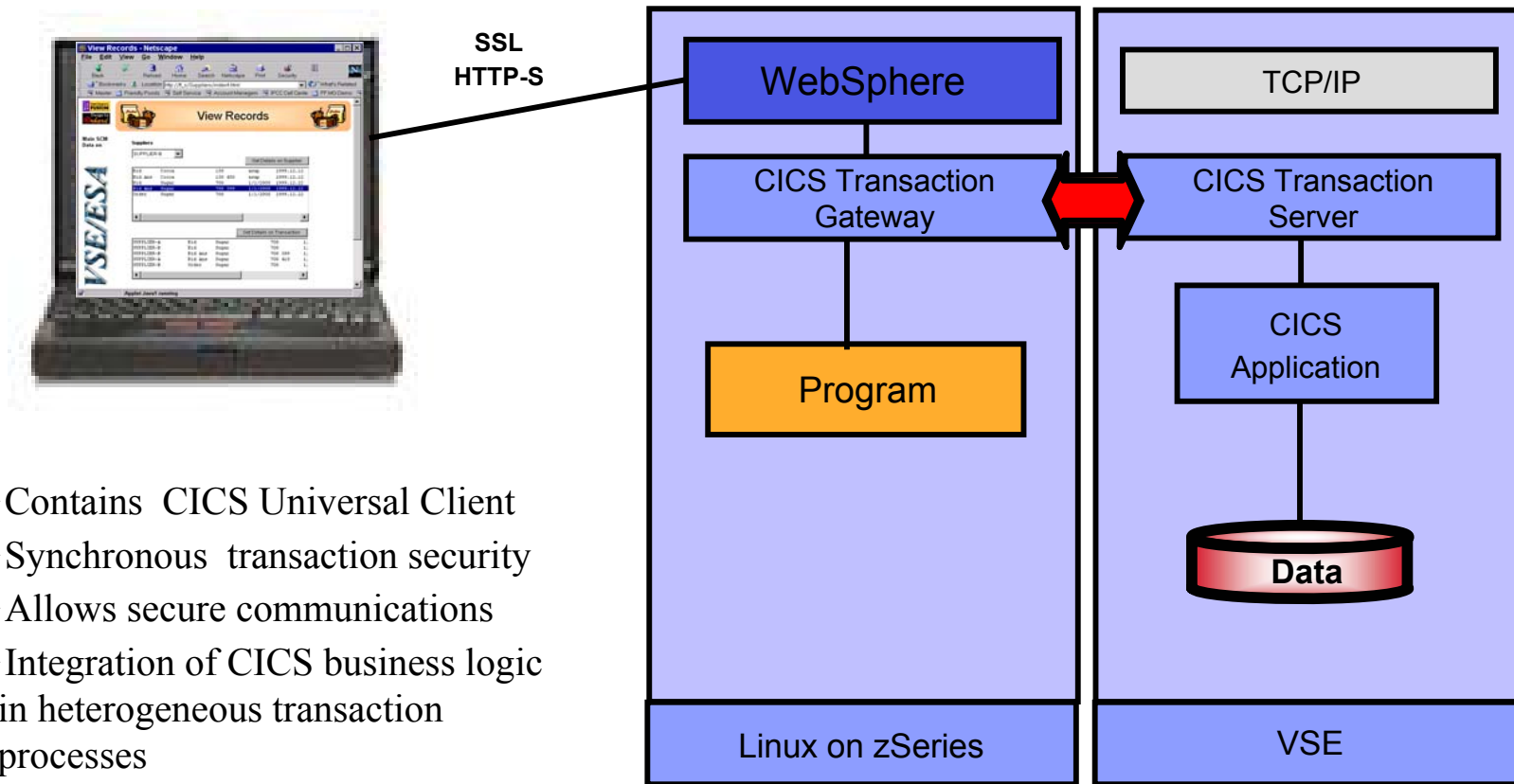
► Contains CICS Universal Client

► Synchronous transaction security

► Allows secure communications

► Integration of CICS business logic in heterogeneous transaction processes

► about 2.0 mill trans per day

General access to VSE/ESA via browser

Host Access transformation Server (HATS) and Host on Demand

❑ Distributor – Finland – modernisation for z/VSE and z/OS

Fictitious Foods

| WebSphere |
| Host Integrator (HATS, Host On Demand) |

| TCP/IP |
| CICS Transaction Server |
| Data |

Linux on zSeries

VSE
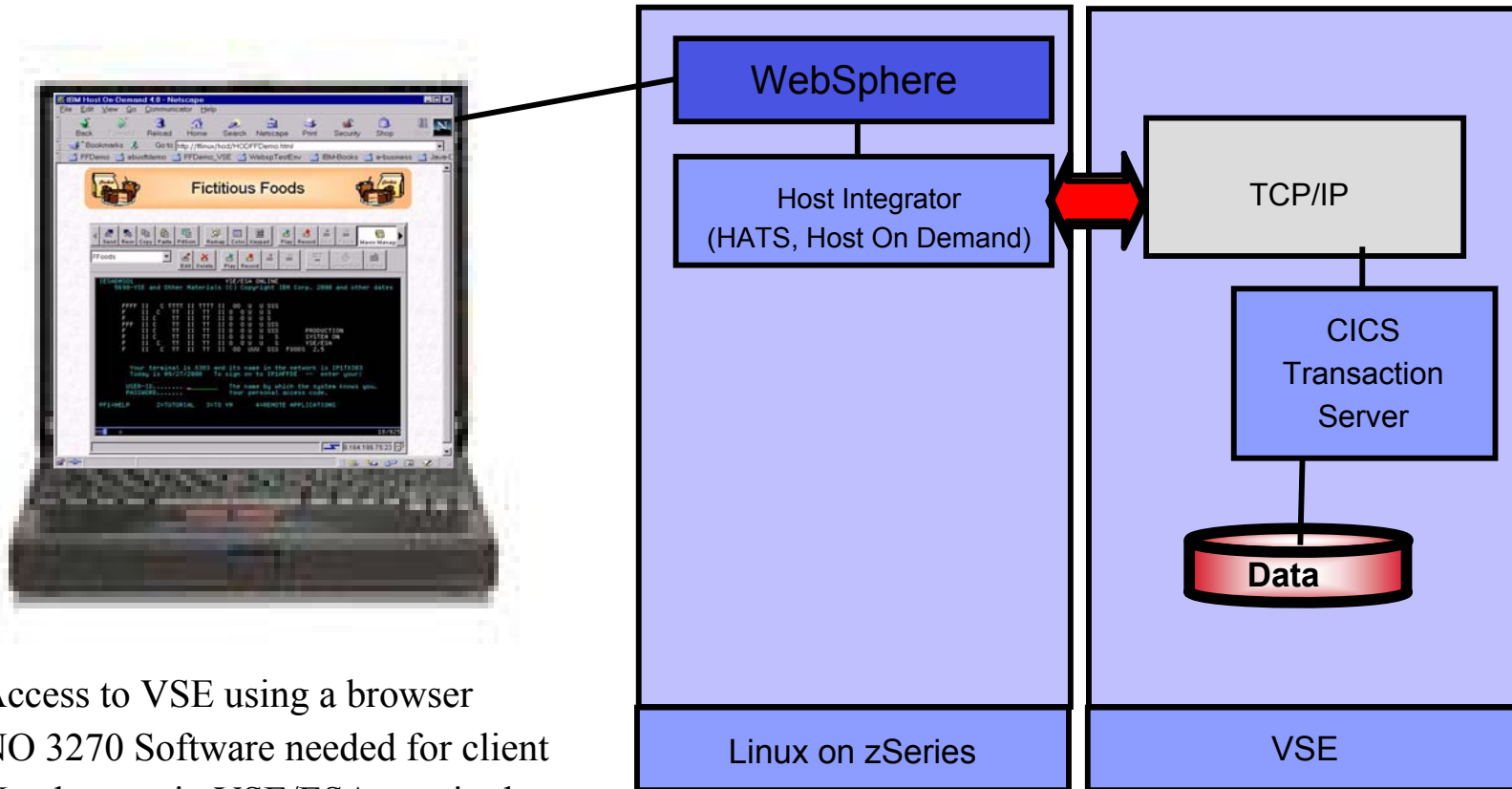
►Access to VSE using a browser
►NO 3270 Software needed for client
►No changes in VSE/ESA required

Interaction with VSE/ESA via browser using (HATS)

Agenda: Optimization of operations

(1) Common data store with distributed data
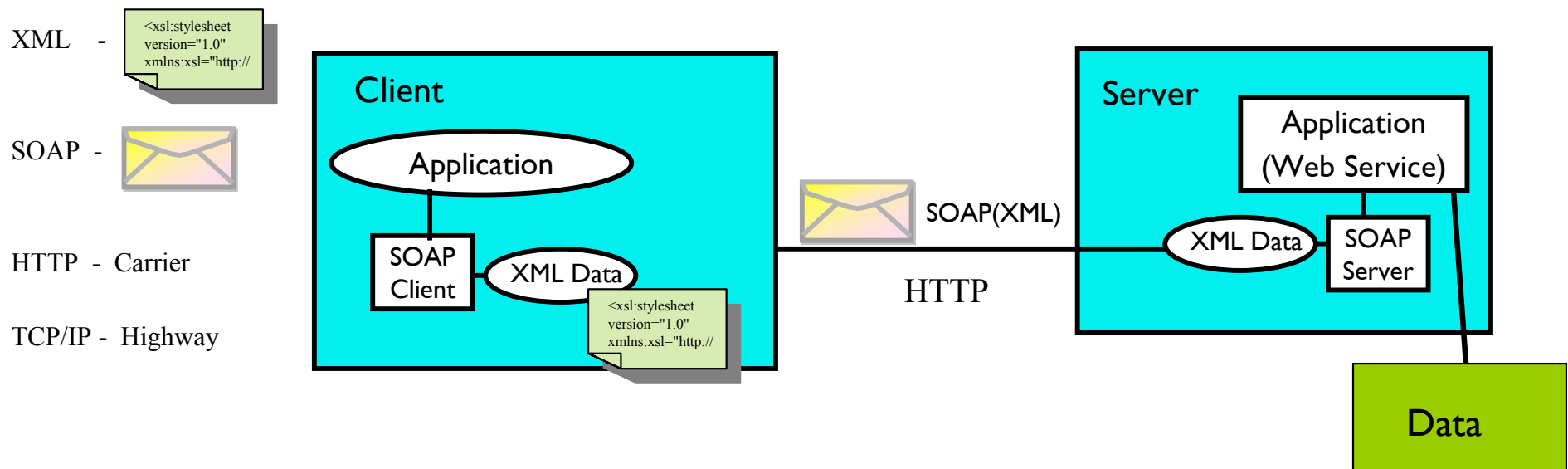
(2) Web transaction processing

(3) Application integration

(4) Service Oriented Architecture (SOA)

(5) DB2 VSE data on DB2 UDB Linux

(3) Application integration and Enterprise Modernization
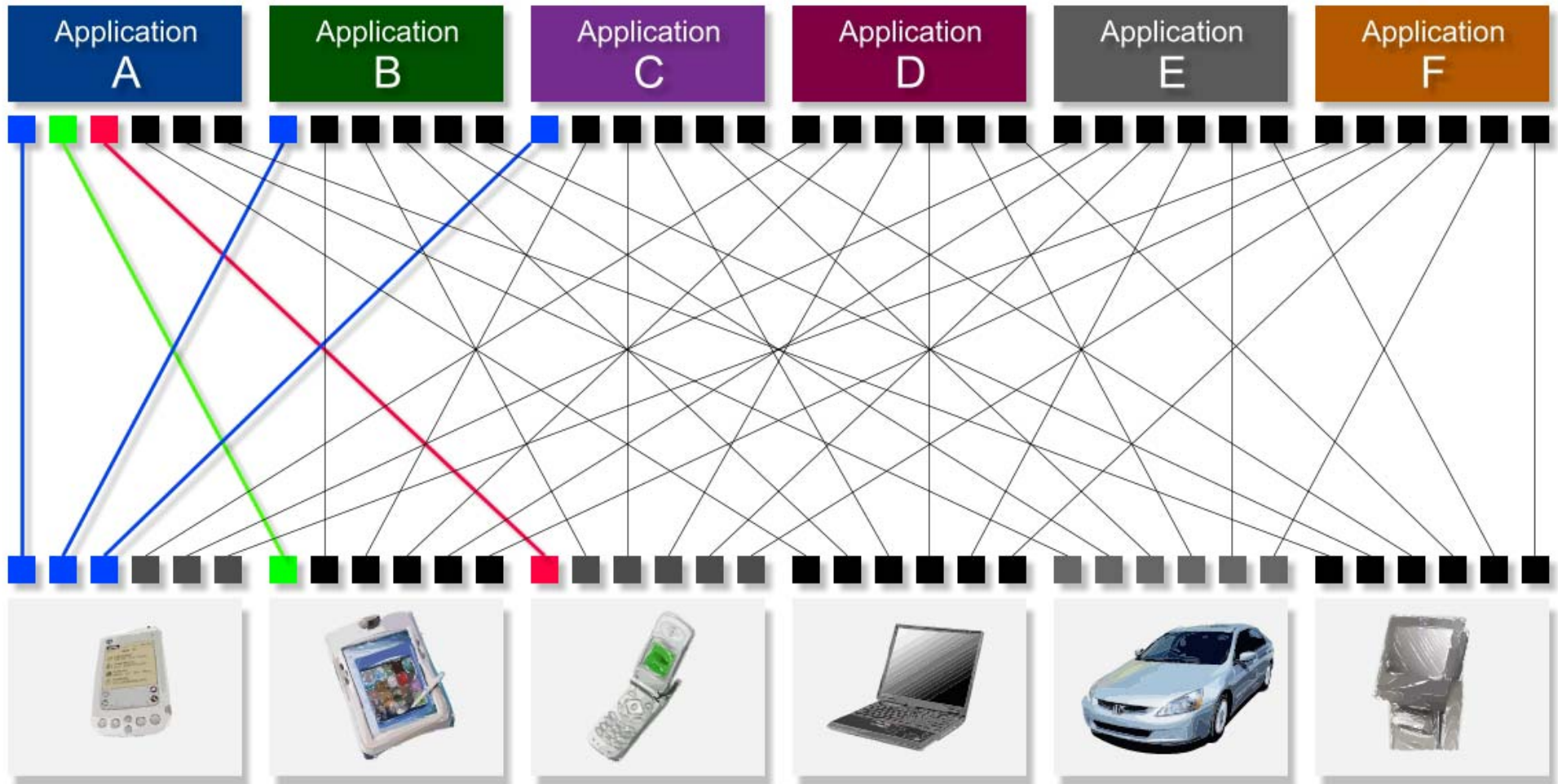
M applications...

N devices   *How do you solve an expanding "M x N" matrix?*

A Mobile Application Platform Defined
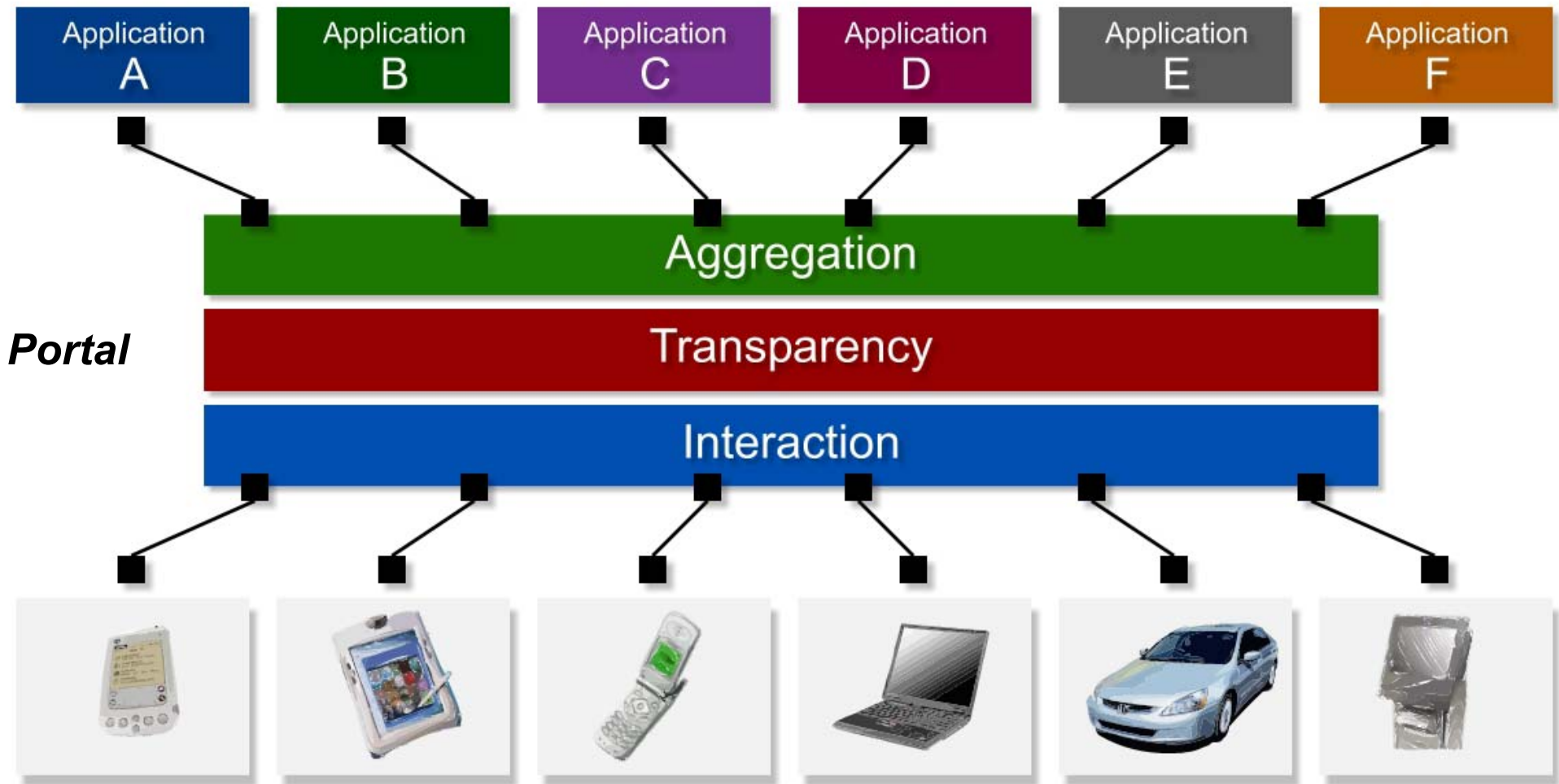
What is a Portal?

- Enterprise Applications
- Messaging
- Search
- Collaboration
- E-meetings
- Web Content
- People Finder
- Knowledge Management
- Business Intelligence
- Document management
- Host systems

A single point of personalized interaction with applications, content, processes and people
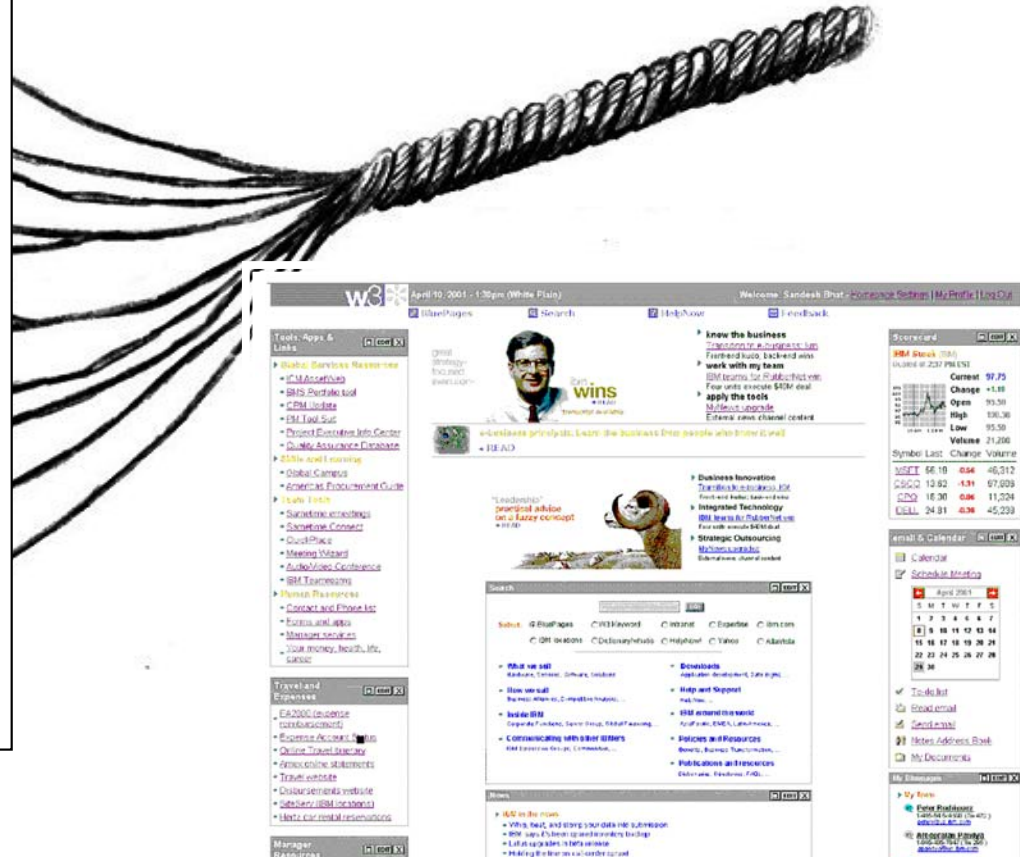
Where Portals are used in today's IT's

B2E Portals improve employee
productivity and speed decision making

B2C Portals
increase
customer
loyalty and
cross-sell
revenue

B2B Portals
build partner
relationships
through
integration with
your business
processes

Content

Applications

People

Processes
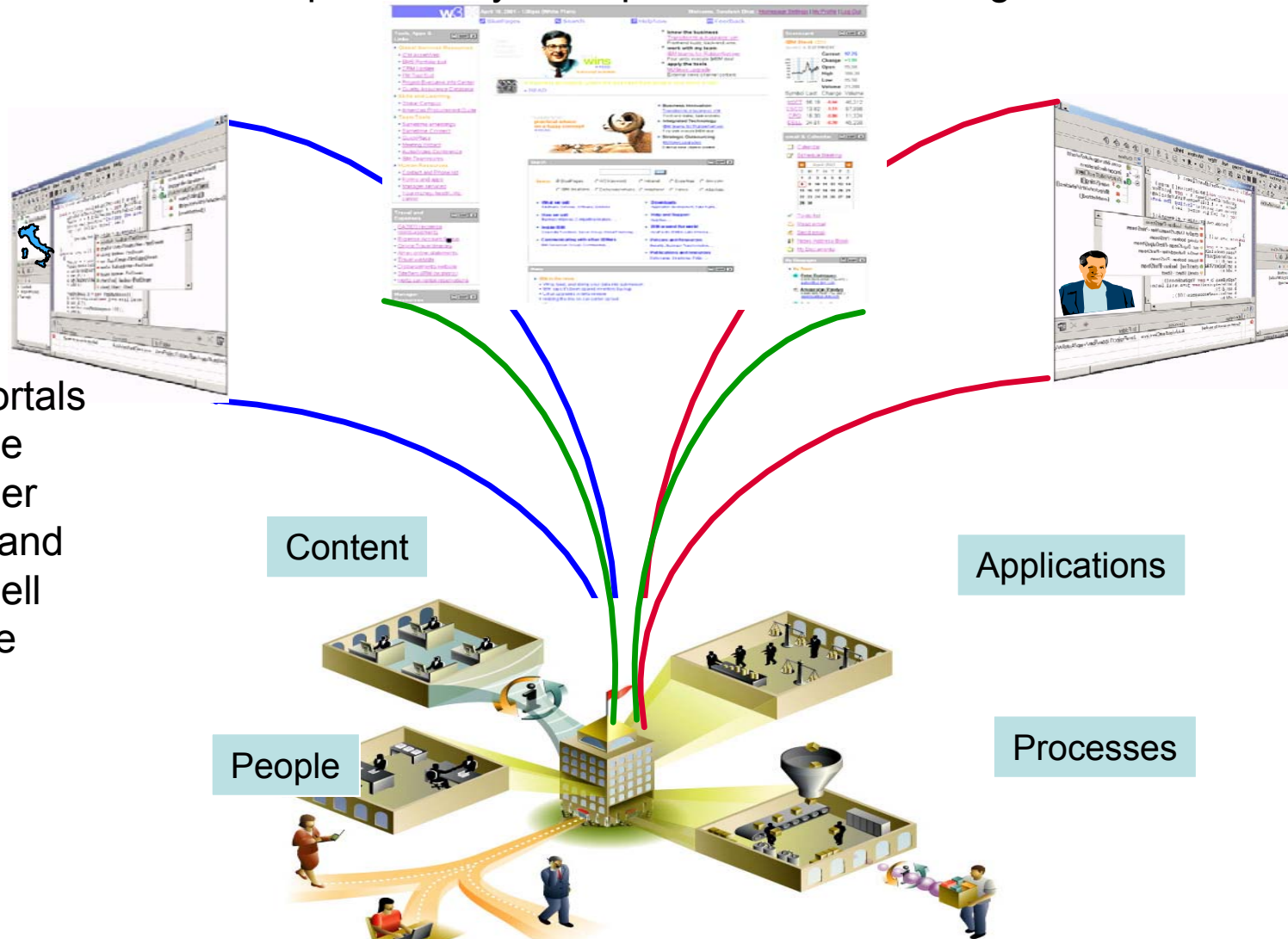
Common portal framework reduces costs and meets changing requirements

Infrastructure

❑ Banks, internet distributor– Germany, Switzerland
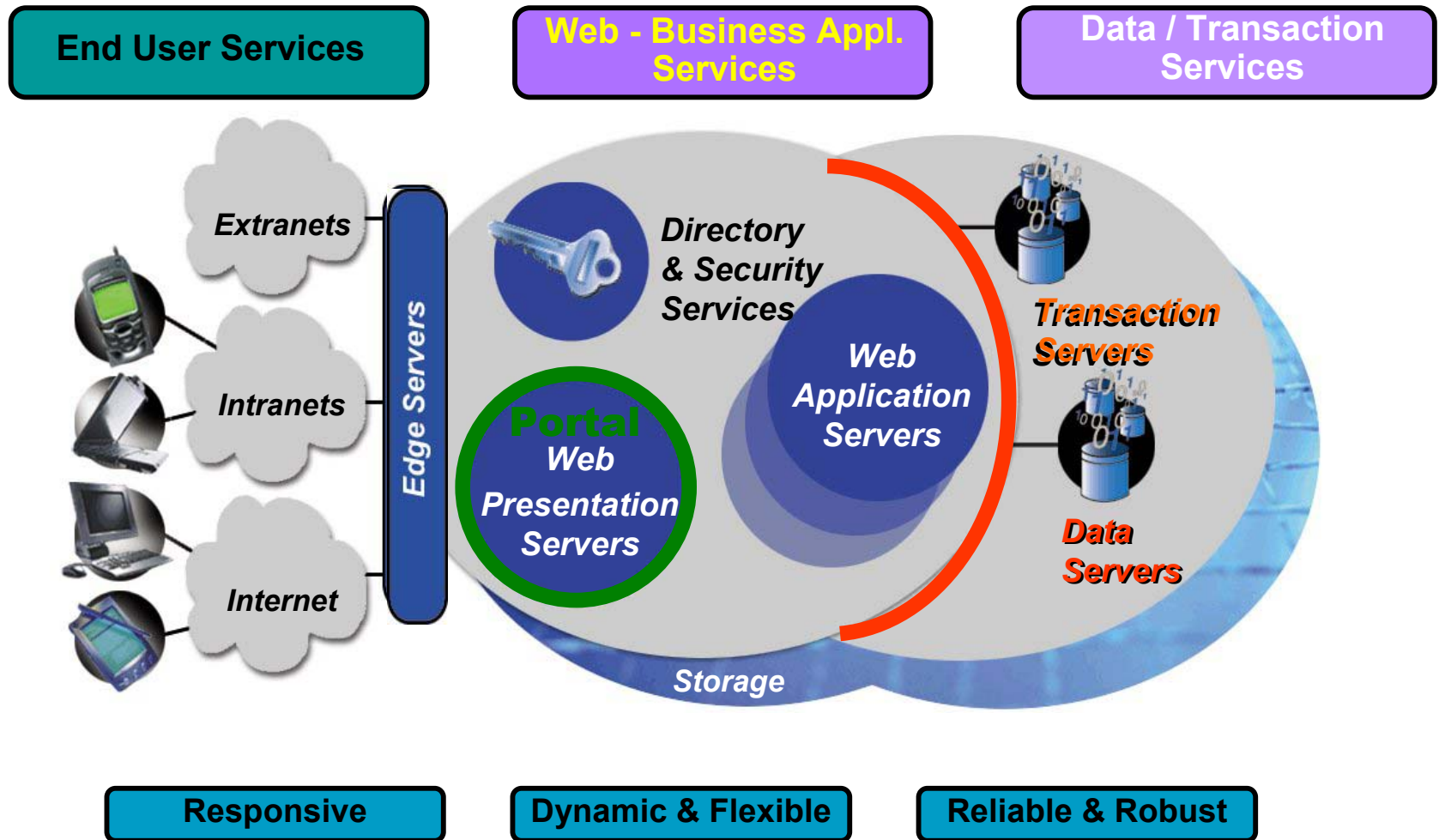
Agenda: Optimization of operations

(1) Common data store with distributed data

(2) Web transaction processing

(3) Application integration

(4) Service Oriented Architecture (SOA)

(5) DB2 VSE data on DB2 UDB Linux

(4) Service Oriented Architecture (SOA) with z/VSE
using Web Services

z/VSE

Business Partner

Customers and
Business Partners

Web Service

SOAP (XML)

Business Partner

Web Service

Web Service

Shipping and
Tracking System

Trucking
Company

Customers

Data

Transactions

e-mail
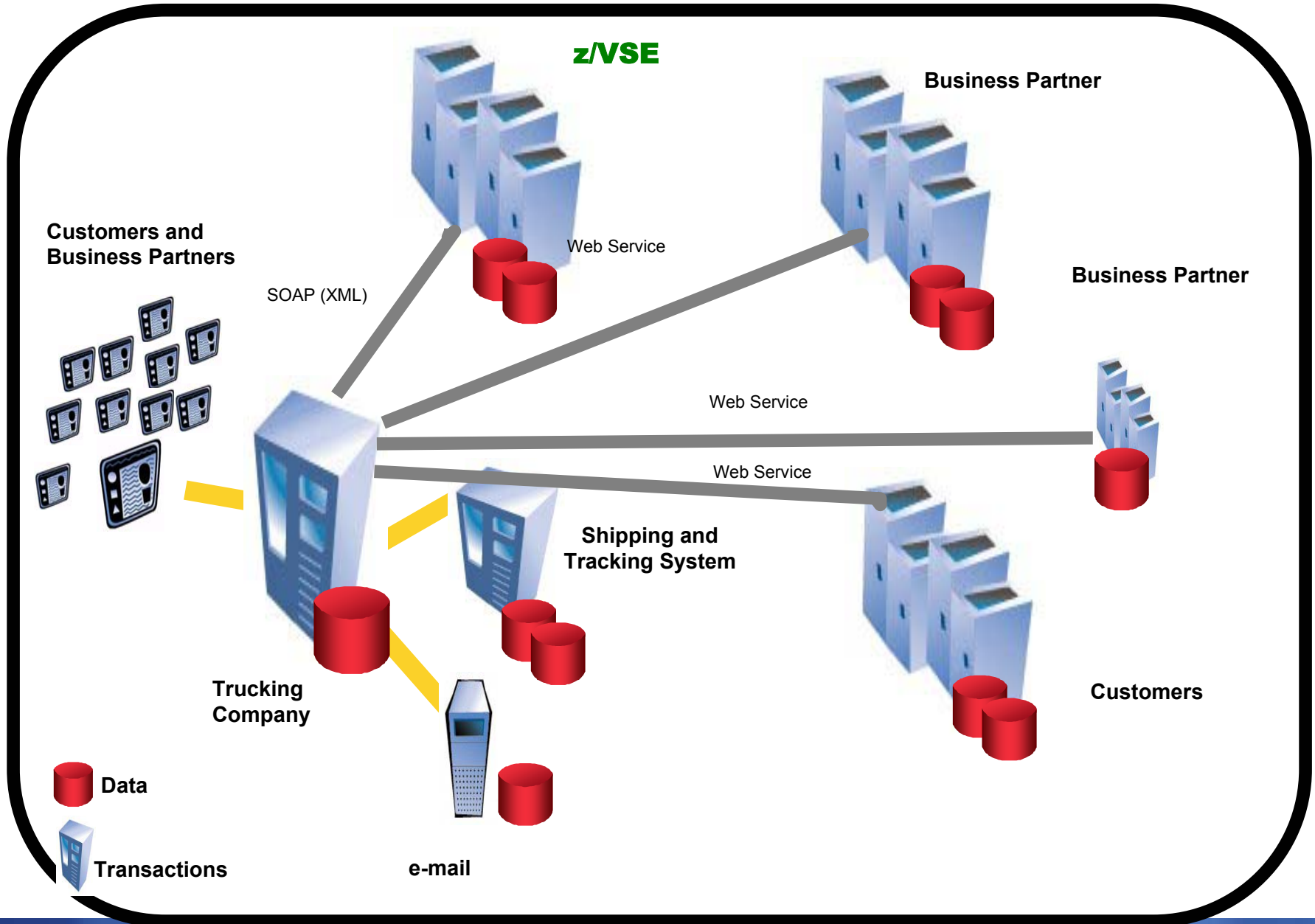
Web Services
XML Document + SOAP Protocol = Web Services

XML -

SOAP -

HTTP - Carrier

TCP/IP - Highway

A *web service*

☞ implements a business, application or system functionality

☞ is intended for application communication

☞ is useable in internet, intranet, extranet

☞ is useable for browser-based solutions up to the B2B integration between companies

☞ uses only standard internet technologies

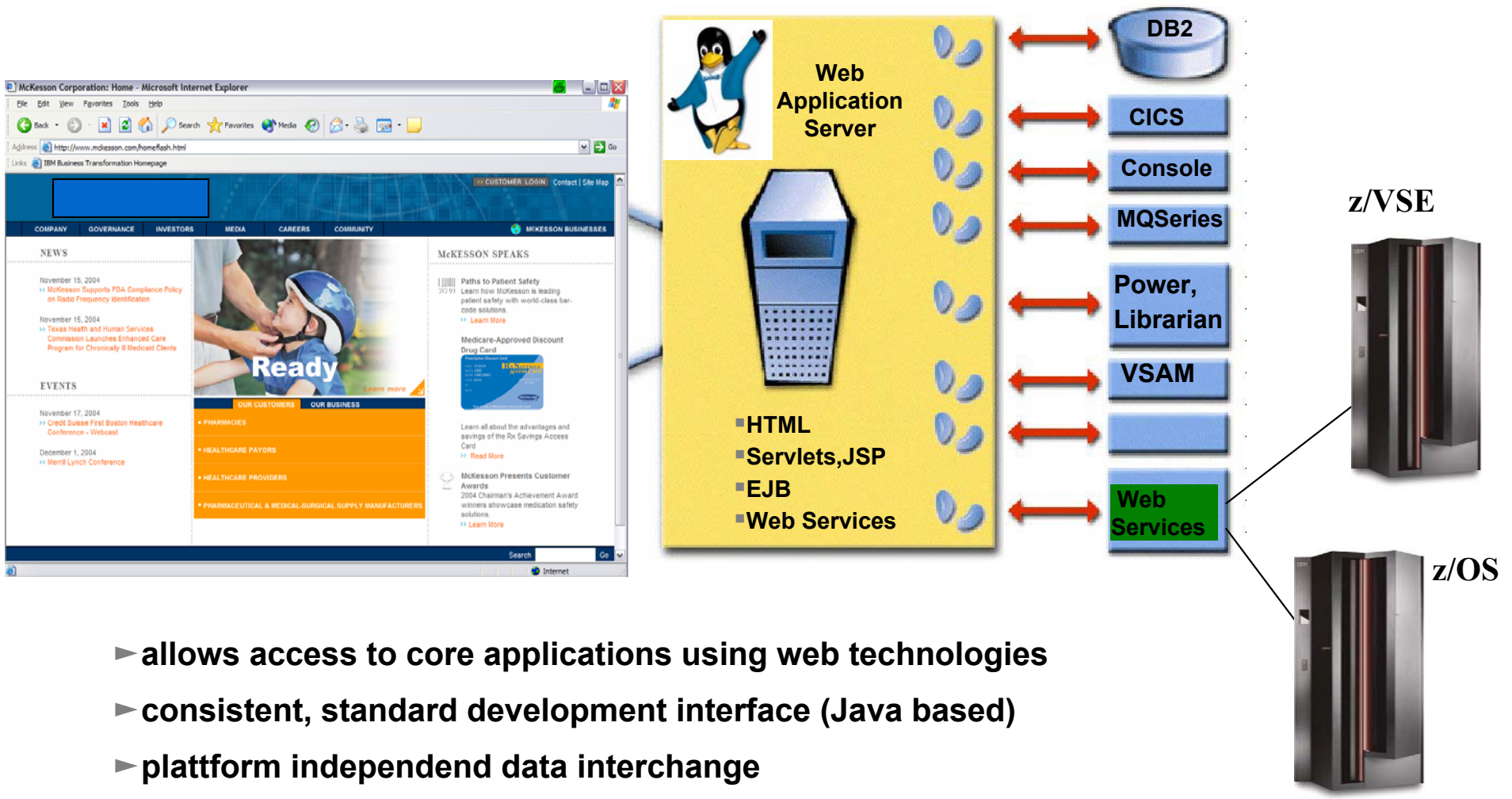# Web Services with z/VSE

SOA and XML data interchange with CICS transactions in VSE

B2B

Microsoft .NET
Websphere
Apache SOAP
AXIS
Java

SOAP Client/Server

HTTP (HTTPS)
SOAP Envelope

XML

z/VSE

CICS TS

XML Parser

SOAP Engine

XML to Commarea proxy

Commarea

Transaction

**NEW Tool !
CICS2WS**
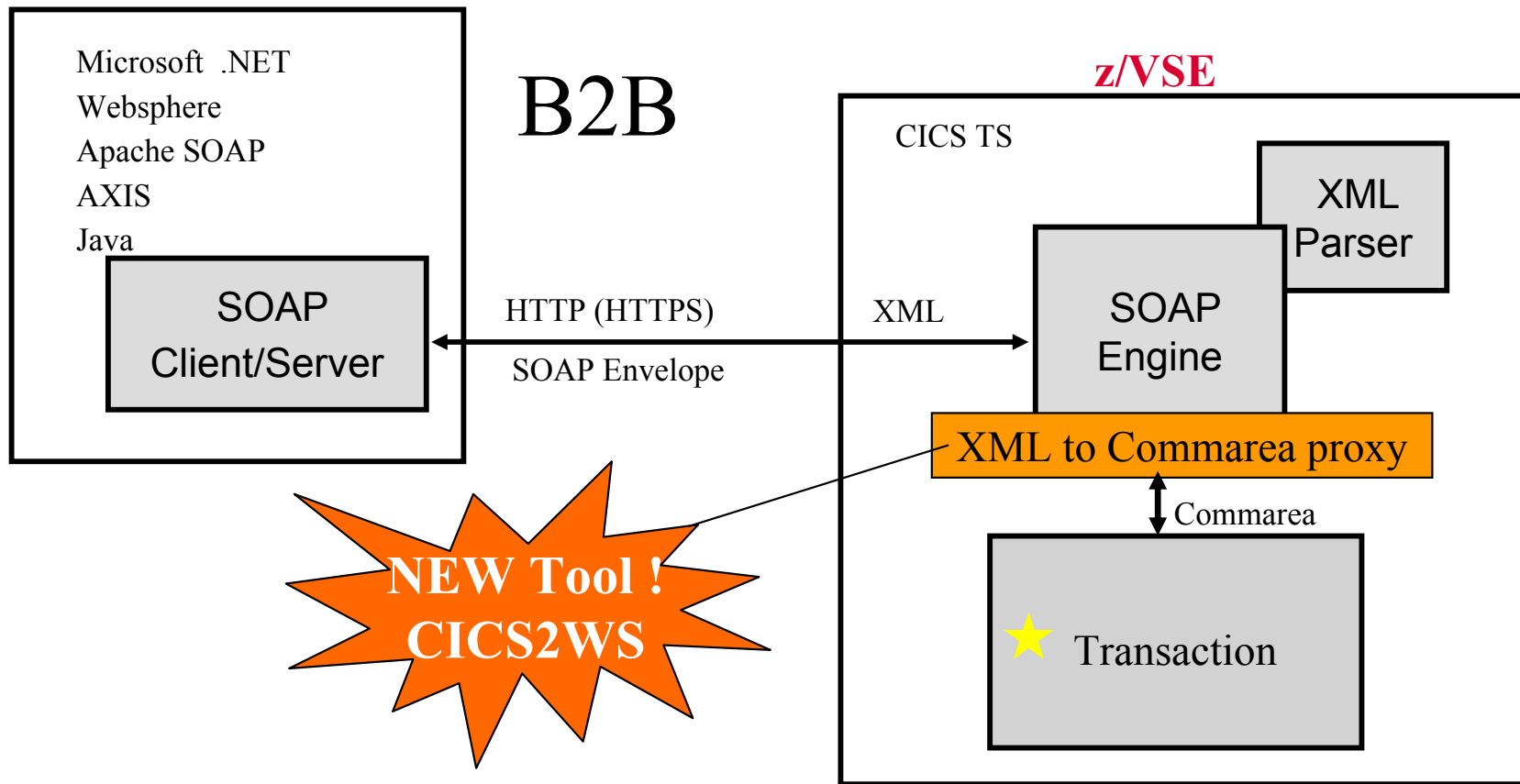
⭐ Existing VSE Transactions as Web Service
⭐ Existing Transactions can remote Call Web Services

Web Transactions with z/VSE using Web Services

(with the Websphere Software Plattform and VSE Connectors)

❑ VSE and XML, SOAP Web Services – Insurance France, Germany, US, Nordics

- Web Application Server
- HTML
- Servlets,JSP
- EJB
- Web Services

DB2

CICS

Console

MQSeries

Power, Librarian

VSAM

Web Services

z/VSE

z/OS

► **allows access to core applications using web technologies**

► **consistent, standard development interface (Java based)**

► **plattform independend data interchange**

Agenda: Optimization of operations

(1) Common data store with distributed data

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(5) DB2 VSE data on DB2 UDB Linux

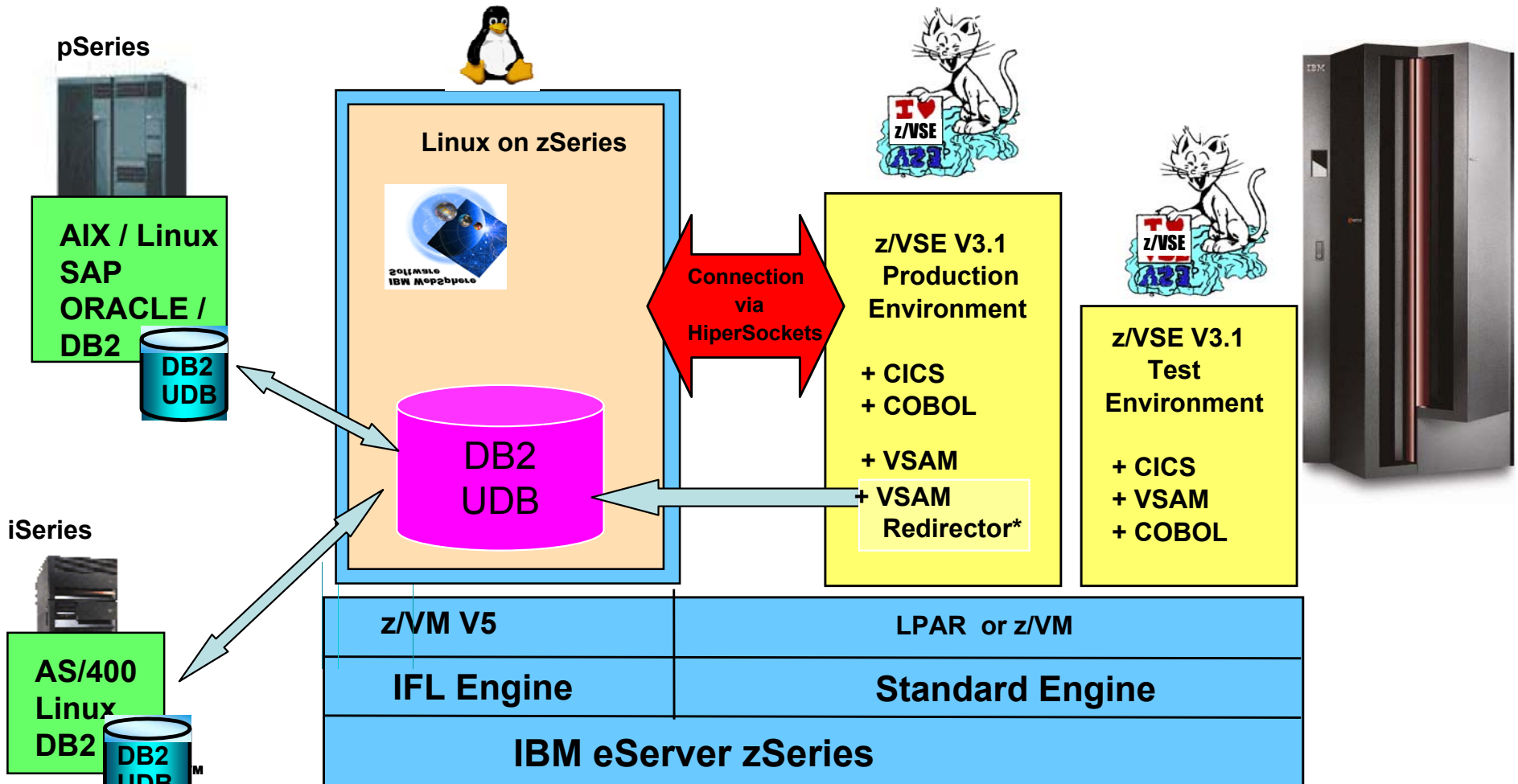# Typical VSE Customer Environment

- Various different servers (zSeries, pSeries, iSeries, xSeries, and competitive)
- VSAM data on VSE (few DB2 environments)
- Relational databases on distributed platforms (DB2, Oracle)
- Data interchange via FTP

iSeries

pSeries

AS/400 Linux DB2

DB2 UDB

xSeries (Windows) Server Farm
i.e. ATMs

AIX / Linux SAP ORACLE / DB2

DB2 UDB

IP

Windows/ Linux DB2 ORACLE

DB2 UDB

Data Exchange

z/VSE Production Environment

+ TCP/IP
+ CICS
+ VTAM
+ COBOL

+ VSAM
(+ DB2 VSE)

VSAM

z/VSE Test Environment

+ CICS
+ VTAM
+ VSAM
+ COBOL

z/ VM

DB2 VSE/VM

zSeries or System z
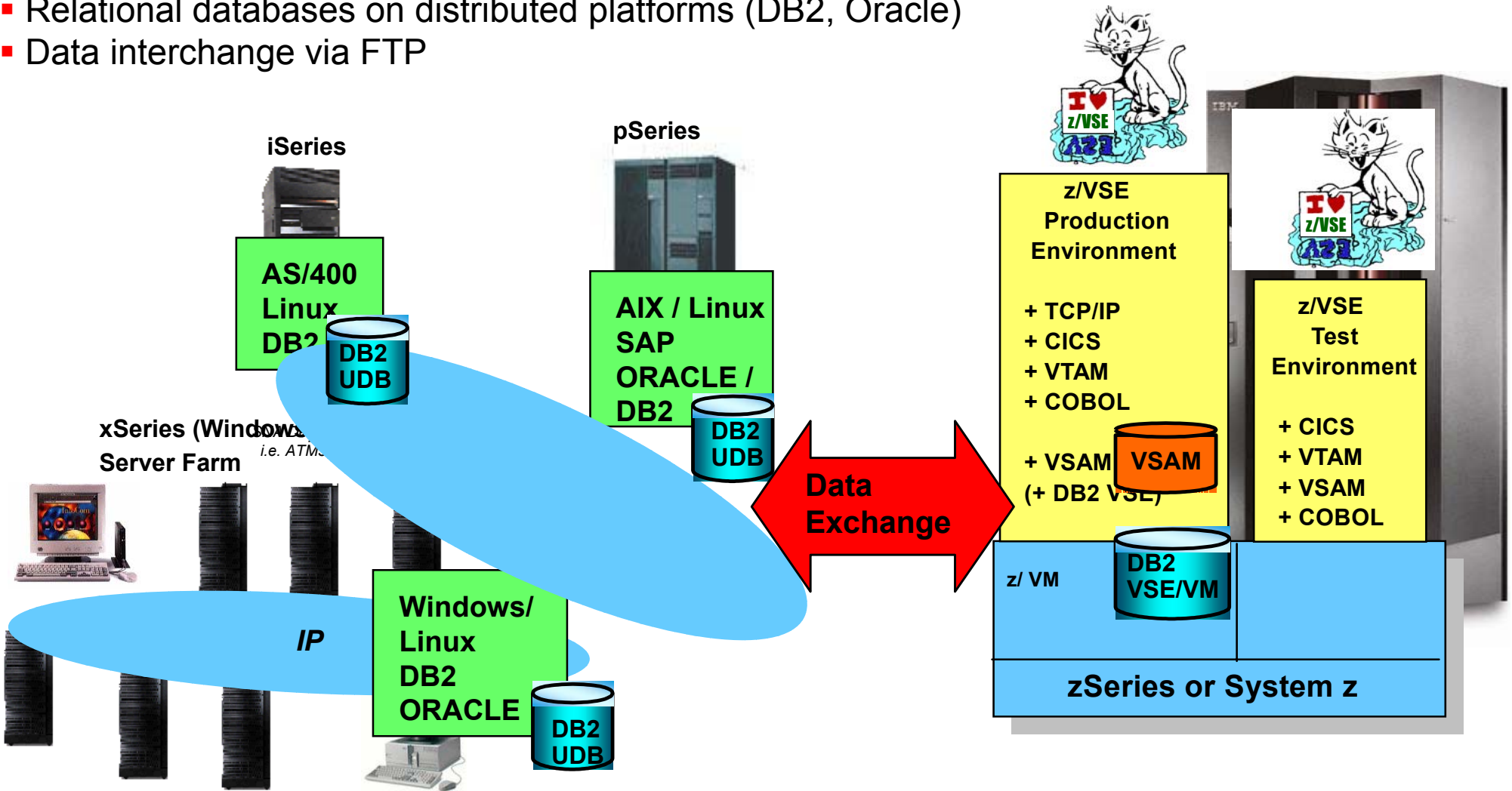
VSE applications and DB2 UDB on Linux on zSeries

z/VSE Server

DB2 UDB
???

TCP/IP
LE/VSE
Batch
CICS
? ? ?

DB2
VSAM
DB2
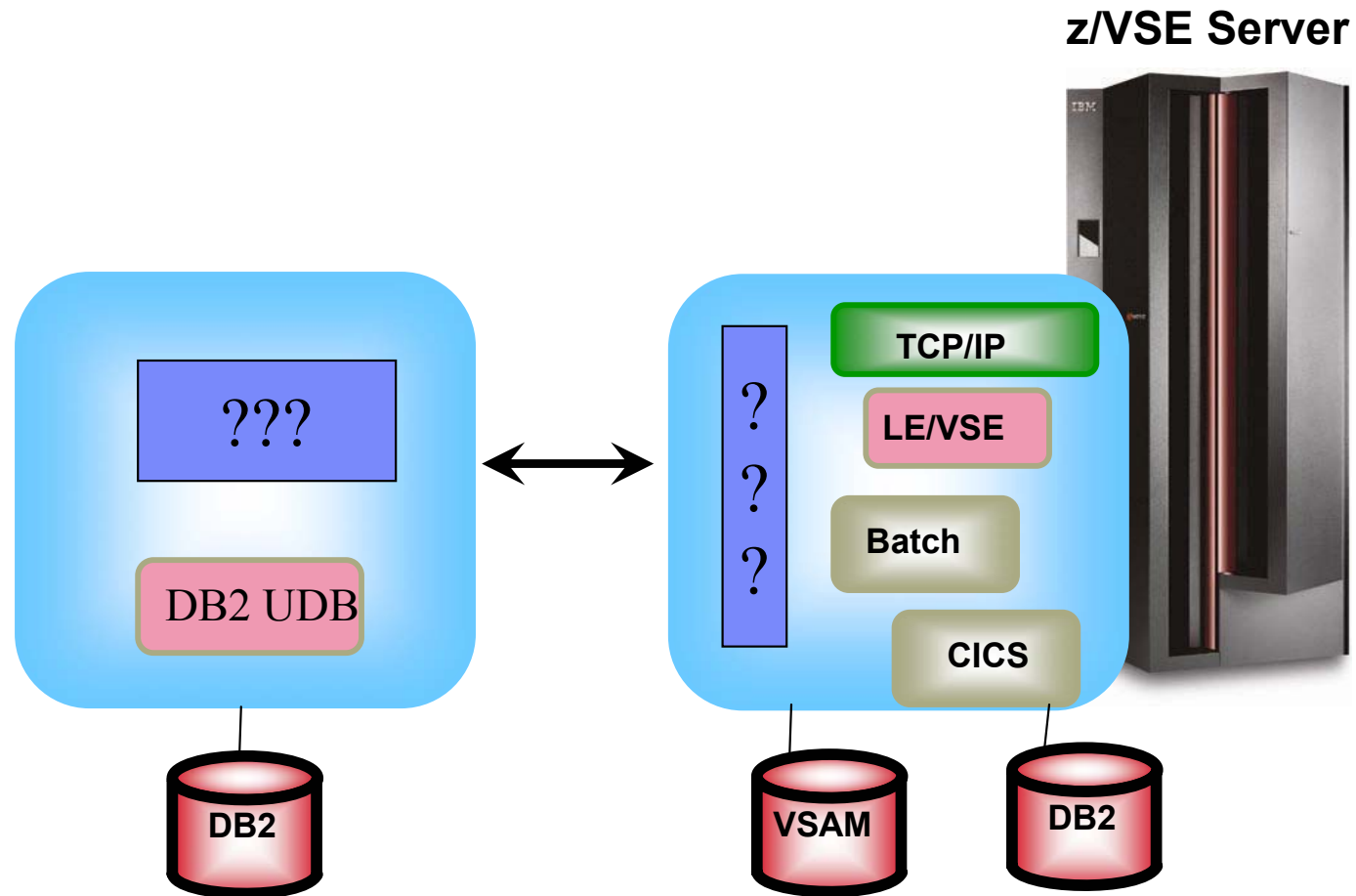
Common Data Store – Transparent Work of VSAM Programs with DB2 UDB on Linux on zSeries

pSeries

AIX / Linux SAP ORACLE / DB2

DB2 UDB

Linux on zSeries

Software IBM Morshpolo

DB2 UDB

Connection via HiperSockets

z/VSE V3.1 Production Environment

+ CICS
+ COBOL

+ VSAM
+ VSAM Redirector*

z/VSE V3.1 Test Environment

+ CICS
+ VSAM
+ COBOL

iSeries

AS/400 Linux DB2

DB2 UDB

z/VM V5	LPAR or z/VM
IFL Engine	Standard Engine
IBM eServer zSeries	

(*) VSAM Redirector – Common data store solution – with DB2 on Linux on zSeries Solutions without changes to VSAM programs

VSE/VSAM applications access to DB2 UDB on Linux on zSeries

z/VSE Server

VSAM Redirector Server

Handler

DB2 UDB

DB2

VSAM Redirector Client

TCP/IP

LE/VSE

Batch

CICS

VSAM
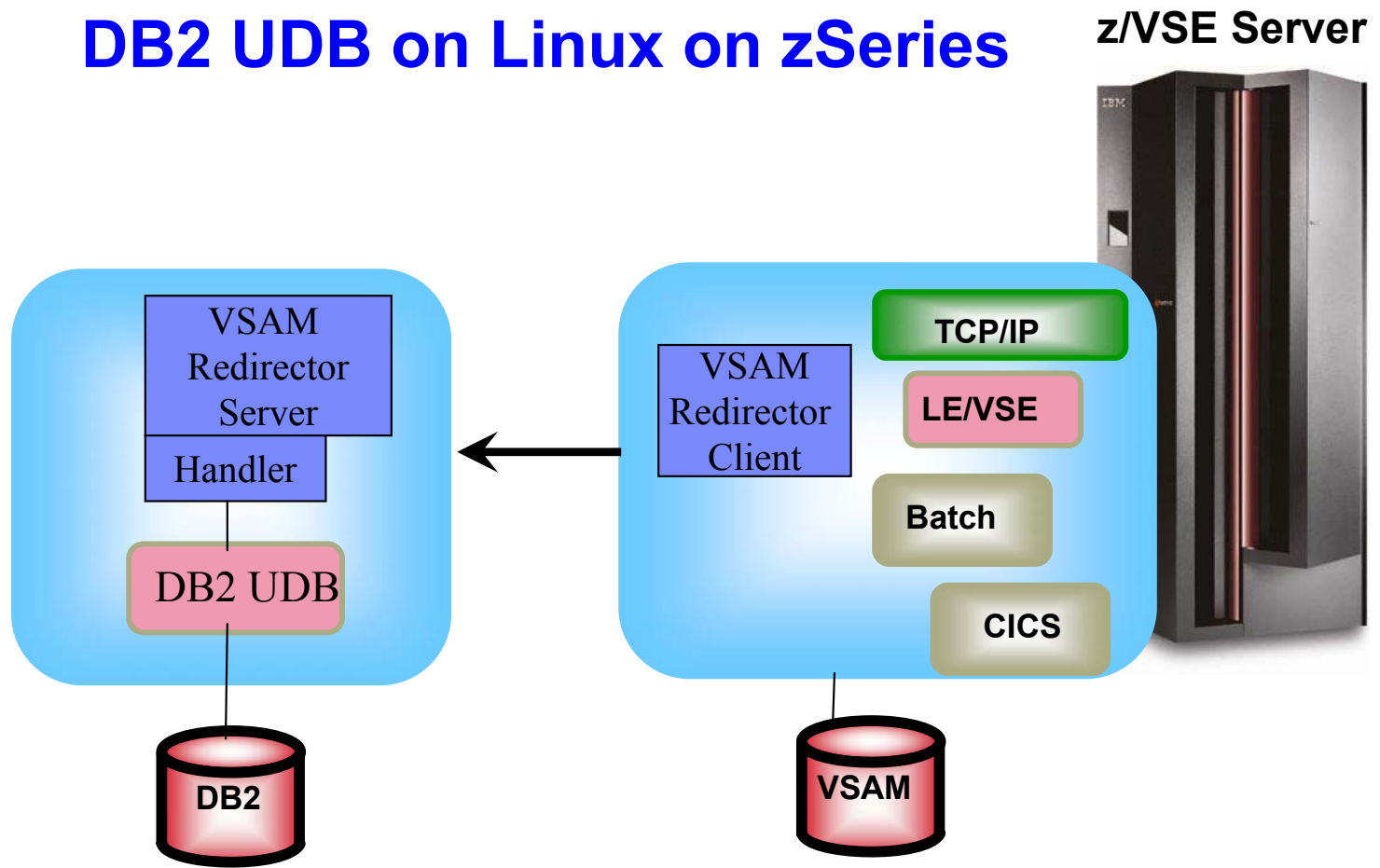
DB2 Scenarios – with DB2 UDB on Linux

pSeries

AIX / Linux SAP ORACLE / DB2

DB2 UDB

iSeries

AS/400 Linux DB2

DB2 UDB

Linux on zSeries

Software IBM WebSphere

Connection via HiperSockets

DB2 UDB

DB2 VSE

z/VSE V3.1 Production Environment

+ CICS
+ VSAM
+ COBOL

+ DB2 VSE Client*

z/VSE V3.1 Test Environment

+ CICS
+ VSAM
+ COBOL

z/VM V5	z/VM V5	z/VSE Test System LPAR
IFL Engine	Standard Engine	
IBM eServer zSeries		
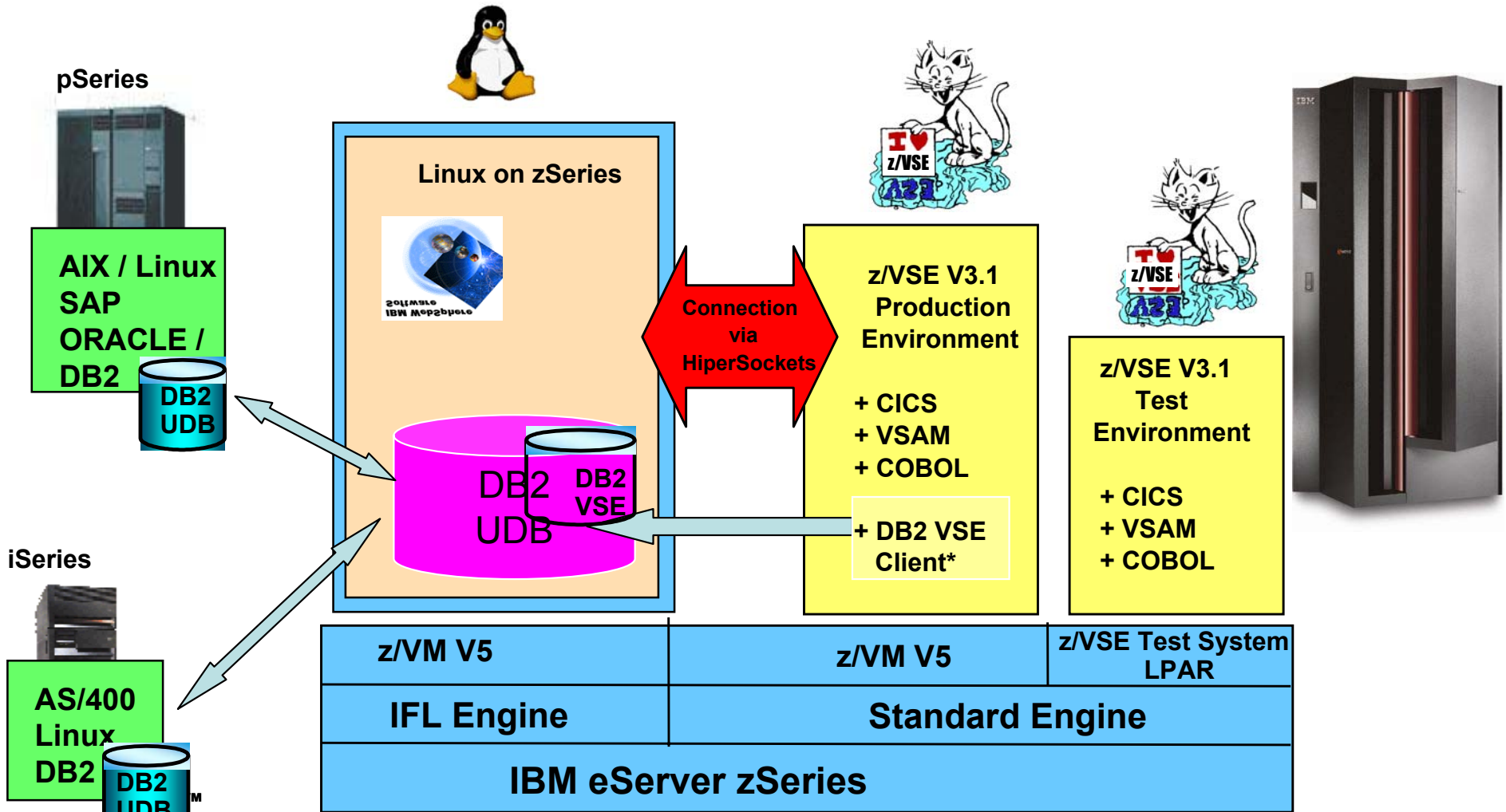
(*) DB2 VSE Client – the client functionality only, can be obtained with PRPQ P10154

DB2 VM applications to access, remote DB2 UDB on Linux
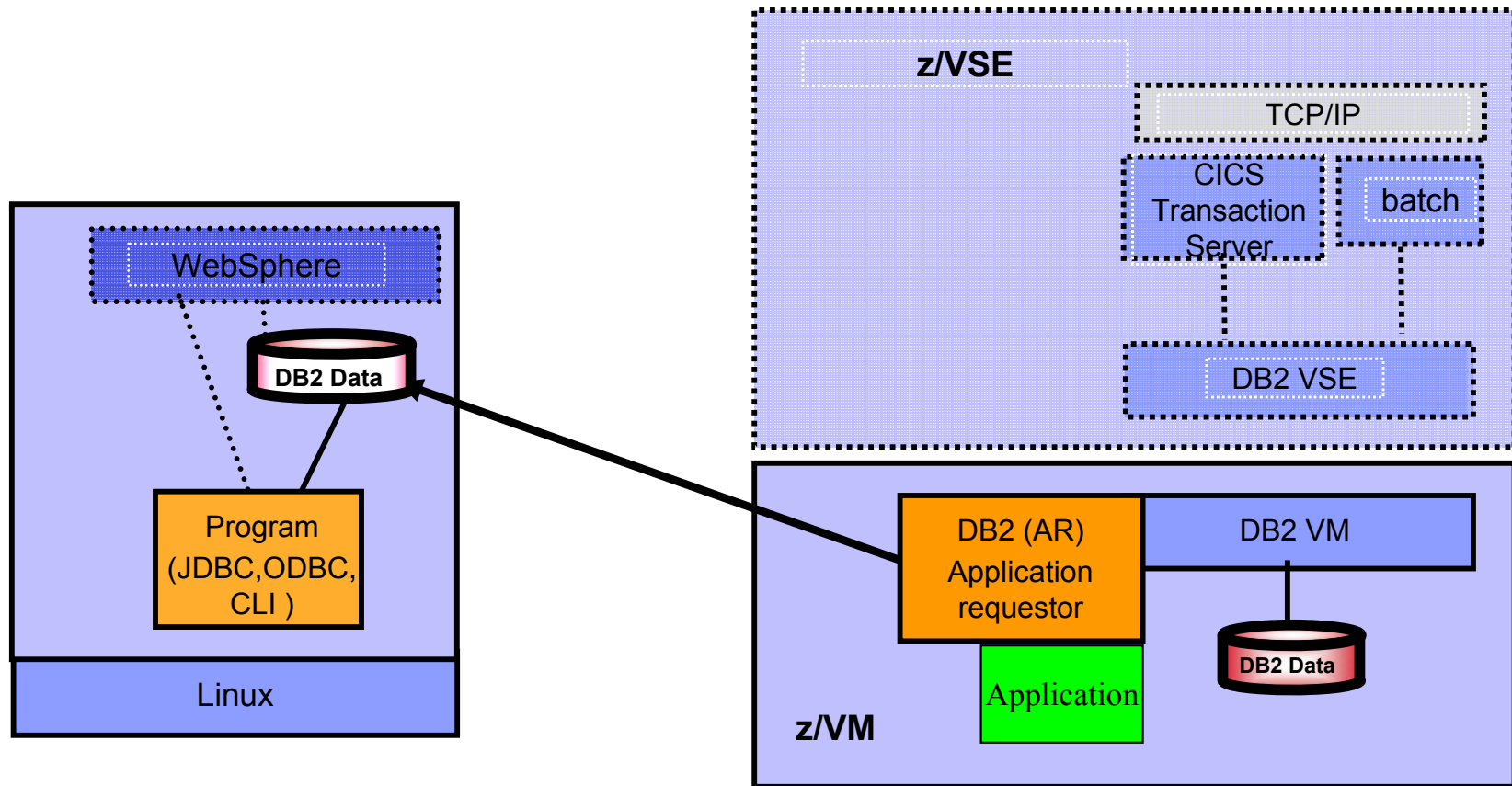
►VM application accesses DB2 UDB on Linux

DB2 VSE applications to access, remote DB2 UDB on Linux on zSeries - Special OFFERING
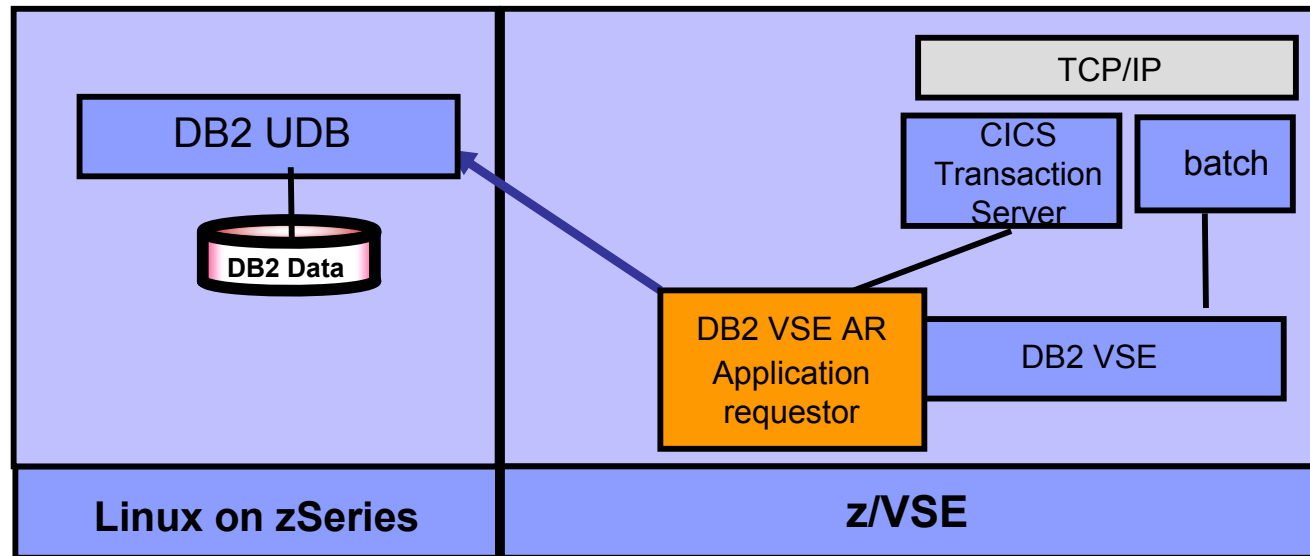
- ►Original Price Model: License for DB2 VM/VSE **AND** DB2 UDB for Linux
- ►**PRPQ: P10154 (Ordering Nr: 5799-HAQ)**
  - ►**Reduced License for DB2 VSE Client only - if NO data on VSE**
    - ►**Full Price for DB2 UDB on Linux on zSeries**

- ►**Special Price for DB2 UDB for Linux on zSeries**

- ►*Note:*
  - ►*Both Products are needed because of the Programing interface and precompiler*
  - ►*On VSE the SQL language that can be used is the DB2 VSE SQL Language – because of precompiler*

DB2 VSE and DB2 UDB on Linux on zSeries

Why use DB2 UDB on Linux on zSeries with VSE Core applications

- Modern environment in DB2 UDB on Linux on zSeries

- Existence of lots of tools for:
    - database management
    - Optimization and Tuning
    - Data analysis (Warehouse, Mining, OLAP)

- ASCII environment – easy integration with distributed DB2 UDBs
- Consolidation of DB2 UDB databases from distributed platforms

- **Note: DB2 CONNECT is not needed on Linux on zSeries**

DB2 VSE and DB2 UDB on Linux on zSeries

Why use DB2 UDB on Linux on zSeries with VSE Core applications

- VSE applications access to DB2 UDB on Linux via HiperSockets
  - reliable network – no wires
  - fast network (memory copy speed)
  - transparent

- Core applications on VSE (CICS and batch):
  - can be used unchanged with considerations of EBCDIC – ASCII code pages (i.e. sorts with low values)
  - can show performance degradations if mass single row processing is done – these applications might need adaptions

- **Note: DB2 CONNECT is not needed on Linux on zSeries**

Environment and Database design

Configuration for CICS applications and remote DB2 UDB database

- VSE environment
  - configure DB2 VSE database directory
    - configure ARISDIRD (IP, port, DBname of remote database)
  - enable DRDA code (batch and online)
    - configure ARIS74LD (batch), ARIS745D (AR)
    - new transaction in CICS to bind packages (CBND) to remote AS (done during program preparation)

- zLinux environment
  - configure database manager on DB2 UDB zLinux
    - change some DBM parameters to allow implicit connect from within CICS
  - configure VSE batch and ISQL options (create remote packages)
    - ARIISQL for ISQL and ARIDSQL for Batch

- **Note: DB2 CONNECT is not needed on Linux on zSeries**

Environment and Database design

Configuration for CICS applications and remote DB2 UDB database

Application considerations:

- migrate tables from DB2 VSE to DB2 UDB zLinux
  - UDB export/import options
  - use of federated DB2 UDB options and a cursor application

- existing CICS/DB2 VSE applications
  - no changes to the source code required (except Code page issues)
  - the SQL precompile creates new packages on the remote DB2 UDB)

- existing VSE batch DB2 VSE applications
  - no changes to source code required
  - adapt CONNECT statements to access remote DB2 UDB

DB2 UDB on Linux on System z logical integrates DB2 VSE via Federated option in DB2 UDB
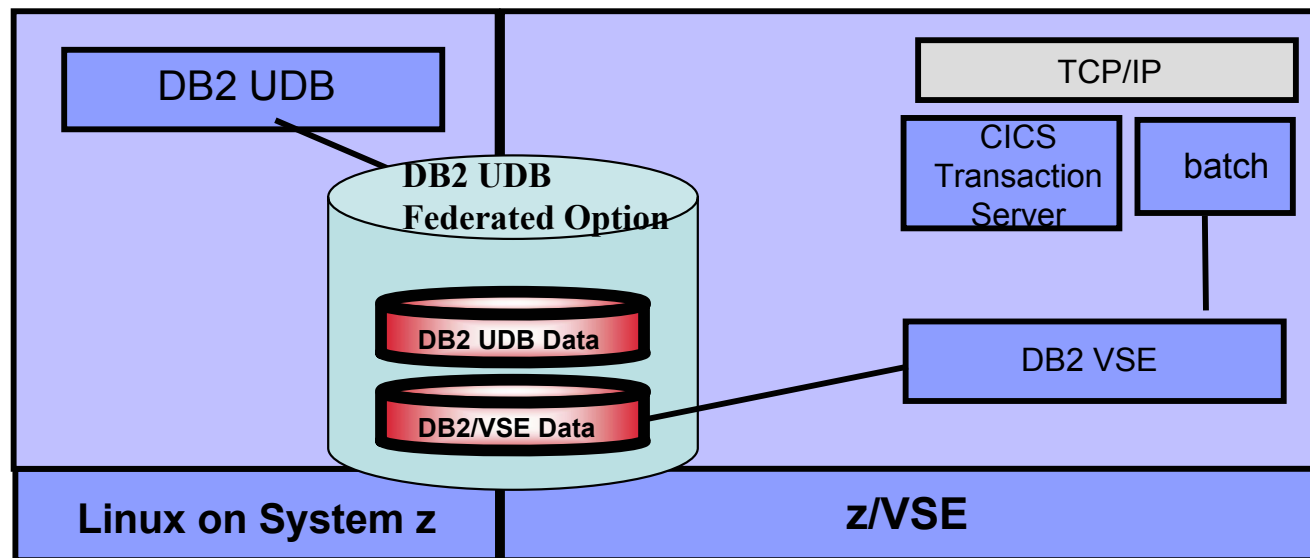
► Minimum changes – maximum combination

  ► DB2 UDB for Linux on System z with Federated Option – includes DB2 VSE logically

  ► DB2 UDB Applications have transparent access to DB2/VSE

Federated Database design
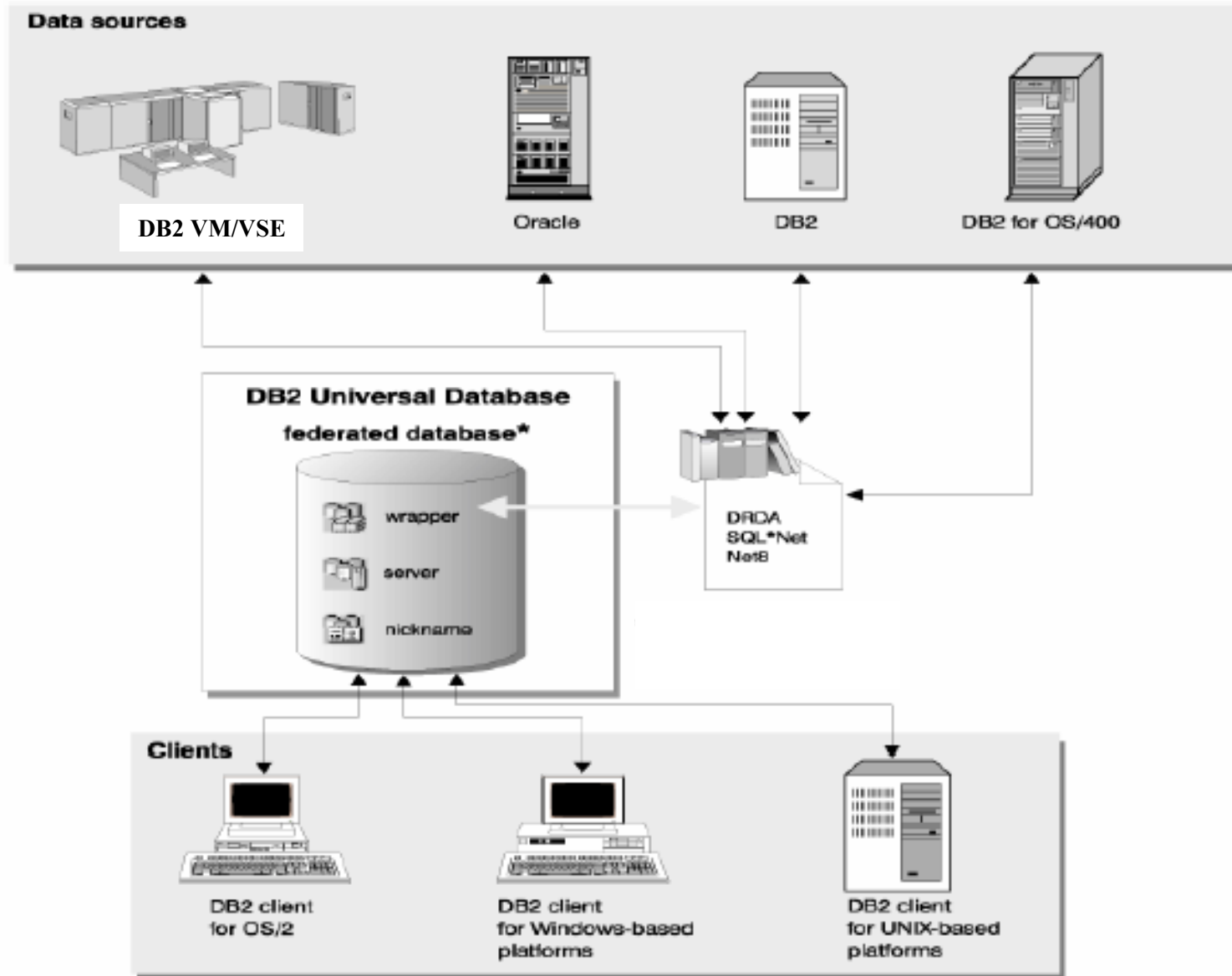
Summary

Solutions with DB2 UDB with Linux on zSeries enable modern possibilities with VSE:

- easy to configure environment

- easy migration from DB2 VSE to DB2 UDB zLinux

- in general, no source code change for existing VSE applications

- faster IBM development for DB2 UDB

- advanced SQL on DB2 UDB than DB2 VSE

- more option for DB2 UDB integration to other distributed environments and Development tools (Rational, WebSphere, ...)

More information about DB2 UDB and DB2/VSE

➢ **Summary of DB2 Planning and Customization Tasks (VSE)**

   http://publibz.boulder.ibm.com/cgi-bin/bookmgr_OS390/BOOKS/iespie41/10.4.5

➢ **Enabling the DB2 Server for VSE**

   http://publibz.boulder.ibm.com/cgi-bin/bookmgr_OS390/BOOKS/iespie41/10.4.4

➢ **Customizing Tasks for DB2 Server for VSE (DB2-Based Connector)**

   http://publibz.boulder.ibm.com/cgi-bin/bookmgr_OS390/BOOKS/IESWUE41/HDRINDB2BC

➢ **DB2 - Resolve Frequent Problems**
   http://publib.boulder.ibm.com/infocenter/db2help/index.jsp?topic=/com.ibm.db2.udb.doc/conn/c0005607.htm

➢ **DB2 Universal Database (UDB)**

   http://www.ibm.com/software/data/db2/udb/

➢ **Moving Data from DB2/VSE&VM to DB2 UDB**

   http://www-306.ibm.com/software/data/db2/vse-vm/support.html

IBM Education Announcement - z/VSE 4.1 Live Virtual Classes

z/VSE Version 4.1 Virtual Classes after announcement on January 9, 2007

- The Live Virtual Classes (LVC) were delivered using the Interwise tool that employs Voice over IP (VoIP) technology to provide both the audio as well as the visuals for the class to your Windows workstation.

- **The calls are available via replay on the VSE home page   ibm.com/vse**

- The duration for each live virtual class is about 1 hour.

1) z/VSE and MWLC Announcement Overview -   February 1 (Thursday)
Content: Overview of the January 9 announcement including z/VSE 4.1 and updates to the z/VSE pricing.

2) Midrange Workload Licensing Charges for z/VSE -   February 22 (Thursday)
Content: Midrange Workload Licensing and associated sub-capacity pricing.

3) z/VSE 4.1 solutions based on SOA and DB2 -   March 15 (Thursday)
Content: How z/VSE can take part in modern solutions based on System Oriented Architecture (SOA), XML data interchange and Web services standards.

z/VSE, the new web presence

http://www.ibm.com/servers/eserver/zseries/zvse/

Additional Information

- z/VSE/ESA Home Page

  http://www.ibm.com/servers/eserver/zseries/zvse/

- z/VSE solutions

  http://www-1.ibm.com/servers/eserver/zseries/zvse/solutions

- e-business Connectors User's Guide   SC33-6719

  http://www-1.ibm.com/servers/eserver/zseries/zvse/documentation/#conn

Redbooks

- e-business Solutions for VSE/ESA   SG24-5662

- e-business Connectivity for VSE/ESA   SG24-5950

- CICS Transaction Server for VSE/ESA
  CICS Web Support   *SG24-5997-00*

- WebSphere V5 for Linux on zSeries Connectivity Handbook   SG24-7042

We appreciate your comments at :   zvse@de.ibm.com