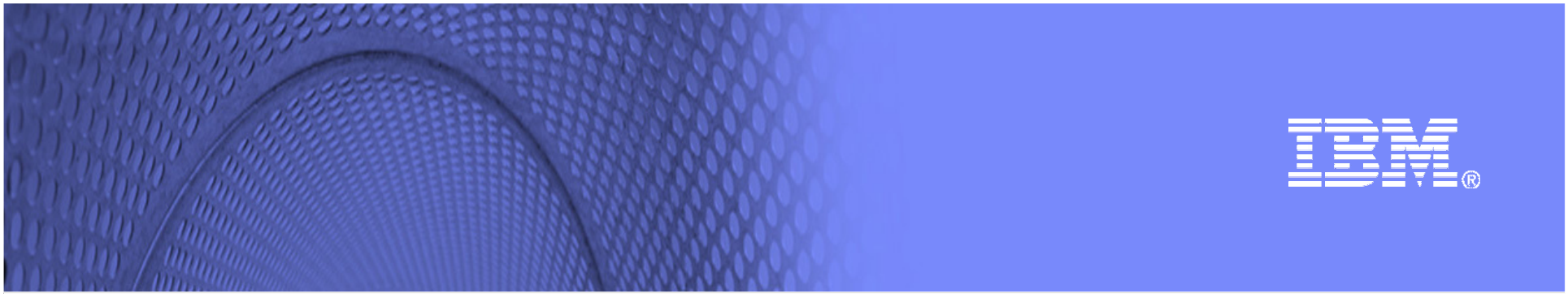
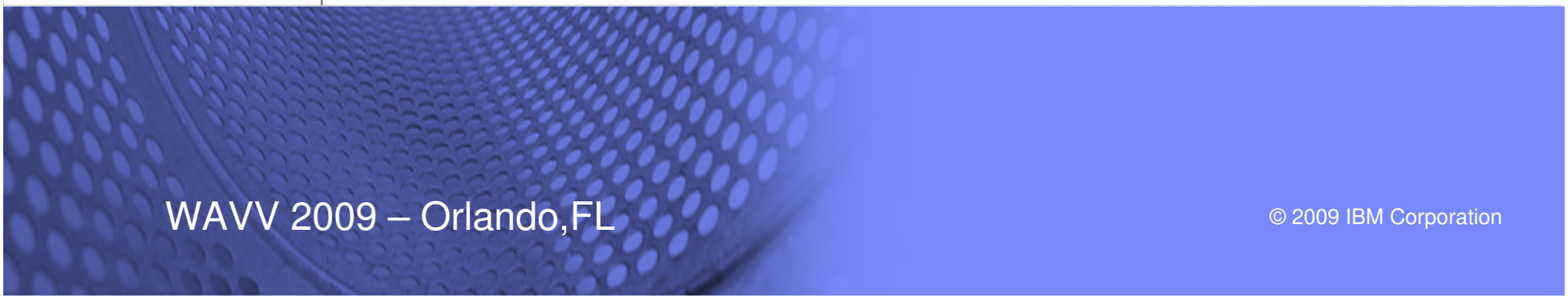


Exploit virtualization in modern solutions with Linux on System z as central hub

Wilhelm Mild
IT Architect
IBM Germany



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Agenda

1. The Role of Linux on System z
2. Linux on System z as ‘Central Portal’
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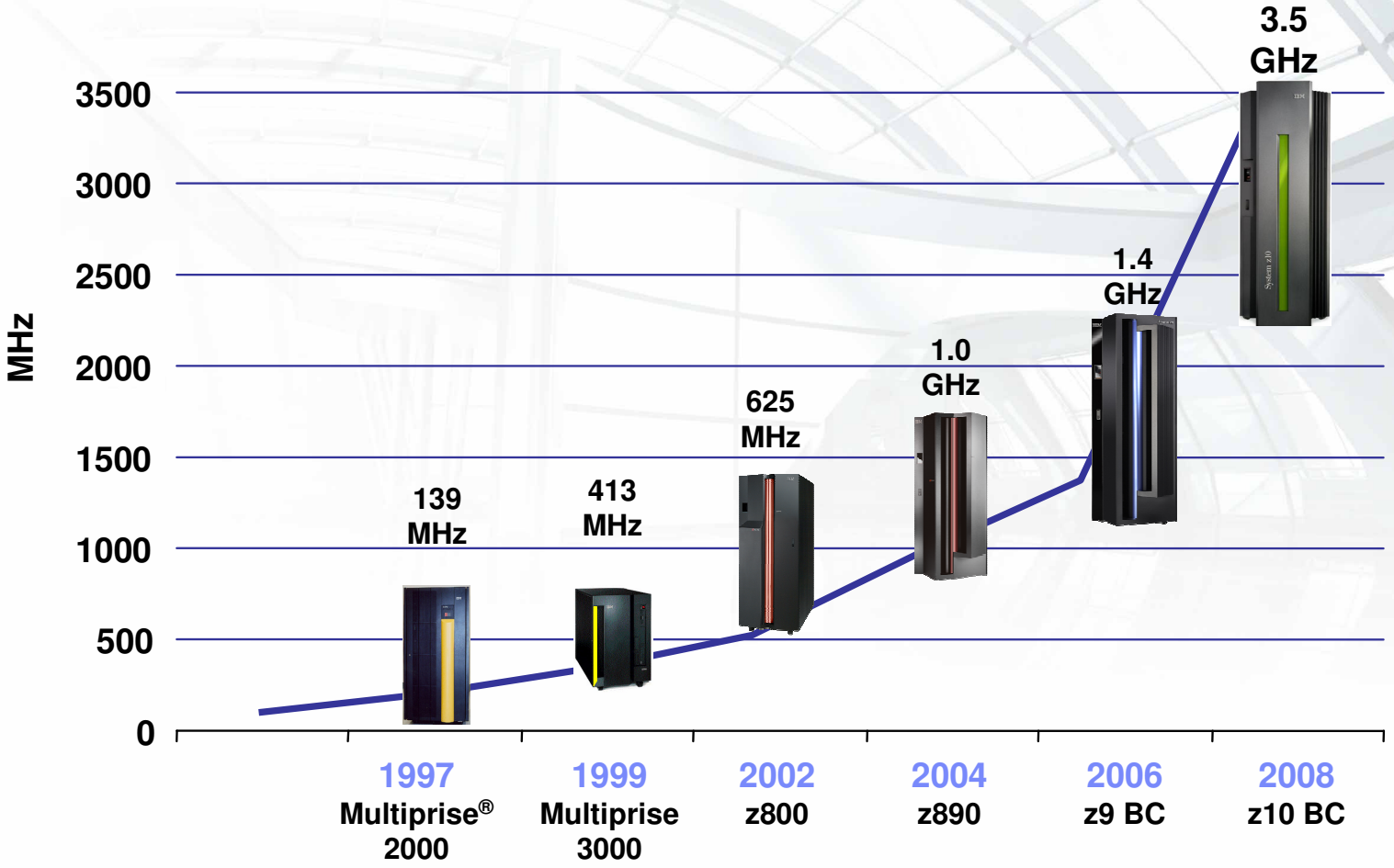
6. Linux on System z as ‘Recovery Hub’

IBM System z10 Business Class – Large scalable server



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

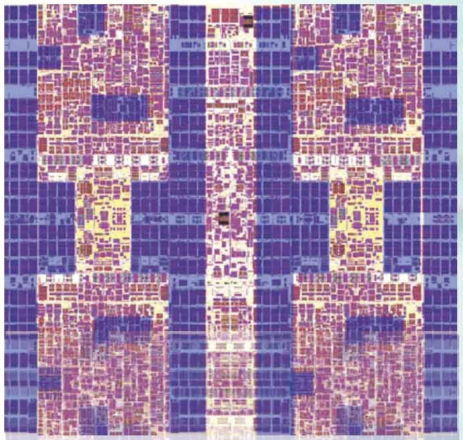
- IBM eServer™ zSeries® 800 (z800) - Full 64-bit z/Architecture®
- IBM eServer zSeries 890 (z890) - Superscalar CISC pipeline
- z9 BC - System level scaling

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

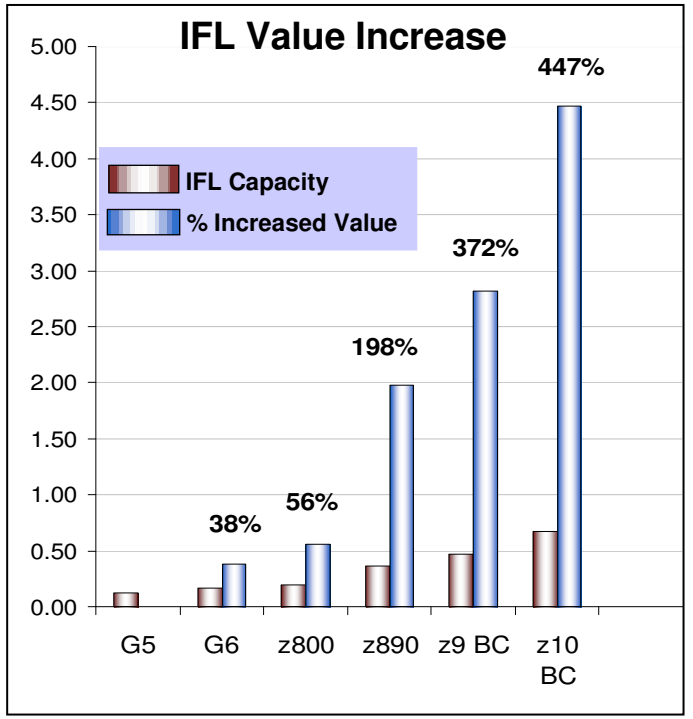


Enterprise Quad Core z10 processor chip

Up to 10X improvement in decimal floating point instructions*

Harness the Unique Value of Specialty Engines

- Specialty engine Prices have remained constant yet deliver more capacity
  - Up to 40% more capacity on single PU from z9 BC!!!
- Specialty engine upgrades to z10 BC typically move with NO charge
  - exception for all IFL server and short path upgrades
- New lower memory costs for specialty engine enabled workloads,
- Distributed Server model over same time:
  - 3 Technology Refreshes (New Hardware)
  - 3 System migrations



* Price may vary by country. Internal Coupling Facilities (ICFs) not included

Specialty Engines:

The investments that continues to deliver value generation to generation

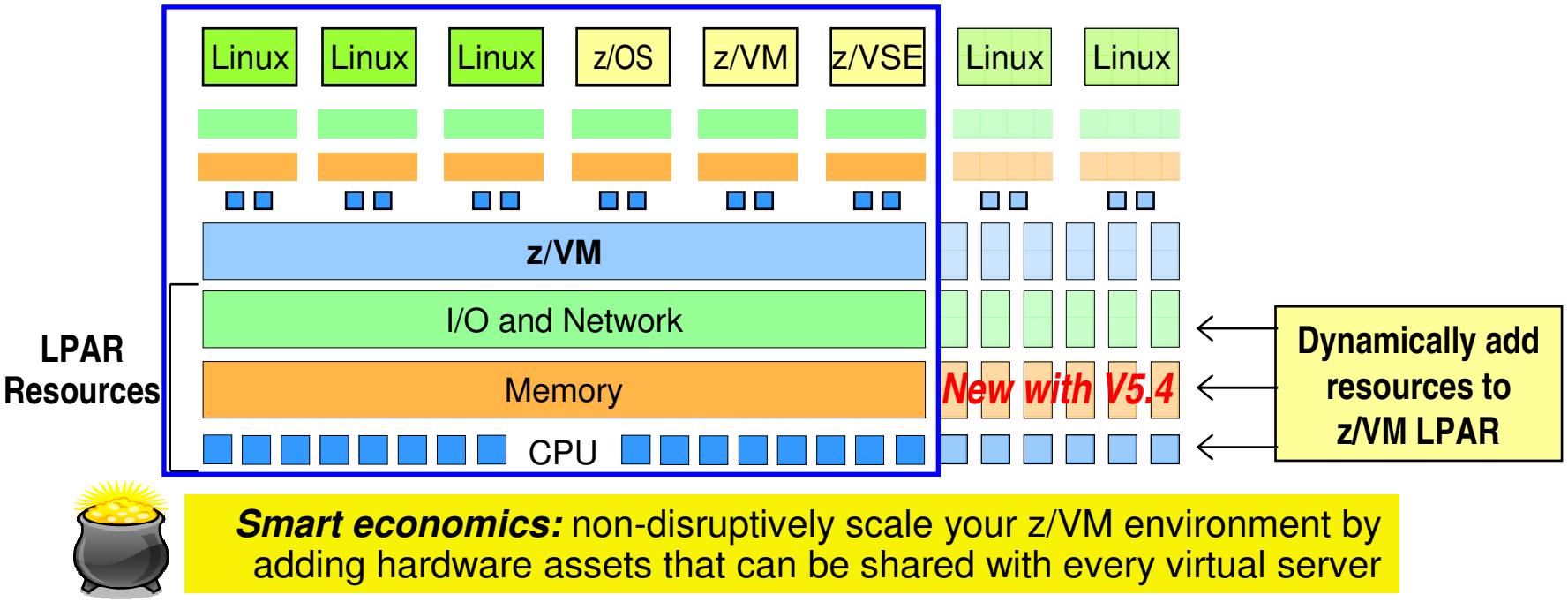
1 - Prices in USD, may vary by country, 2 – Limited to 16GB per engine, 3 – Does not include Internal Coupling Facilities (ICFs)

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 dynamically add CPU, I/O, and networking resources**

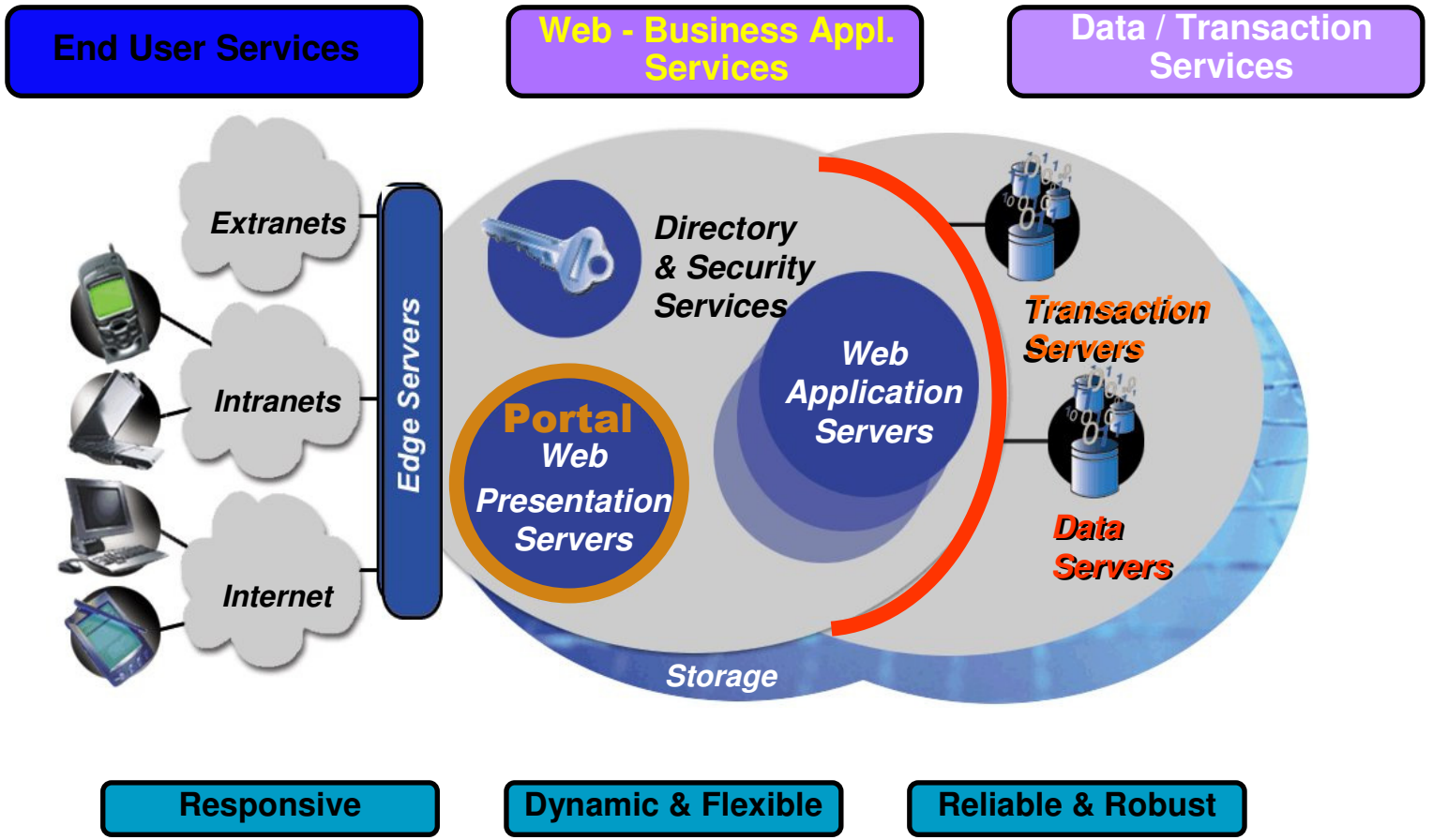


Smart economics: non-disruptively scale your z/VM environment by adding hardware assets that can be shared with every virtual server

z/VM Virtualization Leadership:
The Value of Scaling on a Single Hypervisor

- Grow virtual server workloads without linearly growing energy costs
- Enhance staff productivity with a single point of control at the hypervisor level
- Dynamically add and remove physical resources in a single machine to optimize business results
- Exploit hypervisor automation tools with higher degrees of integration and optimization

Infrastructure



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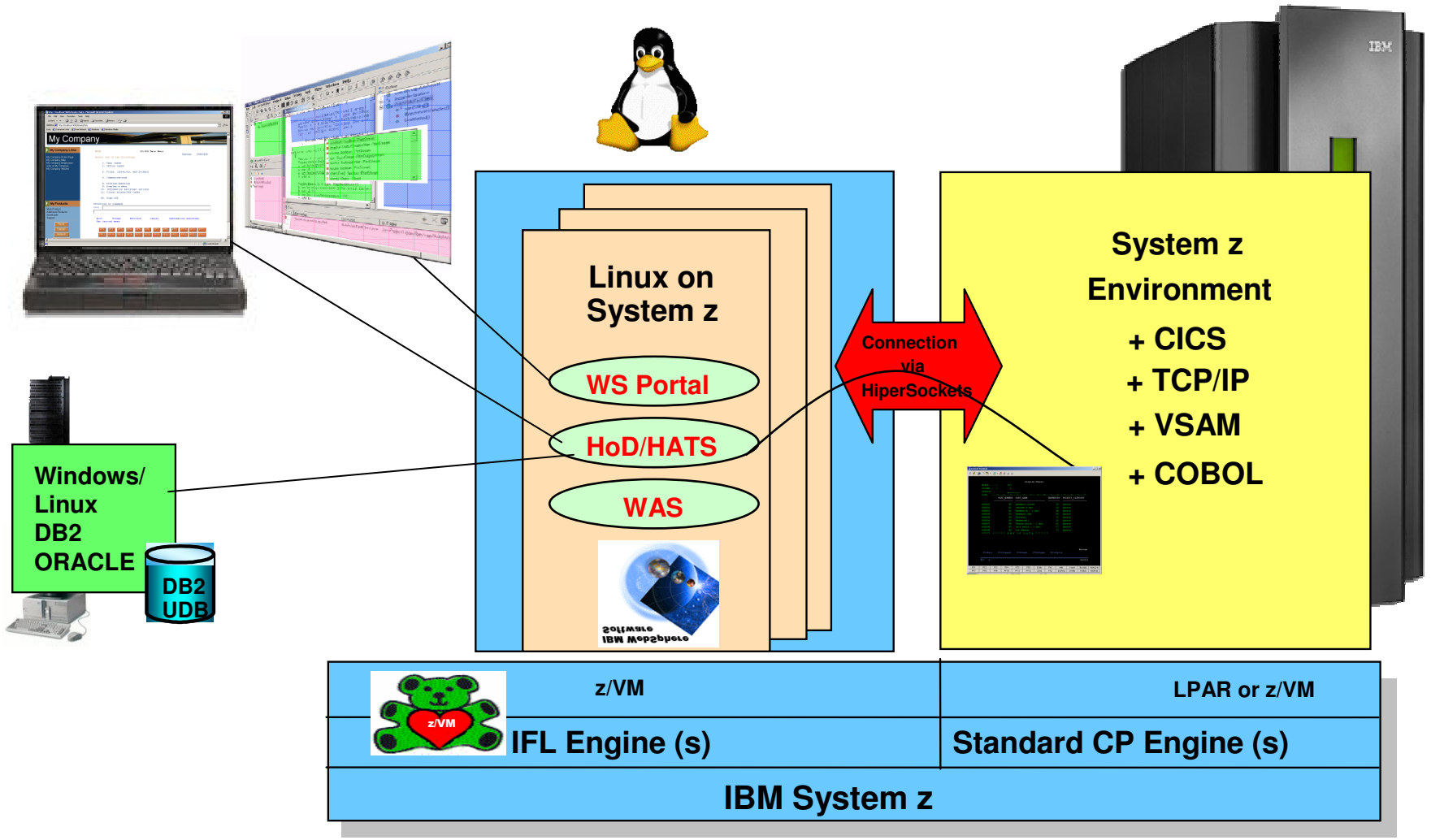
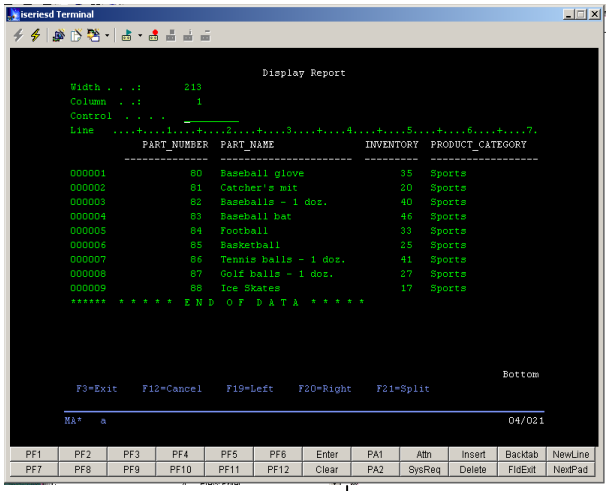
Scenario 1: Linux on System z as Central Access Hub

Web enable, improve interface, simplify, extend existing applications

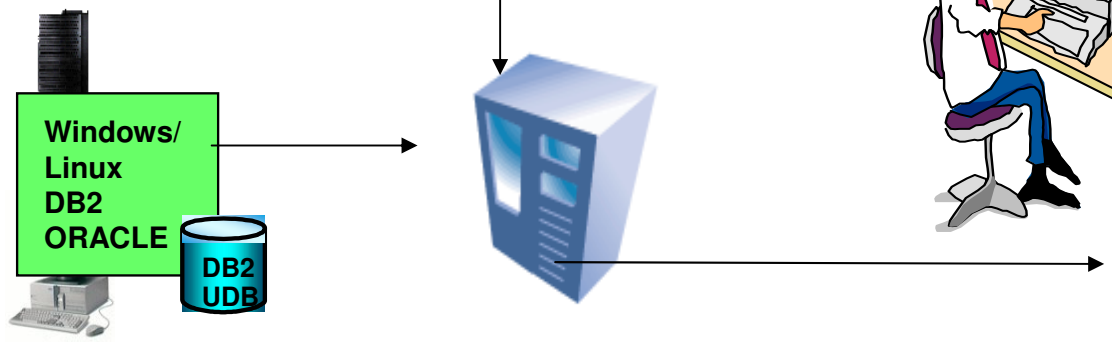


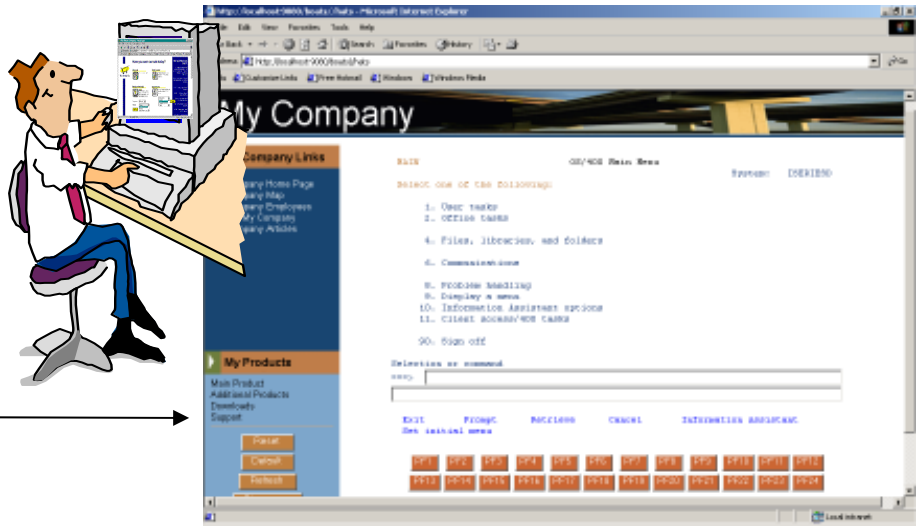
Application Integration with Host Access Transformation Services (HATS)



3270 or 5250 data stream

- 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

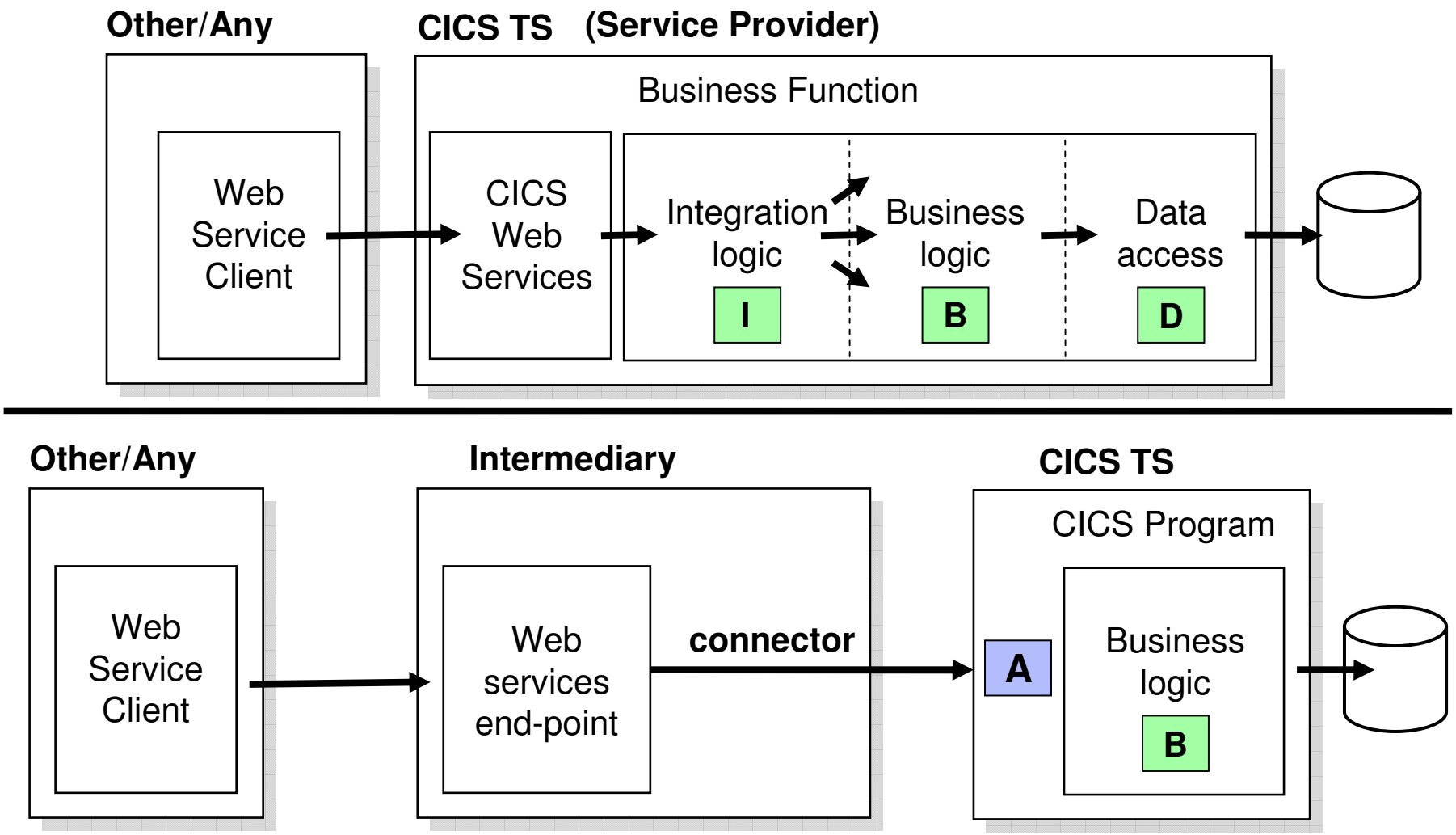




Screen transformation rules running on WebSphere Application Server

HTML in a Browser

The Two Models of CICS Integration



.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

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

De Icaza explai
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.

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."

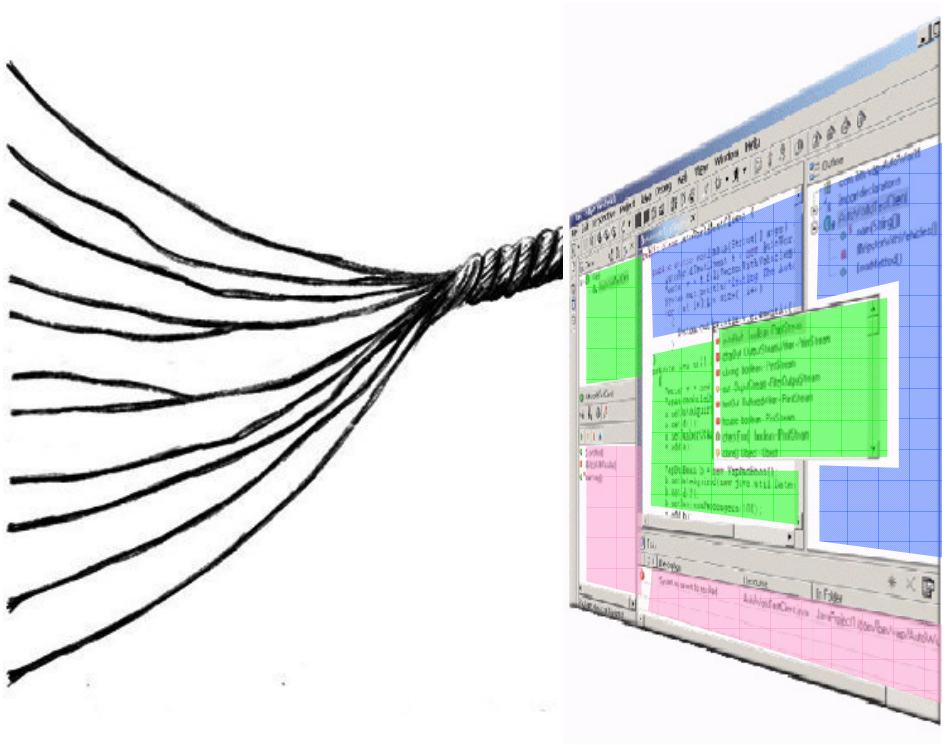
The new plug-in when available will allow for more integrated Visual Studio to mono debugging and control than what is currently available.

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

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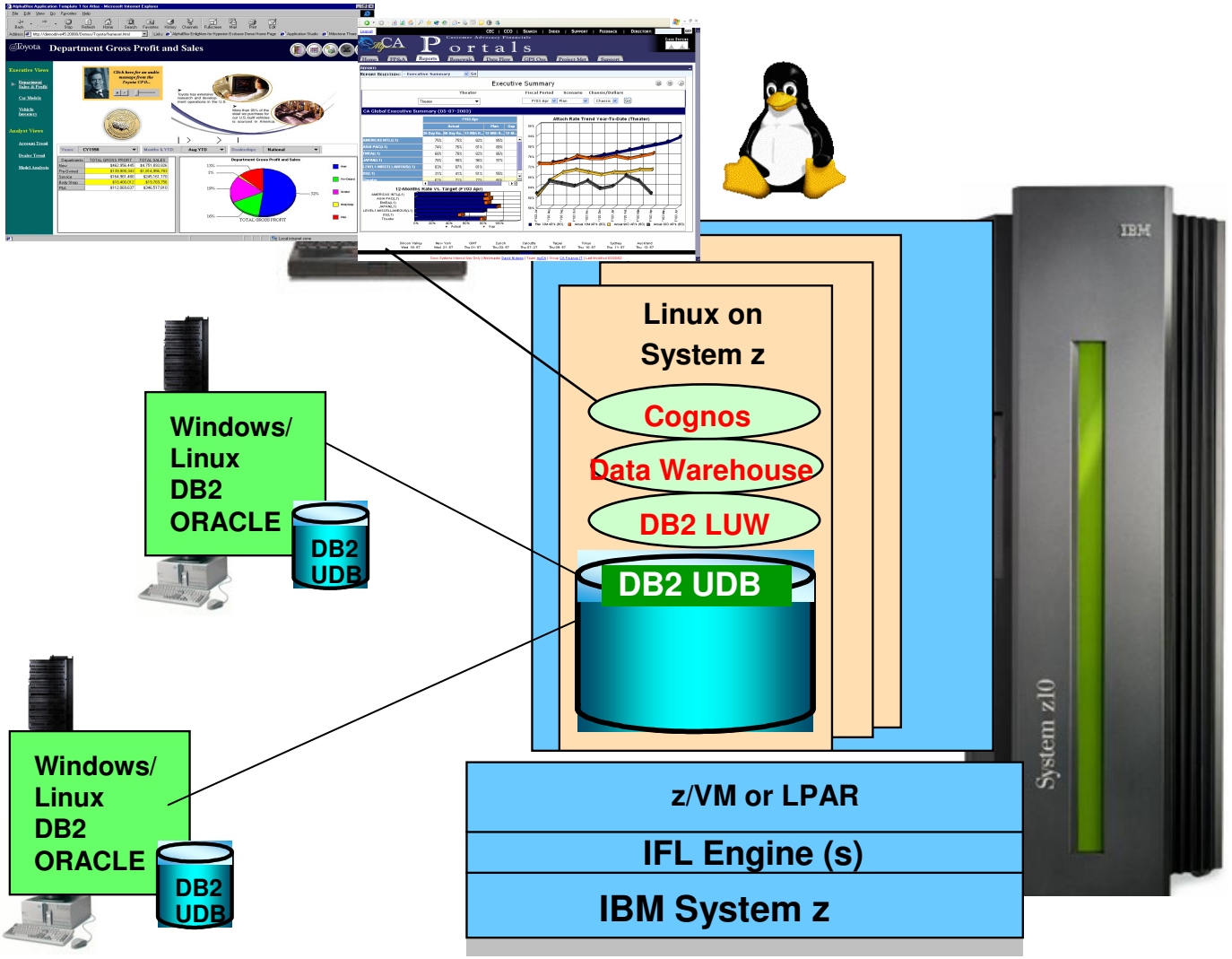
Scenario 2: Linux on System z as data hub

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



DB2 9 with pureXML feature – A Hybrid Data Server

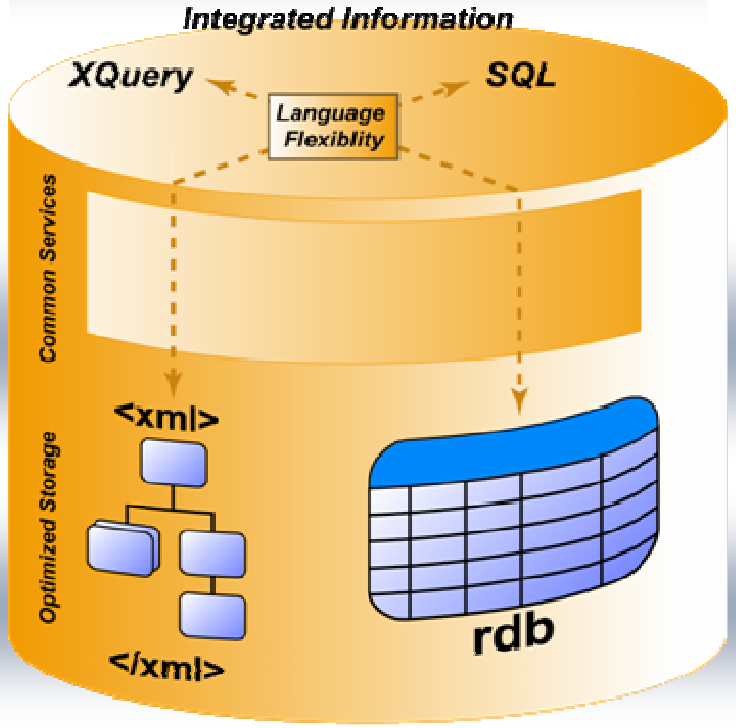
XML Developer

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

Familiar Programming Models

SQL Developer

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



Mature Services

Familiar Tooling

Optimized Storage Models

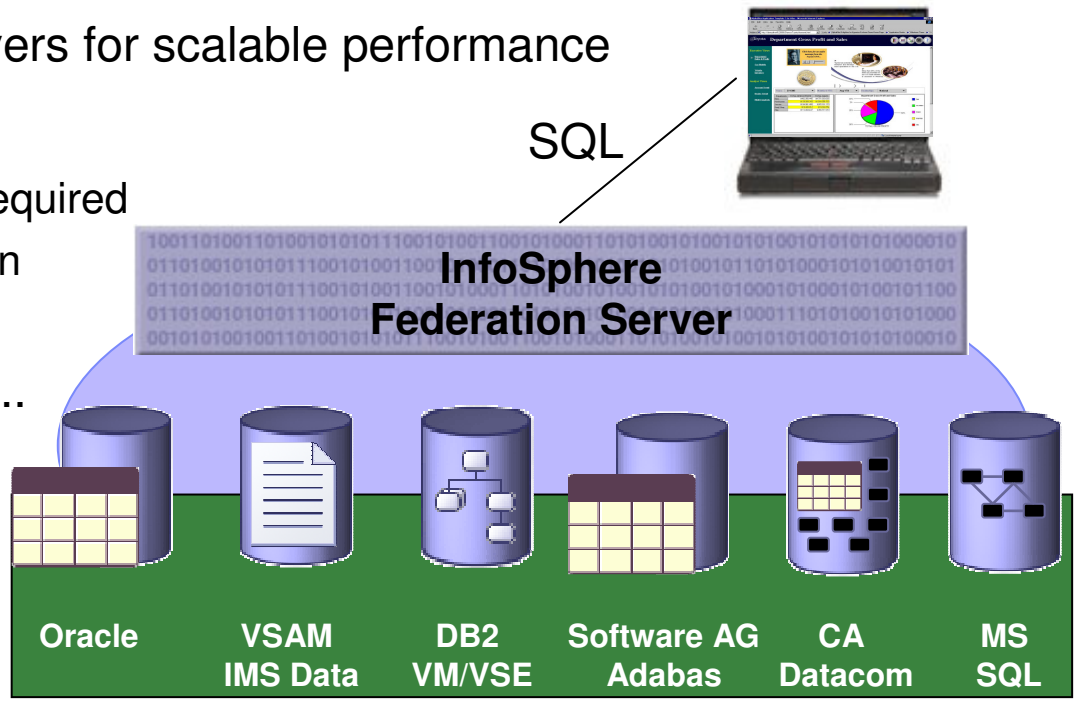
Optimized Performance & Scale

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



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

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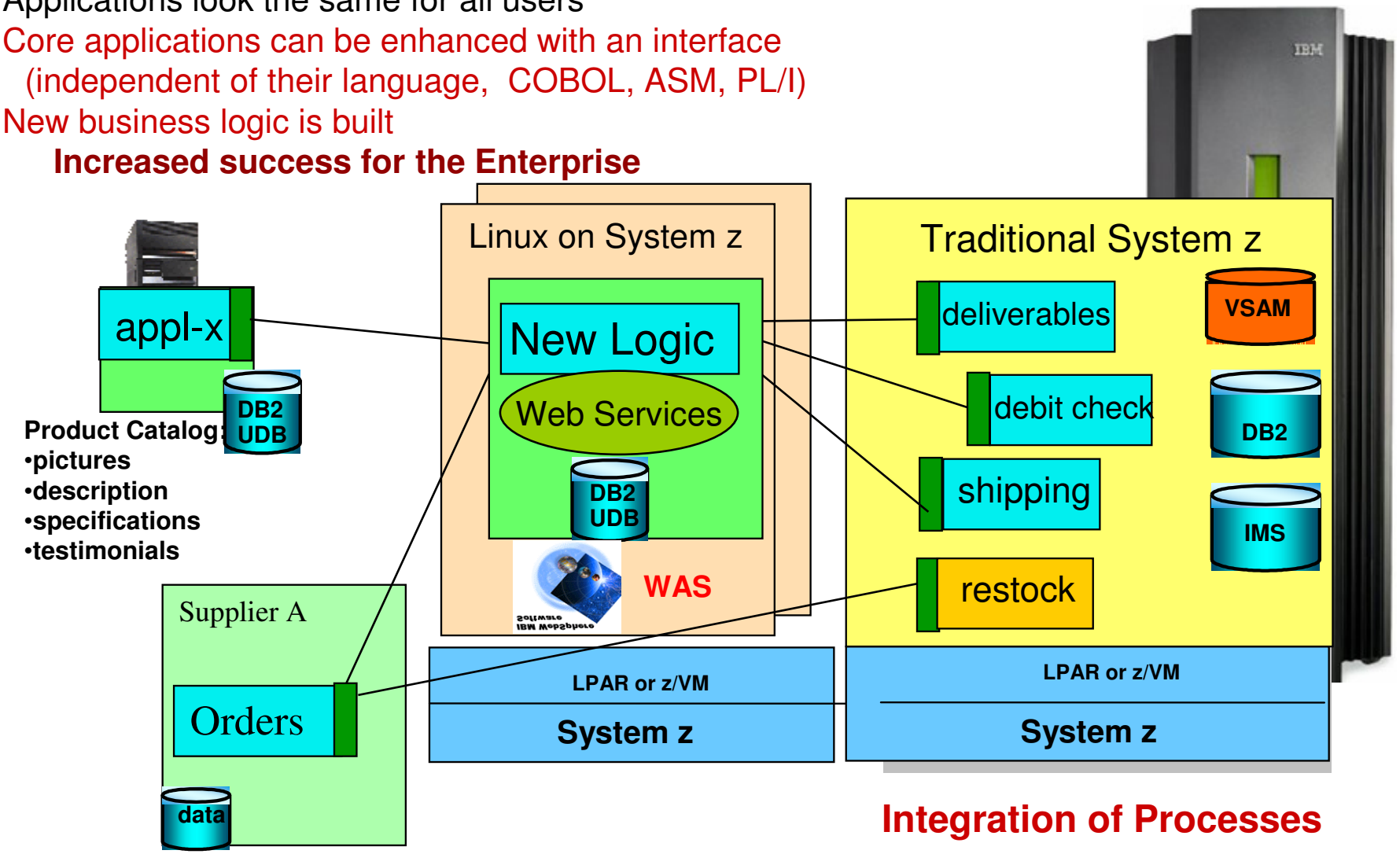
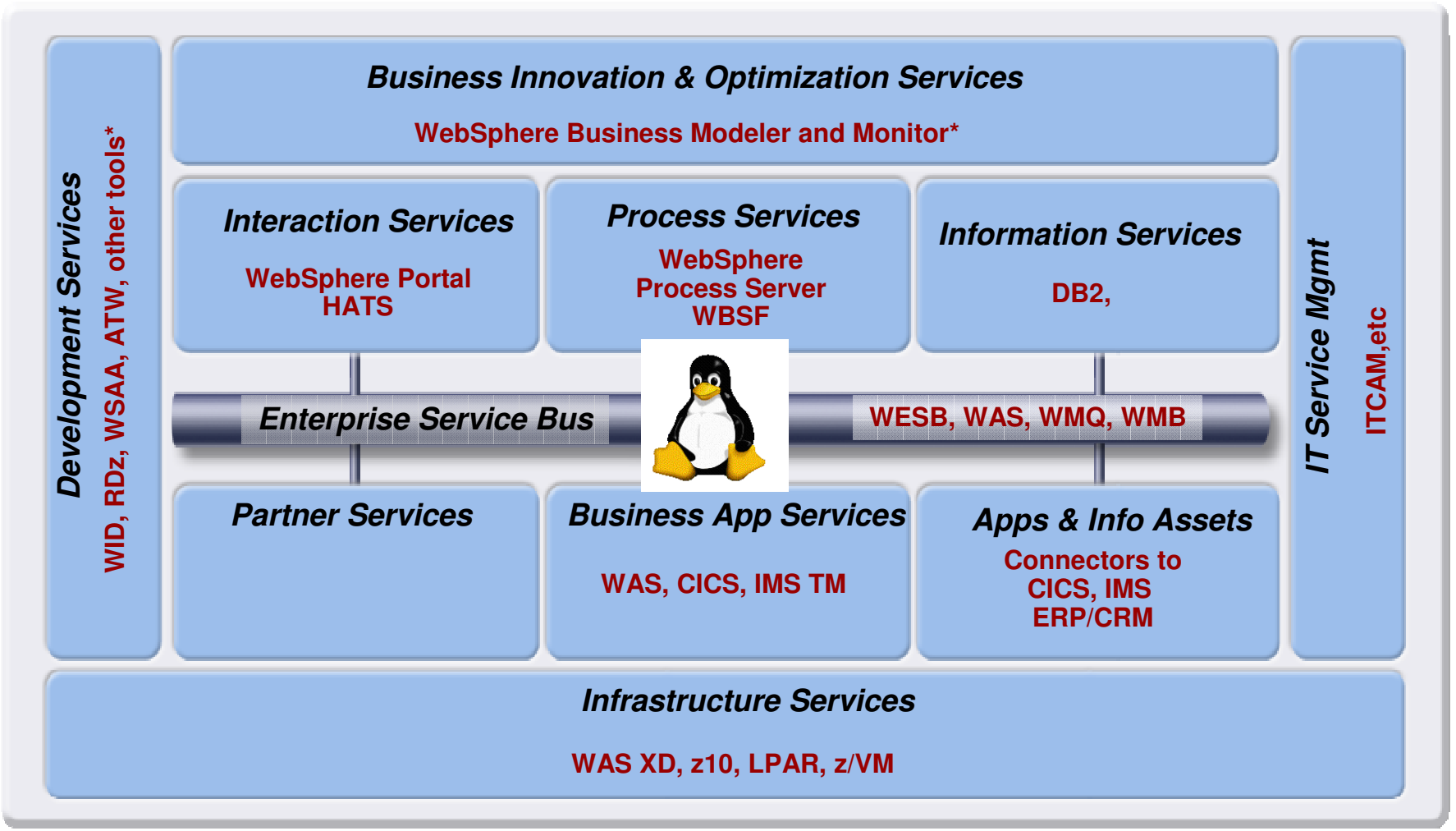
SOA – the way to new applications and processes

- 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



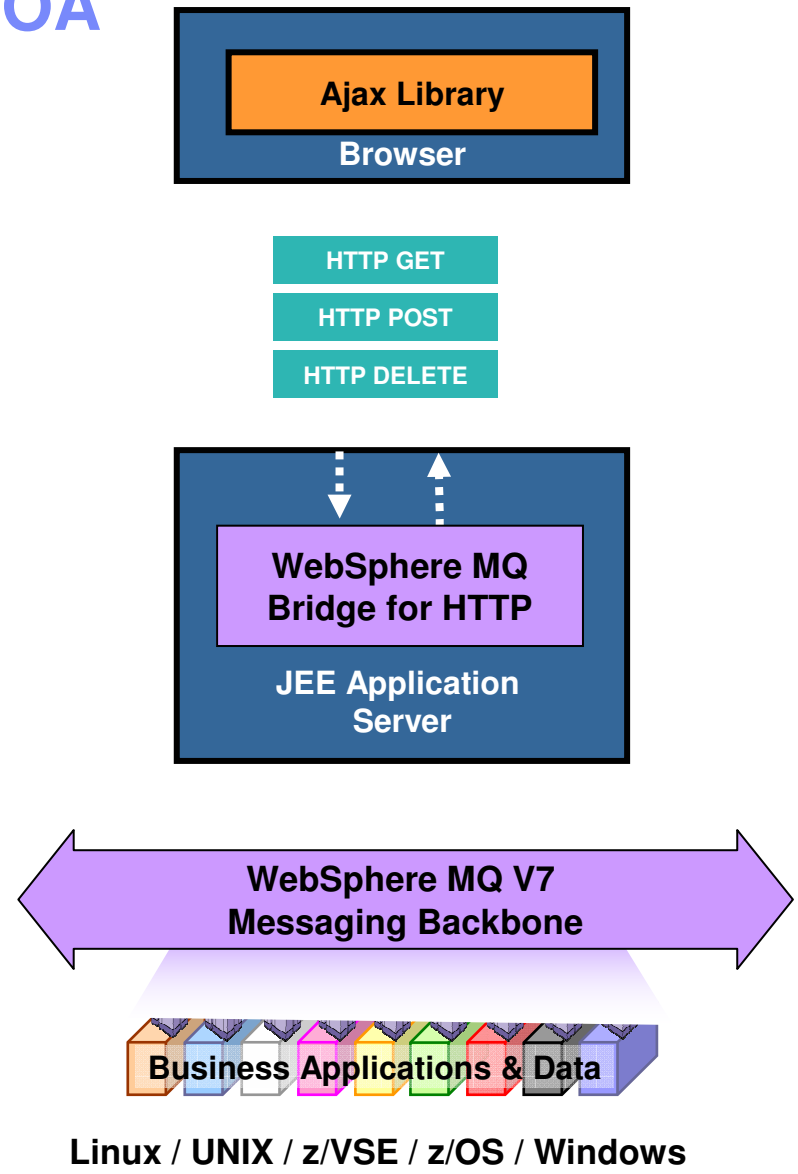
SOA Reference Architecture with z SW Products



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



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

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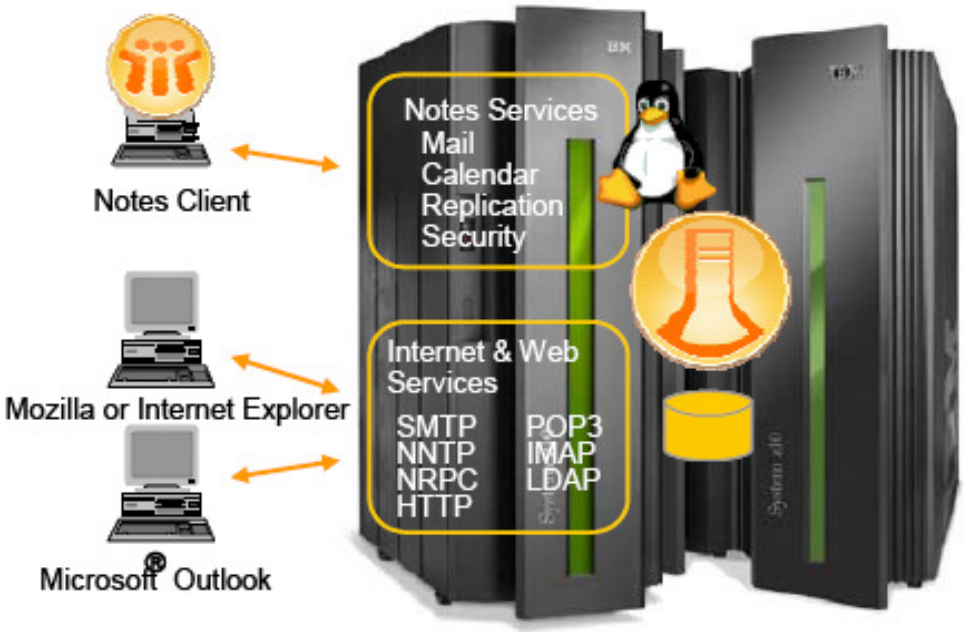
Linux on System z as Mail and Collaboration Hub

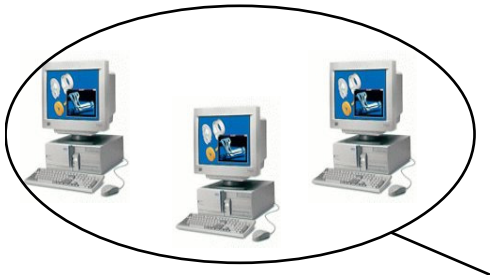
- **Mail**
  - **Exim, Postfix, Exchange4Linux, Evolution, Kroupware**
  - **OTRS- manages telefone calls and mails**

- **Communication/Groupware**
  - **OpenGroupware,**
    - **Groupware server (KOLAB)**
  - **Instant Messaging (Jabber)**
  - **Mailing lists (mailman)**
  - **Forum Server & WIKIs**
    - **phpBB, mediawiki**



- **Spam and Virus scanner**
  - **ClamAV, AMaViS, SpamAssassin, greylista**

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

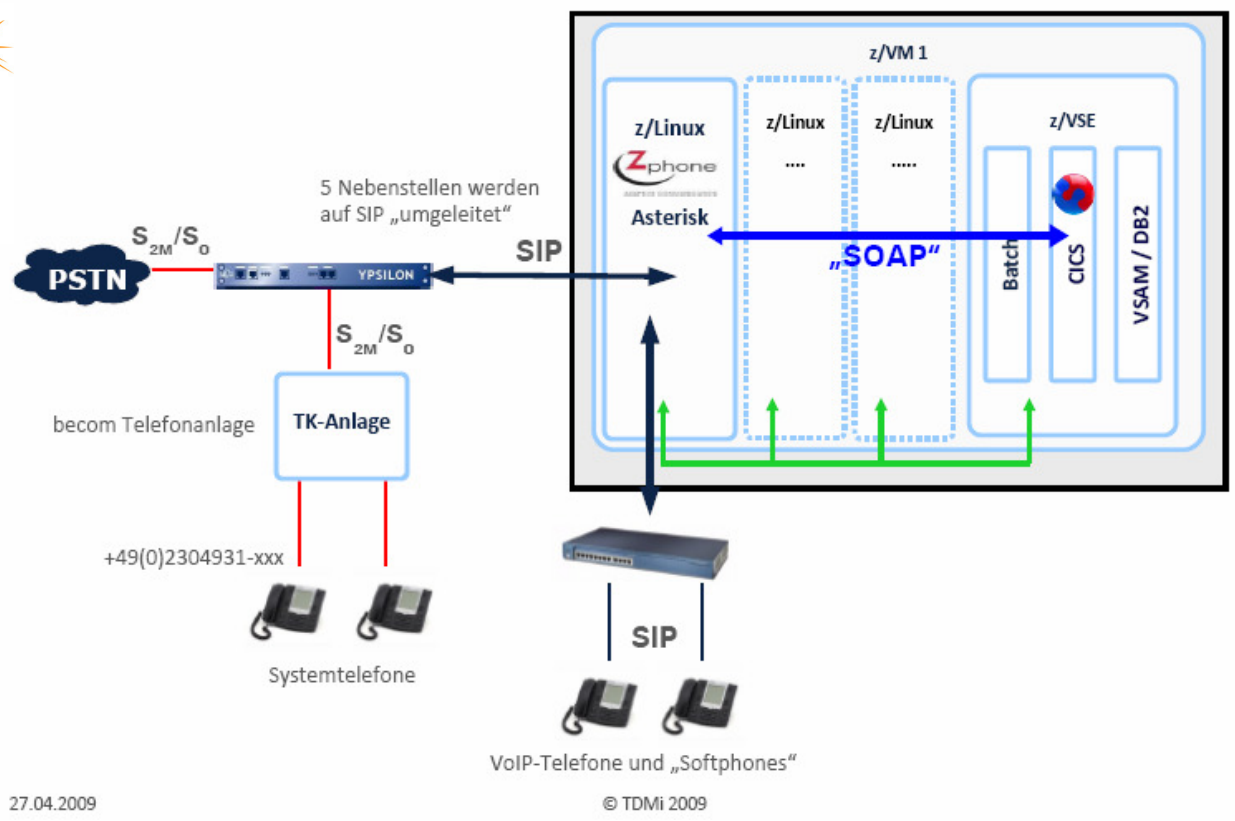
Domino Clustering

- 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"

TDMi becom



(http://www.asterisk.org/support/about)

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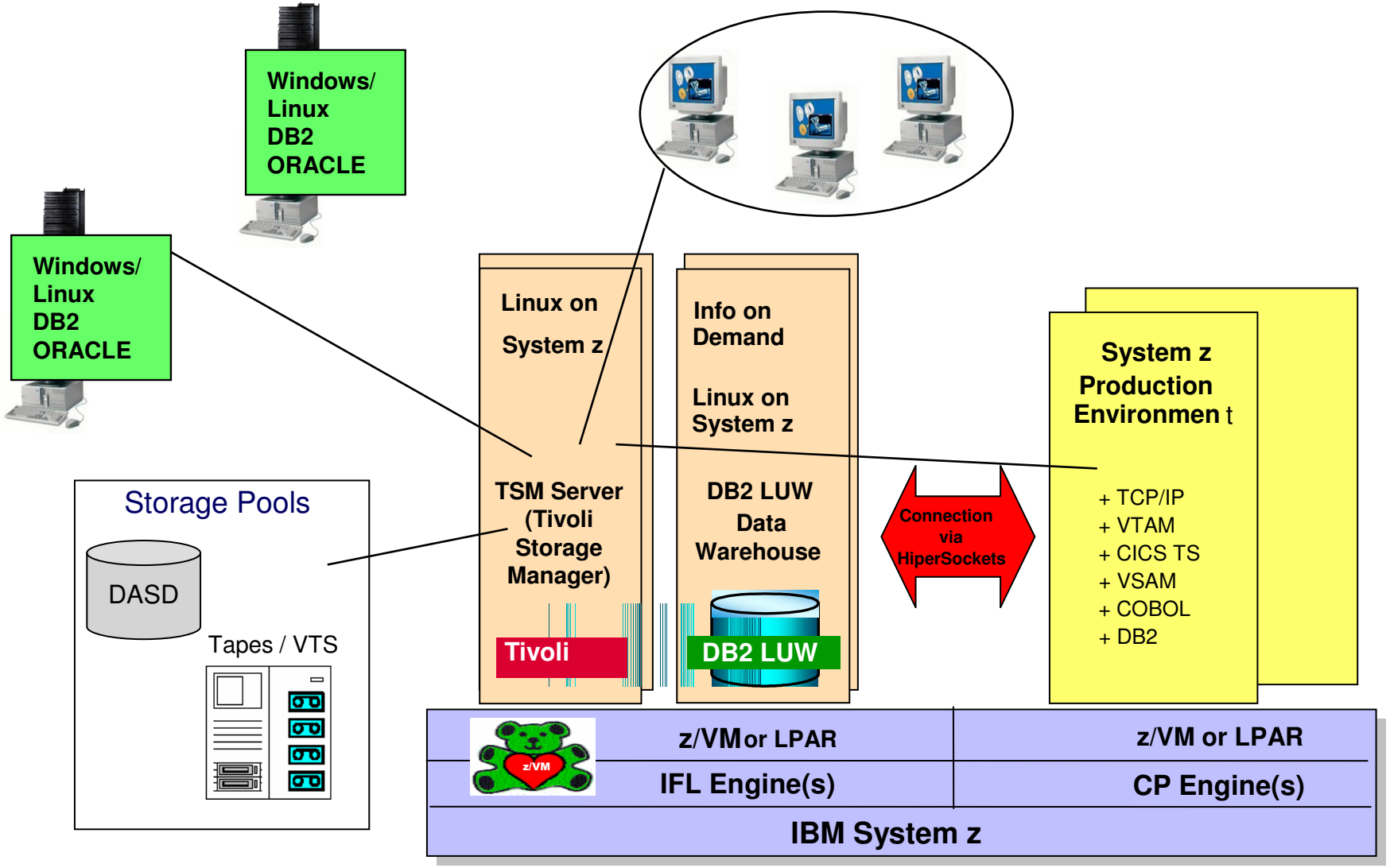
Enterprise Backup Hub



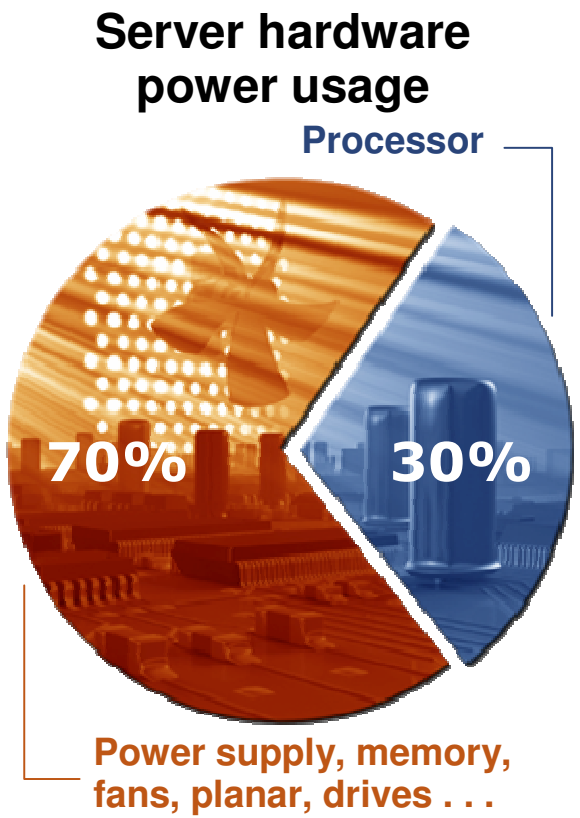
Linux on System z Solution Benefits

- Centralized Backup procedure for the enterprise
- One tool for System z and distributed backups and archives
- Use of Stability of System z for Recovery

Project Big Green Linux

Cooperatively addressing energy consumption and management issues

- **Linux kernel community efforts**
  - Expanding support for scaling CPU clock speed and voltage
  - Keeping idle CPUs in a 'tickless,' low-power state longer
  - Power monitoring built into the kernel through PowerTOP
  - Create power-aware applications and policies
  - Linux Foundation Green Linux Workgroup
- **IBM's "Project Big Green" includes consolidation on Linux**
  - 3,900 internal servers consolidating onto Linux on System z
  - Estimate reduction in annual energy usage by 80%, reduce floorspace by 85%
- **Enabling our Customers to realize savings and efficiency**
  - IBM's Server consolidation factories enable smoother transitions to more efficient highly-virtualized platforms



Success Stories

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

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.

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

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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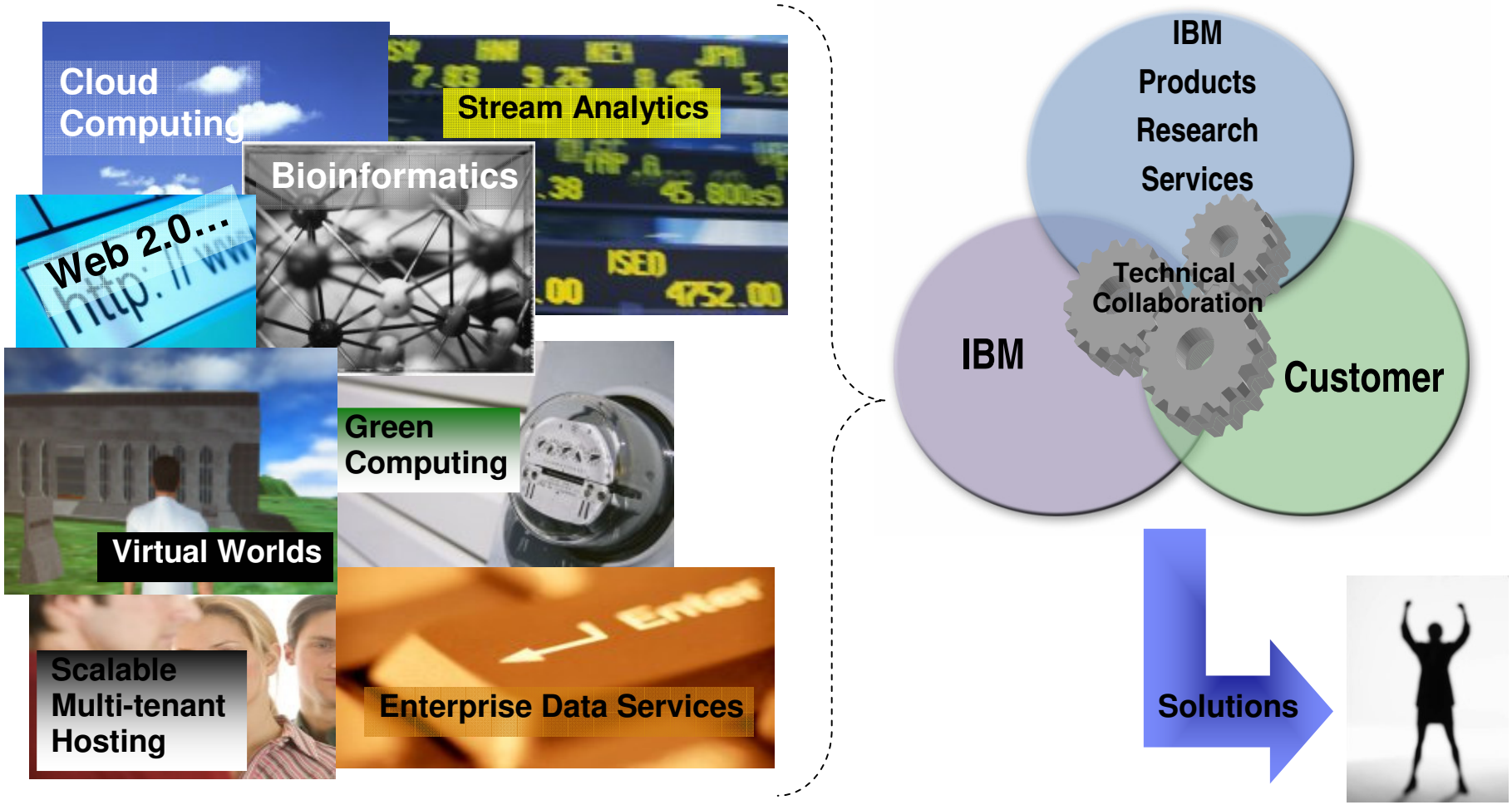
Computer services

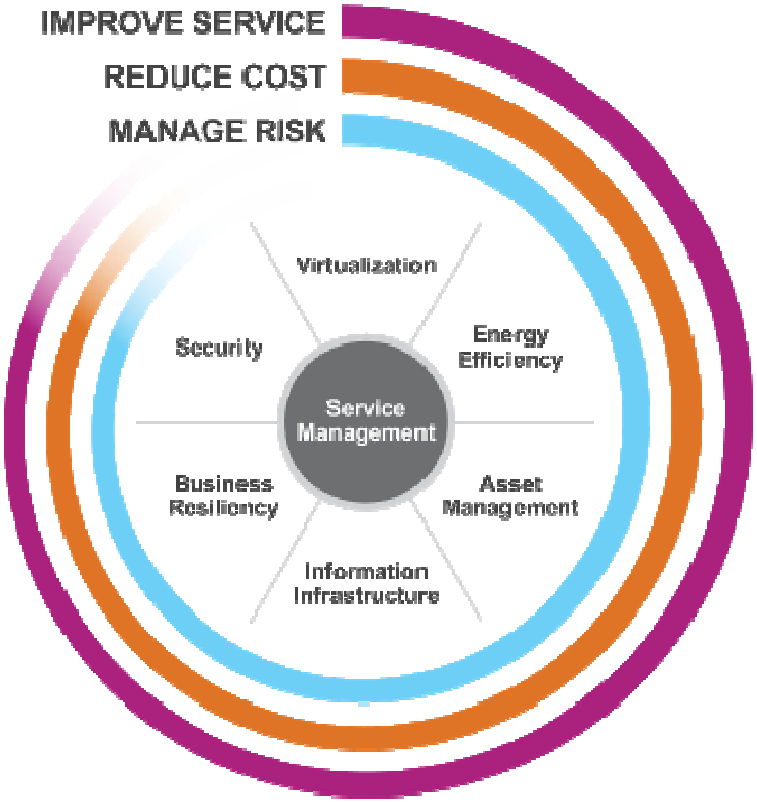
→ IT service provider BRZ Deutschland reduces data processing times
The System z9 technology offered the flexibility to run the z/VSE operating system while also allowing the company's Linux® applications to coexist. Leveraging the z/VSE environment, three Virtual Storage Extended (VSE) systems run in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

Linux on IBM for Next Generation Workloads

We accelerate the availability of innovative solutions for the next generation of IT challenges.



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.

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