Exploit virtualization in modern solutions with Linux on System z as central hub

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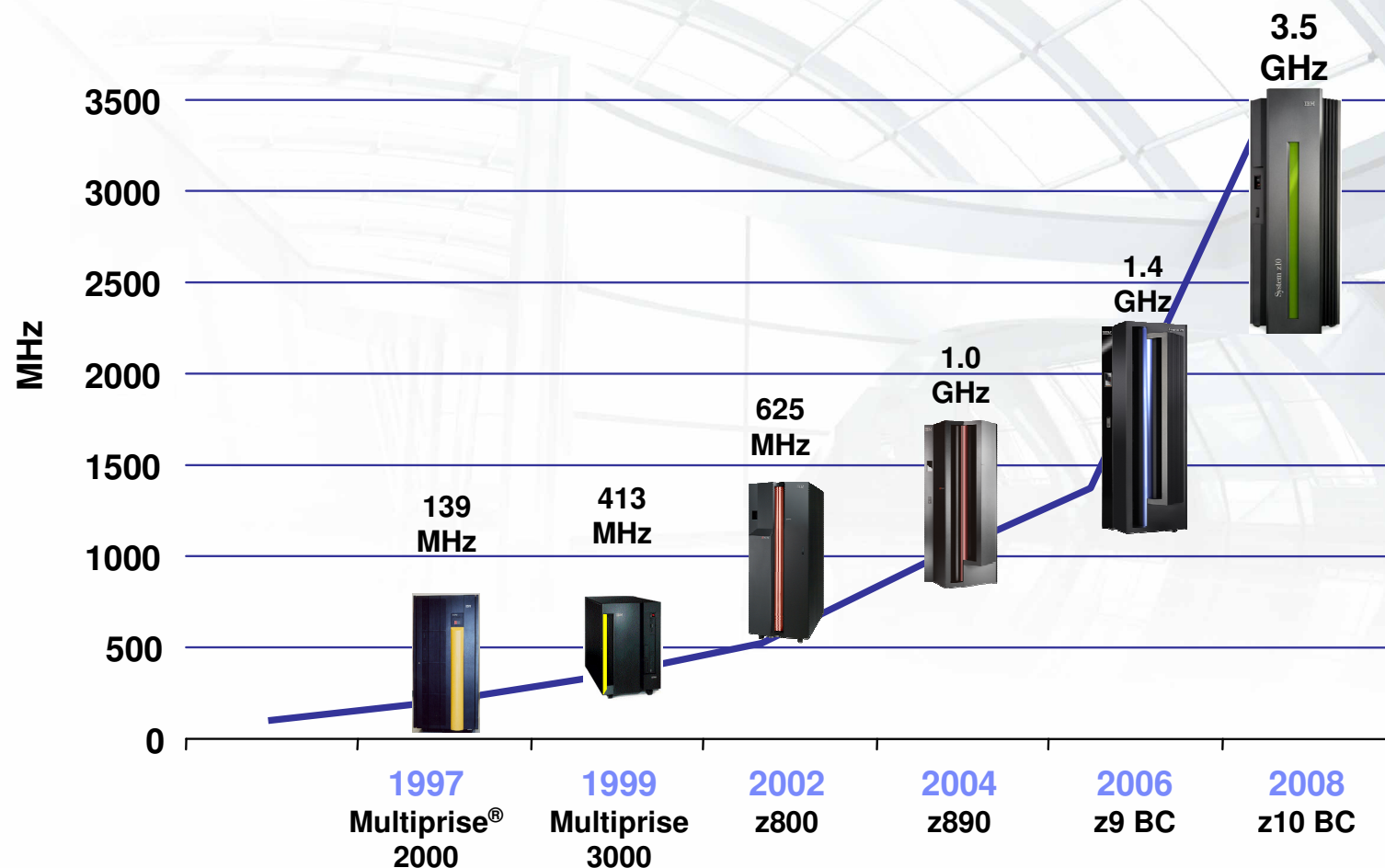
- **Agenda**

→ 1. The Role of Linux on System z

2. Linux on System z as 'Central Portal'

3. Linux on System z as 'Data Hub'

4. Linux on System z as 'SOA Hub'

5. Linux on System z as 'Mail and Collaboration Hub'

6. Linux on System z as 'Recovery Hub'

IBM System z10 Business Class – Large scalable server

1997	**1999**	**2002**	**2004**	**2006**	**2008**
Multiprise®	**Multiprise**	**z800**	**z890**	**z9 BC**	**z10 BC**
2000	**3000**				

- **Multiprise 2000 - 1st full-custom CMOS S/390®**
- **Multiprise 3000 – Internal disk, IFL introduced on midrange**

- **IBM eServer™ zSeries® 800 (z800) - Full 64-bit z/Architecture®**
- **IBM eServer zSeries 890 (z890) - Superscalar CISC pipeline**
- **z9 BC - System level scaling**

- **z10 BC - Architectural extensions**
- **Higher frequency CPU**

Making high performance a reality
Designed for the next evolution of Enterprise applications

- **New Enterprise Quad Core z10 processor chip**
  - 4.4 / 3.5 GHz - additional throughput means improved price/performance
  - Cache rich environment optimized for data serving
  - 50+ instructions added to improve compiled code efficiency
  - Support for 1 MB page frames

- **Hardware accelerators on the chip**
  - Hardware data compression
  - Cryptographic functions
  - Hardware Decimal Floating point

- **CPU intensive workloads get performance improvements from new core pipeline design**
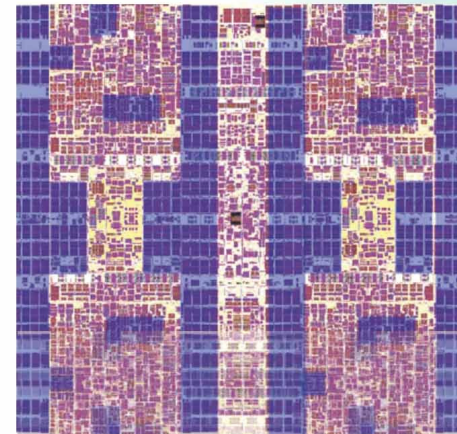
Enterprise Quad Core z10 processor chip

Focused performance boost
Hardware Decimal Floating Point

Up to 10X improvement in decimal floating point instructions*

- **Decimal arithmetic widely used in commercial and financial applications**

- **Integrated on every z10 core to deliver a performance boost to execution of decimal arithmetic**

- **Growing industry support for hardware decimal floating point standardization**

  - **Java BigDecimal, C#, XML, C/C++, GCC, DB2® V9, Enterprise PL/1, Assembler**
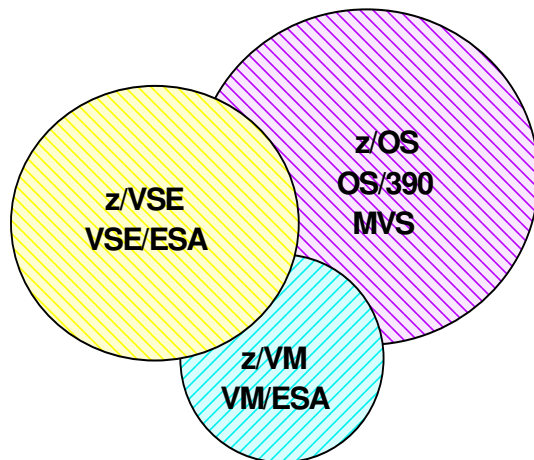
  - **Open standard definition led by IBM**

Bringing high performance computing benefits to commercial workloads

* All performance information was determined in a controlled environment.

Operating Systems on IBM System z

Traditional Mainframe Operating Systems

Standard Processors

- **CP**
  - For z/OS, z/VSE, z/VM workloads

Specialty Processors

- **CF (Coupling Facility)**
  - For Parallel Sysplex with z/OS
- **IFL (Integrated Facility for Linux)**
  - For Linux and Linux applications
- **zAAP (zSeries Application Assist Processor)**
  - For offload of Java applications from z/OS
- **zIIP (System z9 Integrated Information Processor)**
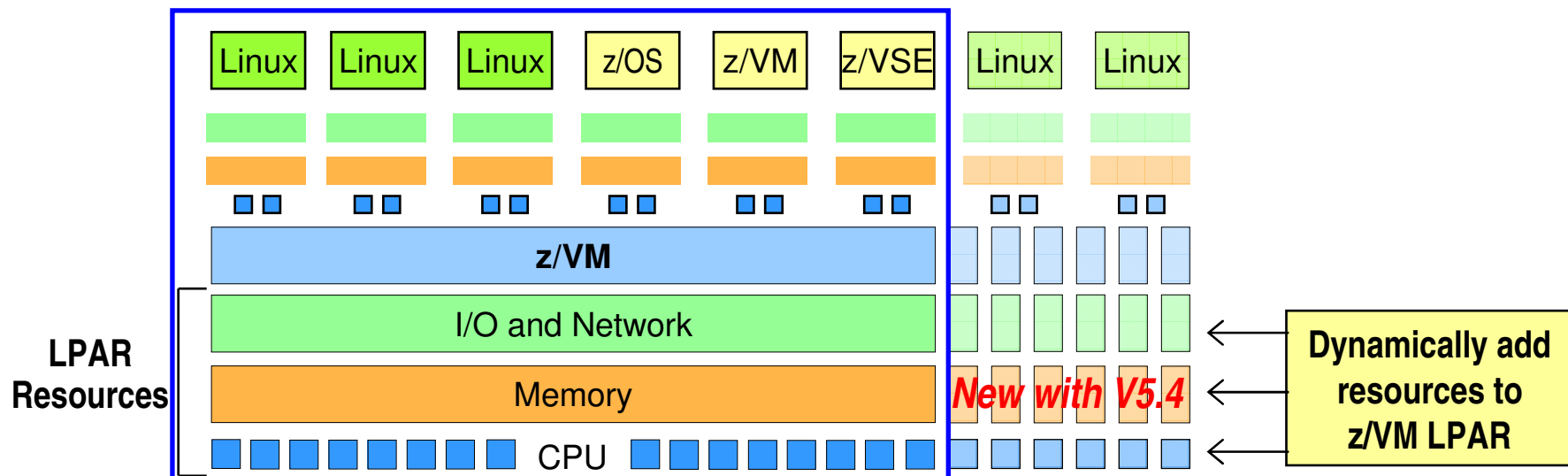 - For z/OS offload of DB2 distributed requests
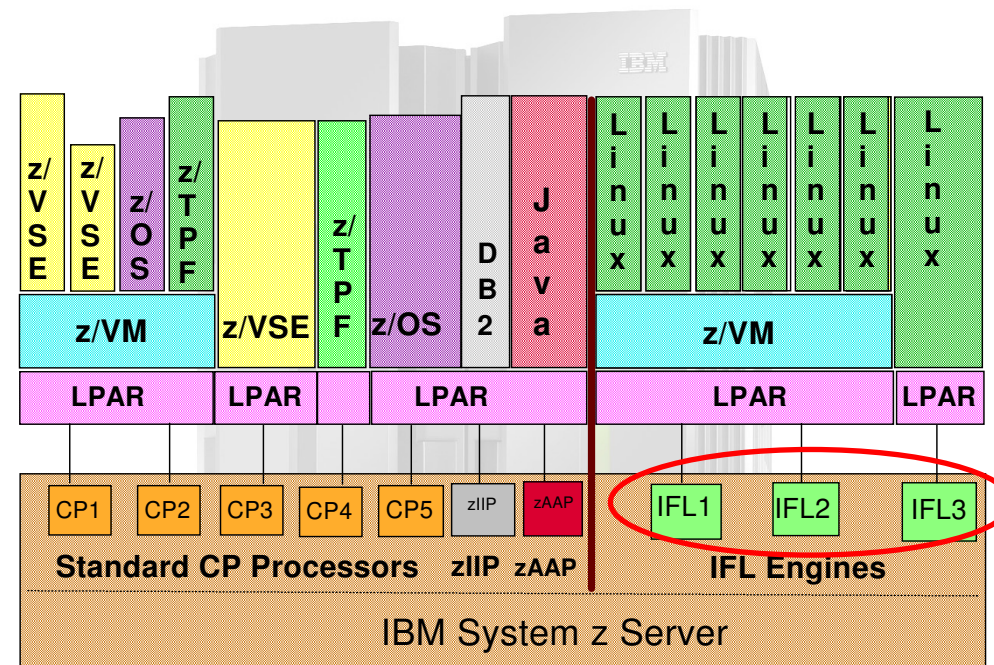
Virtualization – per Excellence
Virtualization for different workloads on the same layer
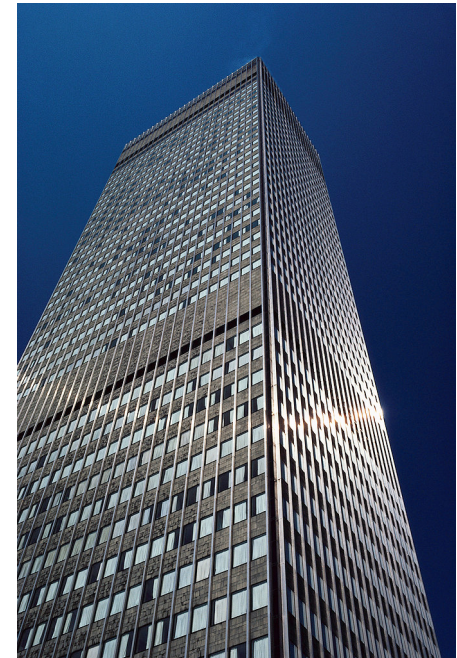
New z/VM V5.4 Function Enhances System Availability

- **Users can non-disruptively add memory to a z/VM *LPAR***
  - ► Additional memory can come from: *a)* unused available memory, *b)* concurrent memory upgrade, or *c)* an LPAR that can release memory
  - ► Memory *cannot* be non-disruptively removed from a z/VM LPAR
- **z/VM virtualizes this hardware support for *guest machines***
  - ► Currently, only z/OS and z/VM support this capability in a virtual machine environment
- **Complements ability to <u>dynamically</u> add CPU, I/O, and networking resources**

Linux	Linux	Linux	z/OS	z/VM	z/VSE	Linux	Linux

z/VM

LPAR Resources

I/O and Network

Memory — *New with V5.4*

CPU

→ **Dynamically add resources to z/VM LPAR**

Smart economics: non-disruptively scale your z/VM environment by adding hardware assets that can be shared with every virtual server

Implement Virtualization on System z: LPAR and z/VM, when to use what

- **z/VM Virtualization**

    - **Vertical virtualization** - Grow workloads without linearly growing number of virtual guest machines

        - one guest can be increased by allocating more resources (CPUs, memory)

    - **Horizontal virtualization** – for isolation between servers

        - isolation of guests in a network
        - Redundancy for application high availability

    - **Dynamically** add, remove and shift physical resources to optimize business results

- **LPAR Virtualization**

    - High Isolation with fixed resources
    - Direct attached I/O devices for max bandwidth

Mainframe Executive Magazine

http://www.mainframe-exec.com/

Infrastructure

End User Services

Web - Business Appl. Services

Data / Transaction Services

Extranets

Intranets

Internet

Edge Servers

Directory & Security Services

Portal
Web Presentation Servers

Web Application Servers

Transaction Servers

Data Servers

Storage

Responsive

Dynamic & Flexible

Reliable & Robust

Agenda

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Scenario 1: Linux on System z as Central Access Hub

Web enable, improve interface, simplify, extend existing applications

Linux on System z

- WS Portal
- HoD/HATS
- WAS

Connection via HiperSockets

System z Environment

+ CICS
+ TCP/IP
+ VSAM
+ COBOL

Windows/ Linux DB2 ORACLE

DB2 UDB

z/VM	LPAR or z/VM
IFL Engine (s)	Standard CP Engine (s)
IBM System z	
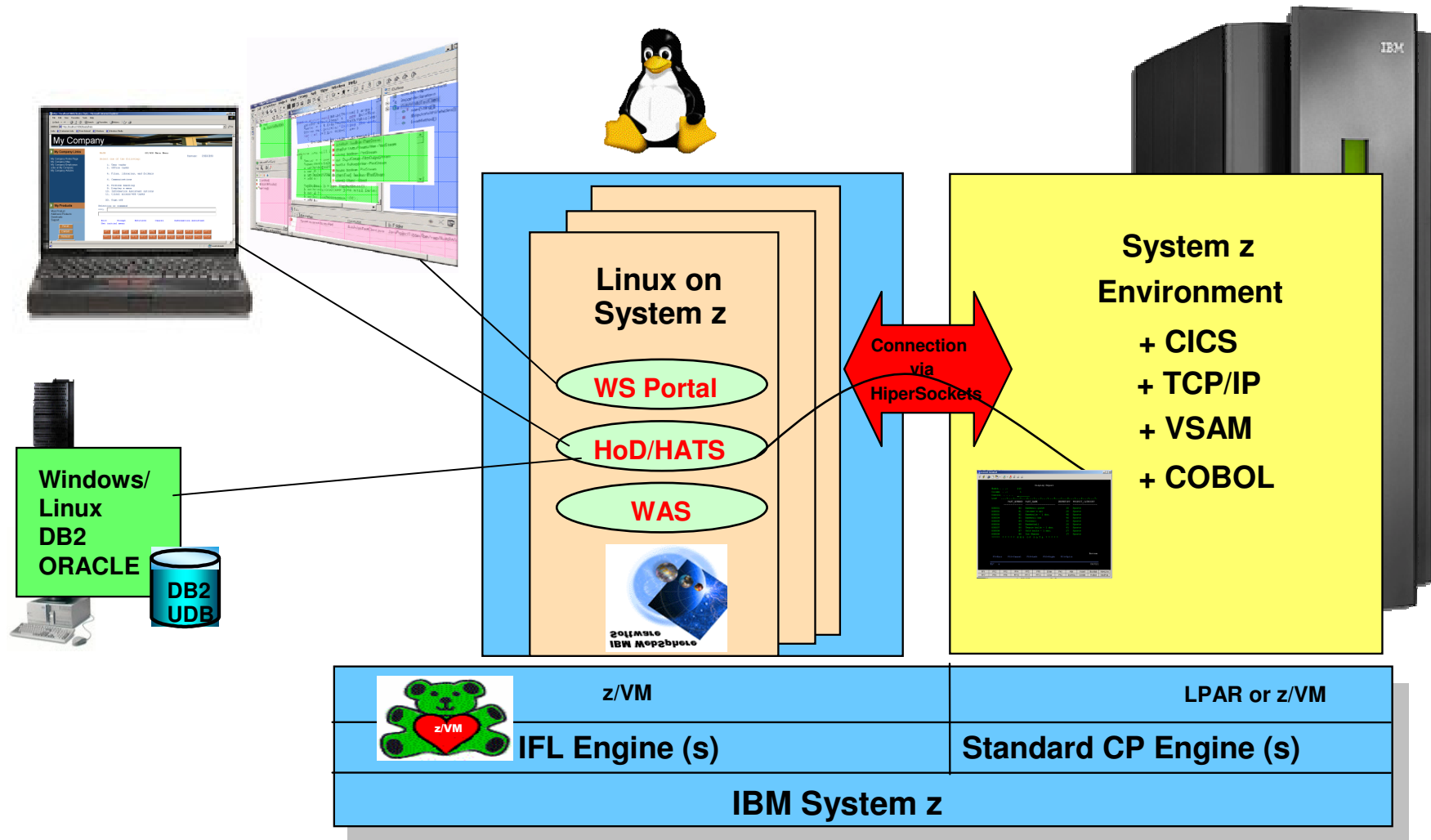
Application Integration with Host Access Transformation Services (HATS)
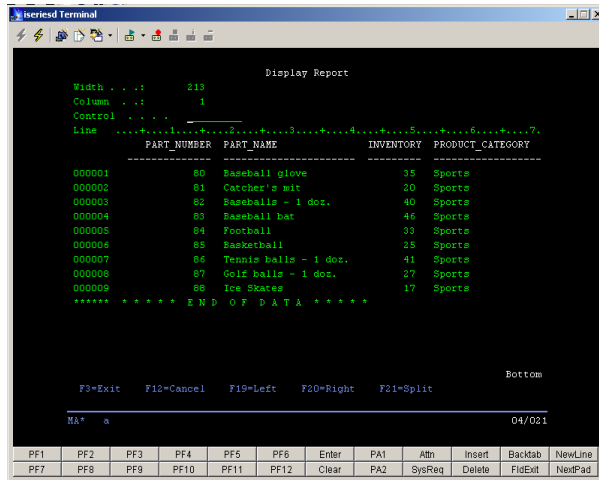
- No software download to the client
- Converts green screens to GUI
- Integration with distributed applications
- improves ease of use of host applications
- Web Service on the fly

3270 or 5250
data stream

**Windows/
Linux
DB2
ORACLE**

DB2
UDB
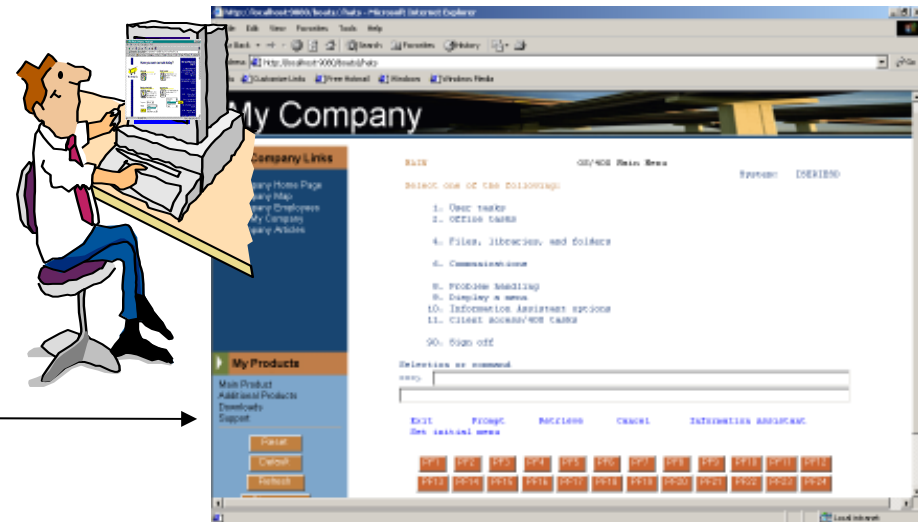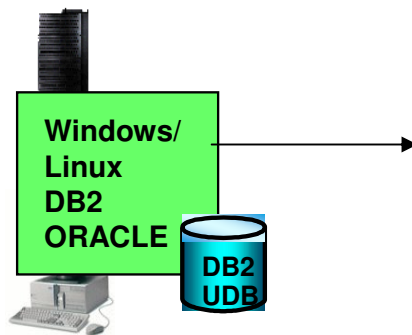
Screen transformation rules running on
WebSphere Application Server

HTML in a Browser

The Two Models of CICS Integration

Other/Any **CICS TS** **(Service Provider)**

Business Function

Web Service Client → CICS Web Services → Integration logic **I** ⇒ Business logic **B** → Data access **D** →

Other/Any **Intermediary** **CICS TS**

CICS Program

Web Service Client → Web services end-point → **connector** → **A** Business logic **B** →
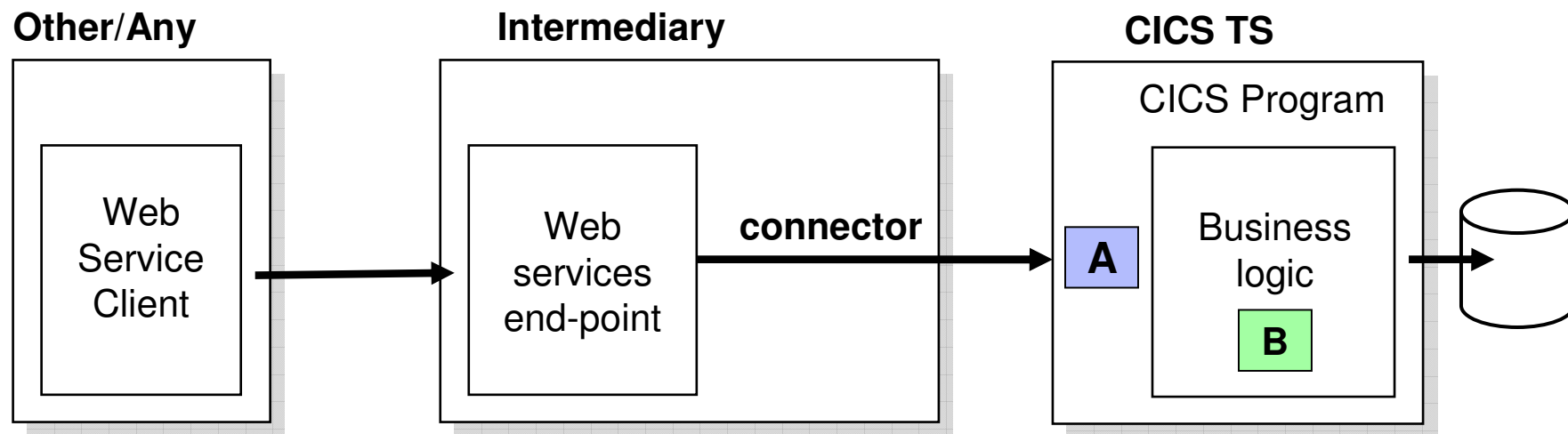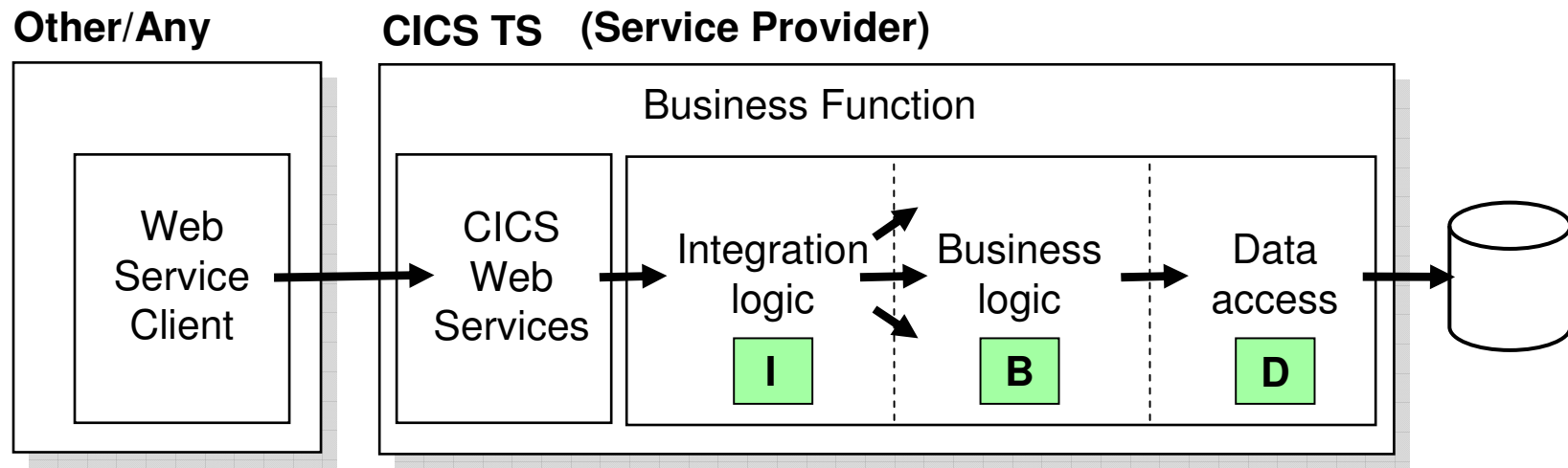
.NET application run on Linux on System z

- **03/2009 Announcement Novell / SUSE**
  - New Version of MONO runs .NET applications

- **High scalable Web environment possible with Linux on System z**

- **Centralization on a large scalable platform on Linux**

IBM®

Novell's Mono Gets Faster and More Visual

Novell delivers new releases of Mono and MonoDevelop, making .NET on Linux easier and Windows-based development for Linux deployment faster.

March 31, 2009
By Sean Michael Kerner: 🖹 *More stories by this author.*

Novell is making it easier for a Microsoft .NET developer to de
applications on Linux, whether they develop their application:
on Linux, with the release of Mono 2.4.

Mono is a .NET on Linux implementation and the new version
Monday, promises greater compatibility and better performan
deploying .NET apps on Linux. Also, Novell is also releasing M
an improved IDE (define) for building .NET applications.

All told, the two new releases continue Novell's push to ensu
remains a viable platform choice for .NET applications. The ne
on the heels of Novell's SUSE Linux Enterprise Server 11 relea
includes for the first time commercial support for Mono.

"MonoDevelop 1.x was the basic foundation, but we knew it
many features," Miguel de Icaza, vice president of developme
Novell (NASDAQ:NOVL) and leader of the Mono project told *In*
"The editing experience now is night and day."

RELATED ARTICLES

› Is .NET on Linux Finally Ready?
› Novell SUSE Linux 11 Everywhere?
› .NET Goes Open Source and Catches Mono
› Open Source Mono Gets Visual Basic

For more stories on this topic:

[   ] GO

Visual Studio integration

While MonoDevelop offers Linux developers a way of natively developing .NET application on Linux, Windows developers tend to use Microsoft's Visual Studio. Making Mono a more attractive deployment target for Visual Studio developers is also part of De Icaza's plans.

LATEST NEWS

› Microsoft Claims WebSphere Best on Windows
› FTC Red Flags Rule Enforcement Starts Friday
› Acer Looks to Build on Netbook Gains
› IBM Gives Developer Site a Social Network Feel
› Open Source Eucalyptus Cloud Goes Commercial

He commented that for developers that are comfortable with Visual Studio today, they should keep using it and just publish to Linux for deployment instead of a Windows Server.

"Today's story for Visual Studio is pretty good, you just have to hit the publish button and it will give you a site that will run on Mono," De Icaza said. "But we want to do a lot more integration points. We are working on a Visual Studio plug-in but we're not announcing that today. That will do more than what we can do today."

The new plug-in when available will allow for more integrated Visual Studio to mono debugging and control than what is currently available.

De Icaza expla
rebuilt the edit
ground up. MonoDevelop 2.0
now includes an integrated
debugger, trackable changes
and code templates. Additionally,
MonoDevelop 2.0 now uses the
same msbuild file format for
project code that is used by
Microsoft's Visual Studio.

http://www.internetnews.com/dev-news/article.php/3812851/Novells+Mono+Gets+Faster+and+More+Visual.htm

Application integration with 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
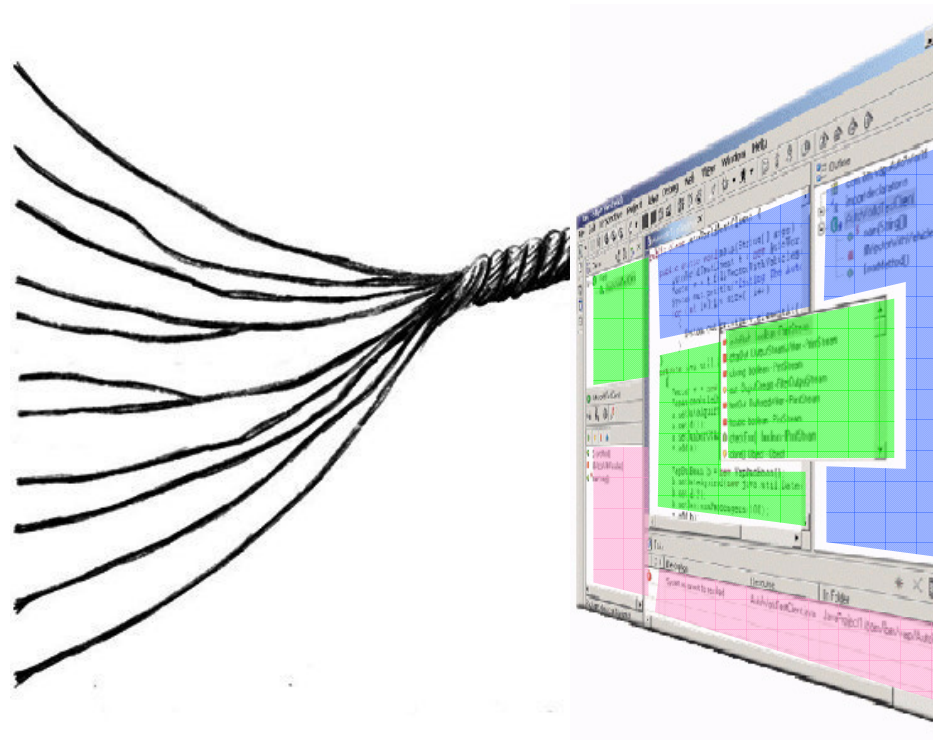
Linux on System z Solution Benefits

- High Stability – inherits from System z

- Highly Scalable horizontally and vertically

- Very flexible environment with Virtualization z/VM

- Use of Standard interfaces and applications

- Very effective integration with existing applications

- **Agenda**

1. The Role of Linux on System z

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Scenario 2: Linux on System z as data hub

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

Linux on System z
- Cognos
- Data Warehouse
- DB2 LUW
- DB2 UDB

Connection via HiperSockets

System z Environment
- + TCP/IP
- + CICS
- + VSAM
- + COBOL

VSAM

DB2 VSE/VM

Windows/ Linux DB2 ORACLE — DB2 UDB

Windows/ Linux DB2 ORACLE — DB2 UDB

z/VM or LPAR	LPAR or z/VM
IFL Engine (s)	Standard CP Engine (s)
IBM System z	
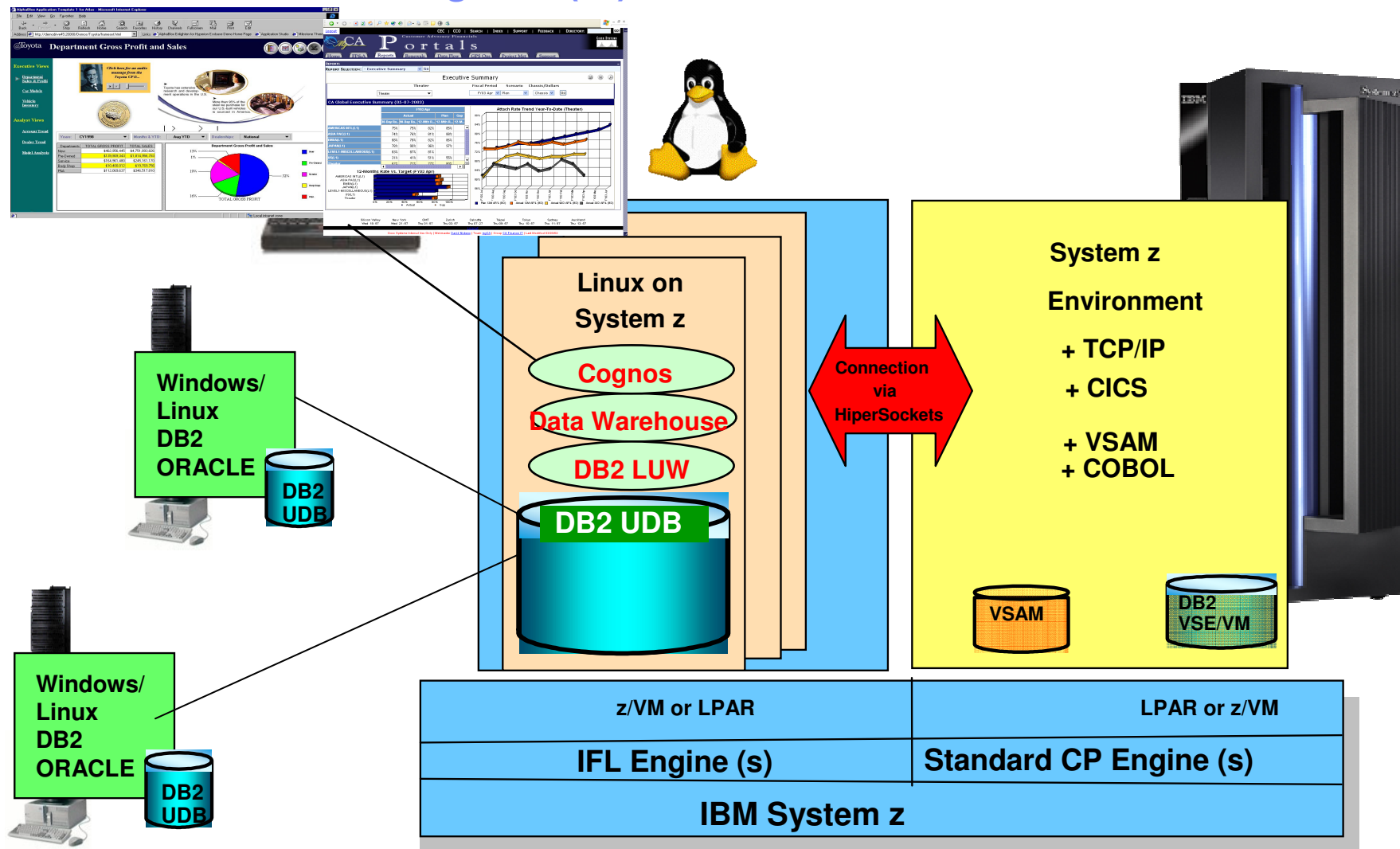
DB2 9 with pureXML feature – A Hybrid Data Server

XML Developer

"I see a sophisticated XML repository that also supports SQL."

Familiar Programming Models

SQL Developer

"I see a sophisticated RDBMS that also supports XML."

Integrated Information

XQuery

Language Flexiblity

SQL

Common Services

Optimized Storage

Mature Services

Familiar Tooling

rdb

Optimized Storage Models
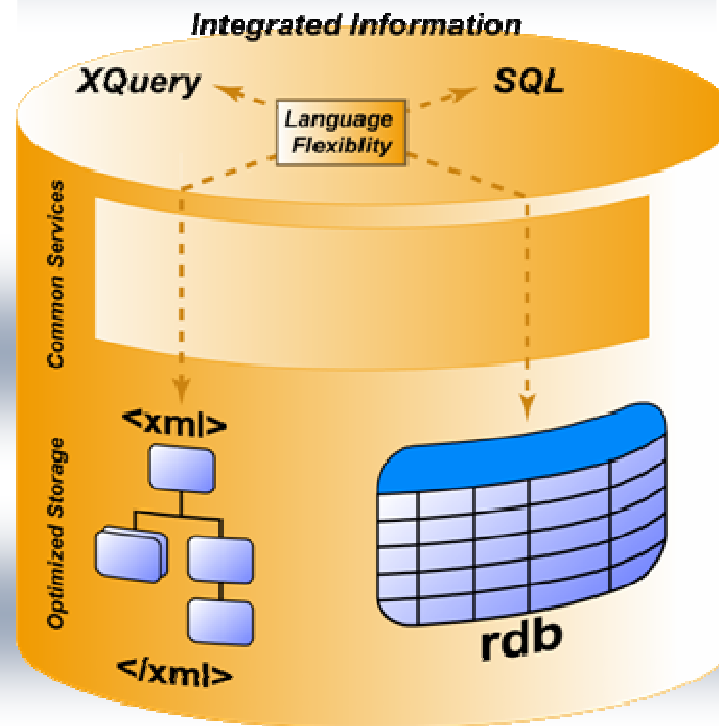
Optimized Performance & Scale

New XML applications benefit from:
- Ability to seamlessly leverage relational investment
- Proven Infrastructure that provides enterprise-class capabilities

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

InfoSphere Federation Server

| Oracle | VSAM IMS Data | DB2 VM/VSE | Software AG Adabas | CA Datacom | MS SQL |
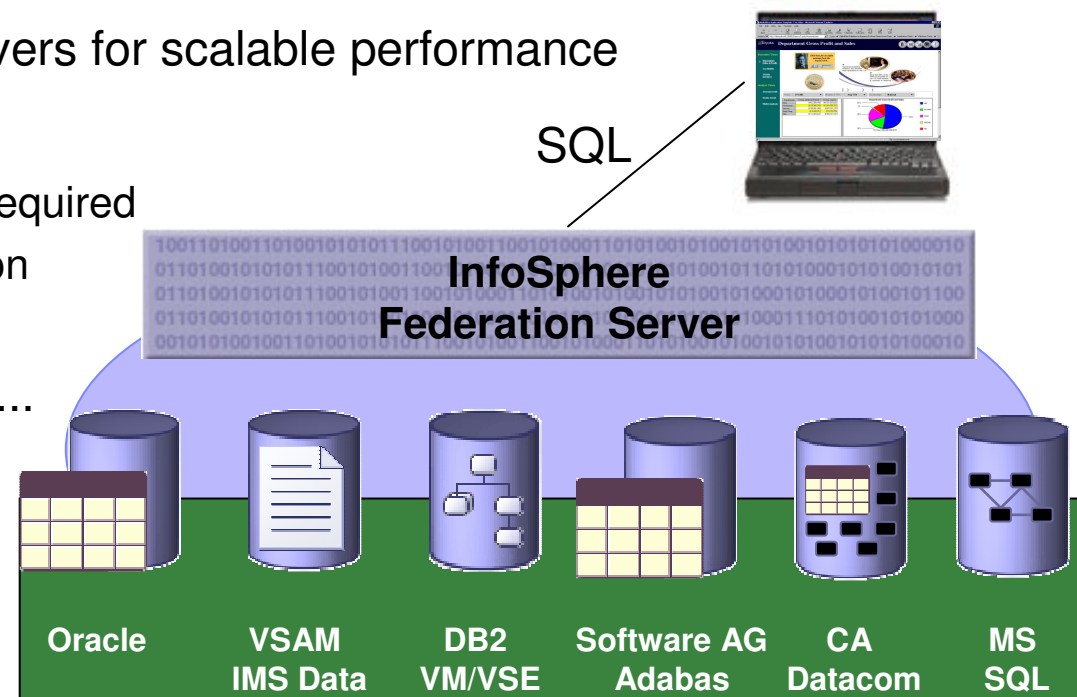
Cognos on IBM System z with z/VSE

Connectors like *VSAM Redirector* enable a VSE
application to store data on a remote system.

The VSE program doesn't need any change.
Working with a remote relational database (i.e. IBM
DB2 UDB), a real time synchronization between
VSAM data and the database can be done.

COGNOS. **Cognos Bi V8.3**

IBM Information Server

DB2

connectors

DB2 UDB

VSAM

connectors
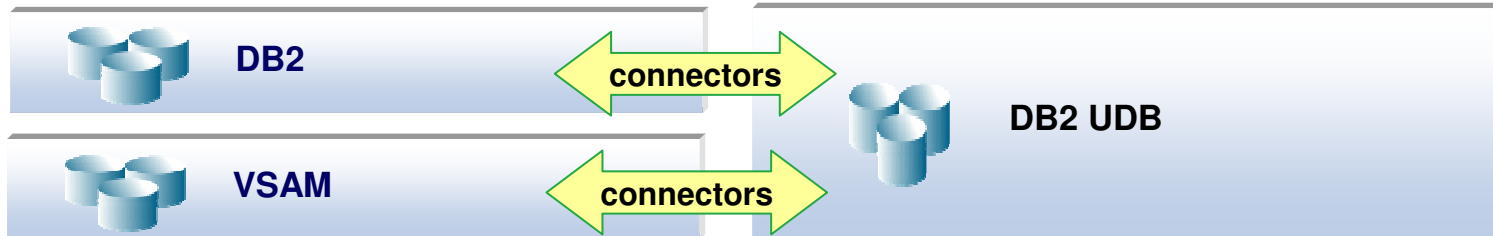
z/VSE

Linux on System z

Linux on System z Solution Benefits

- High Stability – inherits from System z

- High Scalability of Databases

- Very flexible environment with z/VM

- Use of Standard ASCII databases

- Very effective consolidation and federation

- Very good possibilities for centralized data analysis

- Rapid decisions with BI solutions

- **Agenda**

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SOA – the way to new applications and processes

- Applications look the same for all users
- Core applications can be enhanced with an interface
  (independent of their language, COBOL, ASM, PL/I)
- New business logic is built

Increased success for the Enterprise

Linux on System z

appl-x

New Logic

Web Services

DB2 UDB

DB2 UDB

WAS

Software
IBM WebSphere

Product Catalog:
- pictures
- description
- specifications
- testimonials

Supplier A

Orders

data

Traditional System z

deliverables

VSAM

debit check

DB2

shipping

IMS

restock

LPAR or z/VM

System z

LPAR or z/VM

System z
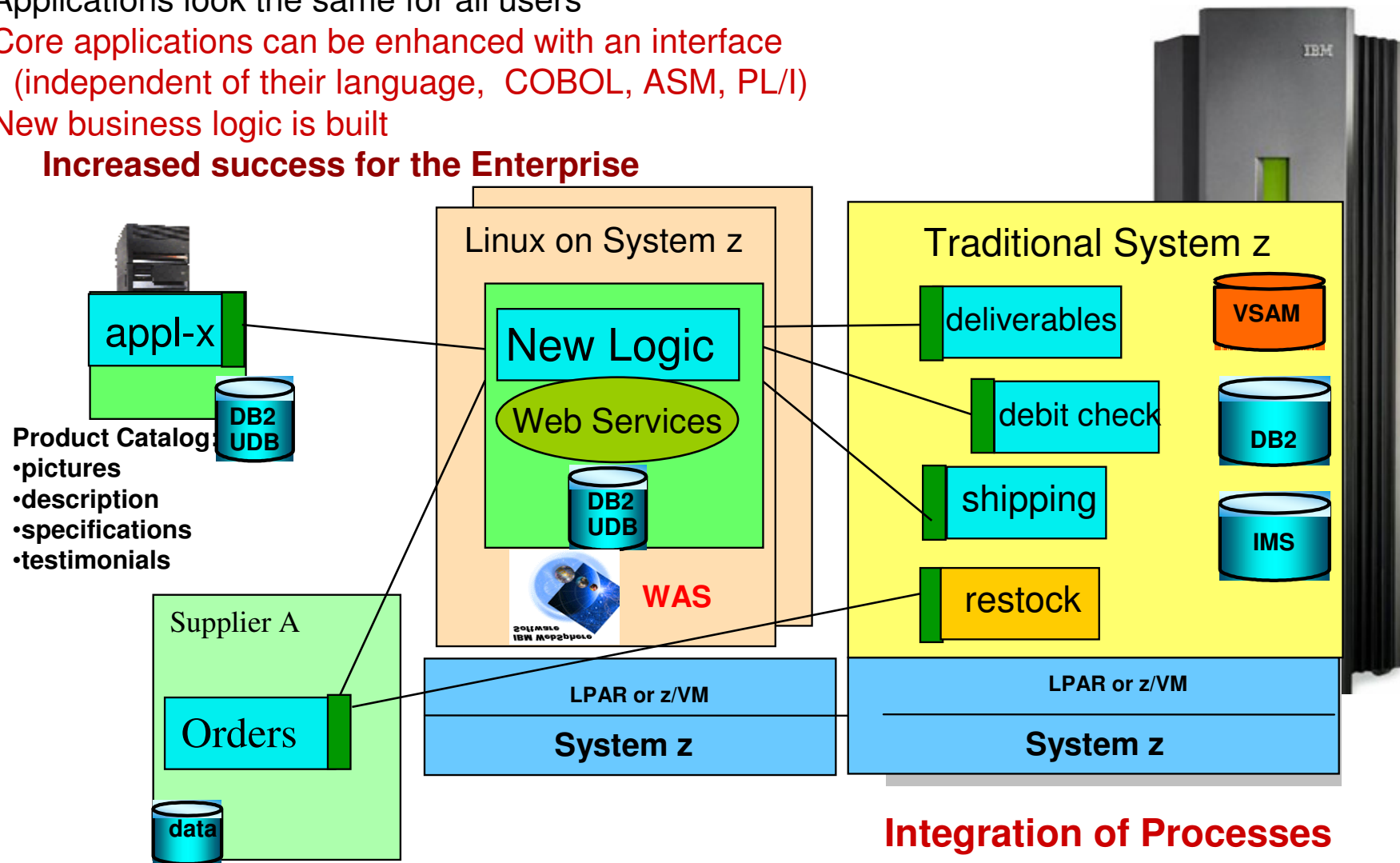
Integration of Processes

SOA Reference Architecture with z SW Products

Development Services
WID, RDz, WSAA, ATW, other tools*

Business Innovation & Optimization Services

WebSphere Business Modeler and Monitor*

Interaction Services

WebSphere Portal
HATS

Process Services

WebSphere
Process Server
WBSF

Information Services

DB2,

Enterprise Service Bus

WESB, WAS, WMQ, WMB

Partner Services

Business App Services

WAS, CICS, IMS TM

Apps & Info Assets

Connectors to
CICS, IMS
ERP/CRM

IT Service Mgmt

ITCAM,etc

Infrastructure Services

WAS XD, z10, LPAR, z/VM

Web 2.0 Connectivity for IBM's SOA

WebSphere MQ goes Web 2.0!
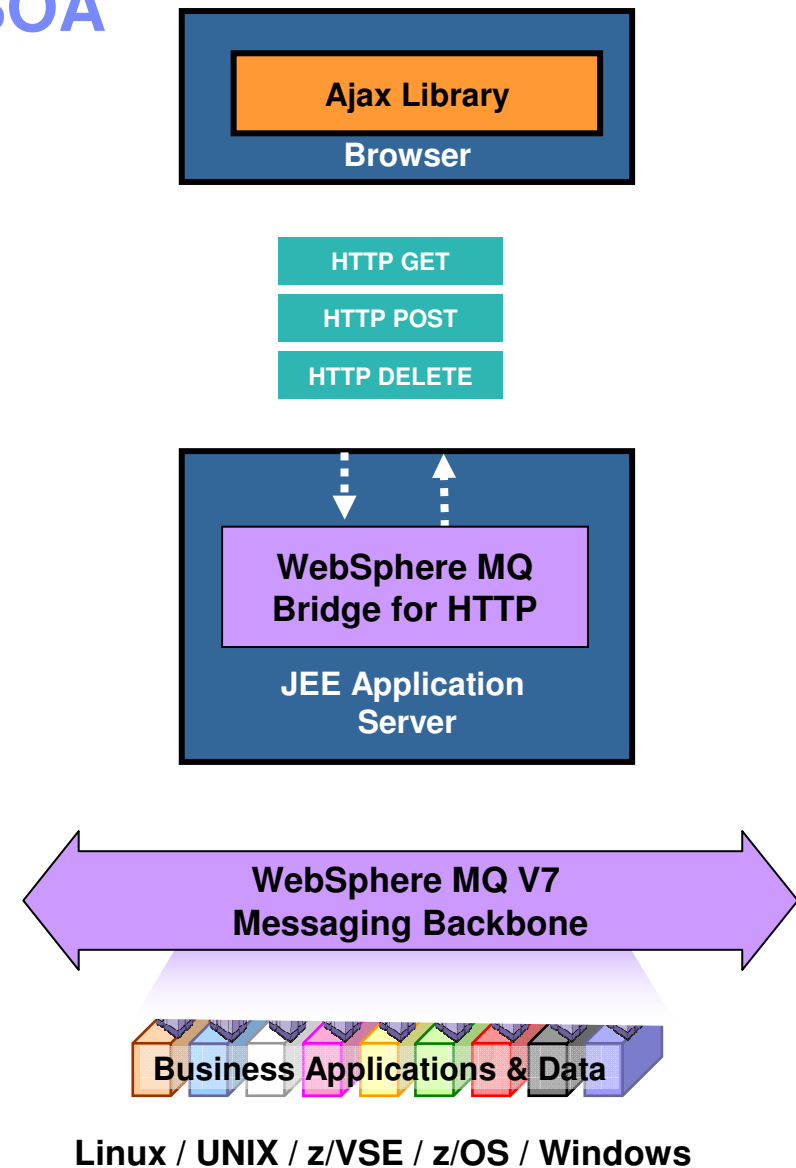
– Helps enrich Web 2.0 applications with real business data

• Distributed and z/VSE platforms

– Developer needs no MQ skills

• Uses Ajax and simple interface to access data by URIs

– Helps simplify deployment and maintenance of large scale distributed applications

• Enables simple access to MQ without need to install MQ clients

Ajax Library

Browser

HTTP GET

HTTP POST

HTTP DELETE

WebSphere MQ Bridge for HTTP

JEE Application Server

WebSphere MQ V7 Messaging Backbone

Business Applications & Data

Linux / UNIX / z/VSE / z/OS / Windows

Linux on System z Solution Benefits

- High Scalability and effective Hub for applications

- Use of Standard SOA architecture and interfaces

- Very good possibilities for new solutions

- High performance integration with transactional load

- System z integration with distributed applications using standard interfaces

- High scalable ESB using WMQ or WebSphere ESB

- **Agenda**

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Linux on System z as Mail and Collaboration Hub

- **Mail**

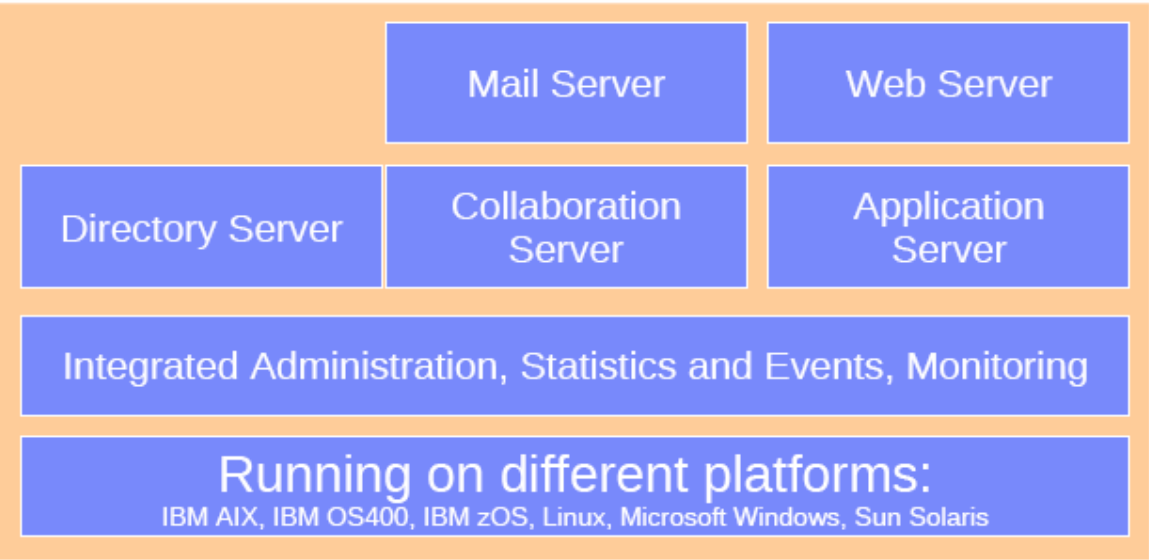   - **Lotus Domino for Linux on System z**

    - **ISV products such as :**

        - **Bynari,**

    - **Open source products:**

        - **Exchange4Linux, Evolution, Kroupware, OpenGroupware, Postfix, sendmail**

    - **Asterisk- manages telefone calls, mails**

- **Reference: Winnebago Industries slashes e-mail costs and dministration time with solution from Bynari, IBM and Linux on System z**
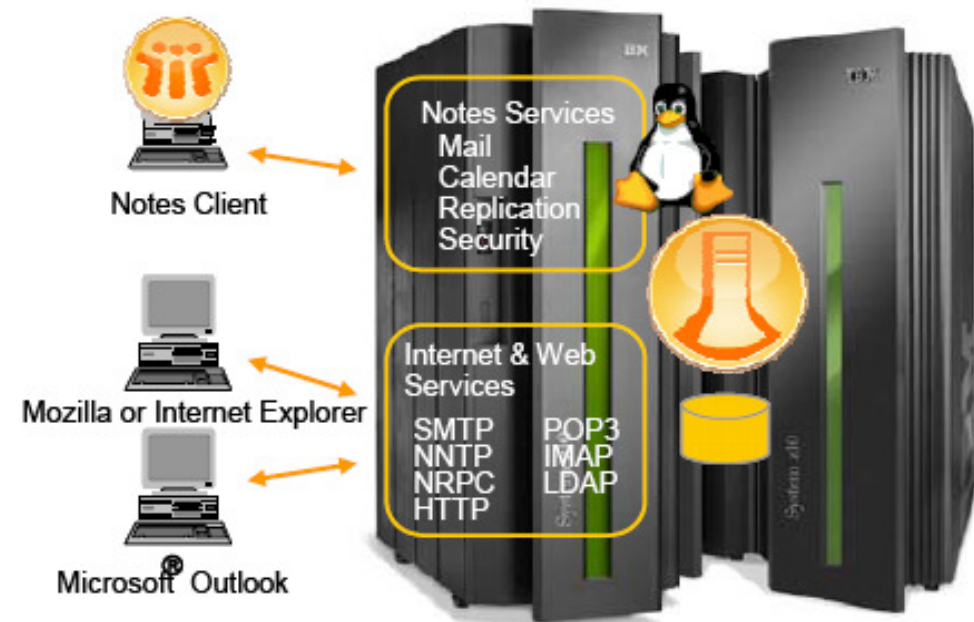
Lotus Domino – more than just Mail server

Choose your Client: Lotus Notes (Windows, Linux und Mac), Domino Web Access, POP3/IMAP, Mobile Devices, MS Outlook

	Mail Server	Web Server
Directory Server	Collaboration Server	Application Server

Integrated Administration, Statistics and Events, Monitoring

Running on different platforms:
IBM AIX, IBM OS400, IBM zOS, Linux, Microsoft Windows, Sun Solaris

Development Tools

High Availablility of Lotus Domino

Domino Clustering

- High Availability of critical databases (mail and applications)
- Fail over and Workload Balancing

  - Active/Hot-Standby

  - Active/Active

- Supported by Domino Utility Server and Enterprise Server
- Use of any supported hardware and operating system
- Can be combined with operating system cluster

IBM System z – the next generation **voice** Hub!
– **more than a simple Phone Server**

„Asterisk® is the world's leading open source telephony engine and tool kit"
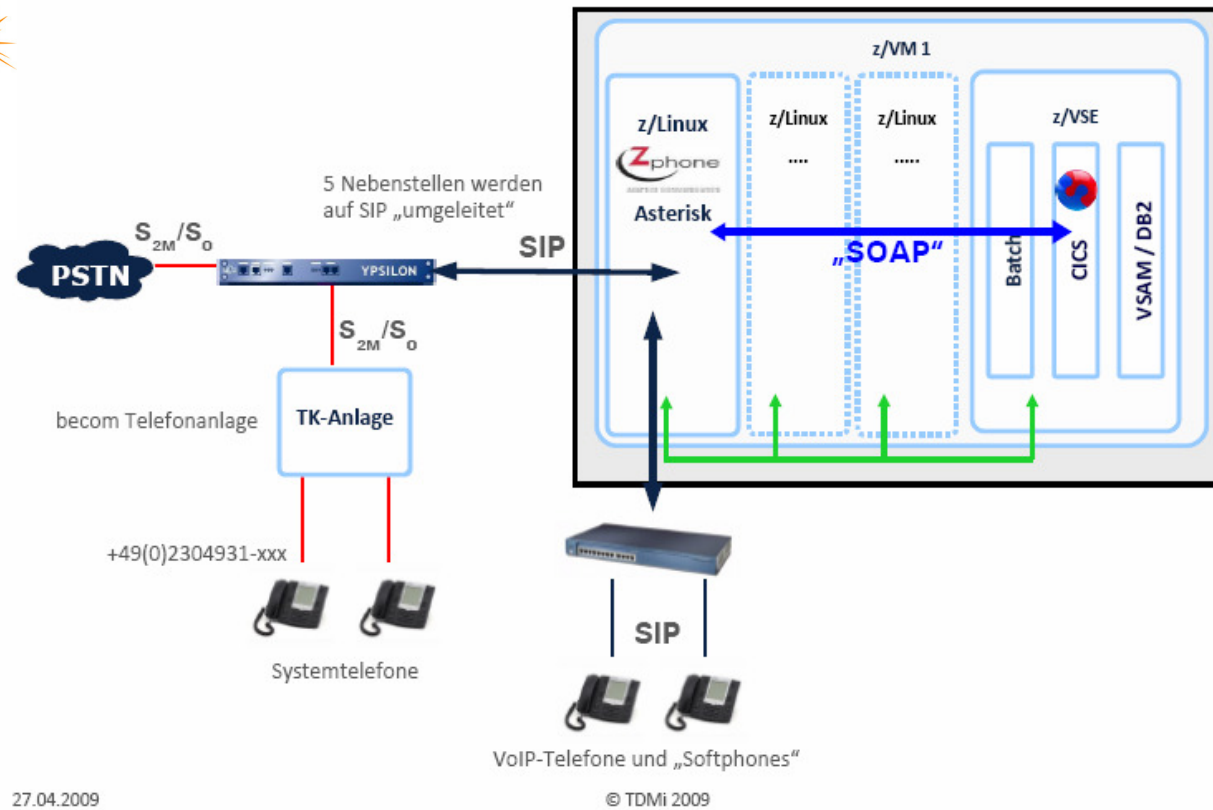
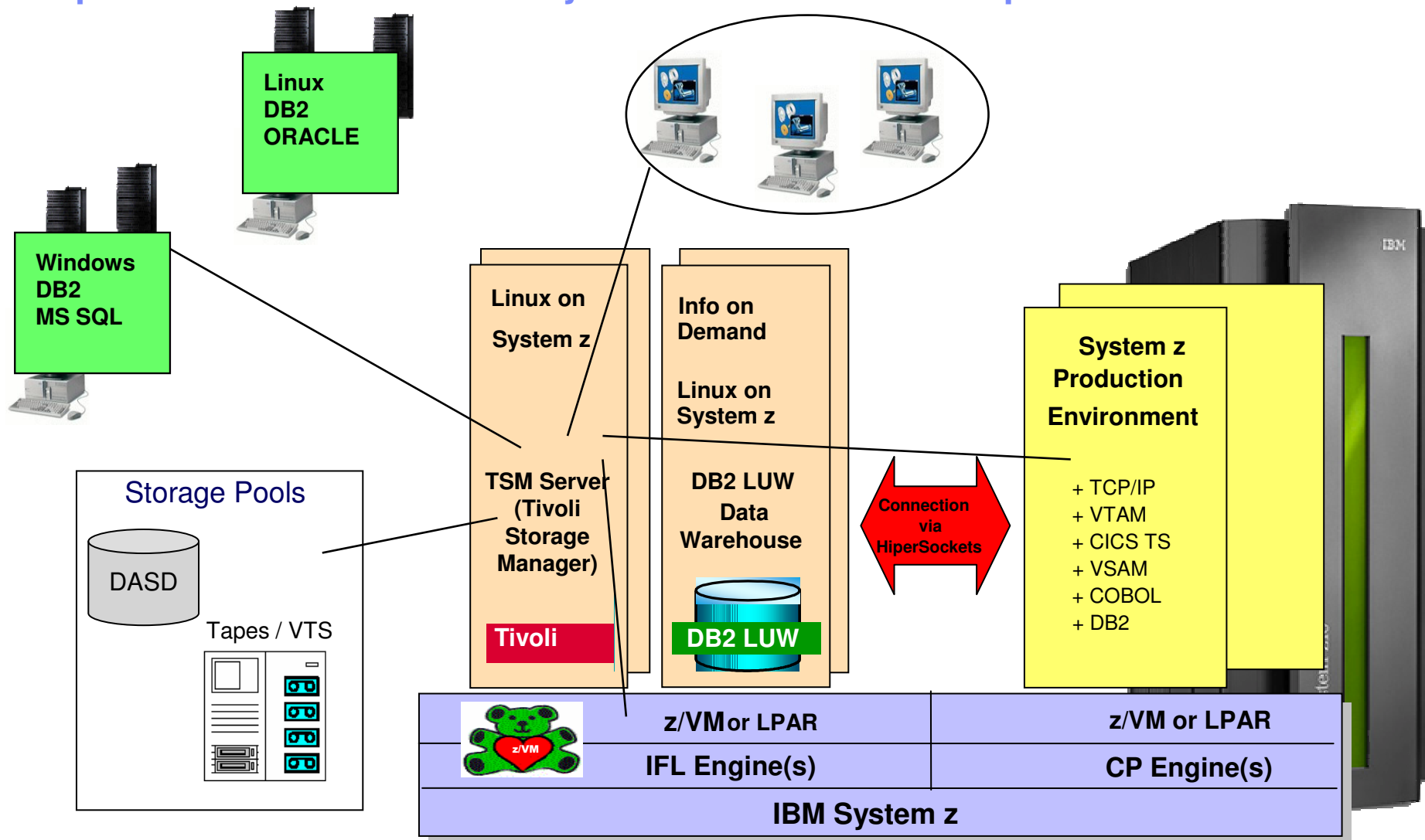(http://www.asterisk.org/support/about)

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Enterprise Backup Hub

Implement TSM on Linux on System z as central Backup Hub

Linux on System z Solution Benefits

- **Centralized Backup procedure for the enterprise**

- **One tool for System z and distributed backups and archives**

- **Use of Stability of System z for Recovery**

Success Stories

http://www-03.ibm.com/systems/z/os/linux/success/

Success stories by industry

- Banking / Financial Services
- Chemicals & Petroleum
- Computer services
- Education
- Government
- Healthcare
- Industrial Products
- Insurance
- Media & Entertainment
- Professional Services
- Retail
- Travel and transportation
- Wholesale Distribution & Services
- Success Stories of Novell SUSE and Red Hat

IBM Systems > Mainframe servers > Operating systems > Linux >

Linux
- About Linux on IBM System z
- Solutions
- Software
- **Success stories and references**
- Services
- Security
- Technical support
- Library
- Education

Success stories and references

Think beyond what you'd expect from IT. Focus on what you need. Virtualization & consolidation - transform businesses of all sizes, all over the world. Learn how clients have put Linux on System z (z10, z9, zSeries) to work for them to lower cost and reduce energy consumption.

Featured success story

Bank of New Zealand Reduces Carbon Footprint on the Mainframe
The Bank of New Zealand has significantly reduced its hardware footprint, power consumption, heat and carbon emissions and costs, including an expected 20 percent cost reduction over the life of the platform. The bank migrated its systems to Linux running under z/VM on the mainframe. Today, BNZ utilizes both IBM System z10 and z9 systems to power the bank's customer-facing banking systems, including Internet banking and teller platforms.

Banking

→ Bank of Russia saves US$400 million per year by consolidating to IBM System z9

The Bank's new infrastructure is an excellent example of what IBM terms the "new enterprise data center": an efficient, simplified, virtualized, highly resilient set of shared resources capable of responding dynamically to business demands. "Using virtualization to consolidate more than 200 distributed servers on just four IBM System z9 mainframes is a great advantage in terms of hardware licensing and energy costs, and decommissioning the 74 existing data centers was another major saving", says Mikhail Senatorov, Deputy Chairman, Bank of Russia.

→ IZB Informatik-Zentrum delivers a flexible, highly secure application infrastructure on IBM System z

According to IZB Informatik-Zentrum, faster development cycles have been a major benefit of migrating to the IBM System z infrastructure. Today, IZB Informatik-Zentrum uses IBM WebSphere Application Server in a 64-bit mode and has successfully deployed Enterprise JavaBeans applications running under z/OS. The company is using Linux on IBM System z under IBM z/VM to serve several different Web applications, including Beta Web Enabler from BetaSystems, MediaWiki and IBM WebSphere Studio Application Monitor software.

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Chemicals & Petroleum

→ Univar extends computing capabilities with IBM System z9

Our business was really taking off at an exponential rate. The ability to respond to growth from an architectural perspective was a major challenge," Dean Schultz, Univar USA's Manager of Technical Services. "A couple of year ago we started testing the idea of running Linux machines on IFLs as part of our virtualization effort. At last count, we have about 40 Linux machines running in development and production." Greg Mueller, Systems Programmer for Univar USA. The IBM z/VM operating system enables the virtualization of these applications, which include the company's e-commerce applications, an FTP server and IBM Domino and IBM WebSphere software.

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Computer services

→ IT service provider BRZ Deutschland reduces data processing times

The System z9 technology offered the flexibility to run the z/VSE operating system while also allowing the company's Linux® applications to coexist. Leveraging the z/VSE environment, three Virtual Storage Extended (VSE) systems run in a logical partition (LPAR), with the System z9 BC server acting as the data hub.

Bank of New Zealand
A bank uses Red Hat Enterprise Linux on System z10 to reduce their carbon footprint, and address datacenter cost and capacity concerns

The Bank of New Zealand reduce their datacenter footprint by 30%, heat output by 33%, carbon footprint by 39%, and expects a 20% ROI

✱ **The Challenge**

- A datacenter with 200 Sun servers was at capacity

- Bank of New Zealand needed to grow, reduce emissions and costs, become more open, and seeks to become carbon-neutral by 2010

✱ **The Solution**

- Consolidate 200 Sun servers down to just 1 IBM System z10 mainframe running Red Hat Enterprise Linux

✱ **The Benefit**

- Bank of New Zealand reduced power consumption by close to 40%, heat output by 33%

- Just one administrator is needed per 200 virtual servers

- New environments are deployed in minutes, not days

"Deploying IBM mainframes with Red Hat Enterprise Linux to address our carbon footprint and cost savings concerns was a very big deal, especially at the senior management level."

Lyle Johnston
Infrastructure Architect
Bank of New Zealand

http://www.ibm.com/press/us/en/pressrelease/26621.wss

Nationwide Insurance Racks up Datacenter Efficiencies with Virtualization

▶ Challenges

- Rapid growth on many underutilized servers taking up datacenter space

- Requirements to facilitate fast provisioning, reduce TCO

▶ Solution

- Consolidated many underutilized servers onto IBM System z™ with Linux

- IBM WebSphere, IBM DB2 UDB, IBM WebSphere MQ

- GTS Capacity Planning & Capacity Management Services

▶ Benefits

- Significantly better TCO (estimated $15 million savings over 3 years)

- 80% reduction in data center floor space needs; power conservation

- 70% average CPU utilization

- 50% reduction in hardware & OS support efforts

- Significantly faster provisioning speed (months to days)

- Capacity on demand; increase/reduce compute power

- Simple and robust high availability & disaster recovery

Customer Example: Wessels & Müller AG

IBM Case Study

IBM.

Wessels+Müller AG:
New opportunities with z/VSE, DB2 UDB
and Linux on the IBM System z9

Overview

■ **The task at hand**
To modernize existing warehouse management systems in order for IT to be able to respond to business fluctuations with maximum flexibility.

■ **The solution**
IBM System z9® with z/VSE™ – via TCP/IP and connectors linked to the DB2® Universal Database™ (UDB) for Linux on system z™ – functions as the most modern DataHub® and allows Wessels + Müller AG to adapt to new business conditions based on demand.

■ **The benefits**
Installing DB2 UDB for Linux on system z achieves maximum flexibility, the best data serving, the highest ever availability of applications and the dynamic rearrangement of resources. The simplified infrastructure reduces operating costs.

The company
Wessels+Müller AG supplies its customers with original parts from brand name manufacturers. In doing so, it ensures punctual deliveries and a service that makes it possible for customers to concentrate more on the success of their businesses.

Johannes Schlentzek, IT Manager at Wessels+Müller: "Together with our employees, we intend to be one of the most high-performing companies in the field of parts supply and delivery and will do all we can to maintain this position. We are pursuing this goal by applying our company's greatest strengths and competencies. These include a comprehensive product assortment, powerful logistics, area-wide delivery capacity and, last but not least, the know-how, skills and the friendliness of our employees."

Advancement thanks to the flexibility of the new solution
The company's main focus is on maximum flexibility in order to shape ongoing operations optimally at all times. The idea is not only to obtain the

highest performance during peak demand, rather above all, to benefit from reduced operating costs during the quieter times. Once the previously installed IBM zSeries® z890 had already reached about 80 percent capacity just handling daily operations, Wessels+Müller decided to opt for migration in order to have more capacity available in the future.

The IBM System z9® platform primarily functions as a pure data serving environment. By using highly scalable services, Wessels+Müller is able to consolidate and manage very large data volumes on one system. The flexible platform offers comprehensive support for open as well as industry standards. Numerous security functions, such as protected access, technologies for network-based and local encryption contribute to the first-class technology of the main frame. The operating system provides a special service. Johannes Schlentzek: "Over the course of the years, as the requirements became higher and higher, the z/VSE™ on the main frame proved itself as an absolutely reliable operating system that was both stable and secure and became easier and easier to administrate."

In close cooperation between Wessels+Müller, the IBM business partner Becom and IBM, migration to the z9 Business Class (BC) IBM System took place in just one weekend.

After migration, the applications as well as the databases (DB2/VM) were noticeably faster, which not only resulted in accelerated processing, but also optimal handling of the data load, even during transaction-intense phases. The team even installed Linux on a separate Linux processor (IFL) and z/VM® V5.2 and also installed the DB2® Universal Database™ (UDB). The first applications have been in production at Wessels+Müller since May 2007. All data and applications are gradually being migrated to the UDB.

With the additional options, Wessels+Müller is able to maintain its competitive edge and to further build on it. The improved service is not only available to the company's 1,950 employees, but also to customers and partners. As an application and data server, the z/VSE functions as the company-wide information and ordering system on the Internet.

Under z/VM V5.2, five z/VSE systems operate in a logical partition (LPAR). In a second LPAR, which is assigned to a dedicated Linux processor, numerous Linux guests are installed under z/VM, which, in turn, serves as the carrier system for DB2 UDB.

Time is money

Wessels+Müller currently relies on z/VSE V3.1.2, but is preparing to upgrade to z/VSE V4.1. With the help of tools, pre-testing is being performed to see which additional options will be offered with the new functions such as workload pricing. In the second quarter of 2008, the 64-bit version of the operating system will be ready for use at Wessels+Müller.

Technical Data

IBM System z9® Business Class (BC), IFL-z/VSE™ V3.1.2, z/VM® V5.2, DB2® Universal Database™ (UDB), LPAR

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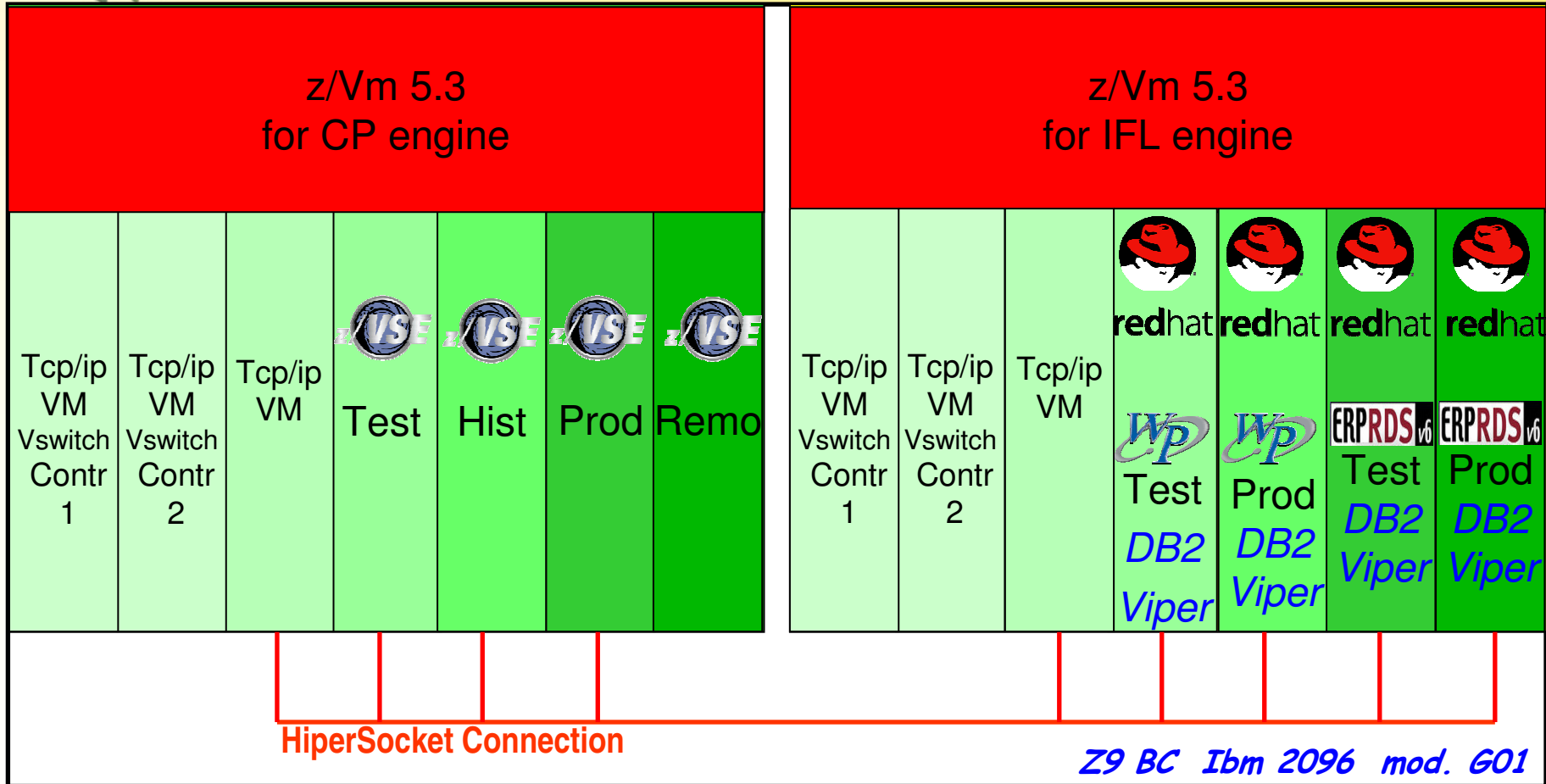Linux is a trademark of Linus Torvalds in the USA and/ or other countries.

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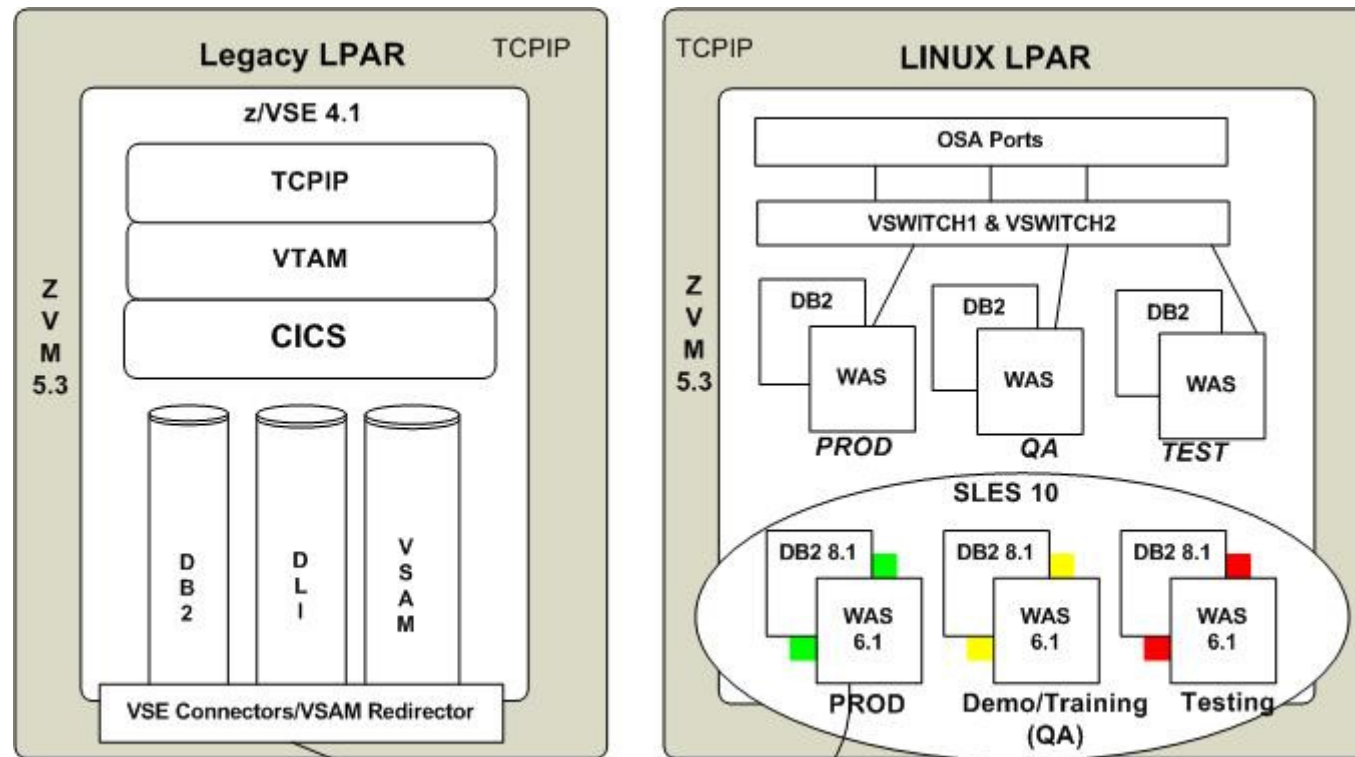<u>Source:</u> IBM Form GK12-4361-00

Internal Connections

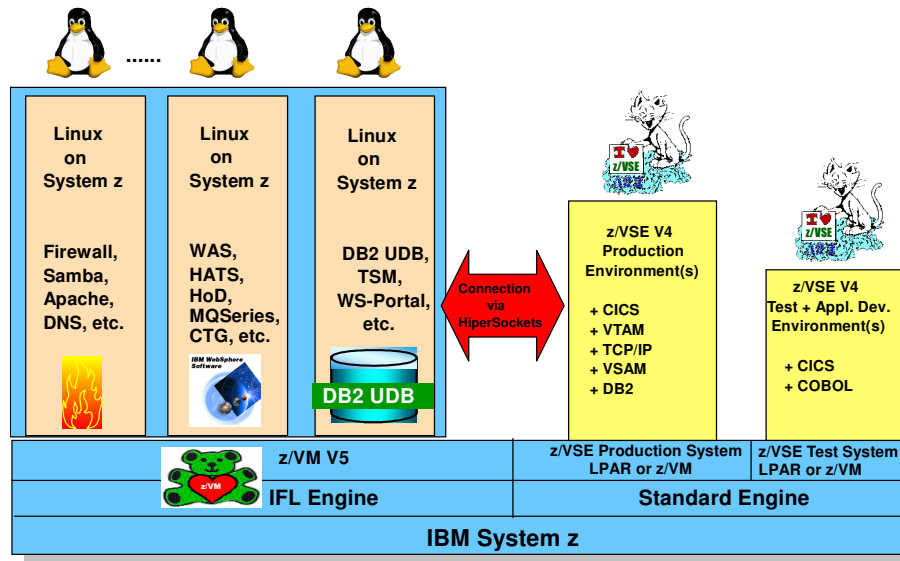# Customer Refrence: Supreme Court, USA

The Magistrate Environment Today

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

Summary
z/VSE Strategy enables and supports customer growth
with IBM System z, IBM System Storage, and IBM Middleware

- **z/VSE V4**
  - ►Protect core IT investments through PIE
  - ►Robust, secure enterprise server
  - ►Cost-effective solutions
  - ►Interoperability with network / servers
  - ►Highly improved price / performance

- **z/VM V5**
  - ►Highly flexible, industrial strength
  - ►Advanced virtualization
  - ►Multiple z/VSE and Linux images
  - ►Designed to exploit System z9

- **Linux on System z**
  - ►Large portfolio of new applications
  - ►Platform for IBM middleware
  - ►Infrastructure Simplification
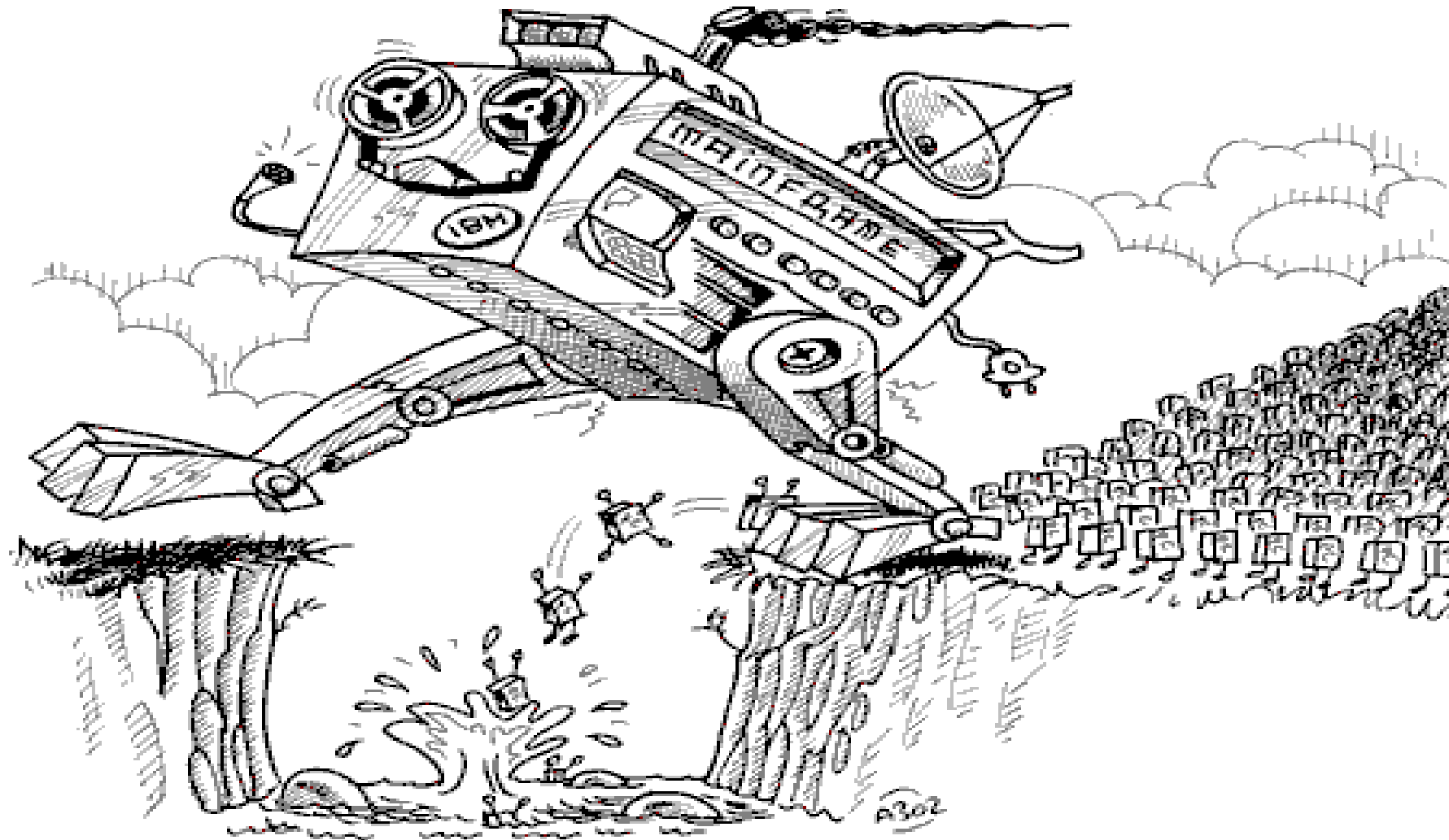 - ►Massive scalability / consolidation

The Future runs on System z, the largest scalable server

… System z delivers extreme business value by helping you reduce cost, manage risk, and improve service.

Do you want to make bigger steps forward ?

More Information about Linux on System z

Linux on System z in IBM:

http://www-03.ibm.com/systems/z/os/linux/

Linux on System z at Developerworks:

http://www.ibm.com/developerworks/linux/linux390

Tuning Linux on System z:

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