



IBM Systems & Technology Group

# User experiences with z/VSE Connector Solutions



**Integration**

Linux on zSeries    z/VSE    z/VM

IBM zSeries and System z

Wilhelm Mild  
IBM Germany  
zvse@de.ibm.com

© 2006 IBM Corporation

## Trademarks

The following are trademarks of the International Business Machines Corporation in the United States and / or other countries.

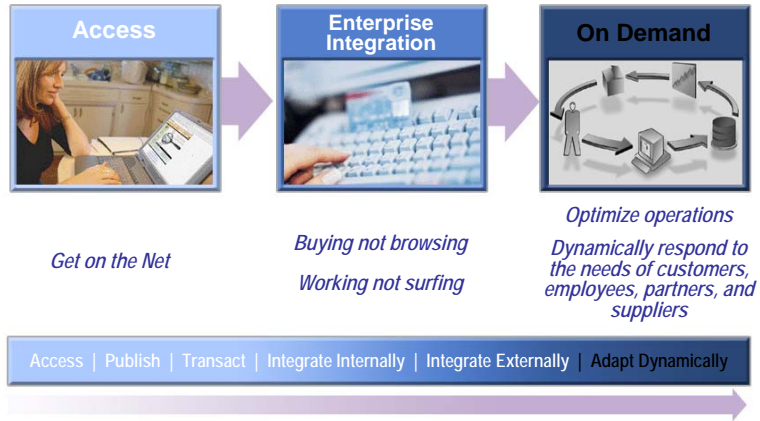
- |                           |                   |                        |
|---------------------------|-------------------|------------------------|
| CICS*                     | IBM*              | Virtual Image Facility |
| DB2*                      | IBM logo*         | VM/ESA*                |
| DB2 Connect               | IMS               | VSE/ESA                |
| DB2 Universal Database    | Intelligent Miner | z/VSE                  |
| e-business logo*          | Multiprise*       | VisualAge*             |
| Enterprise Storage Server | MQSeries*         | VTAM*                  |
| HiperSockets              | OS/390*           | WebSphere*             |
|                           | S/390*            | xSeries                |
|                           | SNAP/SHOT*        | z/Architecture         |
|                           |                   | z/VM                   |
|                           |                   | z/VSE                  |
|                           |                   | zSeries                |
|                           |                   | System z               |

\* Registered trademarks of IBM Corporation

The following are trademarks or registered trademarks of other companies.

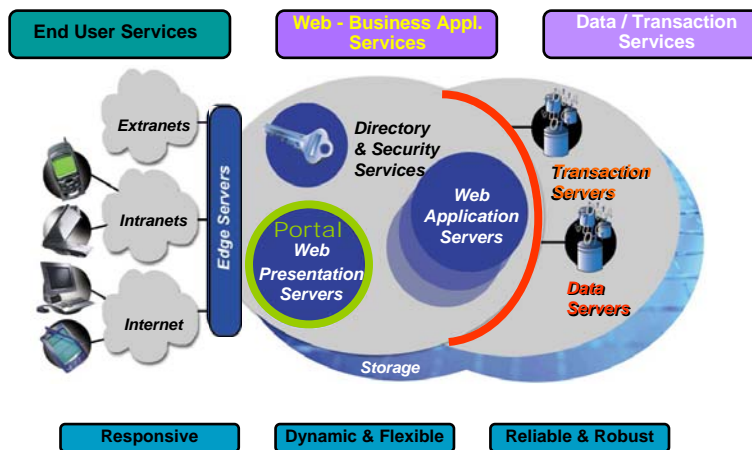
- LINUX is a registered trademark of Linus Torvalds
- Tivoli is a trademark of Tivoli Systems Inc.
- Java and all Java-related trademarks and logos are trademarks of Sun Microsystems, Inc., in the United States and other countries
- UNIX is a registered trademark of The Open Group in the United States and other countries.
- Microsoft, Windows and Windows NT are registered trademarks of Microsoft Corporation.
- SET and Secure Electronic Transaction are trademarks owned by SET Secure Electronic Transaction LLC.
- Intel is a registered trademark of Intel Corporation.

# Evolution of Internet technologies



© 2006 IBM Corporation

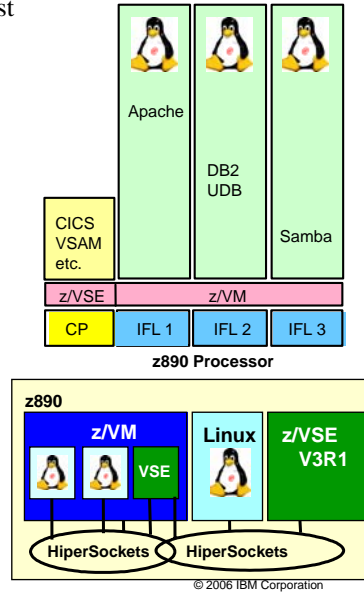
# Infrastructure



© 2006 IBM Corporation

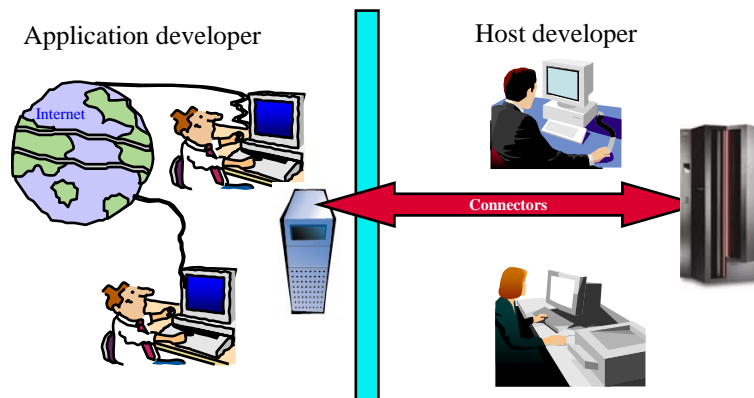
## Linux on zSeries – Advantages for VSE Customers

- Infrastructure simplification to help reduce cost
  - Consolidate existing distributed servers
  - Possible TCO benefits of Linux and zSeries
- Linux on zSeries applications based on IBM Middleware
  - WebSphere Application Server
  - DB2 UDB
  - Lotus® Domino™
  - Communications Server
  - Advanced application development tools
- Linux-based open source and/or ISV applications
  - Linux for zSeries to exploit zSeries 64-bit capabilities
  - Complement 31-bit core VSE applications
- Integrate Linux and VSE solutions
  - Linux access to VSE applications and data

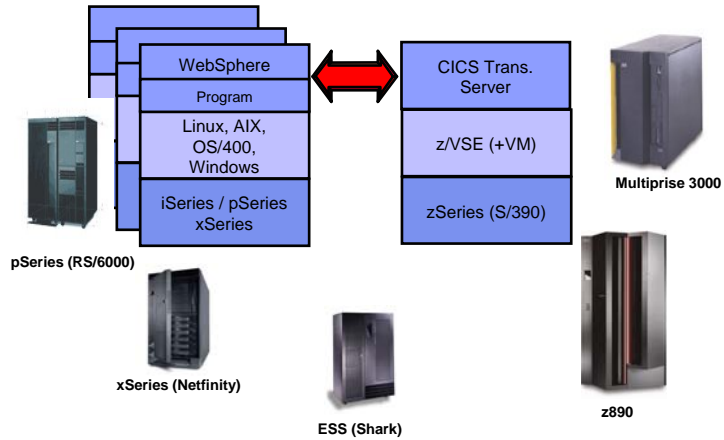


## Challenges in today's IT

### ► Two Architectures, one solution

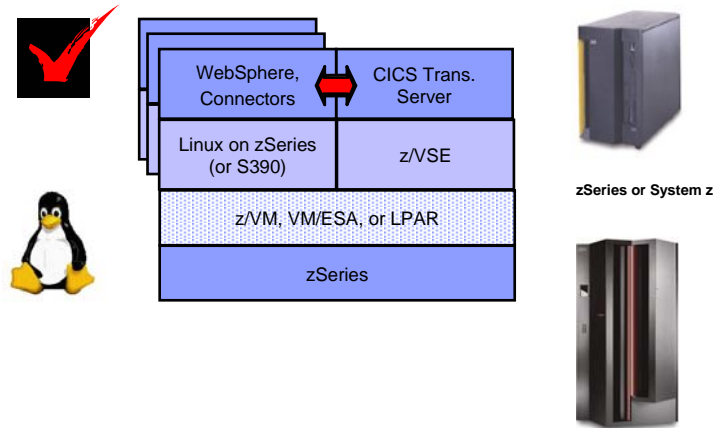


## VSE/ESA Flexibility – in a heterogeneous environment



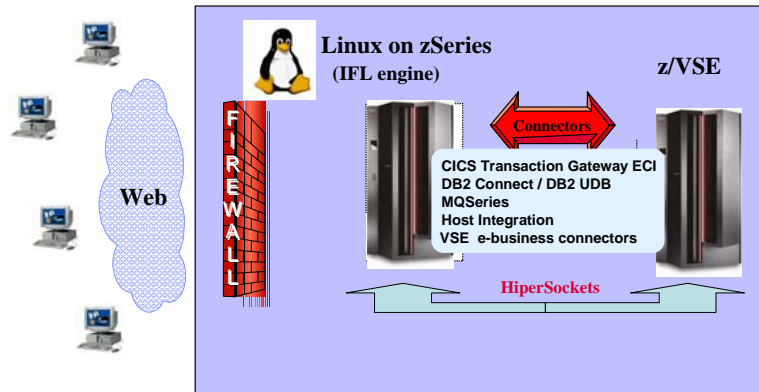
© 2006 IBM Corporation

## Linux for zSeries 3-tier logical / 2-tier physical



© 2006 IBM Corporation

## Integration of z/VSE with Linux on zSeries



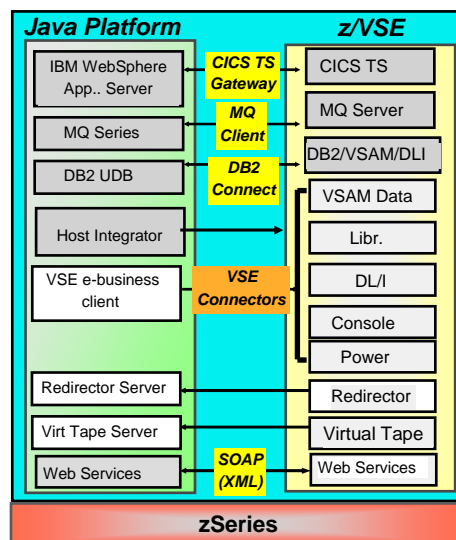
© 2006 IBM Corporation

## Middleware relations to z/VSE

• Modern applications with Linux for zSeries

• Most modern technologies interact with VSE services

• Modernisation using real time access to data



© 2006 IBM Corporation

## Agenda: Optimization of operations

(1) Common data store with distributed data

(2) Web transaction processing

(3) Application integration

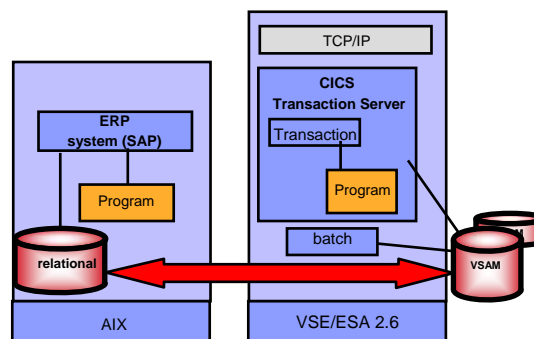
(4) Dynamic On demand business

(5) DB2 VSE data on DB2 UDB Linux

© 2006 IBM Corporation

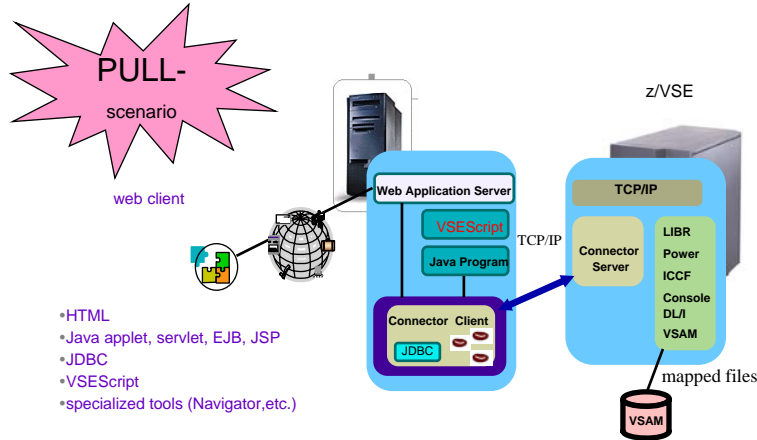
## Common data store in distributed environments (synchronous data propagation)

- ▶ customer data are redundant in both systems in different organisations (VSAM in VSE and relational in AIX)
- ▶ real time data synchronization is needed
- ▶ no change to VSE programs required



© 2006 IBM Corporation

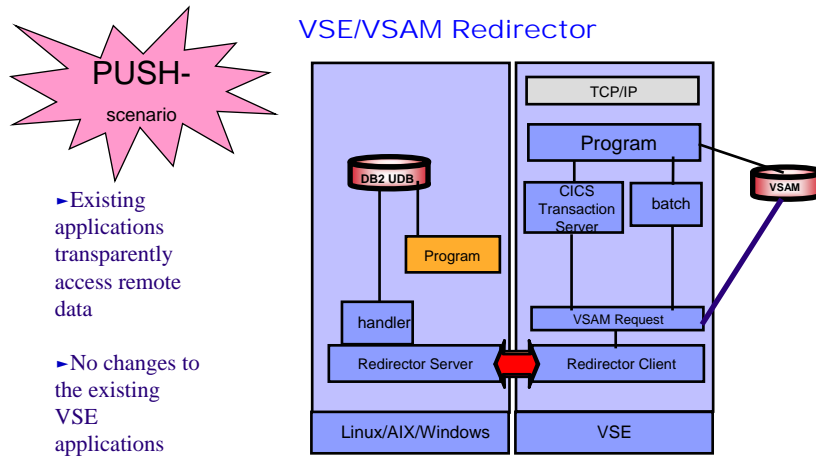
## Real time access to z/VSE – Java –Based Connector



- ▶ real time access to VSE resources from remote systems
- ▶ new possibilities for leveraging z/VSE investment

© 2006 IBM Corporation

## Data propagation / synchronization from VSE



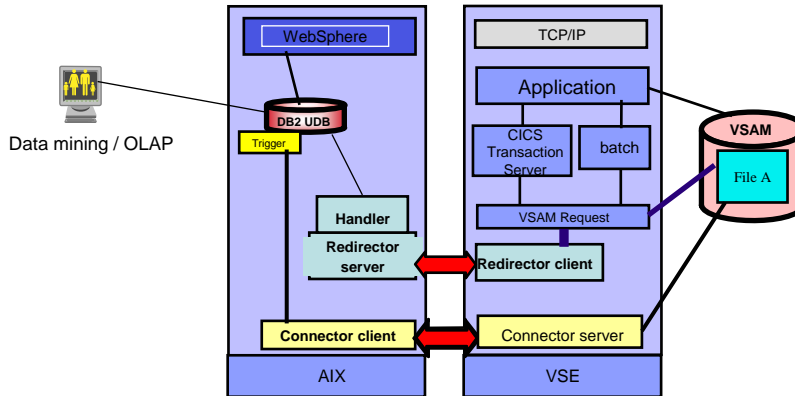
- ▶ Applications on VSE should be able to access DB2 data on Linux
- ▶ Synchronization of DB2 UDB on Linux with VSAM using VSAM Redirector.  
(VSAM Redirector is part of VSE/ESA 2.6/2.7)

© 2006 IBM Corporation

### Final solution

common data store – Business intelligence

- Car manufacturer, paper manufacturer – Germany, insurance – US

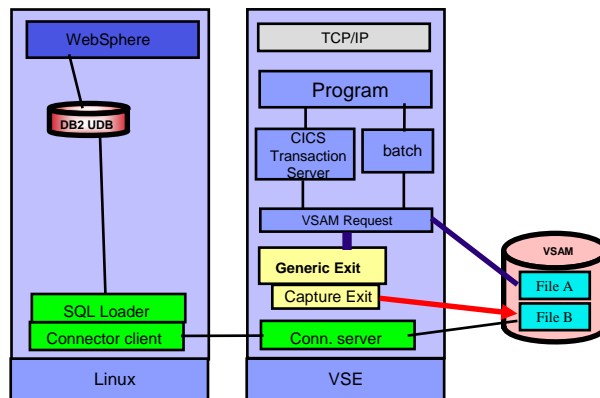


© 2006 IBM Corporation

### Final solution

Incremental, Linux driven updates

- Energy supplier – Germany

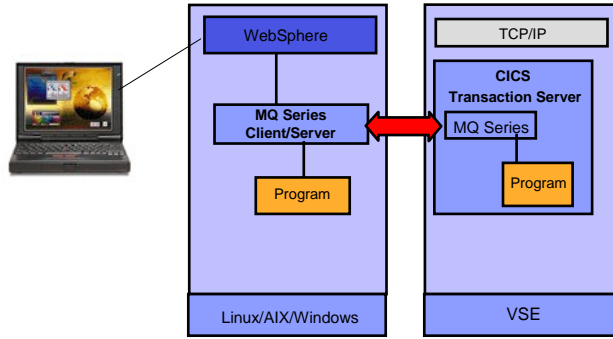


- Collect the changed records in a separate VSAM file
  - Possibility of cleansing
- Process them – with the VSE Connectors

© 2006 IBM Corporation



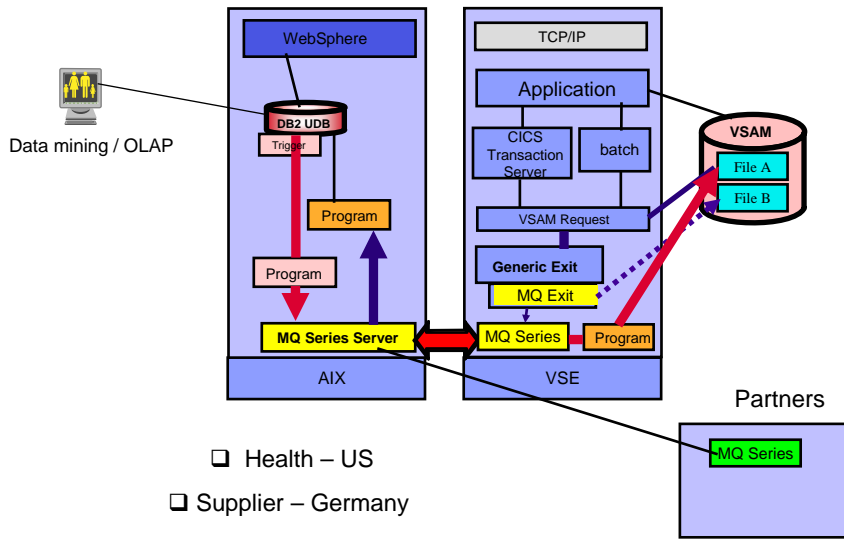
## Asynchronous data propagation MQ Series - Implementation



- ▶ 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

© 2006 IBM Corporation

## Final solution common data store – Business intelligence



© 2006 IBM Corporation

## Agenda: Optimization of operations

(1) Common data store with distributed data

(2) Web transaction processing

(3) Application integration

(4) Dynamic On demand business

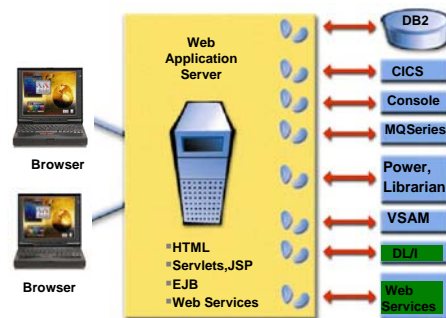
(5) DB2 VSE data on DB2 UDB Linux

© 2006 IBM Corporation

## (2) Web Transaction processing

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

□ Bank- Switzerland, Heating services - Germany

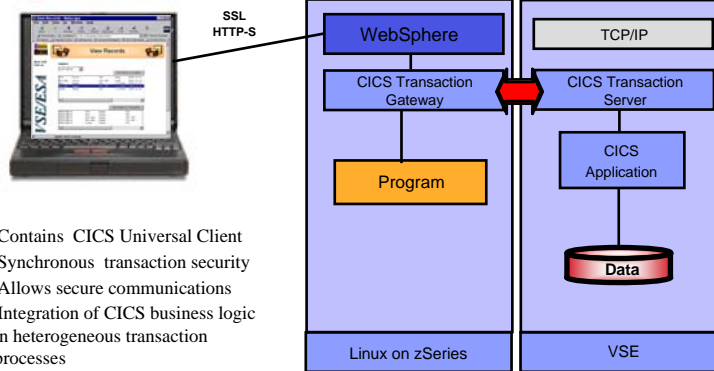


- ▶ Enable the access to core applications with web technologies
- ▶ No change to the core applications required
- ▶ Consistent development interfaces (Java based)

© 2006 IBM Corporation

## Integration of VSE/ESA transaction processes

### IBM CICS Transaction Gateway



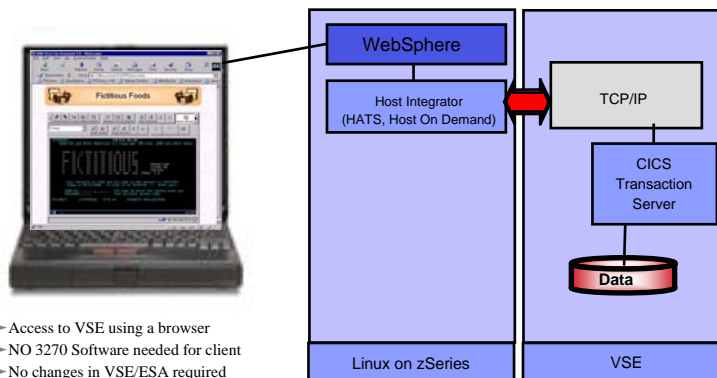
- ▶ Contains CICS Universal Client
- ▶ Synchronous transaction security
- ▶ Allows secure communications
- ▶ Integration of CICS business logic in heterogeneous transaction processes
- ▶ 1.5 mill trans per day

© 2006 IBM Corporation

## 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

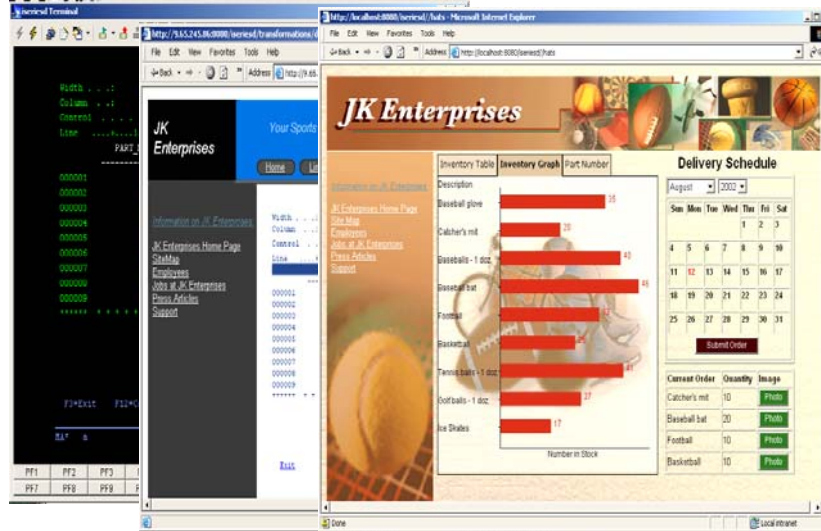


- ▶ Access to VSE using a browser
- ▶ NO 3270 Software needed for client
- ▶ No changes in VSE/ESA required

**NEW!:** Available for Linux on zSeries

© 2006 IBM Corporation

## Interaction with VSE/ESA via browser using (HATS)



© 2006 IBM Corporation

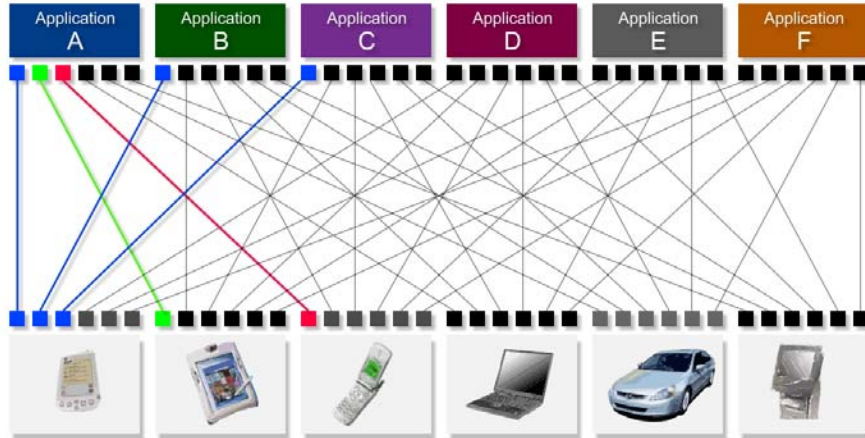
## Agenda: Optimization of operations

- (1) Common data store with distributed data
- (2) Web transaction processing
- (3) Application integration
- (4) Dynamic On demand business
- (5) DB2 VSE data on DB2 UDB Linux

© 2006 IBM Corporation

### (3) Application integration and Enterprise Modernization

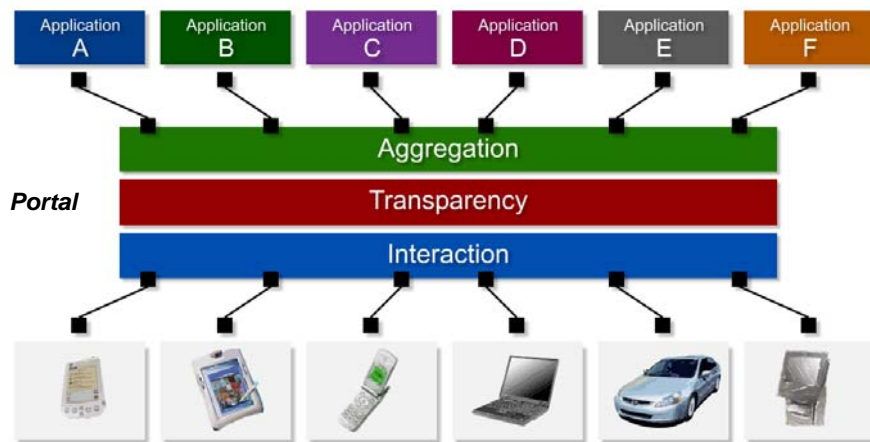
M applications...



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

© 2006 IBM Corporation

### A Mobile Application Platform Defined



© 2006 IBM Corporation

# What is a Portal?

A single point of personalized interaction with applications, content, processes and people

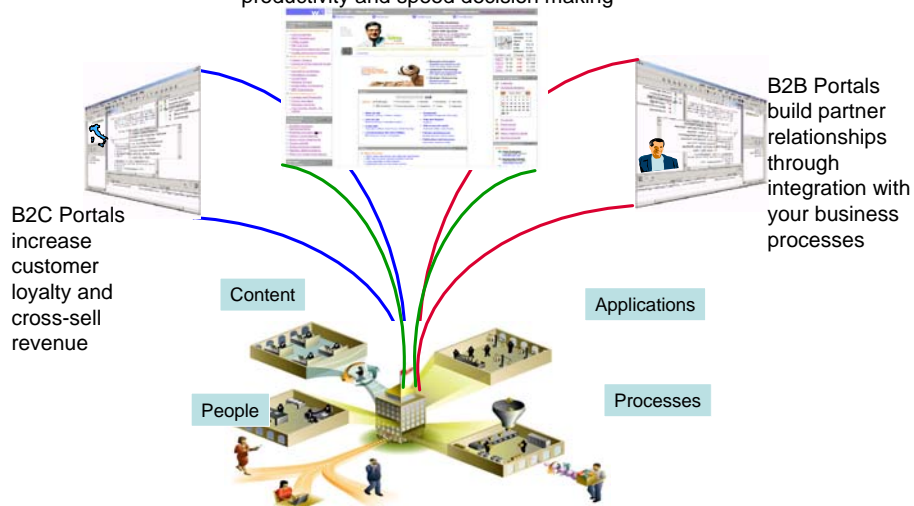
- Enterprise Applications
- Messaging
- Search
- Collaboration
- E-meetings
- Web Content
- People Finder
- Knowledge Management
- Business Intelligence
- Document management
- Host systems



© 2006 IBM Corporation

## Where Portals are used in today's IT's

B2E Portals improve employee productivity and speed decision making

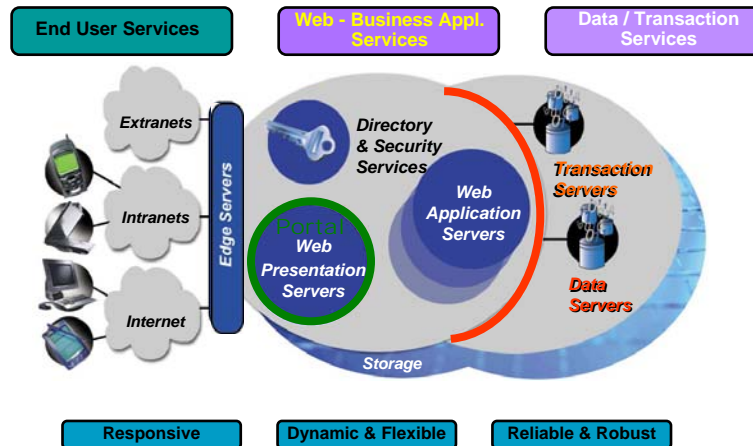


Common portal framework reduces costs and meets changing requirements

© 2006 IBM Corporation

## Infrastructure

- Banks, internet distributor– Germany, Switzerland



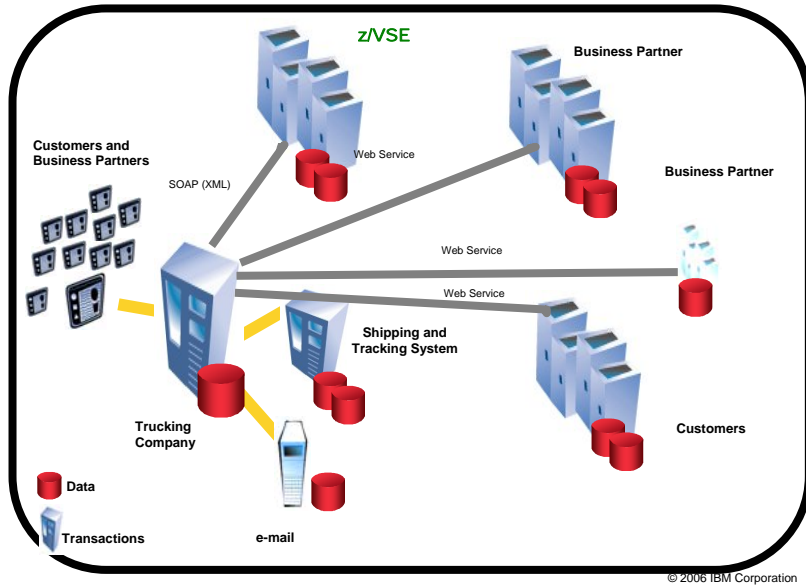
© 2006 IBM Corporation

## 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

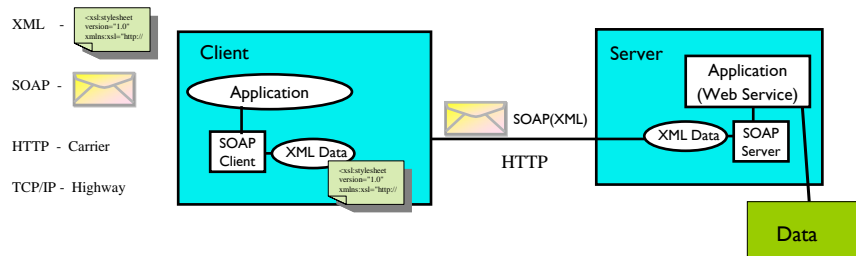
© 2006 IBM Corporation

(4) service oriented architecture with z/VSE  
using Web Services



## Web Services

XML Document + SOAP Protocol = Web Services



### A web service

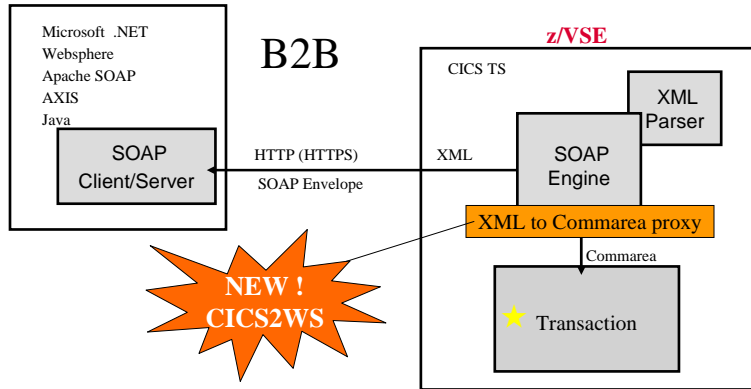
- ☞ implements a business, application or system functionality
- ☞ is intended for application communication
- ☞ is useable in internet, intranet, extranet
- ☞ is useable for browser-based solutions up to the B2B integration between companies
- ☞ uses only standard internet technologies

© 2006 IBM Corporation



## Web Services with z/VSE

XML data interchange with CICS transactions



**NEW!**  
**CICS2WS**

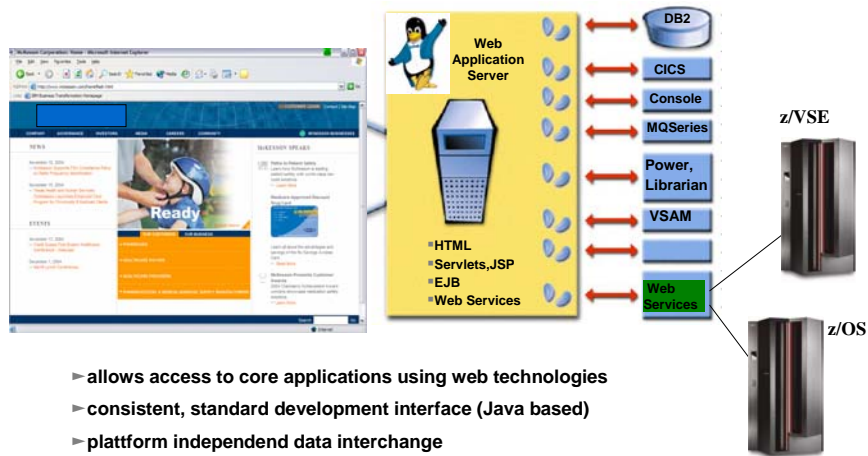
★ VSE Transactions as Web Service

© 2006 IBM Corporation

## Web Transactions with z/VSE using Web Services

( with the Websphere Software Plattform and VSE Connectors )

□ VSE and XML, SOAP Web Services – France, Germany, US



- ▶ allows access to core applications using web technologies
- ▶ consistent, standard development interface (Java based)
- ▶ platform independent data interchange

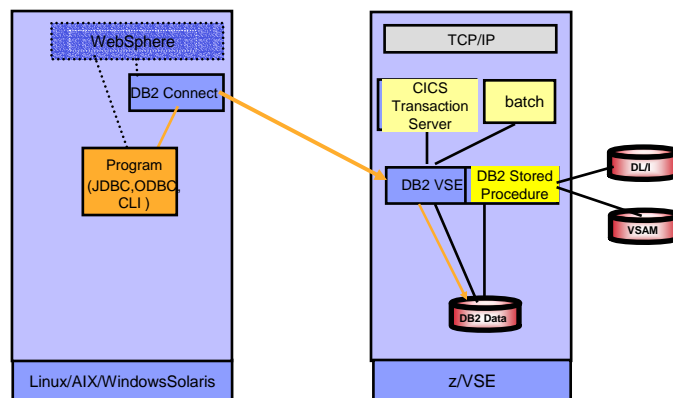
© 2006 IBM Corporation

## 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

© 2006 IBM Corporation

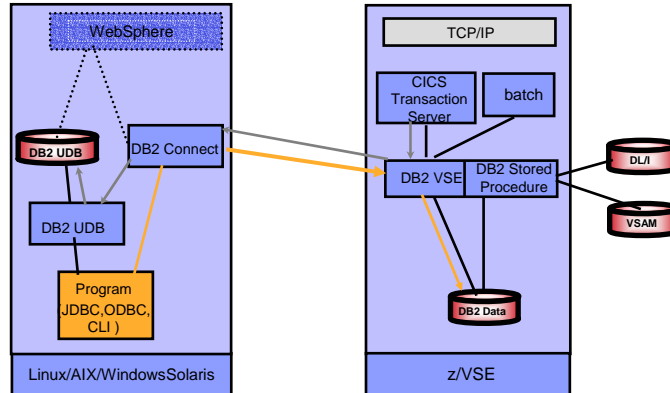
## Relational Access to DB2 VSE



- Remote access of DB2 VSE via DB2 Connect
- Integration of non relational VSE data (i.e. VSAM, DL/I) with remote DB2 logic via Stored Procedures

© 2006 IBM Corporation

## Integration of DB2 UDB with DB2 VSE in Remote applications

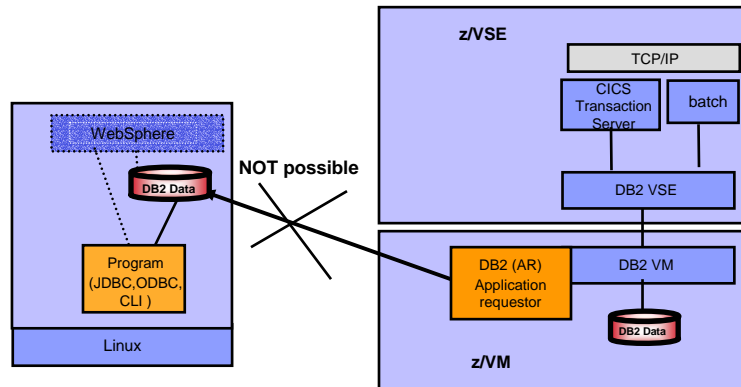


- ▶ Remote access of DB2 VSE via DB2 Connect
- ▶ Integration of non relational VSE data with DB2 logic via Stored Procedures
- ▶ Remote programs can access DB2 UDB and DB2 VSE at the same time.

▶ In this scenario licenses for DB2 VSE and DB2 UDB Linux will be charged

© 2006 IBM Corporation

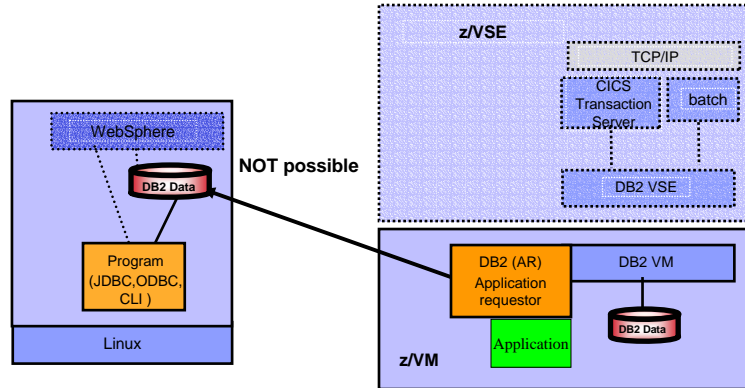
## DB2 VSE applications to access, remote DB2 UDB on Linux (NOT possible via DB2 AR in VM)



- ▶ VSE application access DB2 VM via Guest sharing
  - ▶ DB2 must be installed on both platforms
  - ▶ DB2 Databases on VM only
- ▶ From VSE applications NO remote access via VM Application requestor possible
  - ▶ DB2 VM Application Requestor (AR) can not be a gateway to DB2 UDB on Linux

© 2006 IBM Corporation

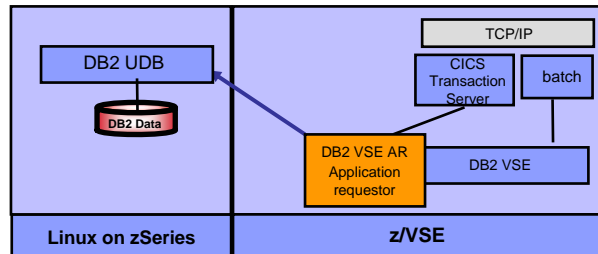
## DB2 VM applications to access, remote DB2 UDB on Linux



► VM application accesses DB2 UDB on Linux

© 2006 IBM Corporation

## 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 Programming interface and precompiler
- On VSE the SQL language that can be used is the DB2 VSE SQL Language – because of precompiler

© 2006 IBM Corporation

## 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**

© 2006 IBM Corporation

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

© 2006 IBM Corporation

## 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**

© 2006 IBM Corporation

## Environment and Database design

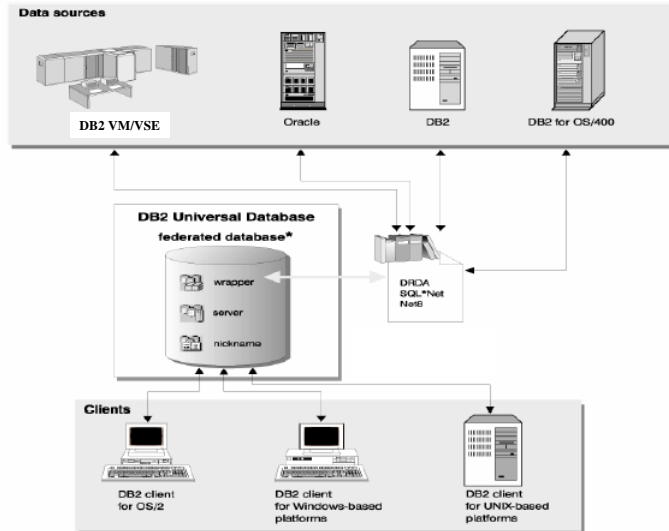
### Configuration for CICS applications and remote DB2 UDB database

#### 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

© 2006 IBM Corporation

## Federated Database design



© 2006 IBM Corporation

IBM eServer zSeries



## Federated Database design

- Define federated database nicknames on the DB2 UDB LUW server for real tables that exist on a DB2/VSE&VM server
- Then new tables are created on the DB2 UDB LUW server, one for each nickname
- The table definitions are identical to the table definitions on the DB2/VSE&VM server.
- A small program with cursor is defined with a select statement from the nickname.
- The DB2 UDB federated server will get the table data from the remote DB2/VSE&VM server using a DRDA protocol query over a TCP/IP connection.
- The LOAD command specifies the cursor name, which results in obtaining the DB2/VSE&VM data, and the target of the load is the new table that was created in the DB2 UDB LUW server.
- The net result is that the table data is copied from the DB2/VSE&VM source table into the DB2 UDB LUW target table.
- The copy is performed in one step.
- The cursor select is fairly efficient since the DRDA blocking protocols can potentially return many table rows in each network send.
- The LOAD is efficient because it uses DB2 UDB fast load feature.



ON DEMAND BUSINESS

## Federated Database design

Other methods moving the data using:  
 DBSU DATAUNLOAD and DBSU DATALOAD on DB2 VM/VSE  
 DB2 UDB EXPORT and DB2 UDB IMPORT commands.

These have the disadvantage of requiring two distinct steps.  
 The DBSU DATALOAD option also requires a DRDA connection to load the data which will be transmitted one row at a time and inserted into the DB2 UDB LUW database one row at a time. This is a huge network overhead and will also incur all of the logging overhead of each insert.

The performance test done of transferring data from a DB2/VSE database to a DB2 UDB for Linux on zSeries server is shown in the table below.

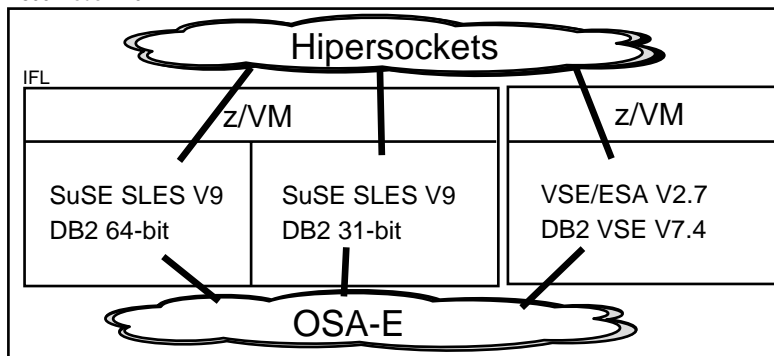
The test consisted of copying the data from 4 different tables of various sizes.  
 The table below shows the result of running each of the data movement utilities. A is a 510,000-row table; B is a 1,530,000-row table; C is a 10,000-row table; and D is a 1000-row table. Your actual results will vary based on the size and speed of CPUs on your hardware, load on your systems and network and the amount of data that you are moving. The table just shows the relation of the 3 methods of moving the data.

	VSE	VSE	Linux	Linux	Linux
	DATAUNLOAD	DATALOAD	EXPORT	LOAD	CROSS LOADER (federated)
	(SQLDS)	(DRDA)	(DRDA)		
A	1383s	1718s	46.276s	6.1s	44.642s
B	4238s	5084s	235s	15.3s	148.128s
C	29s	57s	1.2s	1.7s	2.3s
D	4s	17s	0.17s	1.5s	1.5s



## Environment in a Proof of Concept in the Boeblingen LAB Germany:

z890 model 140



### What was tested?

- 1 performance of CICS application to DB2 (all options)
- 2 performance of VSE batch application to DB2 (all options)
- 3 performance of zLinux batch applications to DB2 UDB zLinux (all options)





## Test Results

### 1. Performance of CICS application to DB2

Test description - VAG-CICS application and	Time (seconds)
Local MP3000 - H30 DB2 VSE	0
Remote MP 3000-H30 DB2 zLinux 31-bit OSA-X	2
Local z890 DB2 VSE	0
Remote z890 DB2 zLinux 31-bit Hipersockets	0
Remote z890 DB2 zLinux 31-bit OSA-E	0
Remote z890 DB2 zLinux 64-bit Hipersockets	0
Remote z890 DB2 zLinux 64-bit OSA-E	0



ON DEMAND BUSINESS™

## Test Results

### Measured Performance of VSE batch applications to DB2

Test description (Inserts of 356.133 rows)	Time (seconds)
Inserts to local z890 DB2 VSE	356 sec (5'56")
Inserts to remote z890 DB2 zLinux 64-bit Hipersockets	272 sec (4'32")
Inserts to remote z890 DB2 zLinux 64-bit OSA-E	317 sec (5'17")
Inserts to remote z890 DB2 zLinux 31-bit Hipersockets	350 sec (5'50")
Inserts to remote z890 DB2 zLinux 31-bit OSA-E	350 sec (5'50")
Inserts to local MP 3000-H30 DB2 VSE	517 sec (8'37")
Inserts to remote MP 3000-H30 DB2 zLinux 31-bit OSA-X	1105 sec (18'25")



ON DEMAND BUSINESS™

## Test Results

### 3. Performance of zLinux batch applications to DB2 UDB zLinux

Test description	z890 31-bit DB2	z890 64-bit DB2	G5 31-bit DB2
Joining 10 tables and 1 subselect	14,8854 sec (0*14')	16,9256 sec (0*16')	226,1293 sec (3*46')
Subselects with sums, unions	1,2781 sec (0*1')	1,3489 sec (0*1')	5,7920 sec (0*5')
with temp with left outer join	1,2366 sec (0*1')	1,3059 sec (0*1')	14,1188 sec (0*14')

Test description	z890 31-bit DB2	z890 64-bit DB2	MP 3000-H30 31-bit DB2
Inserting 1 million records with SQL	50 sec (0*50')	55 sec (0*55')	13 min (13*0')
100 conc app inserting 30 records into table	85 sec (1*25')	41 sec (0*41')	652 sec (10*52')



ON DEMAND BUSINESS™

## Test Results in another customer proof of concepts

Testcase	Time	Factor	Hardware
SQLDS	5:40	1	z890 - 160
UDB LE	8:40	1,53	z890 - 160 + IFL
UDB (DRDA Asm IF)	6:55	1,22*	z890 - 160 + IFL
SQLDS	3:36	0,64	z890 - 170
UDB (DRDA Asm IF)	4:23	0,77*	z890 - 170 + IFL

DRDA Asm IF – is the Assembler interface for DRDA in VSE (available via DB2 PTF)

\*an overall increase of 20% response time was measured

**Conclusion: Every application base is different and no general response time statement can be made**



ON DEMAND BUSINESS™

## 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](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](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](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>



## z/VSE, the new web presence

The screenshot shows the IBM z/VSE website interface. At the top, there is a navigation bar with links for Home, Products, Services & solutions, Support & downloads, and My account. Below this is a search bar and a 'Search' button. The main content area features a large heading 'z/VSE' and a sub-heading 'Announcing z/VSE V3.1'. A red circle highlights the 'Solutions' link in the left-hand navigation menu. Other elements include a 'Learn more' section with links to 'About z/VSE', 'News', and 'History of z/VSE', and a 'Redesigned z/VSE homepage' announcement.

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

© 2006 IBM Corporation

## 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>
- 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](mailto:zvse@de.ibm.com)

© 2006 IBM Corporation