

2012

# IBM System z Technical University

Enabling the infrastructure for smarter computing

## It's time to optimize

zLG05

Wilhelm Mild & Ingo Franzki



---

# Notices

This information was developed for products and services offered in the U.S.A.

Note to U.S. Government Users Restricted Rights — Use, duplication or disclosure restricted by GSA ADP Schedule Contract with IBM Corp.

IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to: IBM Director of Licensing, IBM Corporation, North Castle Drive Armonk, NY 10504-1785 U.S.A.

The following paragraph does not apply to the United Kingdom or any other country where such provisions are inconsistent with local law: INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this information to non-IBM Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this IBM product and use of those Web sites is at your own risk.

IBM may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

This information contains examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples include the names of individuals, companies, brands, and products. All of these names are fictitious and any similarity to the names and addresses used by an actual business enterprise is entirely coincidental.

## COPYRIGHT LICENSE:

This information contains sample application programs in source language, which illustrates programming techniques on various operating platforms. You may copy, modify, and distribute these sample programs in any form without payment to IBM, for the purposes of developing, using, marketing or distributing application programs conforming to the application programming interface for the operating platform for which the sample programs are written. These examples have not been thoroughly tested under all conditions. IBM, therefore, cannot guarantee or imply reliability, serviceability, or function of these programs. You may copy, modify, and distribute these sample programs in any form without payment to IBM for the purposes of developing, using, marketing, or distributing application programs conforming to IBM's application programming interfaces.

---

## Trademarks

- This presentation contains trade-marked IBM products and technologies. Refer to the following Web site:

<http://www.ibm.com/legal/copytrade.shtml>

## The Data Center Challenge - Controlling IT complexity and cost while maintaining daily operations

- An Integrated system of multiple architectures for optimizing the deployment of multi-tier workloads
- Creating a single point of control for management and administration to reduce operational overhead by up to 80%, including:
  - Power and Facilities
  - Labor
  - Software License

### zEnterprise

- Lowers cost of acquisition by up to 56%
- Reduces cost of ownership by up to 55%\*



A strategic systems platform....

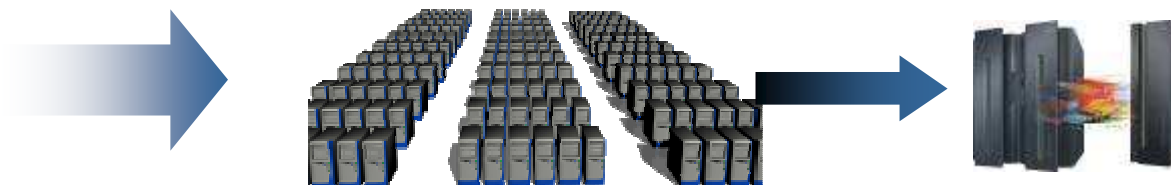
Helping to free up resources for critical projects and establish a base for the future

• Based on IBM analysis of a large Financial Services company Datacenter. See details on [ibm.com/systems/zenterprise/](http://ibm.com/systems/zenterprise/) Deployment configurations based on IBM studies and will vary based on workload characteristics. Price calculations based on publicly available US list prices, prices will vary by country.

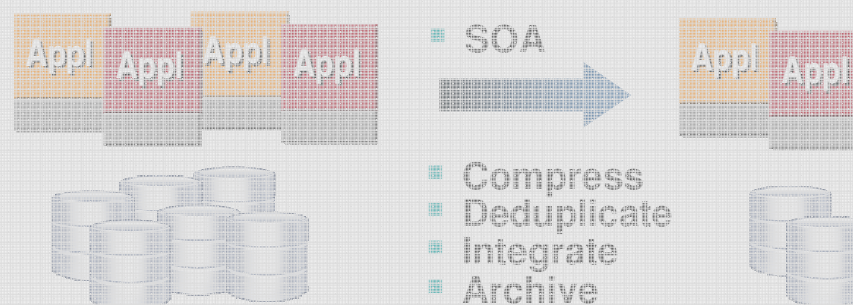
# Strategies to Improve Value and reduce Complexity and Costs

## Optimize the Overall IT Environment

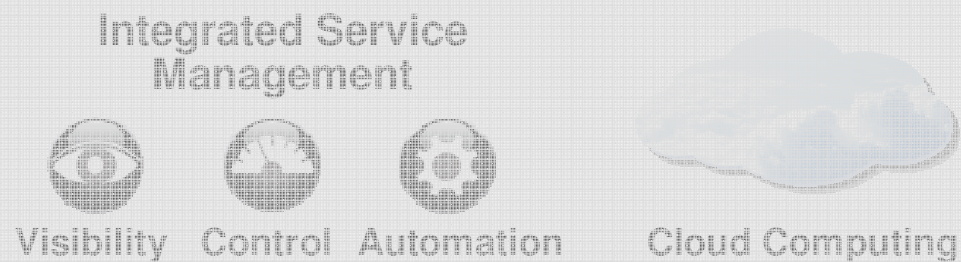
➤ Simplify Hardware Infrastructure



➤ Integrate Redundant Software and Data

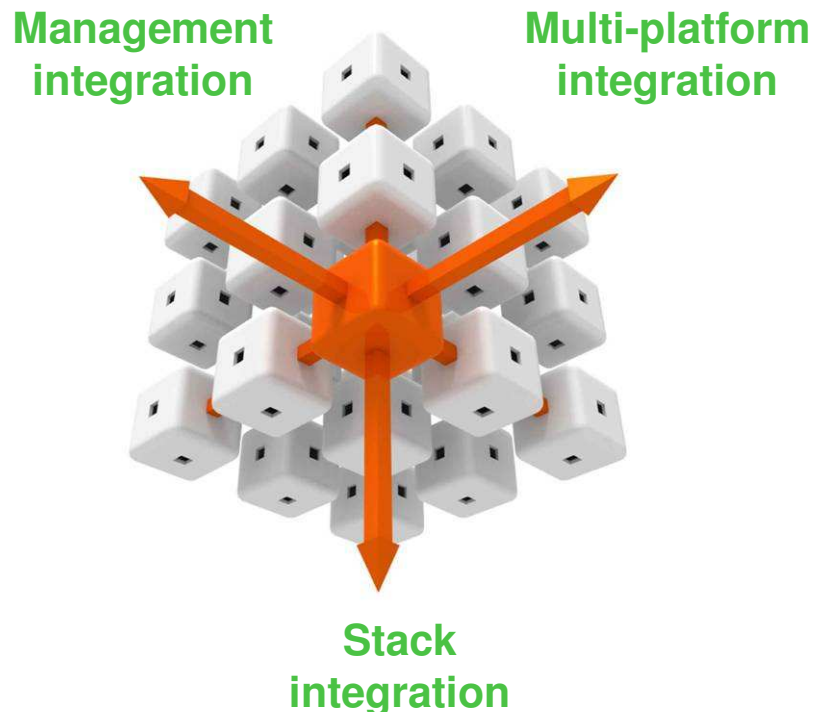


➤ Improve Service Delivery



# The IBM zEnterprise System

## *A New Dimension in Computing*



- A “System of Systems”, integrating IBM’s leading technologies to dramatically improve productivity of today’s multi-architecture data centers and private clouds.
- The world’s fastest and most scalable enterprise system with unrivalled reliability, security, and manageability.
- The industry’s most efficient platform for large scale data center simplification and consolidation.

# IBM focus: Linux on IBM Systems

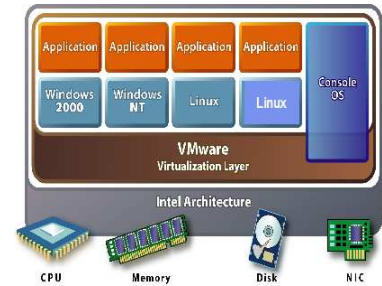
## Linux on System z

- Applications close to the data
- Applications need "Mainframe" criteria
- Vertical and horizontal scaling (hundreds of virtual servers at the same time)
- Great workload-management
- excellent virtualization



## Linux on System x

- Low-priced entry
- Simultaneous operation of Windows and Linux via virtualization
- High reliability and simple manageability by Enterprise X-Architektur
- Very good price / performance ratio via Clustering
- Big performance density by BladeCenter



## Linux everywhere Linux on System i

### Linux on System p

- Applications demanding high performance
- Consolidation of multiple servers / applications via LPARs
- Native Linux or AIX



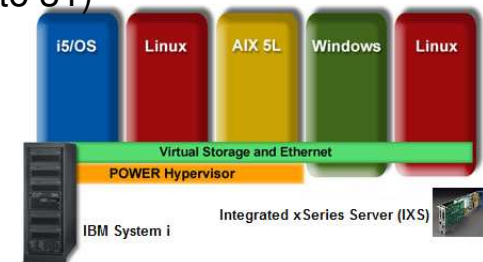
### Linux on CBE

- Applications demanding highest performance
- special purpose



### Linux on System i

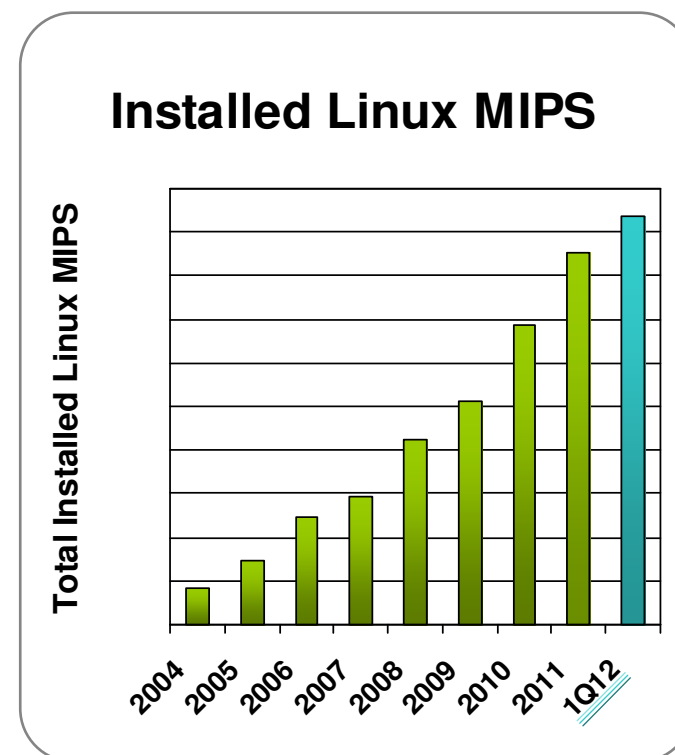
- If an integrated solution is required (hardware / software / network)
- Simple administration and operation
- If midrange system is required
- Consolidation of applications via LPARs (up to 31)
- High degree of security



## Linux on IBM System z in 1Q2012 - the Momentum is great !

*Installed Linux MIPS at 39% CAGR\**

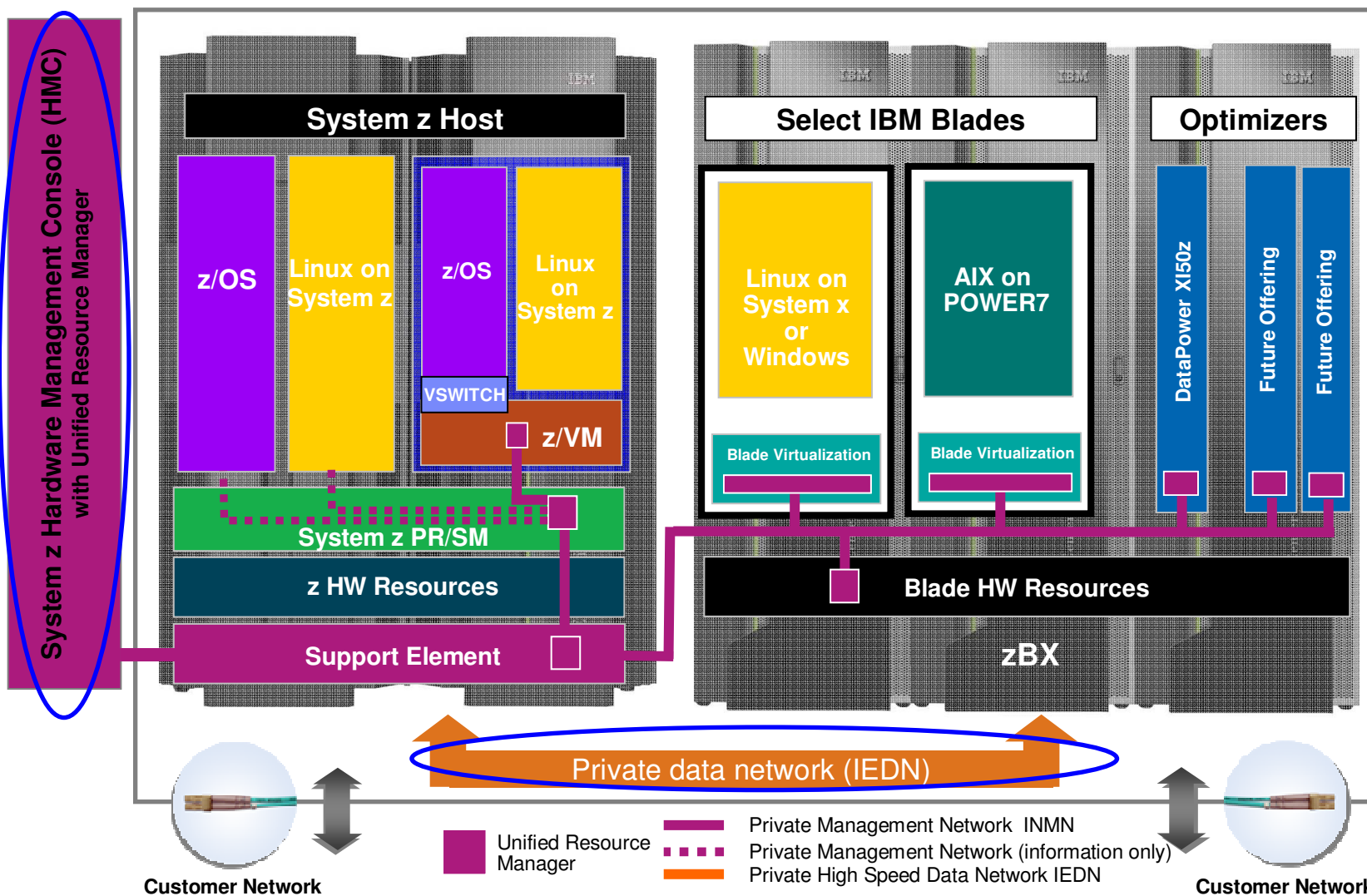
- **20% of Total installed MIPS run Linux as of 4Q11**
- **Installed IFL MIPS increased 24% in 2011**
- **36% of System z Customers have IFLs installed as of 1Q12**
- **70 of the top 100 System z Customers are running Linux on the mainframe as of 1Q12**
- **20% increase in Linux only servers from 1Q11 to 1Q12**
- **30% of all System z servers have IFLs**



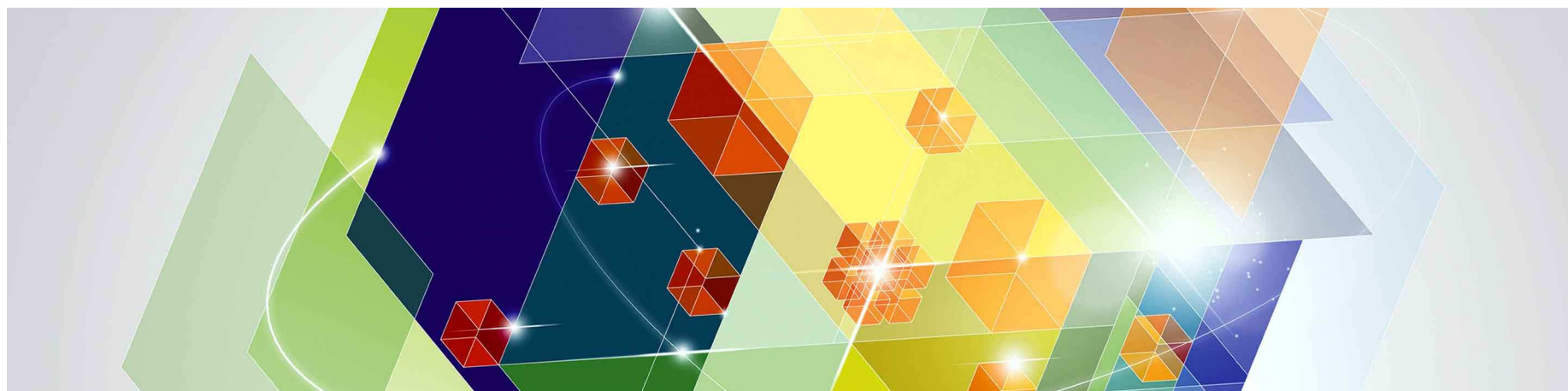
\* Based on YE 2004 to YE 2011 - Compound Annual Growth Rate



# The zEnterprise designed for workload integration

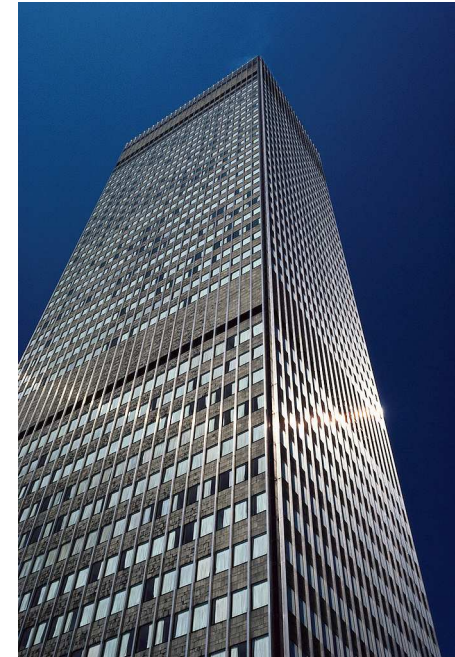


# IT Infrastructure Virtualization



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

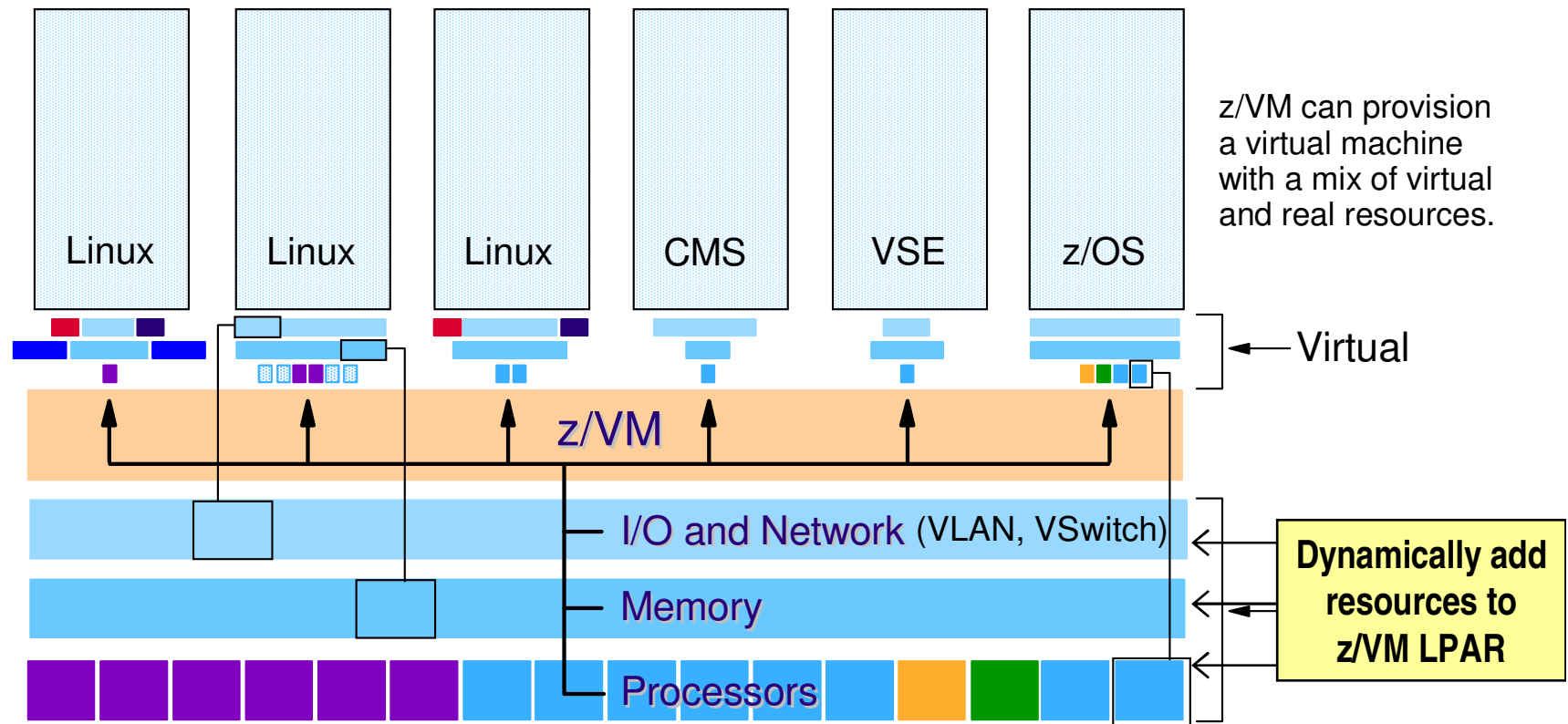
- **LPAR Virtualization**
  - *High Isolation* with fixed resource allocation
  - Direct attached I/O devices for max bandwidth
  
- **z/VM Virtualization**
  - **Vertical virtualization** - Grow workloads without linearly growing number of virtual guests
    - *Scalability*: one guest can be increased by allocating more resources (CPUs, memory)
  
  - **Horizontal virtualization** – server isolation
    - *Isolation* of guests in a network
    - *Redundancy* for application high availability
  
  - **Dynamically** add, remove and shift physical resources to optimize business results



# Virtualization in System z and zEnterprise

## z/VM Technology: Share everything

- z/VM simulates the existence of a dedicated real machine, including processor functions, storage, and input/output resources.
- z/VM includes network Virtualization, high availability and integrated security between VMs
- It supports uniquely, over commitment on all levels.



Linux on z/VM is the industry's most advanced virtual solution

## z/VM V6.2 - Available since Dec, 2011

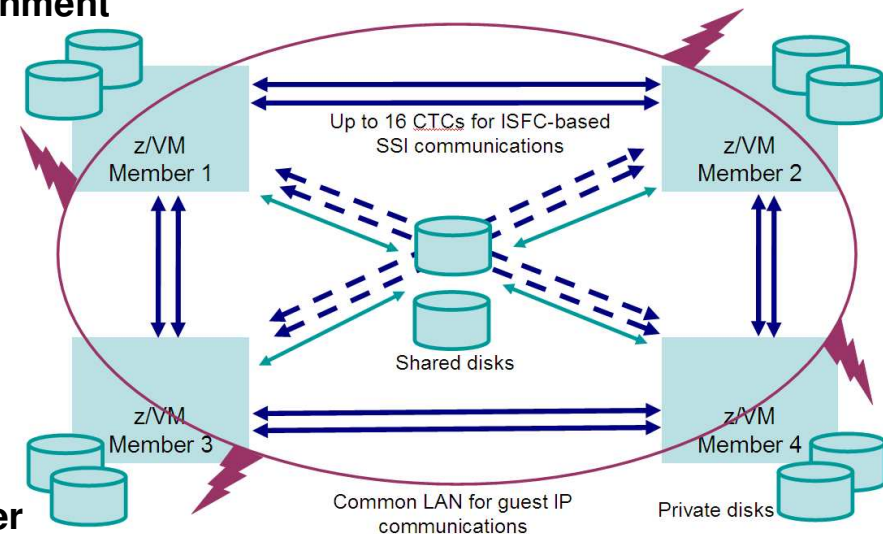
*Single System Image, Clustered Hypervisor, Live Guest Relocation*

- **Single System Image (SSI)** - connect up to four z/VM systems as members of a cluster
- **Provides a set of shared resources for member systems and their hosted virtual machines**
  - Directory, minidisks, spool files, virtual switch MAC addresses
- **Cluster members can be run on the same or different z10, z196, or z114 servers**
- **Simplifies systems management of a multi-z/VM environment**

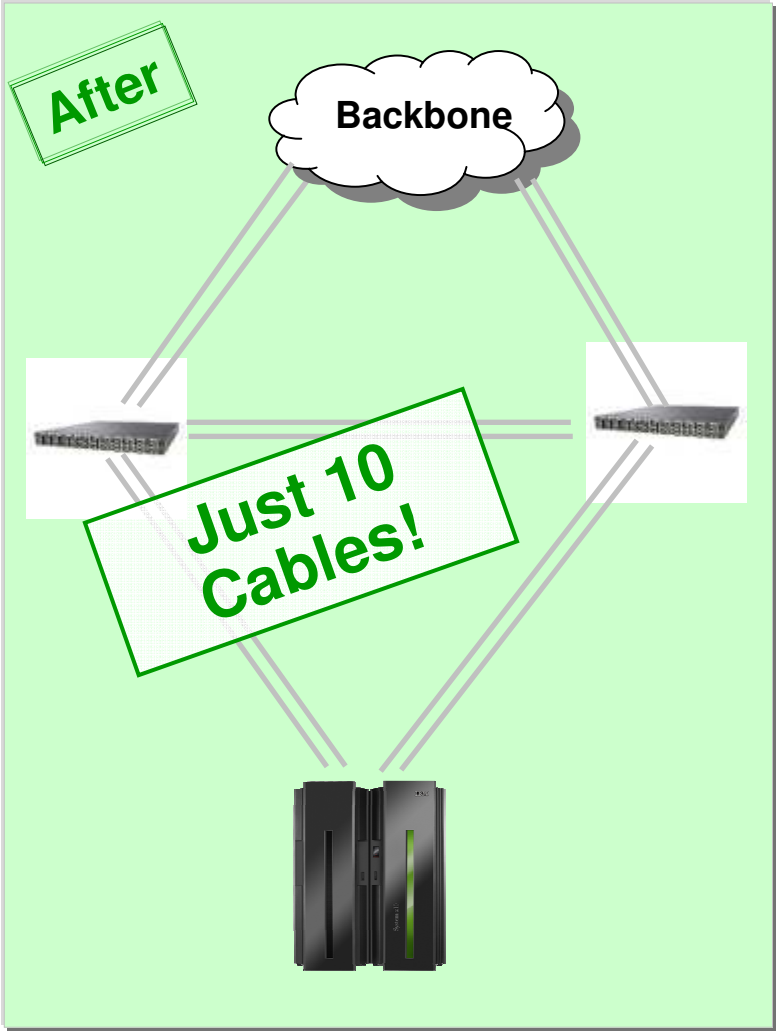
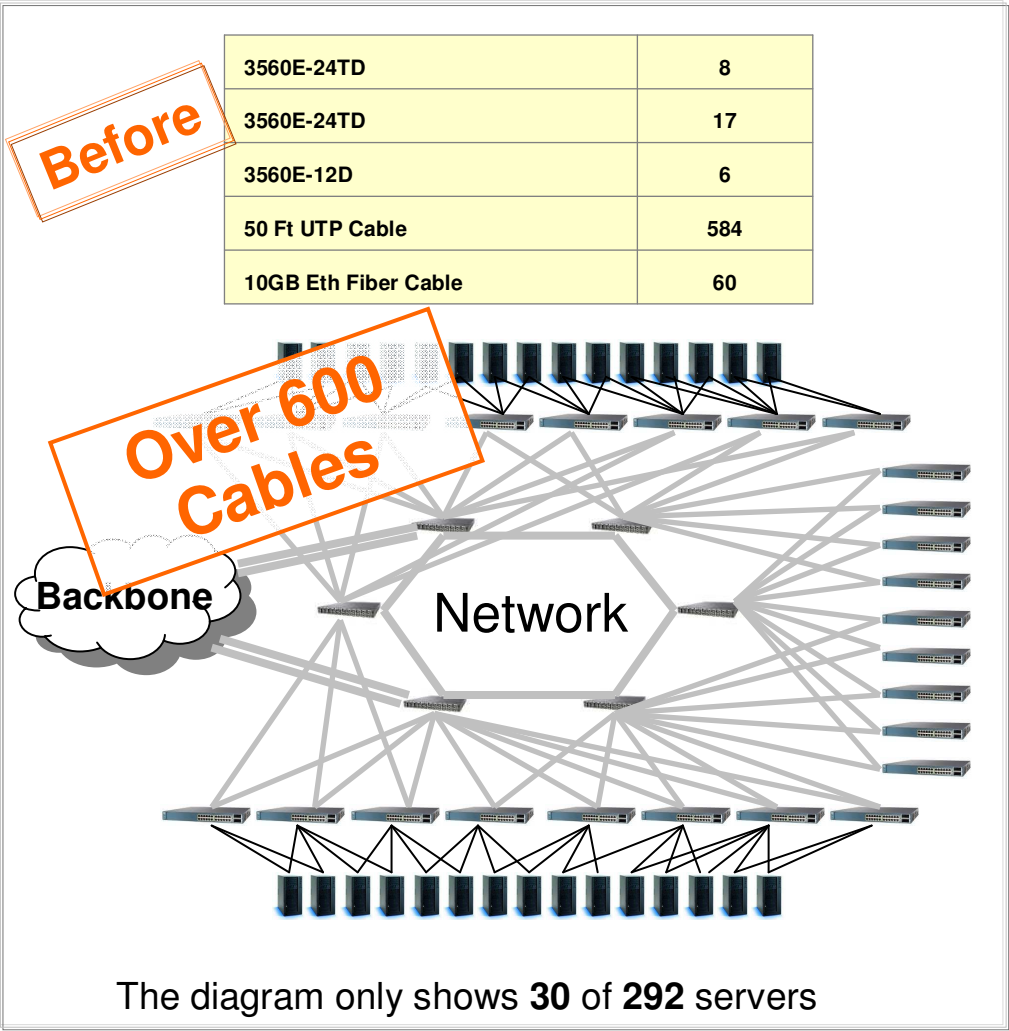
- Single user directory
- Cluster management from any member
  - Apply maintenance to all members in the cluster from one location
  - Issue commands from one member to operate on another
- Built-in cross-member capabilities
- Resource coordination and protection of network and disks

- **Live Guest Relocation (LGR)** – Dynamically move Linux guests from one z/VM member to another  
Reduce planned outages; enhance workload management

- Non-disruptively move work to available system resources **and** non-disruptively move system resources to work
- When combined with Capacity Upgrade on Demand, Capacity Backup on Demand, and Dynamic Memory Upgrade, you will get the best of both worlds



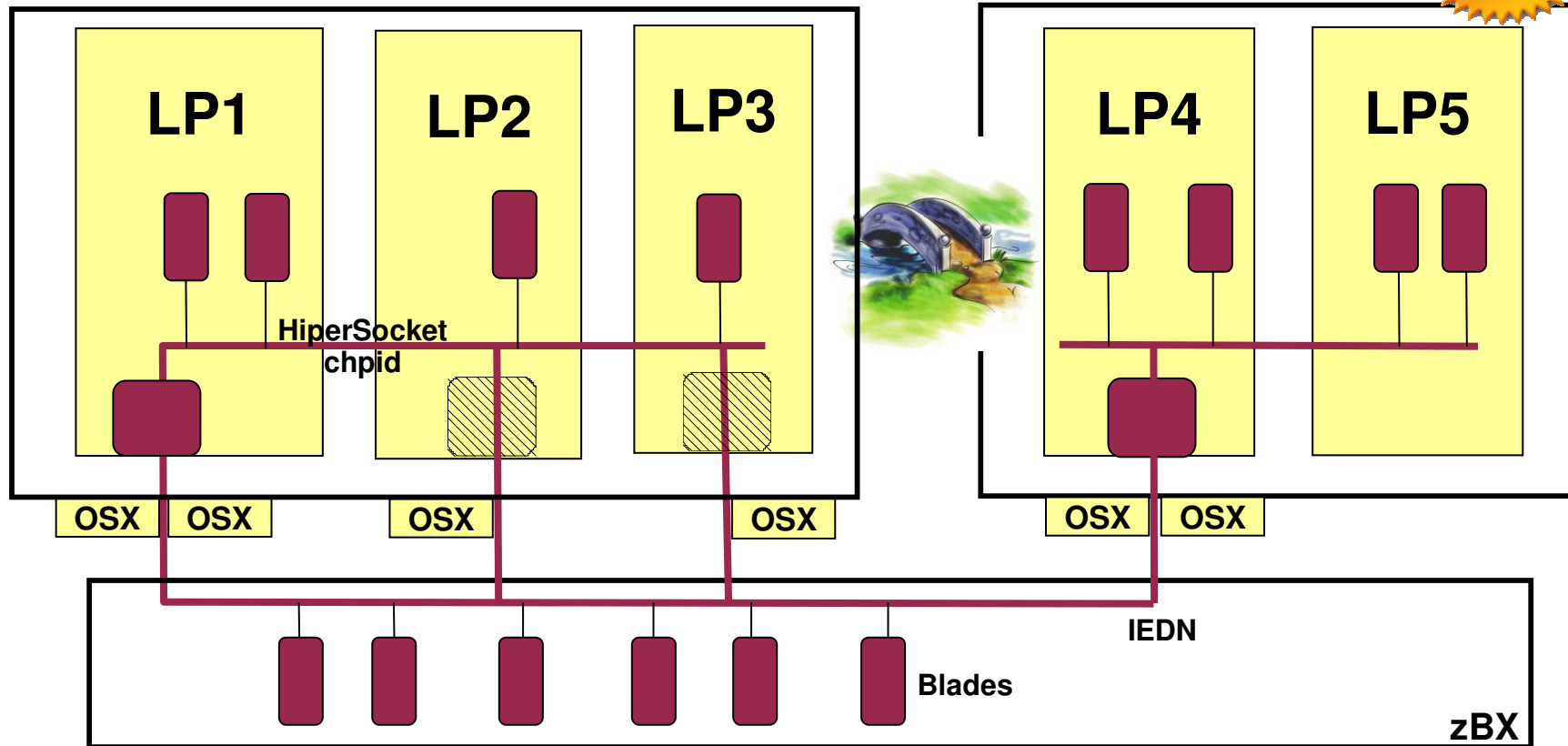
# Insurance Company Consolidated 292 Servers to a z10



Data is based on real client opportunity and on internal standardized costing tools and methodologies. Client results will vary by types of workloads, technology level of consolidated servers, utilization factor, and other implementation requirements. Savings will vary by client.

# HiperSocket VSWITCH Integration with zEnterprise IEDN and zBX

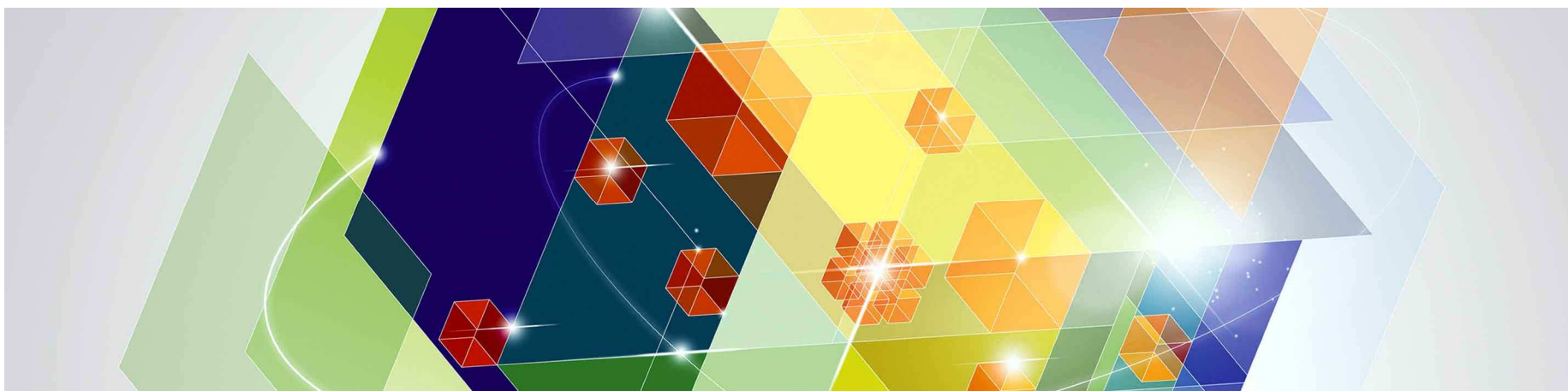
Available since: April 13, 2012



- Built-in failover and failback
- Bridge new IQDX chpid to OSX chpid
- Also works for IQD to OSD

- Same or different LPAR
- One active bridge per CEC
- PMTU simulation

# IT Infrastructure simplification





# Utilization of Distributed Servers

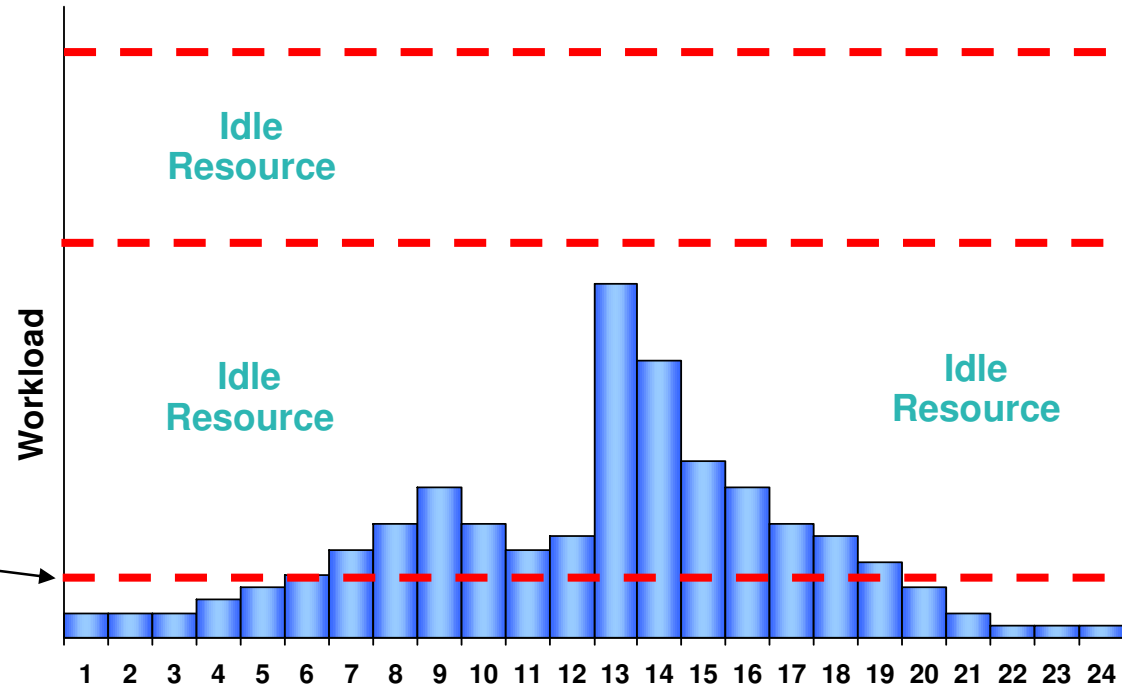
Provision for expected growth

Provision capacity for peak workload



Server dedicated to one application

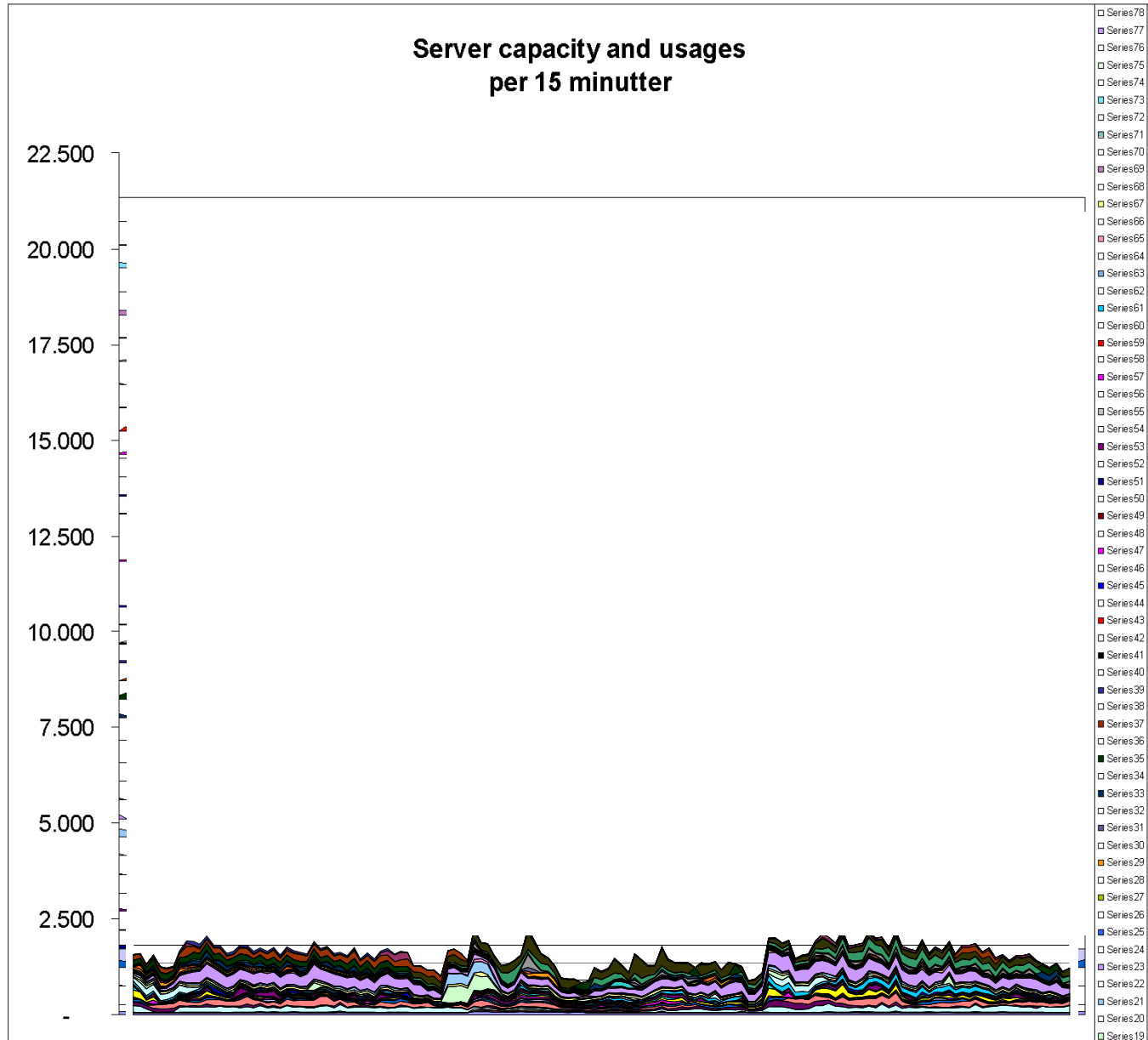
Average utilization



- ▶ Typical utilization of Windows Servers 5 – 10%
- ▶ Typical utilization of UNIX Servers 10 – 20%
- ▶ Typical utilization of System z Servers 85 – 100%

# Accumulated USED Distributed Server capacity

**RPE2**  
(from Ideas International)



## Host 76 Linux Servers

*...should I use ELS & z/VM Enterprise Virtualization or x86 Virtualization?*

### Enterprise Linux Server



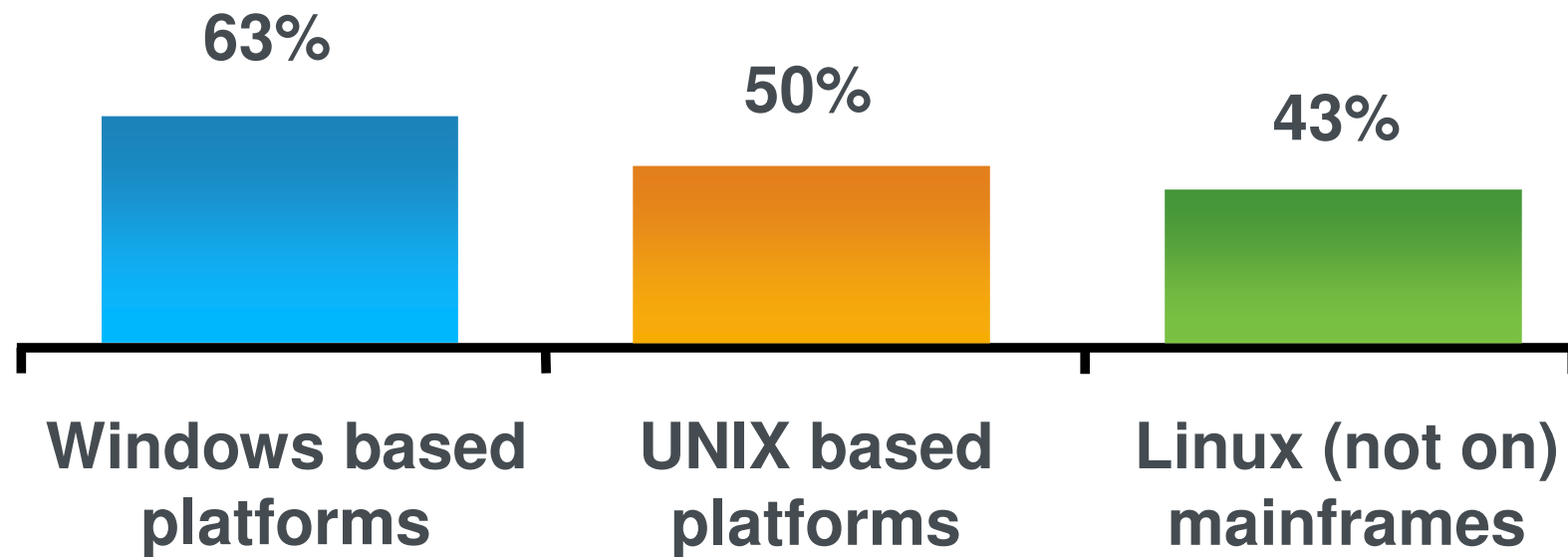
Grow inside the box

### X86 Virtualization



<<Rack and Stack>> approach:  
Add more Servers

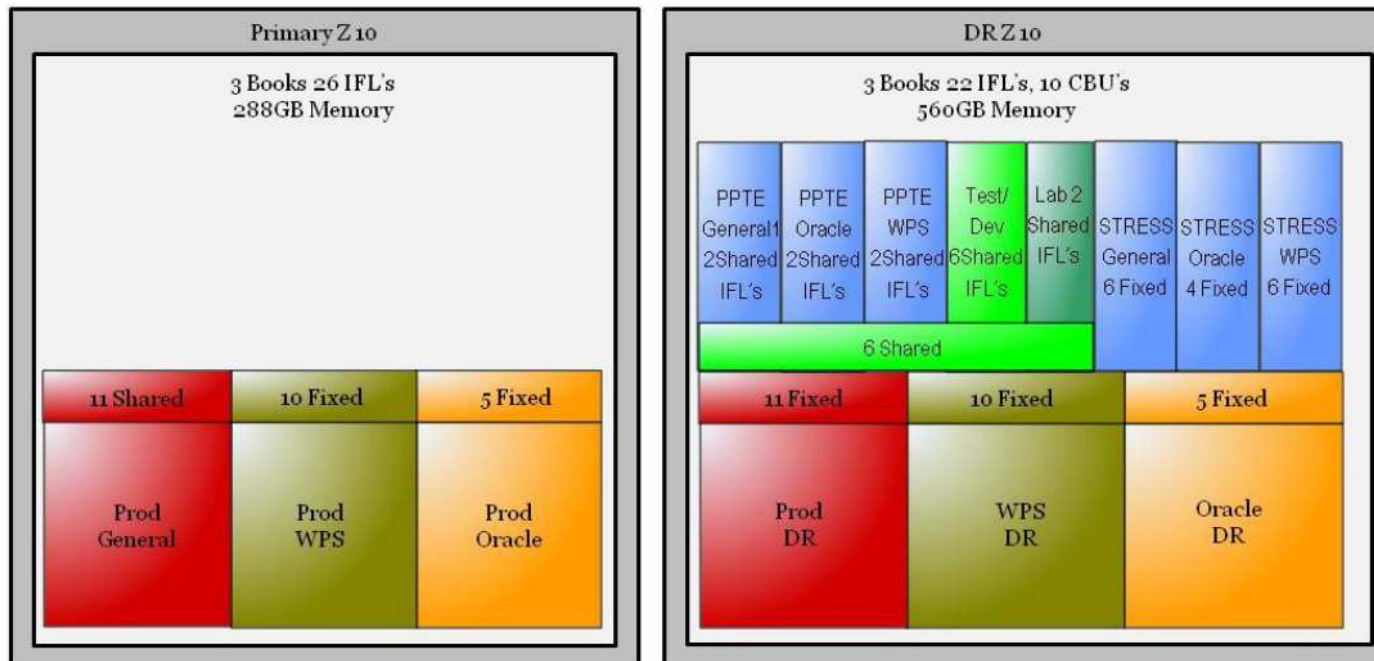
## Latest Customer Survey: Previous Platform for Consolidated Workloads



# Bank of New Zealand



- Consolidated 200 Sun servers down to one System z10 running Red Hat Enterprise Linux
- Reduced data center footprint by 30%, heat output by 33%, and power consumption by close to 40%
- Only one administrator needed per 200 virtual servers
- New environments are deployed in minutes, not days



## Consolidates from 60 Servers to One Mainframe in 48 Hours

Based on:

[www.computerworld.com.au/article/324815/allianz\\_consolidates\\_from\\_60\\_servers\\_1\\_mainframe\\_48\\_hours](http://www.computerworld.com.au/article/324815/allianz_consolidates_from_60_servers_1_mainframe_48_hours)

### *Insurance giant goes with a z10 mainframe and Linux on System z for its virtualization and consolidation path*

There aren't that many organizations which would consider consolidating 60 servers holding the most critical customer-facing applications down to one mainframe in the space of a weekend. But that's exactly what insurance giant, Allianz did in May 2011.

### **Realize the benefits and value of an optimized IT environment**

- Virtualization to increase resource utilization
- Server and Storage Consolidation to help reduce cost
- Energy Efficiency to maximize work per watt
- Systems Management and Automation to reduce complexity and operations costs

*"It has really ticked all the boxes. It reduced the dependency on a data center, it reduced the complexity from over 60 servers down to one box, it enabled us to put a lot more robustness around it in terms of DRP and scalability, and was environmentally friendly as well.*

*It took our kVA power usage down from about 40 to 4 – so a significant environmental benefit as well. Plus it significantly reduced our IT running costs and paid for itself in just over a year."*

*-- Steven Coles  
Allianz CIO*

## System z project Life Cycle to Production

- **Assessment of workload for Linux on System z**
  - Does the workload run today on standalone servers
  - A Virtualized environment on System z is different than distributed
  - Workload Assessment is not unique for Linux on z – it is required for server changes
  
- **Architecture of solution**
  - Consider Business Requirements
  - Consider functional Requirements
  - Consider Non-functional Requirements
  
- **Proof of Concept / Technology (PoC / PoT)**
  - Define a production like setup for PoT
  - Define needed skills – internal and external
  - Define the exact scope of PoT
  - Define **production like workload** for PoT
  - Consider Network Connectivity
  - Consider Remote Systems involved
  - Define Monitoring capabilities for correct evaluation of workload behavior
  
- **Move to production**
  - Consider fine tuning transition period

---

## Before starting: Get the right groups involved - upfront

- Hardware
  - Network
  - Architects
  - Administrators
  - Storage
  - Security (including network security)
- 
- A wrong start - to just try something – can be a big inhibitor in the project
  
  - Decide Responsibilities for Linux on z



---

## Definition of Hardware Requirements

- **Hardware sizing upfront**

- Based on workload assessment
- Consider the dynamics growth

- **Recommendation:**

- Separate Production LPAR(s) from Dev / Test
  - Even separated LPARs can share Resources on System z
- Consider temporary increase of capacity and memory during PoC
  - These Resources have to be defined upfront to be enabled and disabled non-disruptive
- Main memory size should not be used based on distributed systems

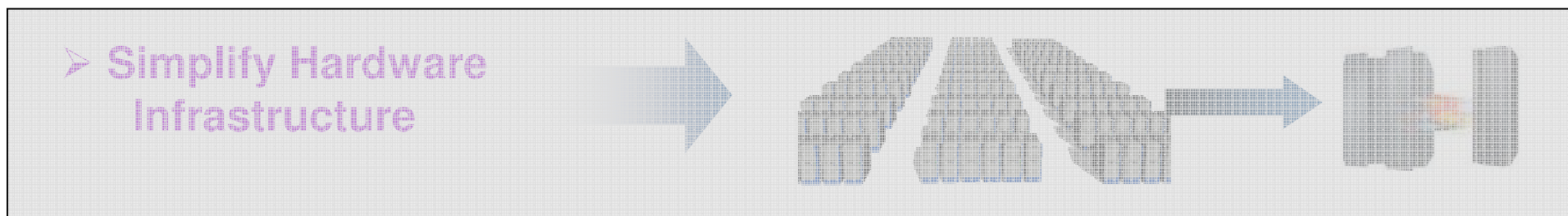
---

## Pitfalls

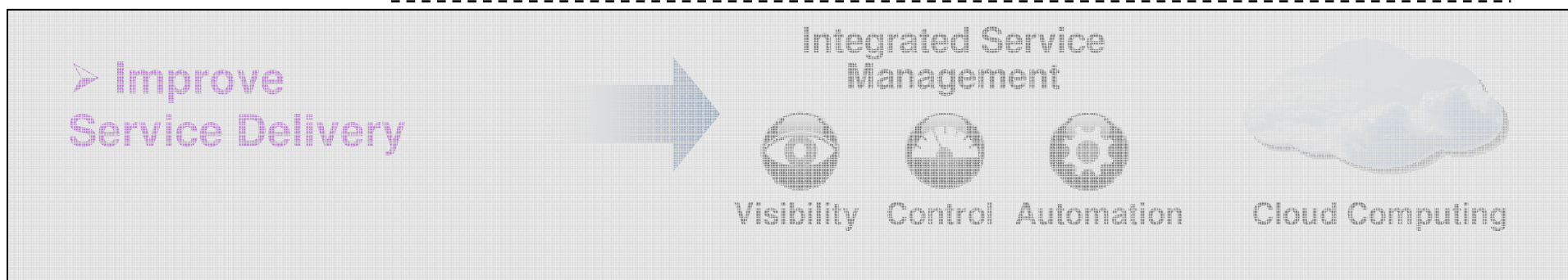
- Sizing for System z – the mindset of a standalone environment has to be adopted
- Virtualized environments in System z are more effective than distributed server
- High availability in System z is built in the platform
  - Clustering and HA is required on application level rather than platform level
- Consolidation – Environment is not for one single user
  - PoCs often compare processor speed on single user environment

# Strategies to Improve Value and reduce Complexity and Costs

## Optimize the Overall IT Environment



➤ Integrate Redundant Software and Data



## Requirements for an Enterprise System

Business Applications require integration of multiple workload components with varying workload characteristics



- Explosive systems and data growth require high flexibility and scalability
- Responsiveness to client needs and market opportunities
- Deployment for business processes in mixed workloads, centrally managed
- Optimized single system integration of data, applications, and web serving

A strategic systems platform for critical enterprise applications  
Helps to integrate workloads and establish a base for the future

# Workloads with recognizable patterns

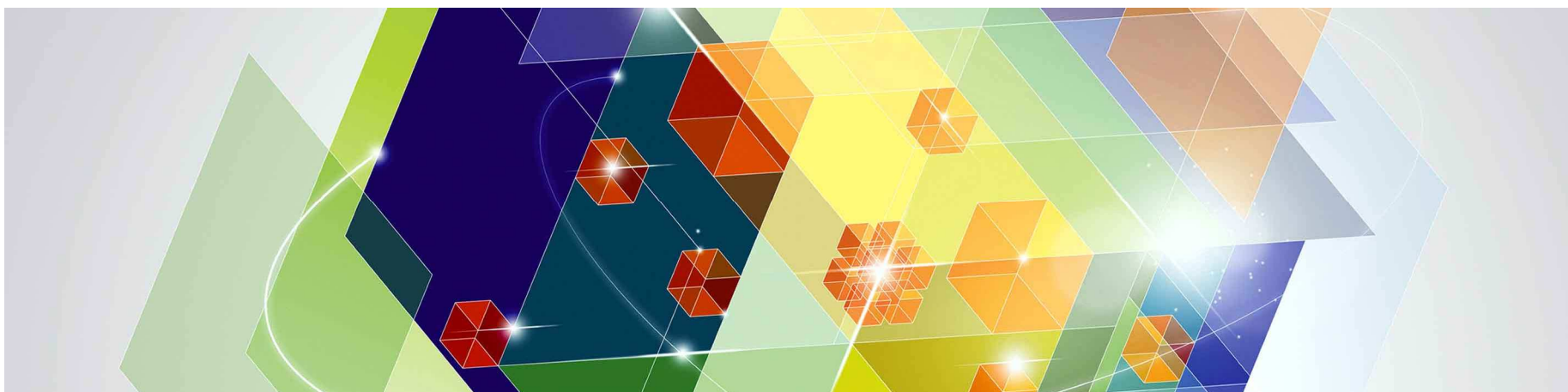
Core Applications	
<b>Application (z)</b> <ul style="list-style-type: none"> <li>• CICS®</li> <li>• COBOL</li> <li>• WebSphere®</li> </ul>	<b>Database (z)</b> <ul style="list-style-type: none"> <li>• DB2 for z/OS</li> <li>• DB2 for Linux on System z</li> <li>• Oracle on Linux for z</li> </ul>
<b>Database (z)</b> <ul style="list-style-type: none"> <li>• DB2® for z/OS®, IMS™</li> </ul>	<b>Application (z)</b> <ul style="list-style-type: none"> <li>• WebSphere</li> </ul>

SAP	
<b>Database (z)</b> <ul style="list-style-type: none"> <li>• DB2 for z/OS</li> </ul>	<b>Database (z)</b> <ul style="list-style-type: none"> <li>• DB2 for z/OS</li> </ul>
<b>Application (z)</b> <ul style="list-style-type: none"> <li>• Linux® for z</li> </ul>	<b>Application (x86)</b> <ul style="list-style-type: none"> <li>• Linux for x86</li> </ul>
<b>Database (z)</b> <ul style="list-style-type: none"> <li>• DB2 for z/OS</li> </ul>	<b>Database (p)</b> <ul style="list-style-type: none"> <li>DB2 for AIX</li> </ul>
<b>Application (Power)</b> <ul style="list-style-type: none"> <li>• AIX®</li> </ul>	

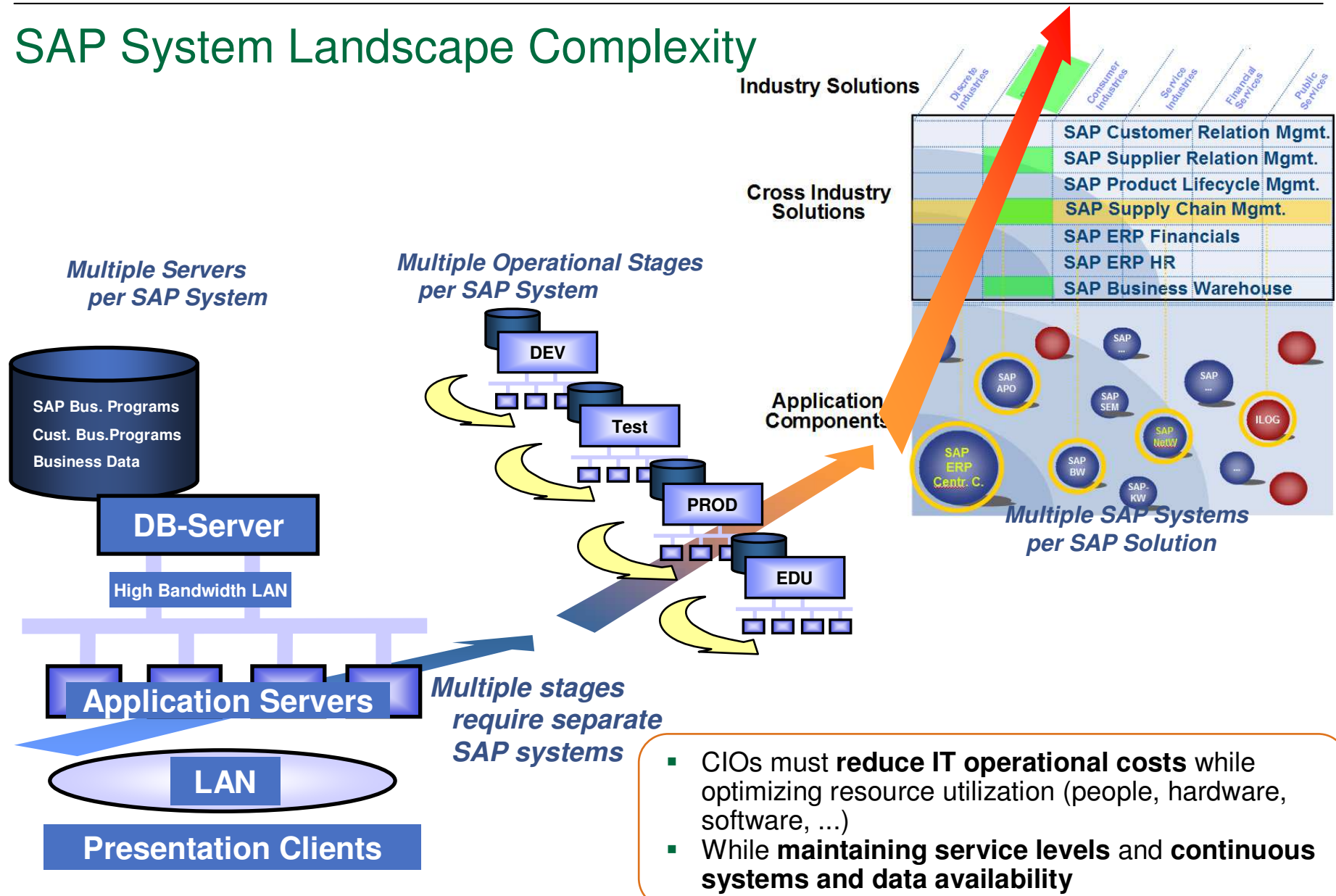
Multi-Tier Web Serving	
<b>Database (z)</b> <ul style="list-style-type: none"> <li>• DB2 for z/OS</li> </ul>	<b>Database (z)</b> <ul style="list-style-type: none"> <li>• DB2 for z/OS</li> <li>• DB2 for Linux on System z</li> </ul>
<b>Application (z)</b> <ul style="list-style-type: none"> <li>• WebSphere</li> </ul>	<b>Application (Power / UNIX)</b> <ul style="list-style-type: none"> <li>• WebSphere</li> <li>• JBoss</li> </ul>
<b>Application (x86)</b> <ul style="list-style-type: none"> <li>• WebSphere</li> <li>• Apache / Tomcat</li> </ul>	
<b>Database (z)</b> <ul style="list-style-type: none"> <li>• DB2 for z/OS, IMS</li> </ul>	<b>Database (z)</b> <ul style="list-style-type: none"> <li>• DB2 for z/OS or IMS</li> </ul>
<b>Transaction Processing (z)</b> <ul style="list-style-type: none"> <li>• CICS, MQ</li> </ul>	<b>Application (Power / UNIX)</b> <ul style="list-style-type: none"> <li>• WebSphere</li> <li>• JBoss</li> </ul>
<b>Application (Power / UNIX / Linux)</b> <ul style="list-style-type: none"> <li>• WebSphere</li> <li>• JBoss</li> <li>• WebLogic</li> </ul>	<b>Presentation (x86)</b> <ul style="list-style-type: none"> <li>• WebSphere</li> <li>• Apache / Tomcat</li> </ul>
<b>Presentation (x86)</b> <ul style="list-style-type: none"> <li>• WebSphere</li> <li>• Windows</li> </ul>	

Data Warehouse & Analytics
<b>Master Data Management Database (z)</b> <ul style="list-style-type: none"> <li>▪ DB2 for z/OS</li> </ul>
<b>Application (z)</b> <ul style="list-style-type: none"> <li>▪ WebSphere MDM (AIX, Linux on z)</li> </ul>
<b>Analytics</b> <ul style="list-style-type: none"> <li>▪ System z/OS <ul style="list-style-type: none"> <li>▪ DB2</li> <li>▪ Cognos®</li> <li>▪ SAS</li> </ul> </li> <li>▪ Linux for System z <ul style="list-style-type: none"> <li>▪ Cognos</li> <li>▪ SPSS</li> <li>▪ InfoSphere™ Warehouse</li> </ul> </li> </ul>

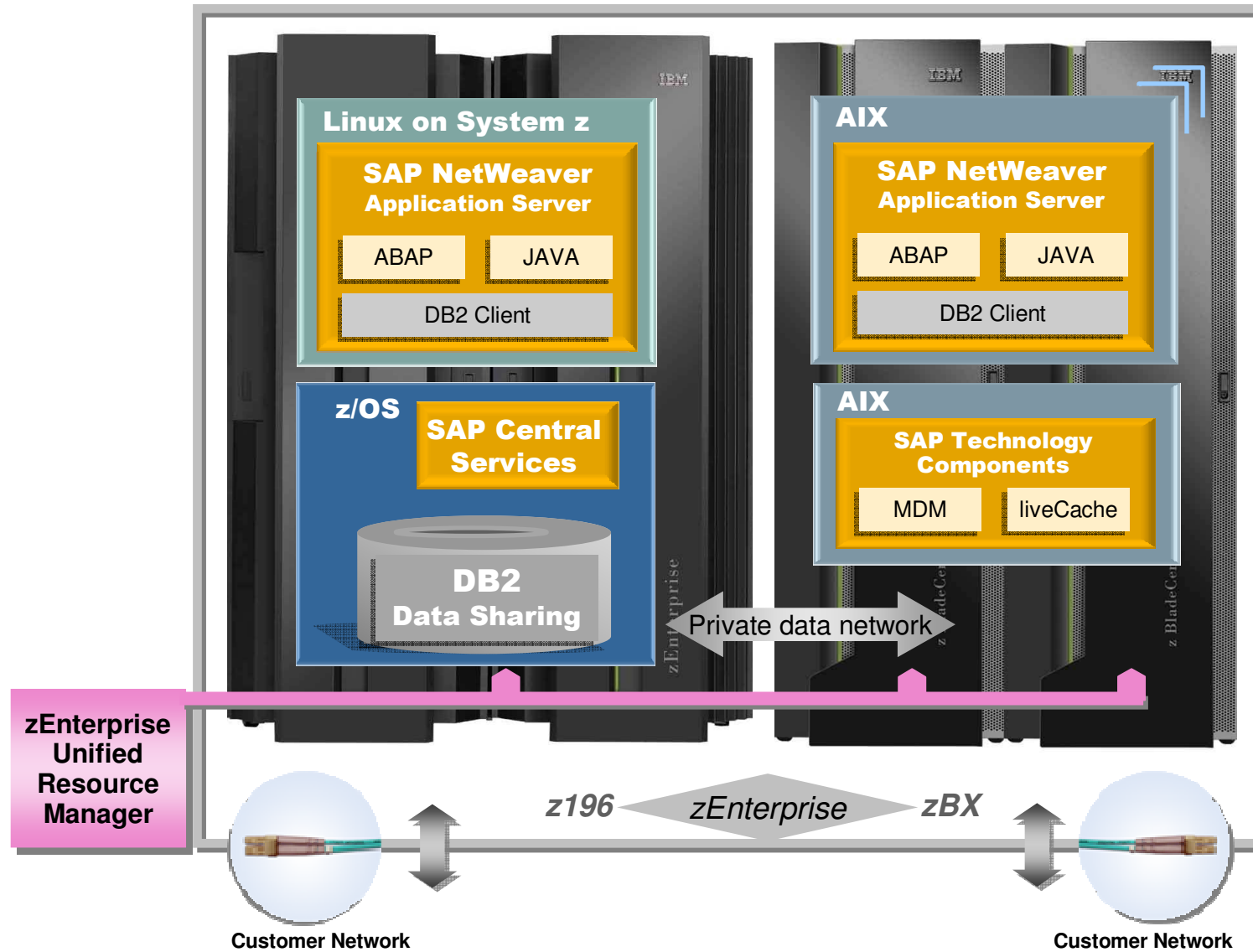
# SAP Solutions on IBM zEnterprise System



# SAP System Landscape Complexity



# SAP on IBM zEnterprise System





# Customer setup in a SAP implementation with traditional load

- Multiple Traditional LPARs
- One Linux LPAR
- No mixed LPARs

zLinux Dev. Sandbox	ZLE1E1	z/VM V5 for Linux	?	z/OS Dev. 4x DB2 E1E, H1E, S1E, S1M	z/OS Test/QA 3x DB2 E2Q, H2Q, S2Q	z/OS Production 3x DB2 H3P, S3P, S3M	z/VM V5 for z/VSE	LPAR Development ZDBE1	LPAR Test + QA ZDBQ1	LPAR Production ZDBP1	LPAR z/VM & z/VSE PROD
zLinux Dev. HR	ZLH1E1										
zLinux Dev. ERP	ZLS1E1										
zLinux Dev. SolMan	ZLS1M1										
zLinux Test/QA Sandbox	ZLE2Q1										
zLinux Test/QA HR	ZLH2Q1										
zLinux Test/QA ERP	ZLS2Q1										
zLinux Prod. HR	ZLH3P1										
zLinux Prod. ERP	ZLS3P1										
zLinux Prod. SolMan	ZLS3M1										
<b>IFLs (shared)</b> 4x IFLs			<b>CPs (shared)</b> 2x processors								
<b>System z10</b> 2 CP, 4 IFLs, 48 GB memory											

*An international electrical equipment manufacturer slashes ongoing management costs and drastically improves flexibility with SAP and Linux on the mainframe*

## \* The Challenge

- Over 8,000 employees in 28 facilities across the globe, rapidly expanding business, overworked IT staff
- **UNIX and Windows environment sprawling fast and difficult to manage, driving 5-8 outages per year**
- **Downtime cost Baldor hundreds of thousands of dollars**

## \* The Solution

- **A single System z10 mainframe, with 50 virtual servers**
- **Consolidated 6,000 ft<sup>2</sup> of data center to just 900 ft<sup>2</sup>**
- **Novell SUSE Linux Enterprise Server**

## \* The Benefits

- Baldor estimates the solution paid for itself in months by avoiding the cost of planned and unplanned outages
- Overall IT spend slashed by 45%
- Reduced energy consumption by 80%

*"We chose Linux over UNIX or Microsoft Windows because we wanted to **standardize on an operating platform that would run on any kind of hardware.**"*

*"SUSE Linux Enterprise Server Priority Support for SAP gives us a **single point of contact** for our support issues."*

*"It's clear that we made the right decision to move to a mainframe environment and we find that **SAP runs much better on Linux than any other platform.**"*

*Mark Shackelford,  
Vice President of Information Services  
Baldor Electric*



[http://www.novell.com/success/baldor\\_electric.html](http://www.novell.com/success/baldor_electric.html)  
<http://www-306.ibm.com/software/success/cssdb.nsf/CS/DNSD-6K9H7V>

## The Home Depot - SAP on System z

- Second largest retailer in the United States with over 1800 stores, 300,000 employees
- Near continuous operations
- Moving application servers to Linux on z for easy provisioning and fast disaster recovery
- Flexible use of resources allows them to add capacity without disruption, and dynamically change priorities based on time of day, or application

***“Continuous availability and manageability are the design principles of our IT architecture. We’re proud of our ability to fail-over without data loss in a very short period of time. The improved availability and disaster recovery capabilities delivered by running the SAP applications on Linux for System z provide an extra layer of insurance against potentially damaging and expensive outages.”***

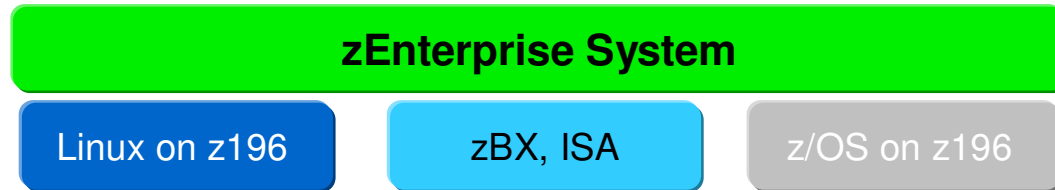
Clifford W. Gum; SAP Technical Architect, The Home Depot



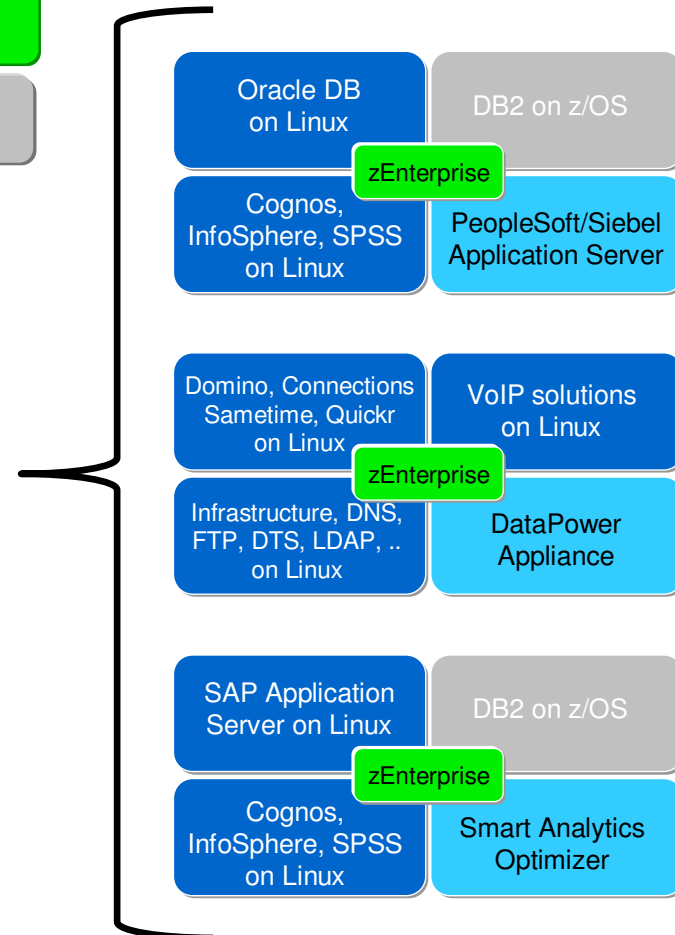
### ***Benefits:***

- Scalability to support over 1 Billion transactions/year
- Ability to support SAP and Business warehouse, enables access to P&L, and daily sales targets
- Low TCO
- Low unit cost /work
- Low staffing costs
- Faster time to market for new offerings in stores

# zEnterprise - Smart Solutions

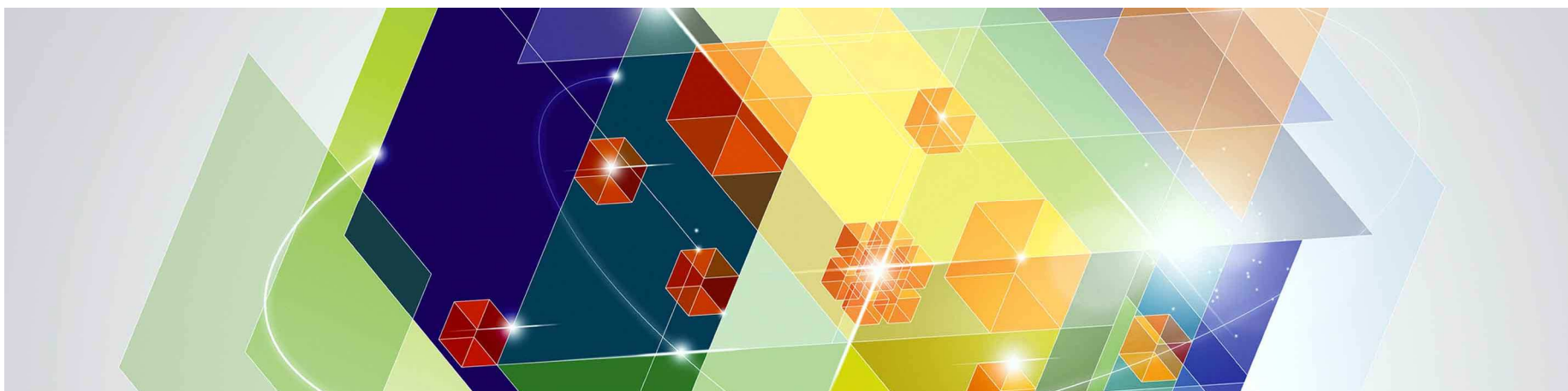


- Build complete end to end solutions with z196 and zBX
- Leverage centralized control of servers with Unified Resource Manager
- Simplify communications with internal and contained networking
- Leverage zEnterprise strong database capabilities and ability to host multiple diverse database workloads
- Leverage close proximity of BI applications to the hosted databases
- Use Fit for Purpose to put solution components on best architecture to optimize solutions



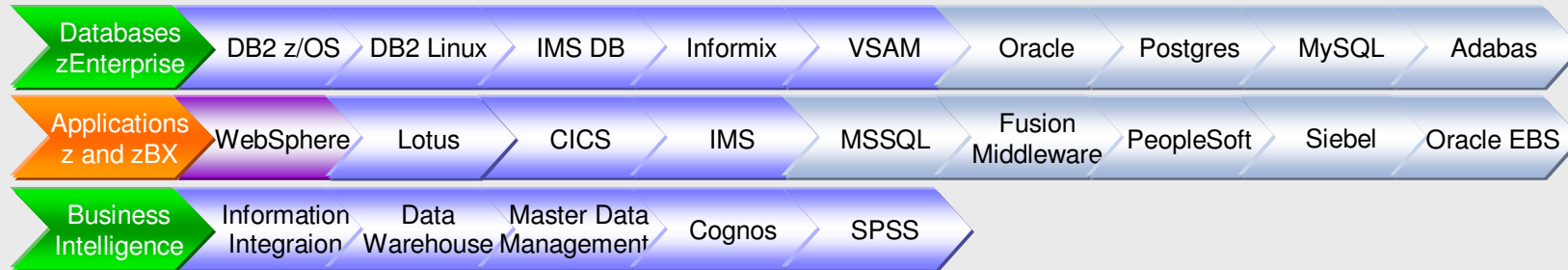
⇒ Build Solutions to match Business Units requirements

# Data Warehouse and Business Analytics on zEnterprise

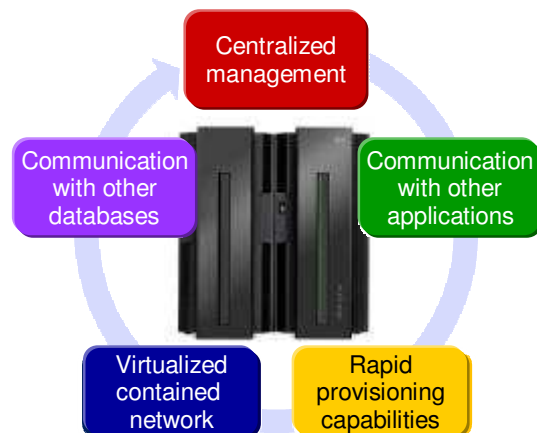


# Foundation for Data, Analytic and Applications

Supports and Integrates Data Like No Other Platform



- Consolidation and integration of databases
- Tight integration of data and applications
- Business Intelligence close to the data



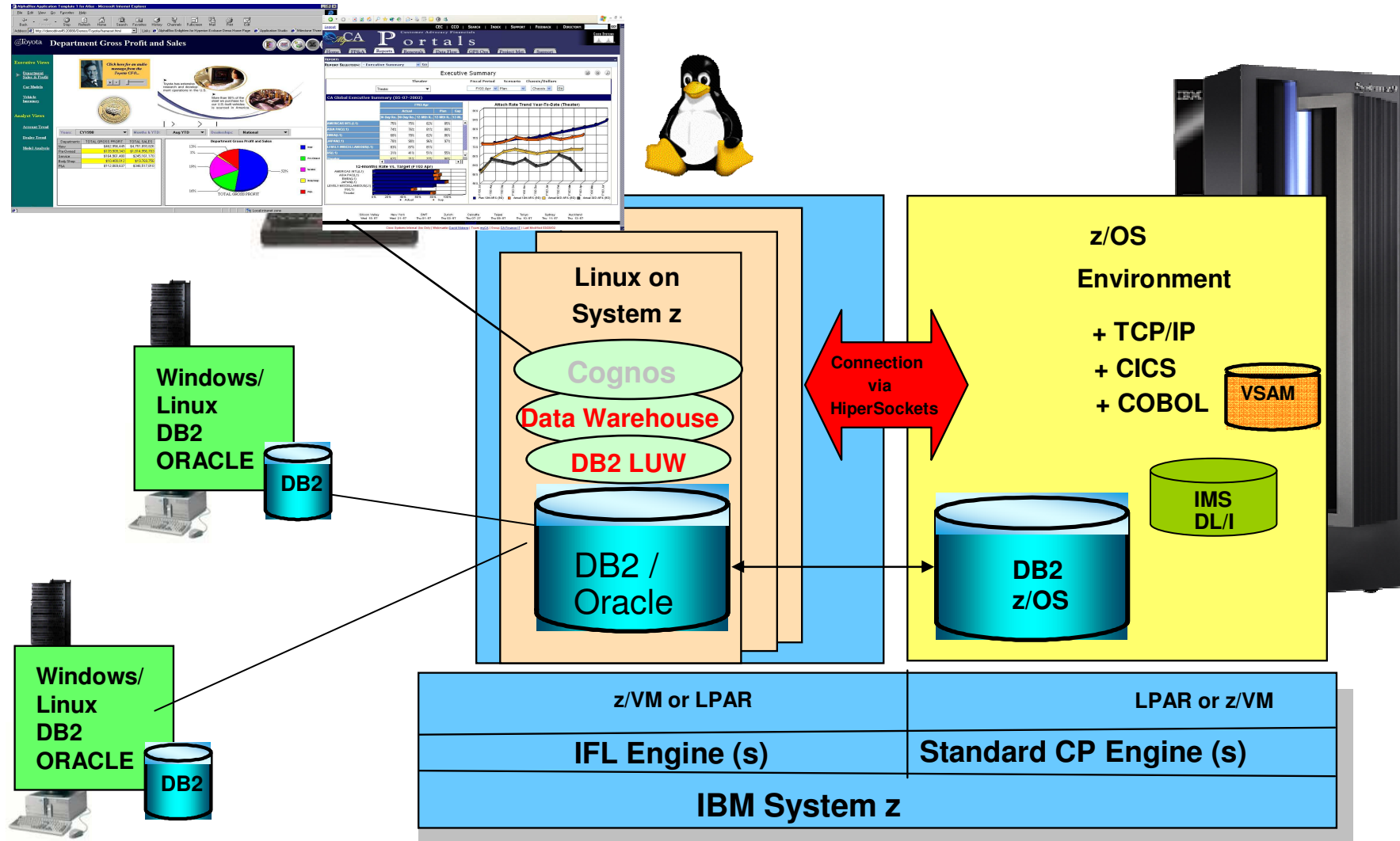
- The only platform that can run nine commercial databases, supported at the same time
- Better align and synchronize data, for data integrity. Use the internal architecture to consolidate database communications
- Leverage internal networking between databases and applications
- Centralize management across entire enterprise

**Data Growth is Exploding !**

# Linux on System z as Data Warehouse and BI



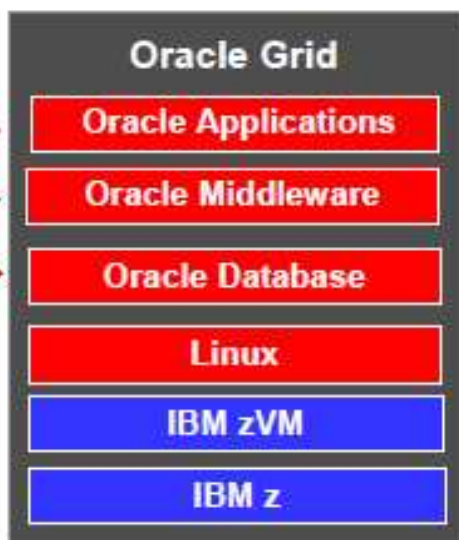
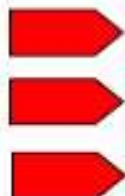
**Integrate, Consolidate, Evaluate, Decide,  
Explore Business Intelligence (BI)**



# Oracle and Linux on System z – IBM & Oracle working together

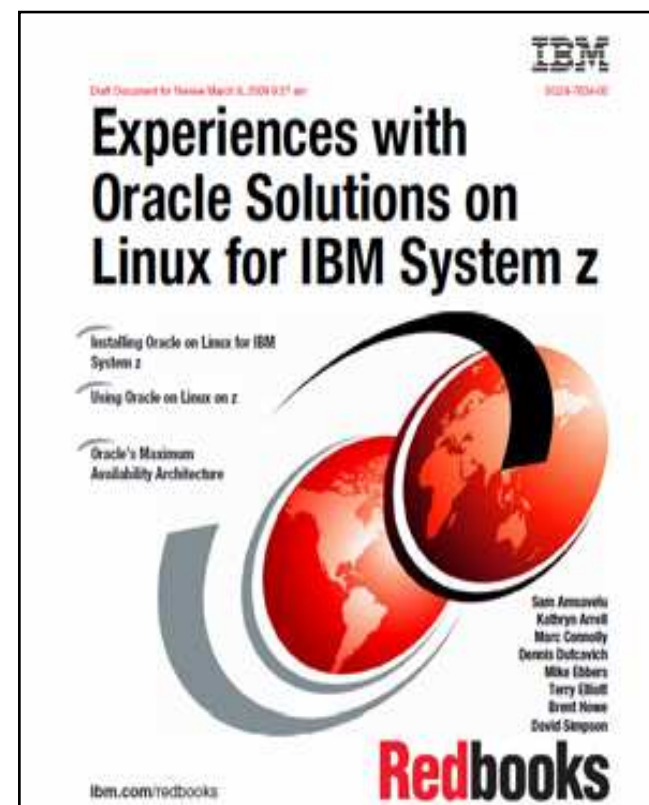
- Linux on System z is Oracle’s platform for the mainframe
- Oracle database 11g R2 available on Linux on System z (since 1Q2011)

Strategic porting investments fortify solutions strategy.



**★ New in 2011**  
**E-Business Suite Native on Oracle Database 11g Release 2 Version 11.2.0.2**

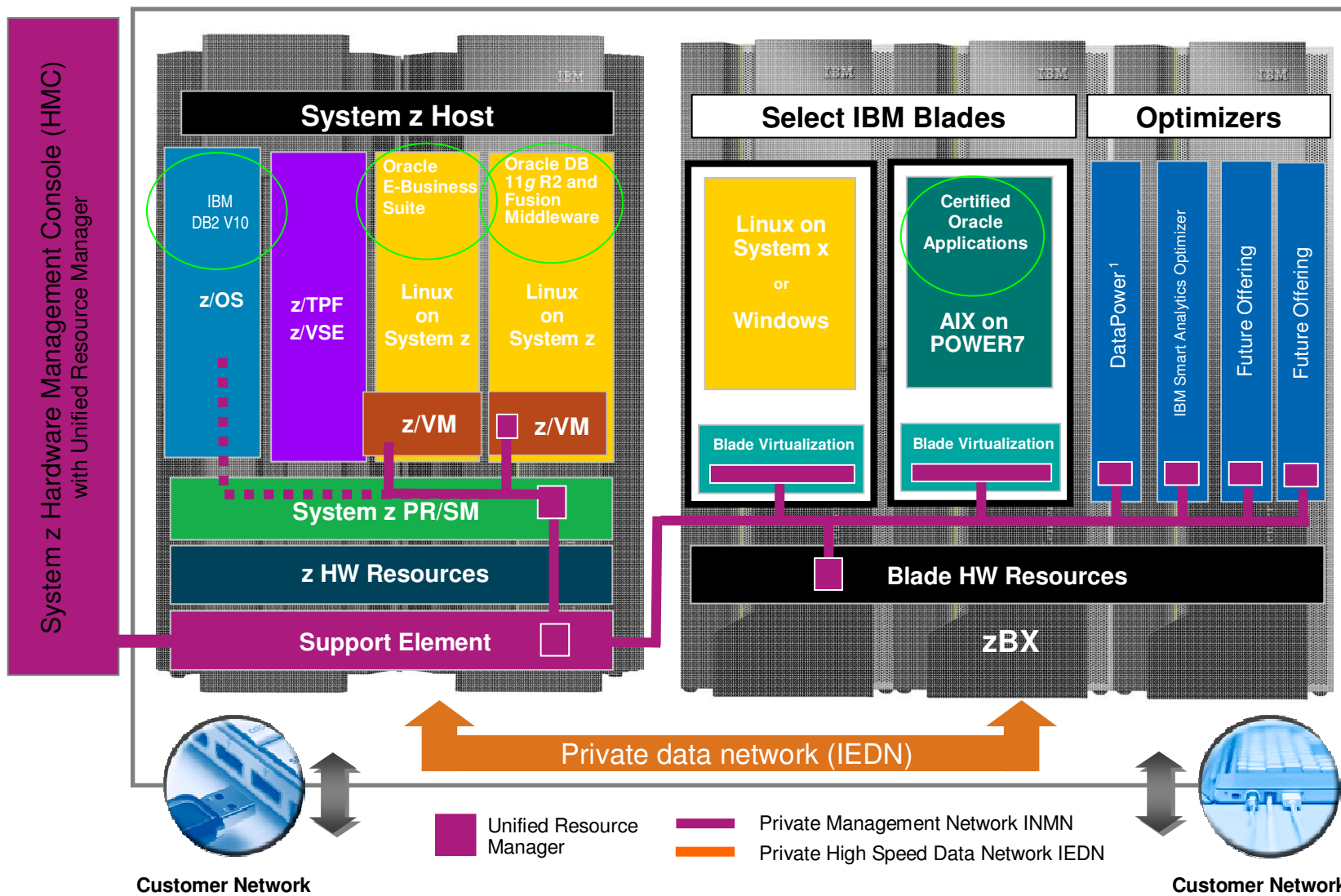
**Note:** Other Oracle solutions that are sometimes associated with E-Business Suite but are NOT supported on Linux for System z: Oracle Retail Suite, Retek, ProfitLogic, 360Commerce, Demantra, Oracle Transportation Management (G-Log), Oracle Pharmaceuticals (Clinical), Oracle iLearning



<http://www.redbooks.ibm.com/abstracts/sg247191.html>



# Examples of Oracle Solutions on IBM System zEnterprise



## Dundee City Council ...

### *Creating a cost-effective IT architecture with IBM System z and IBM XIV Storage System technologies*

#### **Business need:**

Like all UK local authorities, Dundee City Council needs to handle increasing demand for IT and eGovernment services, while also reducing costs in line with central government targets. When the lease on its server and storage hardware needed to be renewed, the Council saw an opportunity to enhance its capabilities and increase value for money.

#### **Solution:**

Dundee worked with IBM to upgrade its mainframe environment with two powerful IBM System z10 servers, and introduced the IBM XIV® Storage System to replace a mixed storage environment. [The new infrastructure runs a range of Linux applications and Oracle databases – supporting key systems such as social services 24x7.](#)

#### **Benefits:**

- Improves performance by more than 50 percent
- Providing capacity for growth without increasing IT costs.
- Enables very rapid provisioning of virtualised server and storage resources.
- Provides excellent availability and disaster recovery capabilities: all systems can be restored within 20 minutes.

*"The combination of the z10 processors and the XIV grid architecture gives us 50 percent better performance than our previous infrastructure – which means we can run 50 percent more workload for the same price. As a result, we can deliver more, faster online services and better value for tax-payers' money, without increasing the IT budget."*

*- Tim Simpson, IT Support Manager,  
Dundee City Council*

# Province of Québec, Canada



## Improves citizens' services while saving money and improving operation



- *Government of the province of Québec, Canada*
  - Relies heavily on large Web-based application environment to serve the needs of its citizens
  - DGTI (Direction generale des technologie de l'information) supports applications and underlying infrastructure
- *Situation:*
  - Fast growth of applications and infrastructure (150+) distributed servers, staffing pressures
- *Problems:*
  - Slow deployment of new applications, limited general manageability (including backup/recovery)
  - Rising software licensing costs, especially for the Oracle environment
- *Solution:*
  - IBM System z9™ Enterprise Class (z9 EC) was ideal choice: robust virtualization capabilities, proven high availability and ease of management
  - **Consolidated approximately 60 hard-to-manage distributed server environment (UNIX® servers) to single z9 EC server with 5 IFLs** and 96GB of memory running SUSE Linux® Enterprise Server (SLES) operating system under z/VM®
    - **80+ Oracle 9i and 10g database instances consolidated to the z9**
    - Consolidation from 60 servers down to 1 server resulted in significant reduction in Oracle licenses
    - Plan to move WebSphere Application Server and Domino instances as well



### Results:

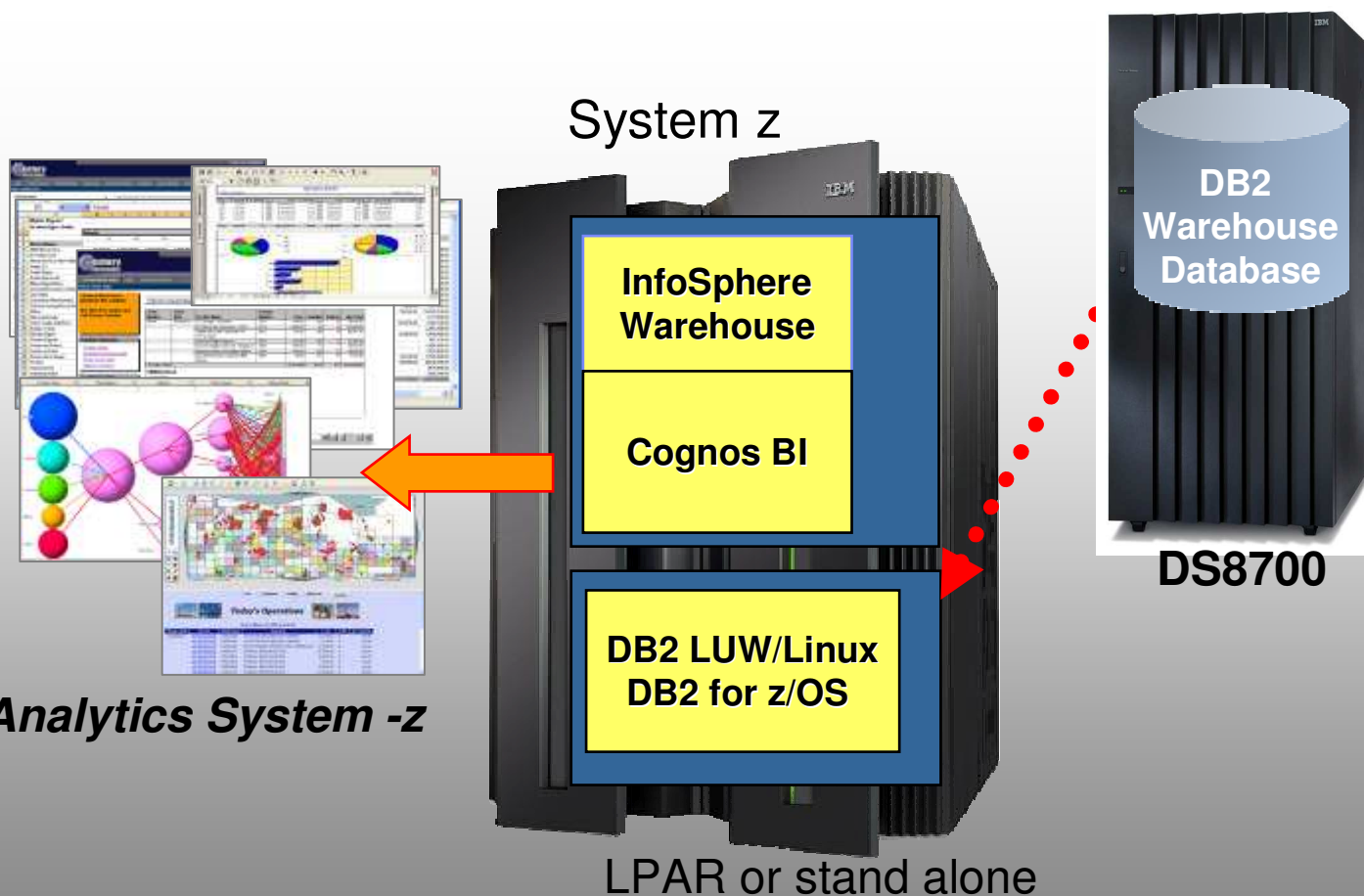
New application deployment time fell from several weeks to days  
**Saved CA\$1.2M** (software licensing) & reduction in management cost  
Drastic improvement in backup and recovery operations

## Pitfalls - Sizing

- Considerations
  - Oracle databases are often memory ‘hungry’
  - Sizing estimate on System z for memory is different than Intel systems
  - CPU sizing using monitoring tools
  - Memory sizing by summ of components with formula:
    - Mem per server = SGA + PGA + 500 MB for Linux + 250 MB for ASM(if used)
  - PoC and production like tests show real behavior

# IBM Smart Analytics System

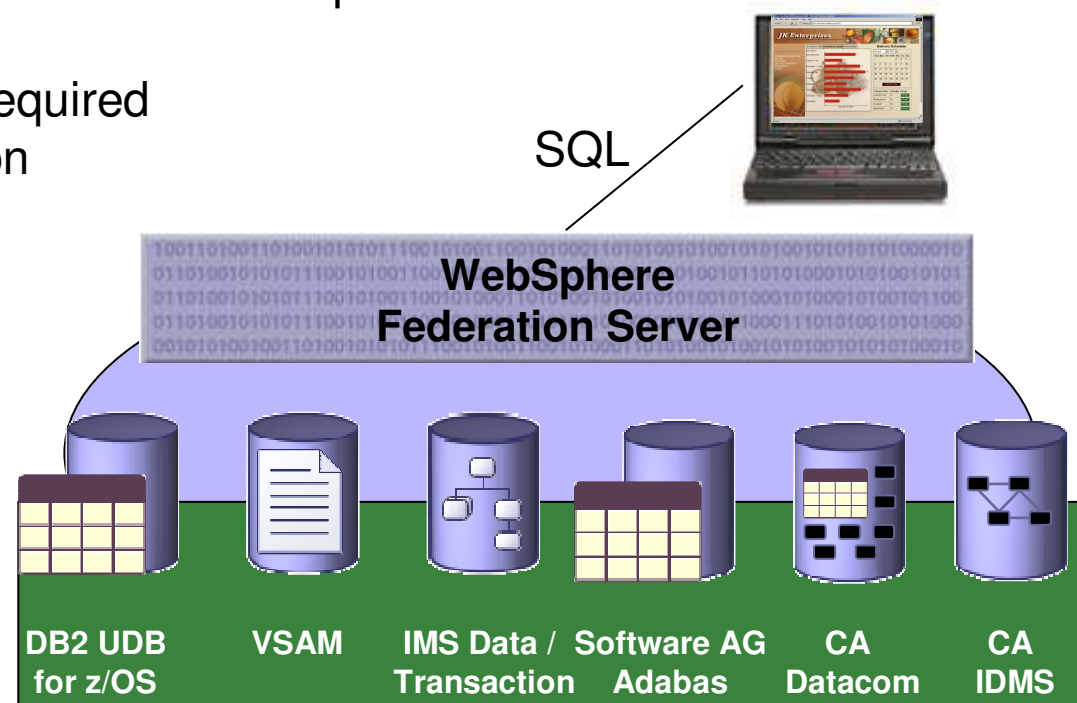
*Building an  
end-to-end  
BI environment  
on System z*



**IBM Smart Analytics System -z**

# InfoSphere Federation Server for Linux on System z InfoSphere Classic Federation for z/OS

- Integrating at the data layer – Federation of data
  - Read from and write to federated data sources using a single SQL
  - Standards-based access via JDBC, ODBC, or Call Level Interface
    - Including for VSAM and foreign databases!
  - 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



## IBM DB2 Analytics Accelerator V2.1

*Capitalizing on the best of both worlds – System z and Netezza*

### What is it?

*The IBM Smart Analytics Optimizer is a workload optimized, appliance add-on, that enables the integration of business insights into operational processes to drive winning strategies. It accelerates select queries, with unprecedented response times.*



### How is it different

- **Performance:** Unprecedented response times to enable 'train of thought' analyses frequently blocked by poor query performance.
- **Integration:** Connects to DB2 through deep integration providing transparency to all applications.
- **Self-managed workloads:** queries are executed in the most efficient way
- **Transparency:** applications connected to DB2 are entirely unaware of the Optimizer
- **Simplified administration:** appliance hands-free operations, eliminating many database tuning tasks



**Breakthrough Technology Enabling New Opportunities**

## Business challenge:

A service provider in the Benelux region wanted a solution that would help the company to do the following:

- Achieve economies of scale by simplifying the heterogeneous distributed computing architecture.
- **Use its business intelligence tools as an individualized communication channel with its stakeholders (clients, business partners, shareholders).**

## Solution:

IBM helped the client build intelligence architecture by leveraging the scaleable capabilities of its information to increase service. The solution enables also the client to:

- Reduces data content of the data warehouse
- Reduces number of queries
- Redesign and re-implement the data warehouse: expensive and time-consuming and high risk (business continuity) option
- Reconsider the computer architecture.

## Benefits:

- The ability to serve multiple users with the very simple architecture from this PoC.
- **An application that does not require a redesign to accommodate its growth in data volumes or in terms of users.**
- **Scalability to a more complex architecture without increased hardware complexity.**

## Solution components:

- **IBM System z10 EC**
- *IBM Information Management **Cognos 8 BI***
- **DB2 9 for Linux UNIX and Windows**
- *WebSphere Application Server for **Linux on z***
- *Novell SUSE Linux*

Register for more information at:

[ibm.com/software/sw-events/teleconference/P701489M19013R36.html](http://ibm.com/software/sw-events/teleconference/P701489M19013R36.html)



## Customers are talking about our Business Analytics solutions



"The IBM® DB2 Analytics Accelerator delivers the speed to create the insights we need to work smarter. By putting the right answers into the hands of decision makers across our business, enables us puts us to quickly adapt and grow."

*Reto Estermann, Director of Information Technology, Swiss Reinsurance Company Ltd.*

"The goal is to book inventory down to the last room available to maximize yield," said Kravchenko. We can expeditiously do this from a centralized reservations system, no matter where in the world the reservation is requested."

**Misha Kravchenko, Vice President, Global Enterprise Mainframe Systems for Marriott International**



"Moved from data mining to full scale data warehousing on System z to deliver the high performance and 24x7 availability required for hospital processes and the consistent uptime, superior scalability and recoverability"

*Bob Goodman, Senior Database Administrator, Florida Hospital*

Business users at Chartis Insurance require SLA with no down time, high performance and fast time to market. With System z, business users benefit from seamless up time of 99.99 percent, the fastest performance available and time to market measured in days."

*Travis Neel, VP BICC, Chartis Insurance*



"Running our data warehouse platform on System z allows us to achieve consistent performance and reliable uptime, which are crucial for maintaining the highest degree of customer confidence in the bank and its services."

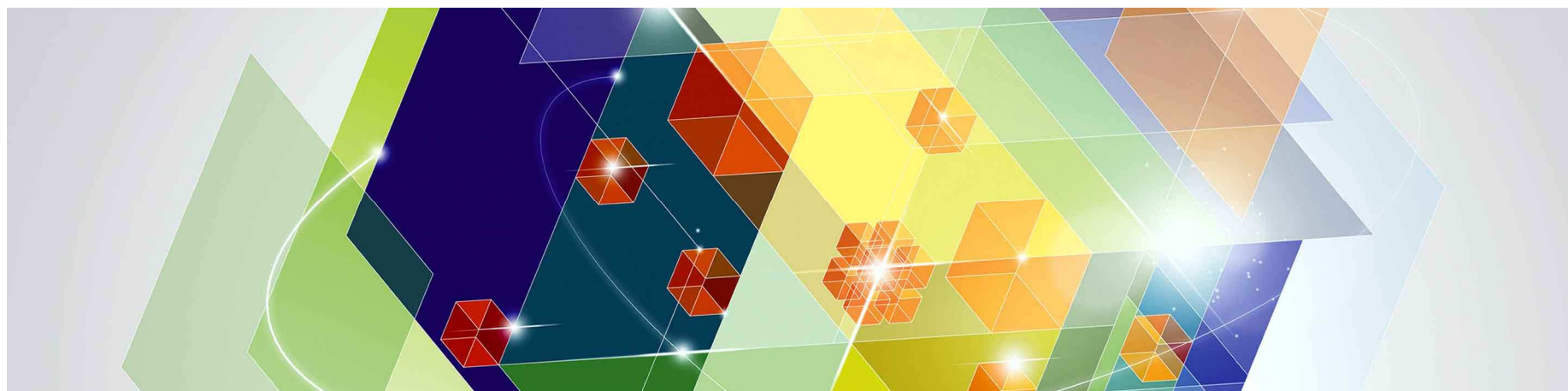
*Hermann Schelling, Head of Database Engineering, Zürcher Kantonalbank*

"Our commitment to informed decision making led us to consider private cloud delivery of Cognos BI via System z, which is the enabling foundation that makes possible the support of 200,000 users and +\$25M savings over 5 years."

*IBM CIO Office*

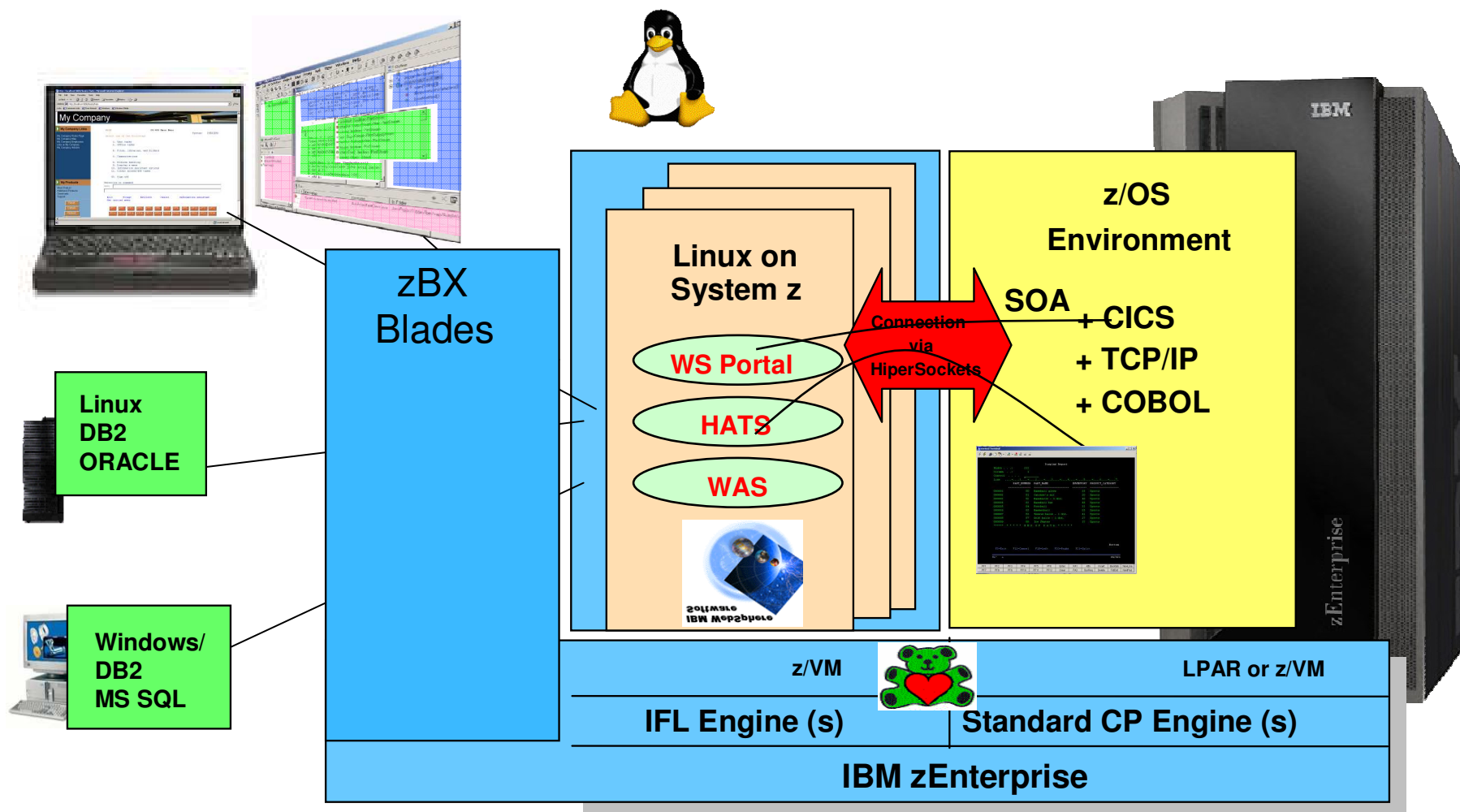


# Integration solutions with IBM System zEnterprise



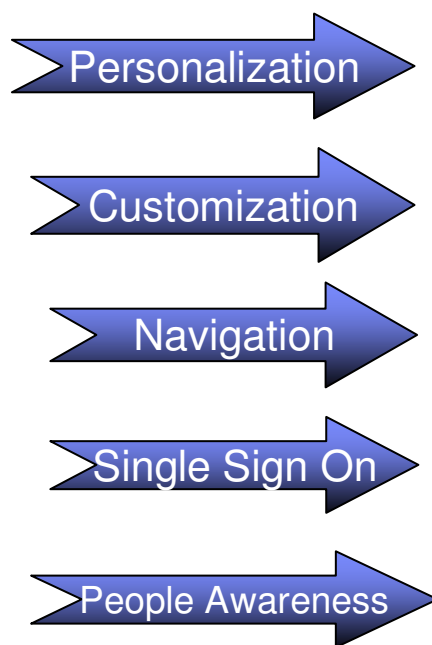
# Linux on System z as Central Access Point

Web enable, improve interface, simplify, extend existing applications

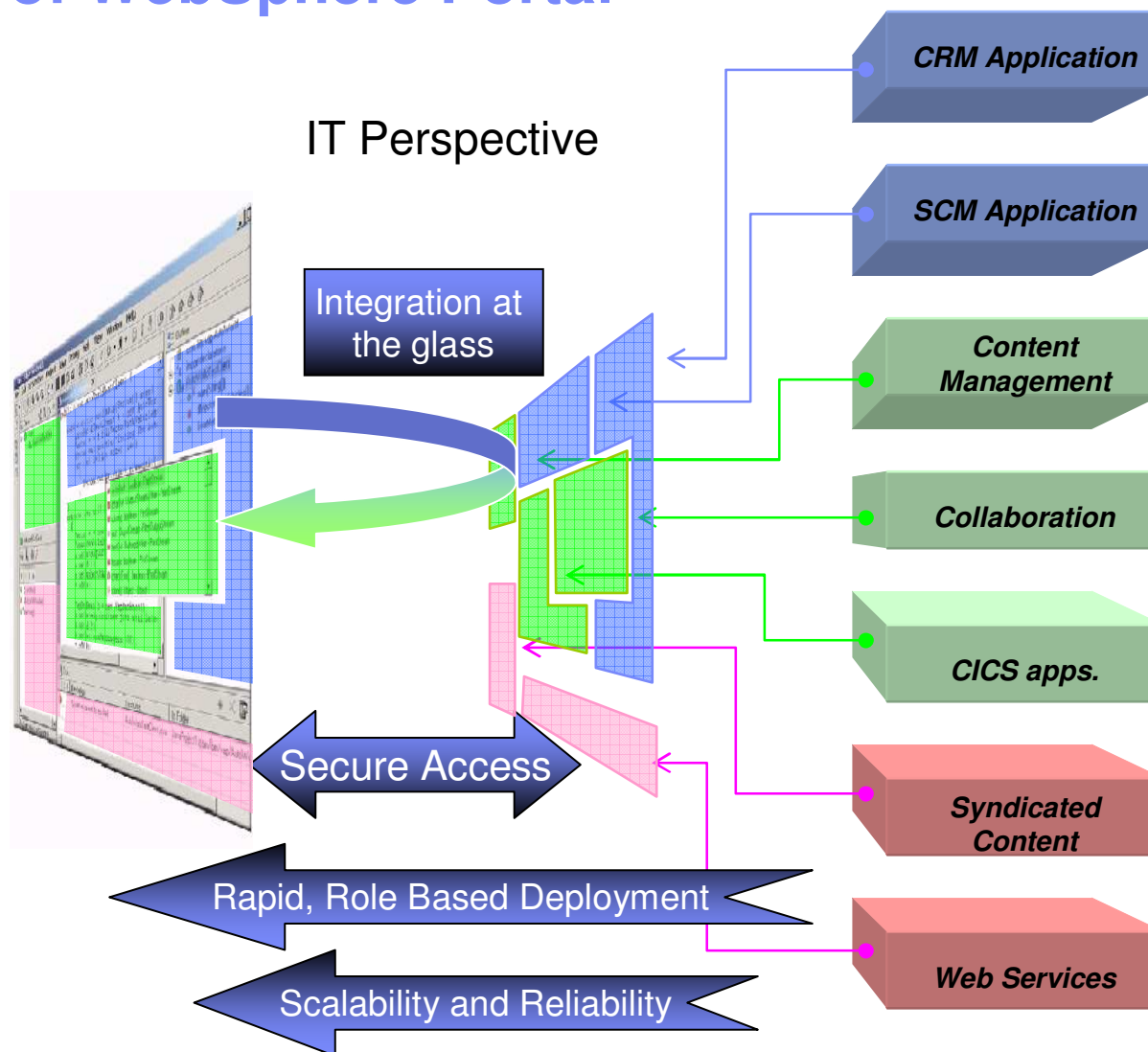


# Integration variety of WebSphere Portal

User Perspective



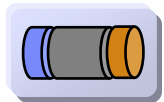
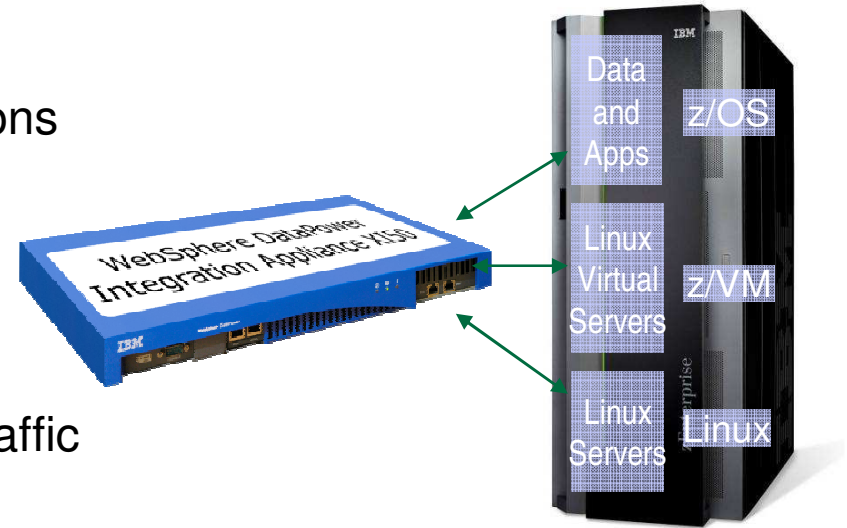
IT Perspective



# WebSphere DataPower XI50z for zBX on zEnterprise

*Purpose-built hardware for Enterprise Service Bus (ESB) functionality*

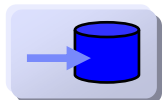
- SOA Integration / ESB Message Enrichment / Web Service virtualization for legacy applications
- Enforce high levels of security independent of protocol or payload format
- Integrate with enterprise monitoring systems
- Service level management options to shape traffic



- Advanced protocol-bridging seamlessly supports a wide array of transports, including HTTP, WebSphere MQ, WebSphere JMS, Tibco EMS, FTP, NFS, et al.



- Any-to-any “DataGlue” engine supports XML and Non-XML (Binary) payloads, promoting asset reuse and enabling integration without coding

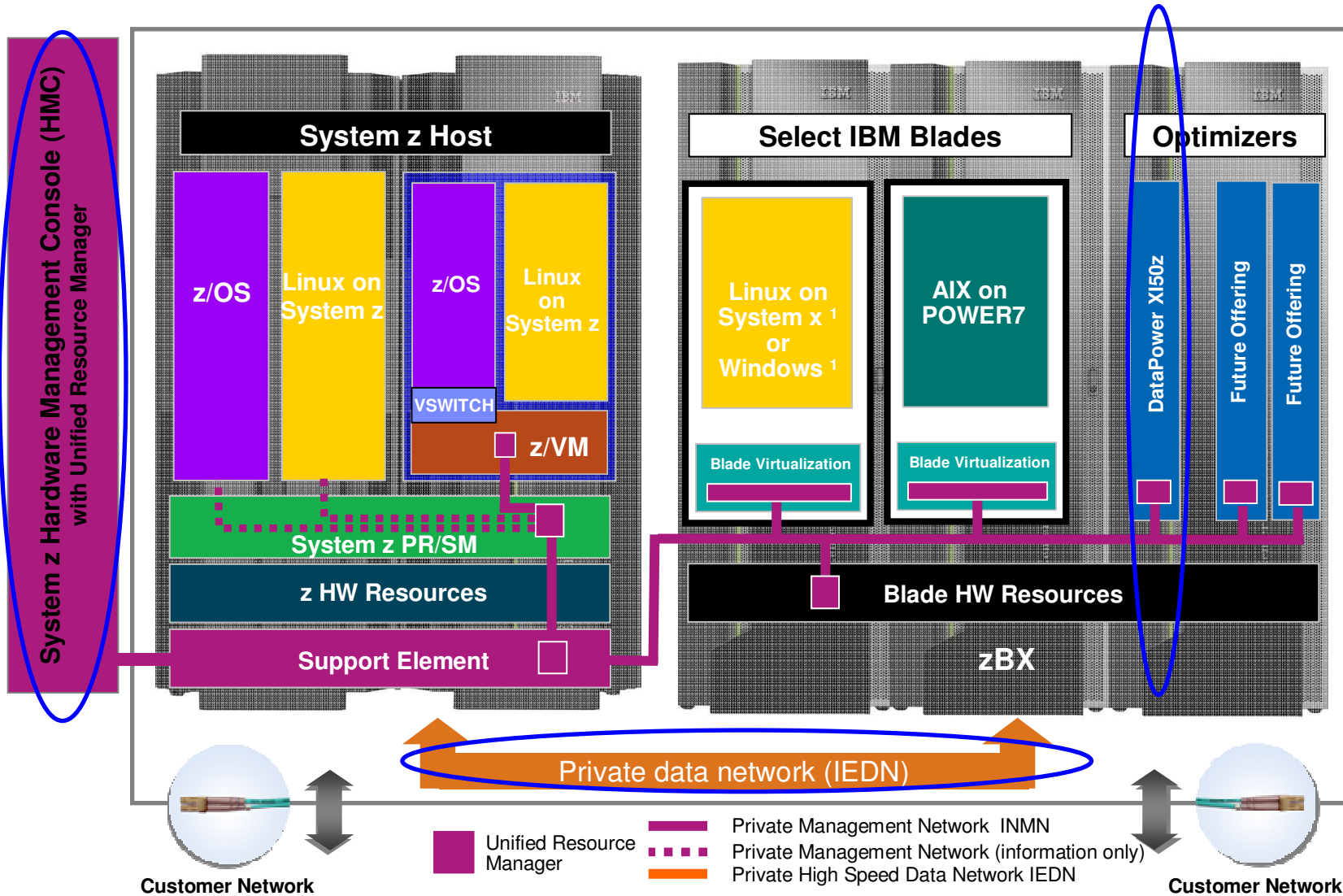


- Direct database access enables message-enrichment and data-as-a-service messaging patterns (DB2, Oracle, MS-SQL, Sybase)



- High performance architecture creates low-cost, easily-scalable ESB solution for Smart SOA needs

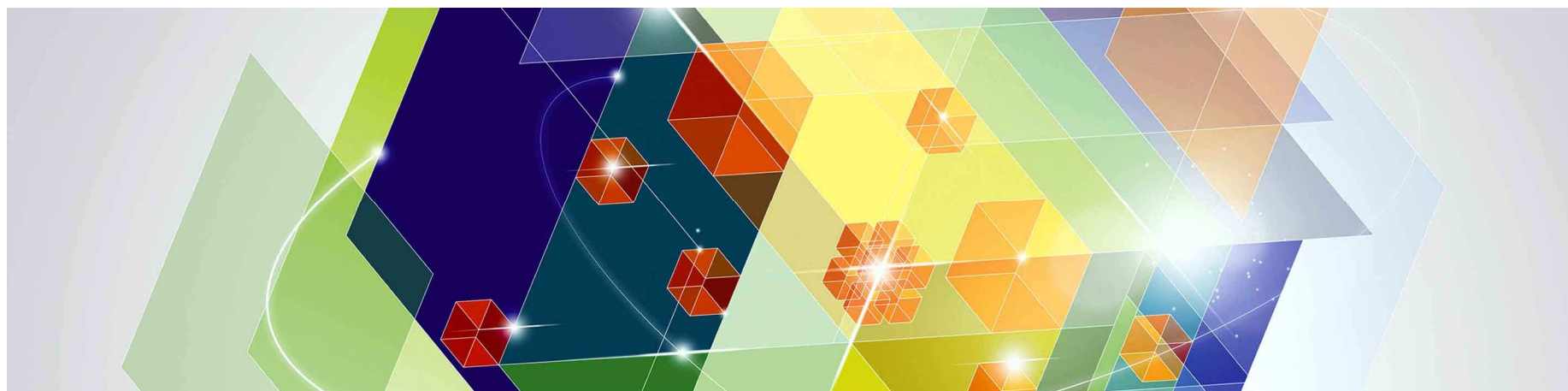
# The zEnterprise designed for workload integration



<sup>1</sup> All statements regarding IBM future direction and intent are subject to change or withdrawal without notice, and represents goals and objectives only.

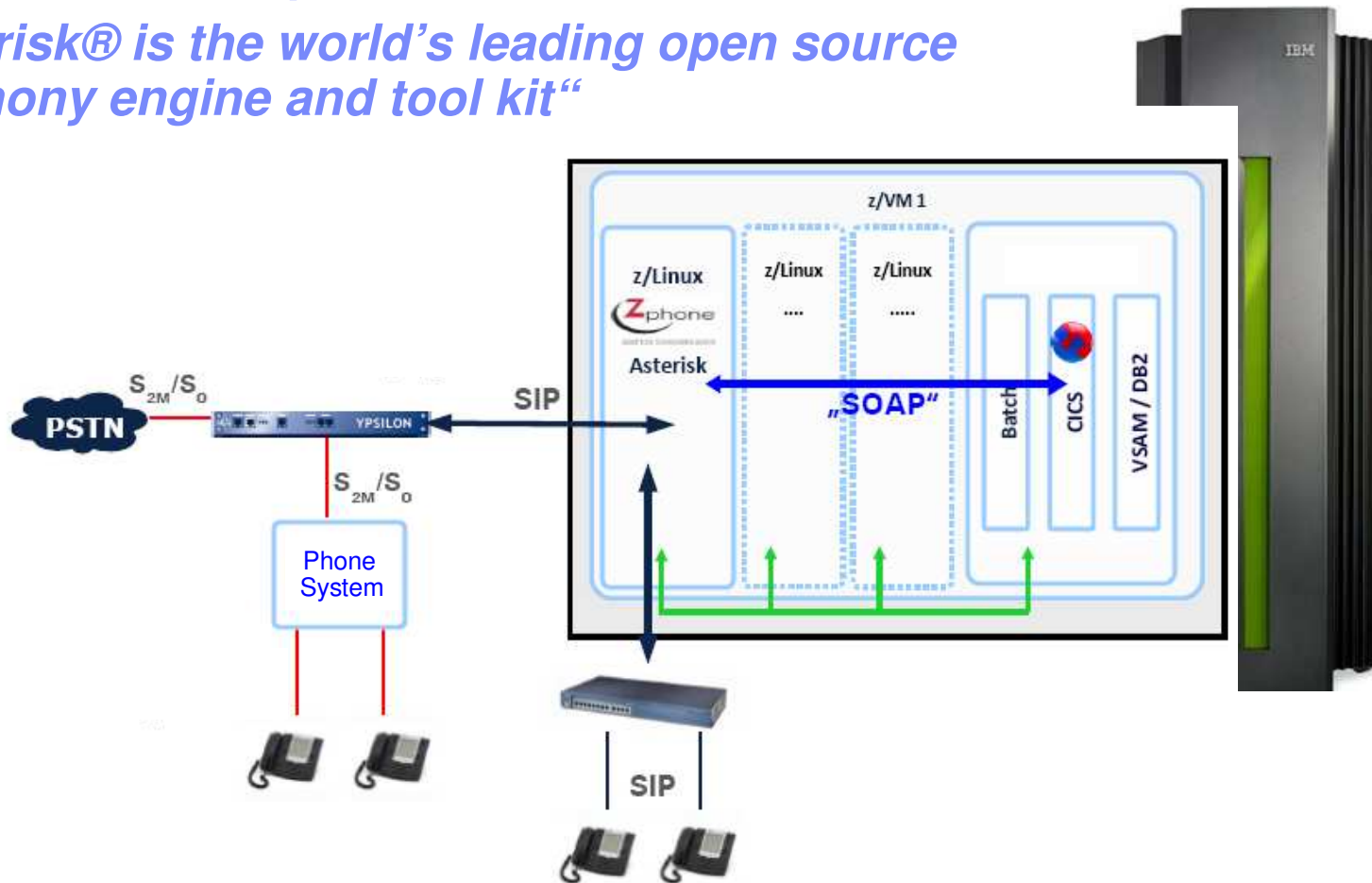
---

## Collaboration – Call Centers on Linux on System z and interaction with distributed or CICS workload



# 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“*

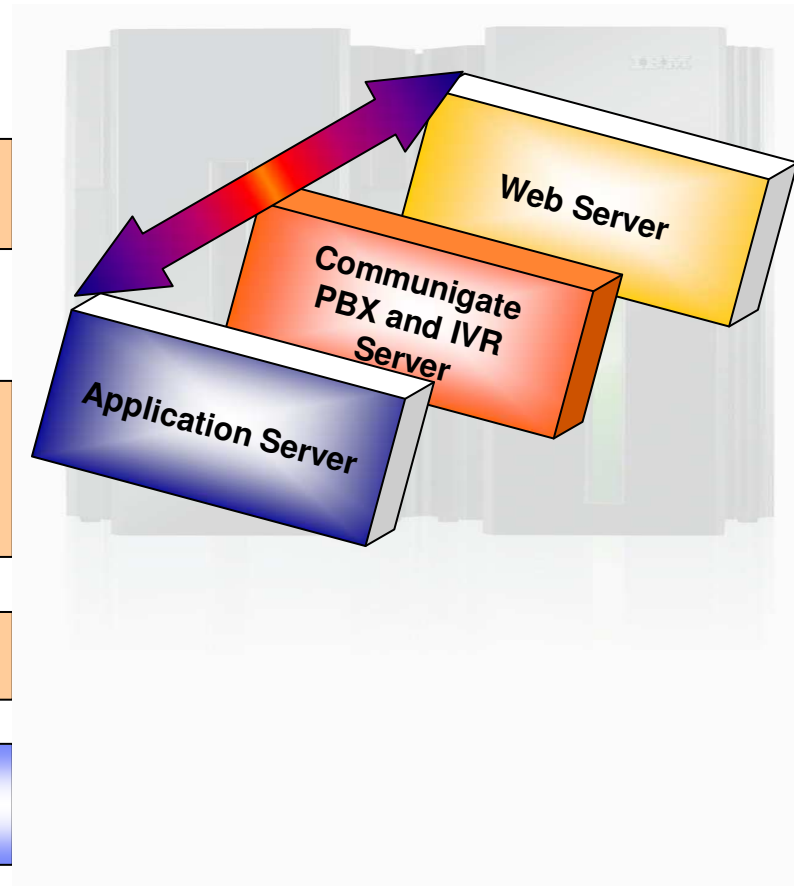
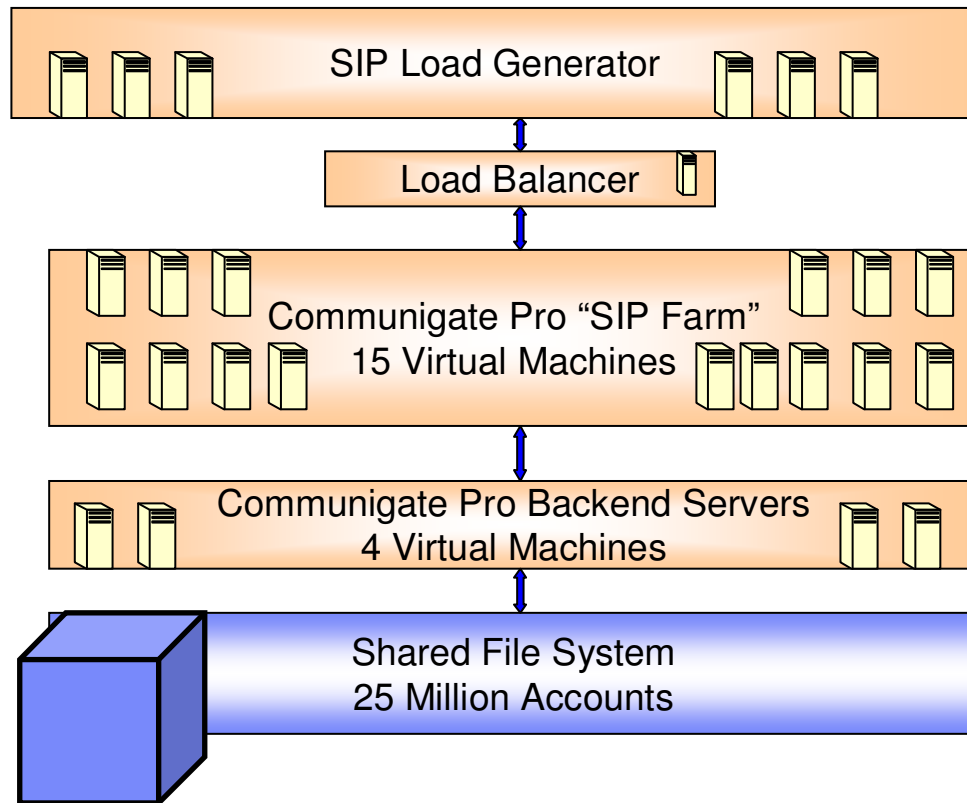


(<http://www.asterisk.org/support/about>)



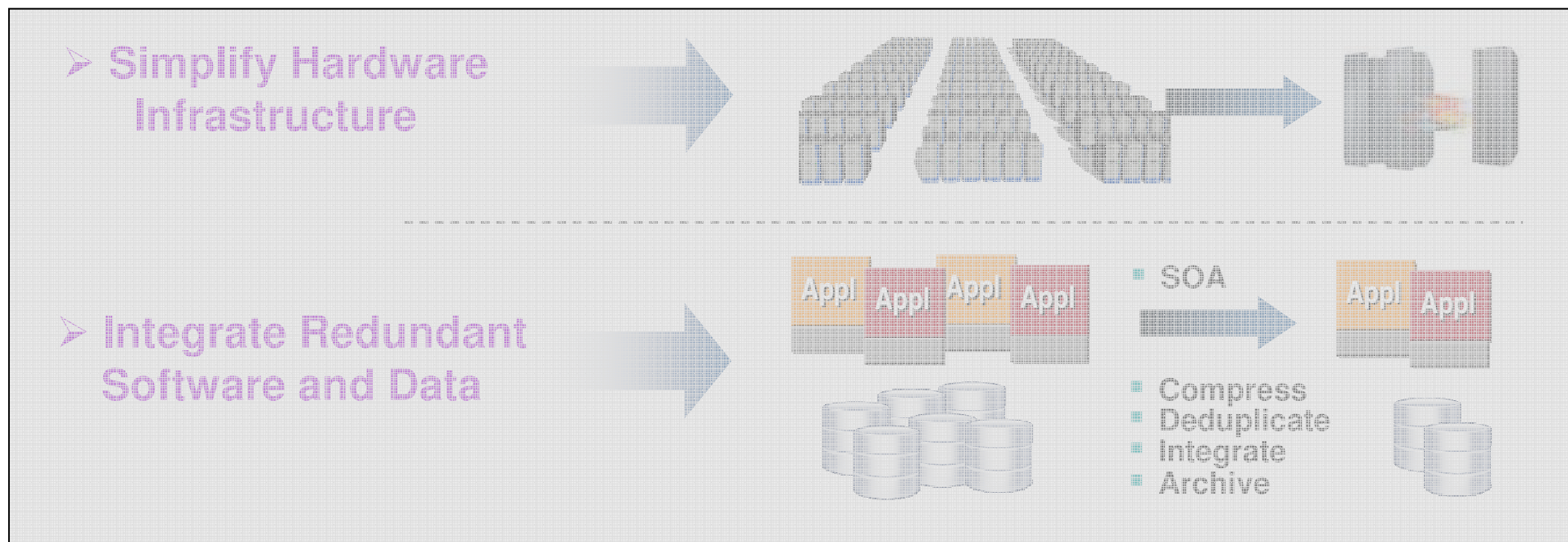
# VoIP, Communicate Pro Running on Linux System z

- Server Test **25 Million Subscribers**
- Largest VoIP Benchmark in Industry
- Brand New Customer to System z

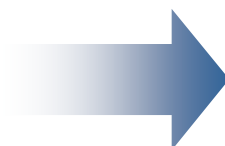


# Strategies to Improve Value and reduce Complexity and Costs

## Optimize the Overall IT Environment



### Improve Service Delivery



#### Integrated Service Management



Visibility



Control



Automation

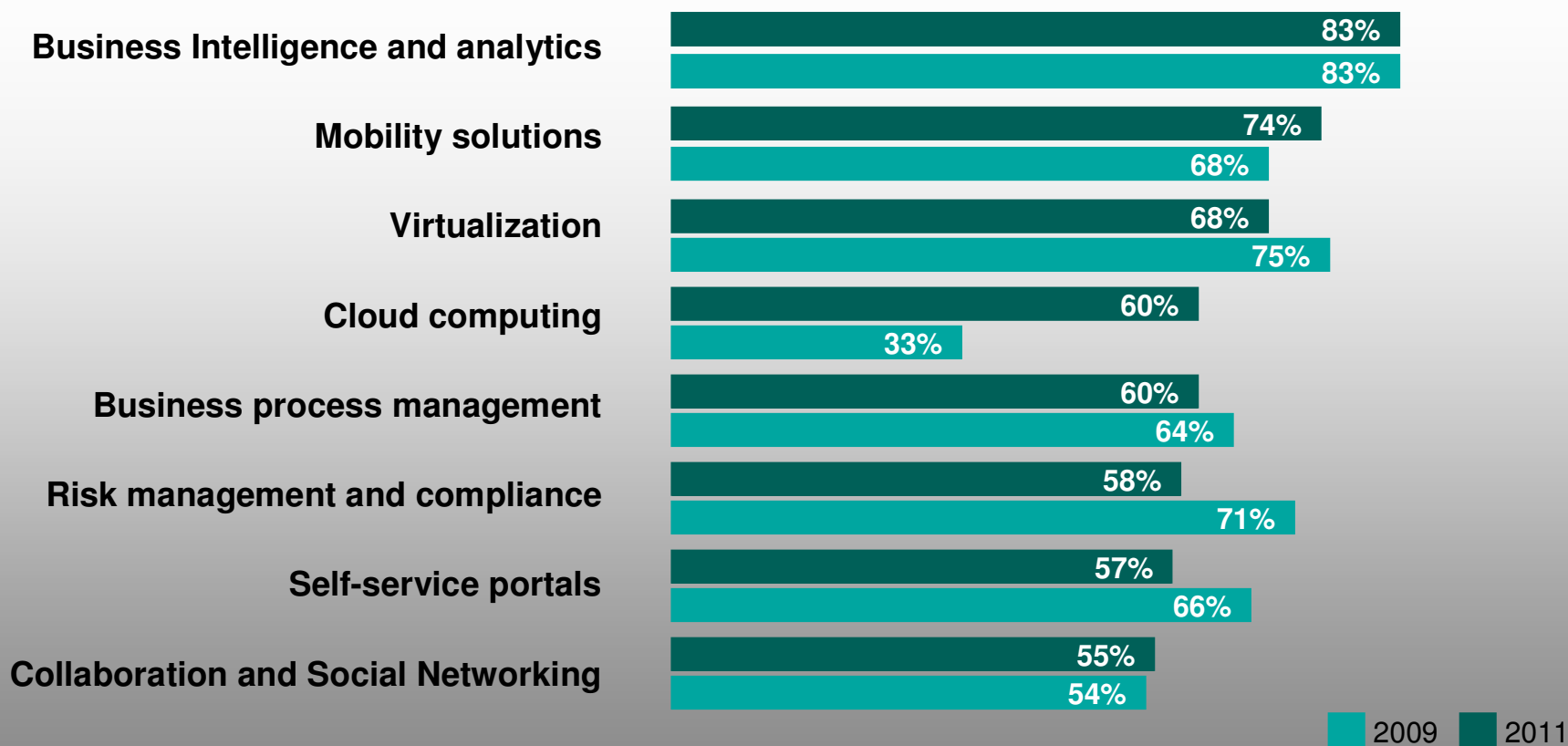


Cloud Computing

# CIO plans today: business intelligence and analytics remain at the top, with cloud computing moving into the top four

## Most important visionary plan elements

*(Interviewed CIOs could select as many as they wanted)*

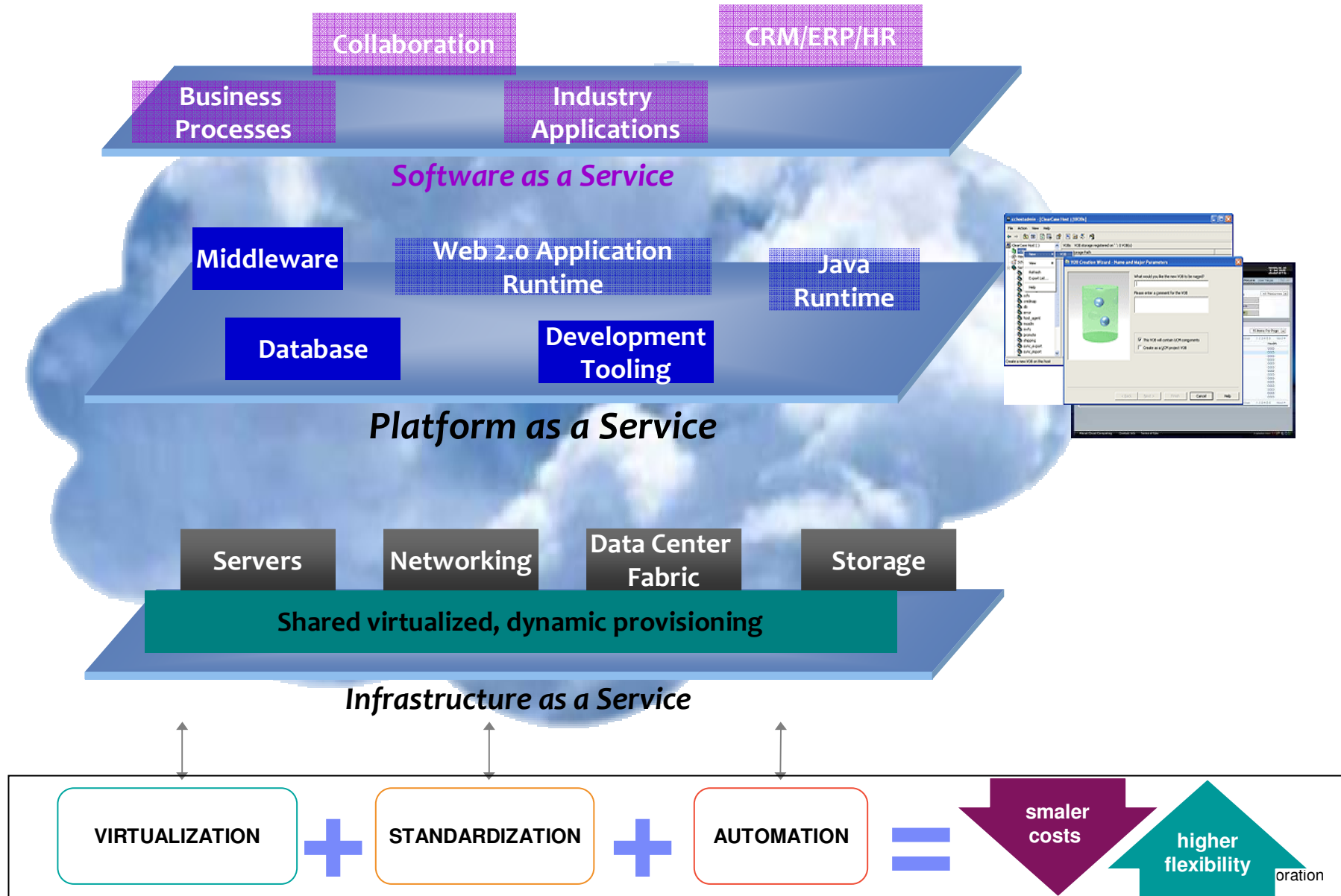


Source: 2011 CIO Study, Q12: "Which visionary plans do you have to increase competitiveness over the next 3 to 5 years?"(n=3,018)

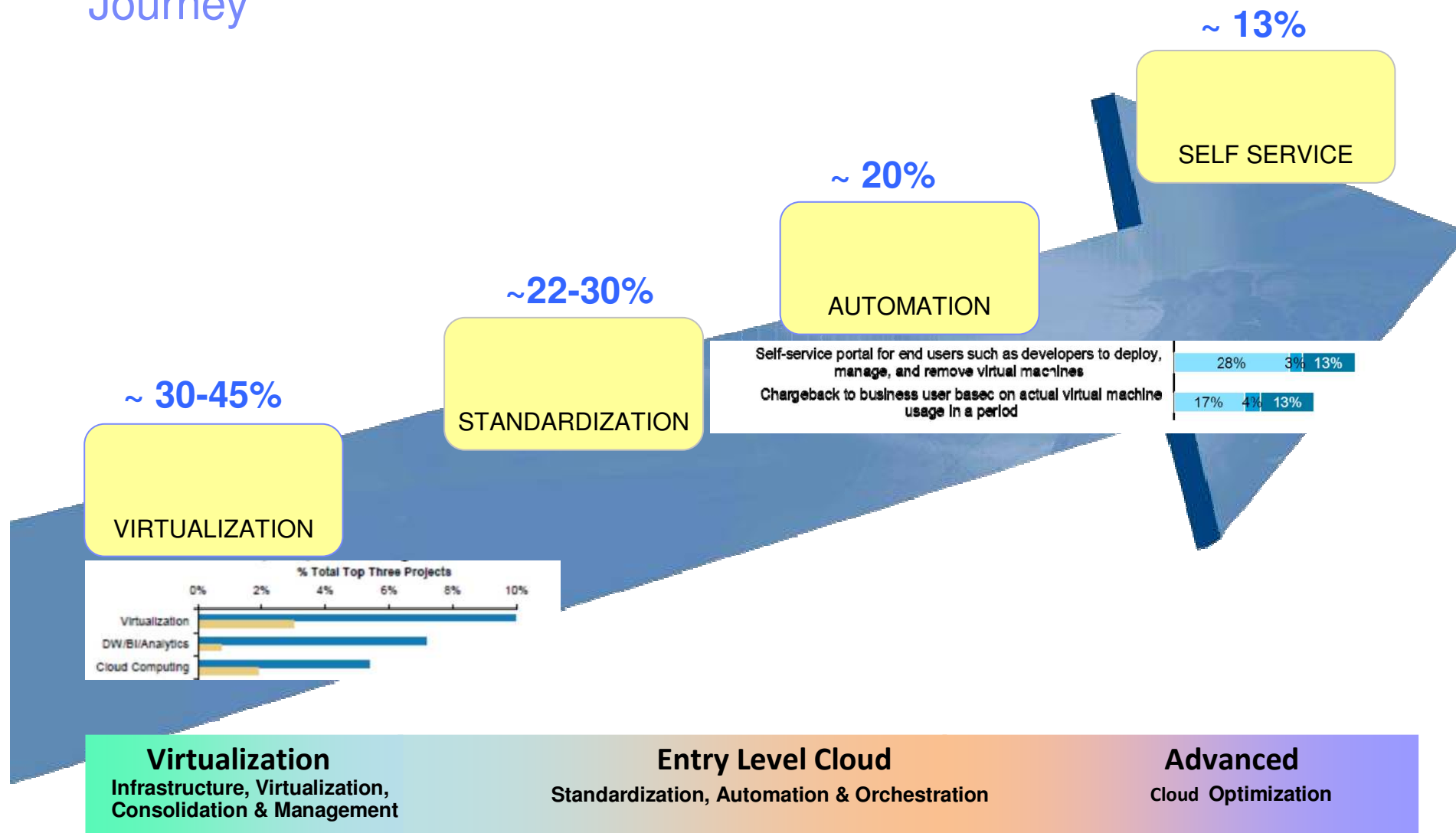
# Cloud Computing environments



## Infrastructure, Platform or Software as a Service



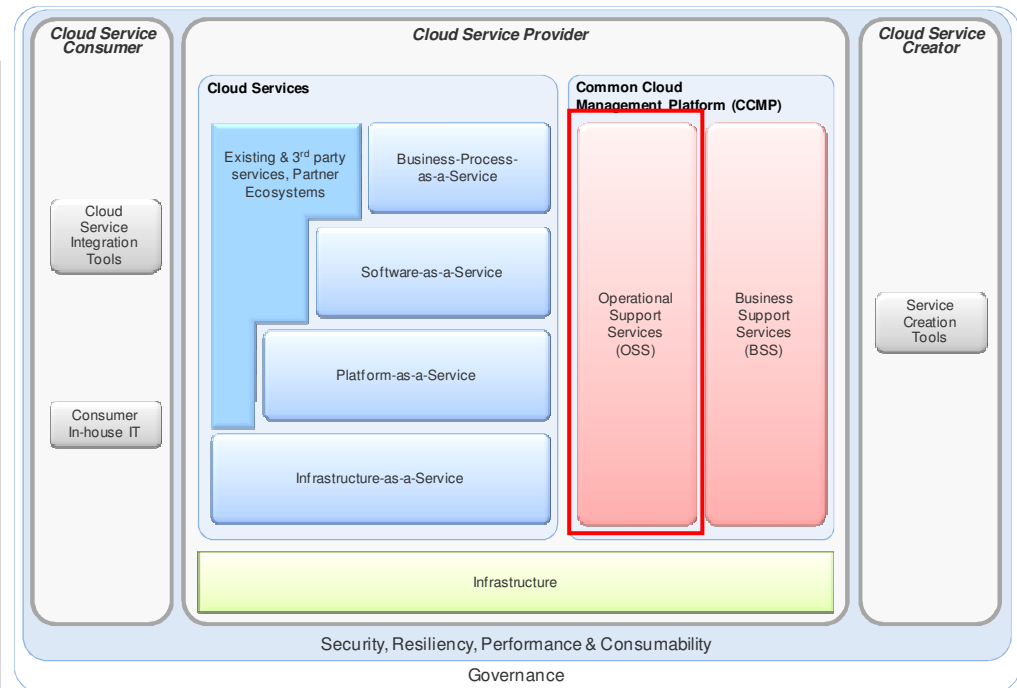
# Market View - Cloud Live Cycle Management - Implementation Journey



# IBM Cloud Computing Reference Architecture (CC RA) – Cloud Lifecycle Management ‘Best Practices’

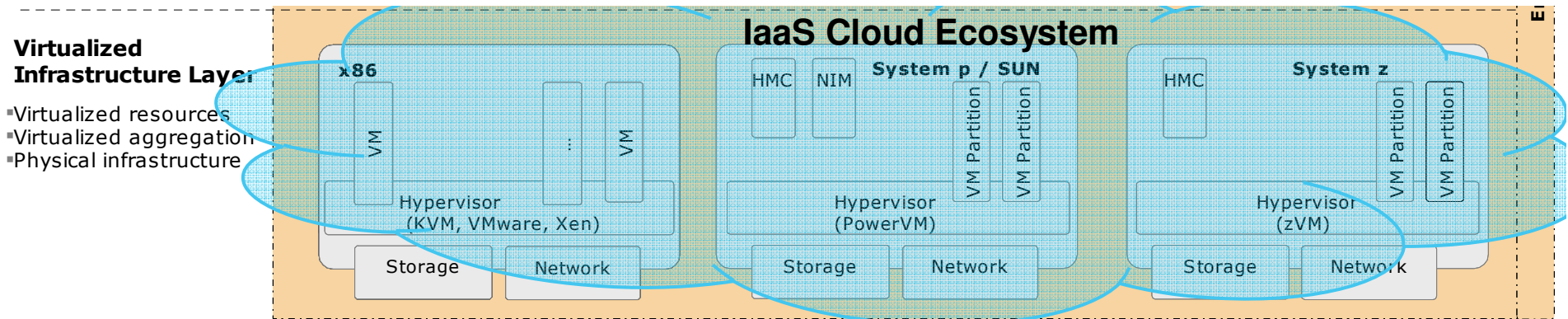
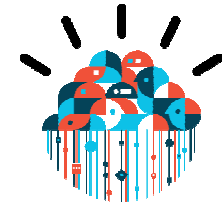
Publically available RA whitepaper on ibm.com:  
<http://public.dhe.ibm.com/common/ssi/ecm/en/ciw03078usen/CIW03078USEN.PDF>

- The IBM CC RA is based on Best Practices from:
  - IBM Cloud Projects with clients
  - IBM Public Cloud Offerings like Smart Cloud Enterprise
- The CC RA consists of 21 detailed Documents, with best-of-industry knowledge regarding Cloud Architecture, Design and Implementation

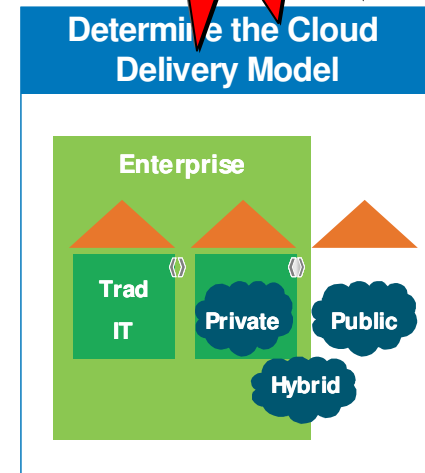
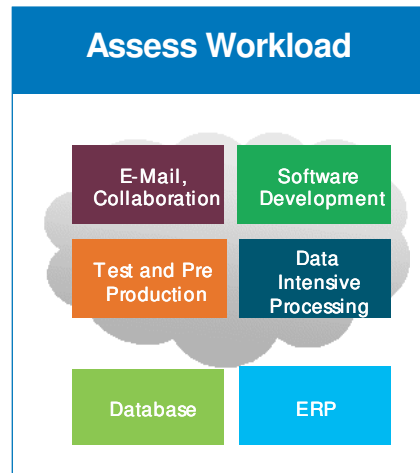
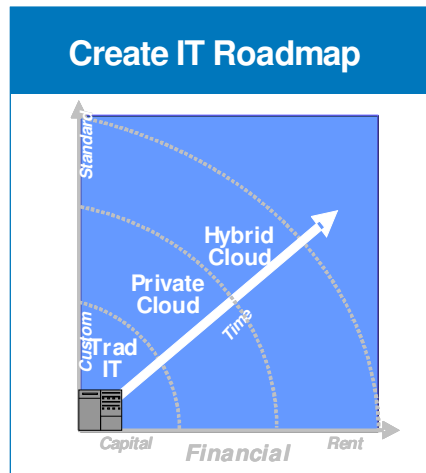


CCRA OpenGroup submission:  
<http://www.opengroup.org/cloudcomputing/uploads/40/23840/CCRA.IBMSubmission.02282011.doc>

# From Infrastructure to Cloud Management Control point with Tivoli



# Six Basic Steps to Cloud Computing



### Define Business Value

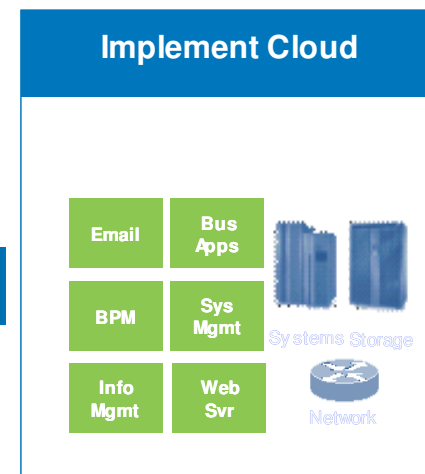
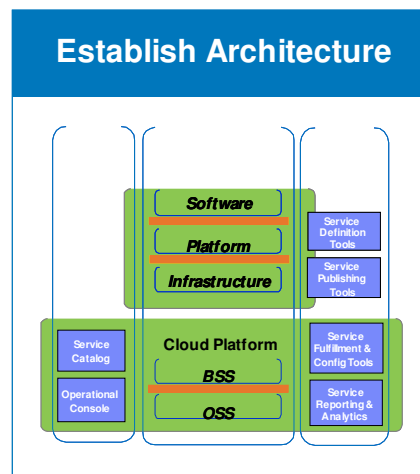
KPI/Metric	KPI - Baseline	KPI - Target	% Change
Reduced IT infrastructure costs			
Improved operational costs			
Improved business process efficiency			
Improved customer service and satisfaction			

	Annual Growth %	Baseline Yr 0	Target Yr 1	Target Yr 2	Target Yr 3
Hardware					
# of dedicated servers currently supporting project requirements					
Average annual server cost					
License					
# of admins required to support dedicated servers & software					
Average annual fully loaded employee labor rate					
Provisioning for Applications and Services					
# of service provisioning requests per year					
Average provisioning time per request (hrs)					
Service length of operation (hours, weeks, months)					

Estimated ROI	Timeline (years)	0	1	2	3
Cashflow					
NPV					
ROI					
IRR					
Payback Period (days)					



*A Cloud Pilot Project enables rapid results and learning in line with a Broader Enterprise Cloud Strategy*



# Universita di Bari

## Innovative Cloud Solutions

### **Wine Market**

*Support for 60 wineries to determine demand and get best market price*

### **Fish Market**

*Electronic fish auction for fishermen while on boats*

### **MoniCA**

*Logistics solution tracks and collects data real time*

## BENEFITS to Clients

**Cloud computing allows multiple organizations to tap into heavy-duty computing power at minimal cost.**

**It lowers the barrier for local businesses to benefit from this technology.**

**Solution Edition for Cloud Computing**



**UNIVERSITÀ  
DEGLI STUDI DI BARI  
ALDO MORO**

**Solve community challenges**

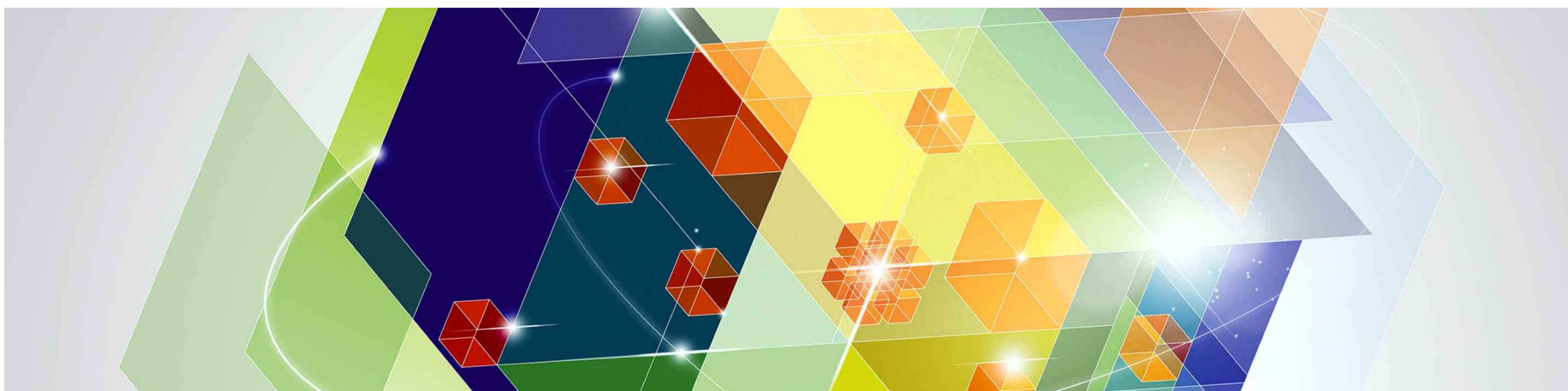
Universita di Bari, established in 1924, is developing cloud-based solutions for a consortium of companies and universities from five regions of southern Italy.



Bari cloud solution in youtube:  
<http://www.youtube.com/watch?v=snZPevfRuus>

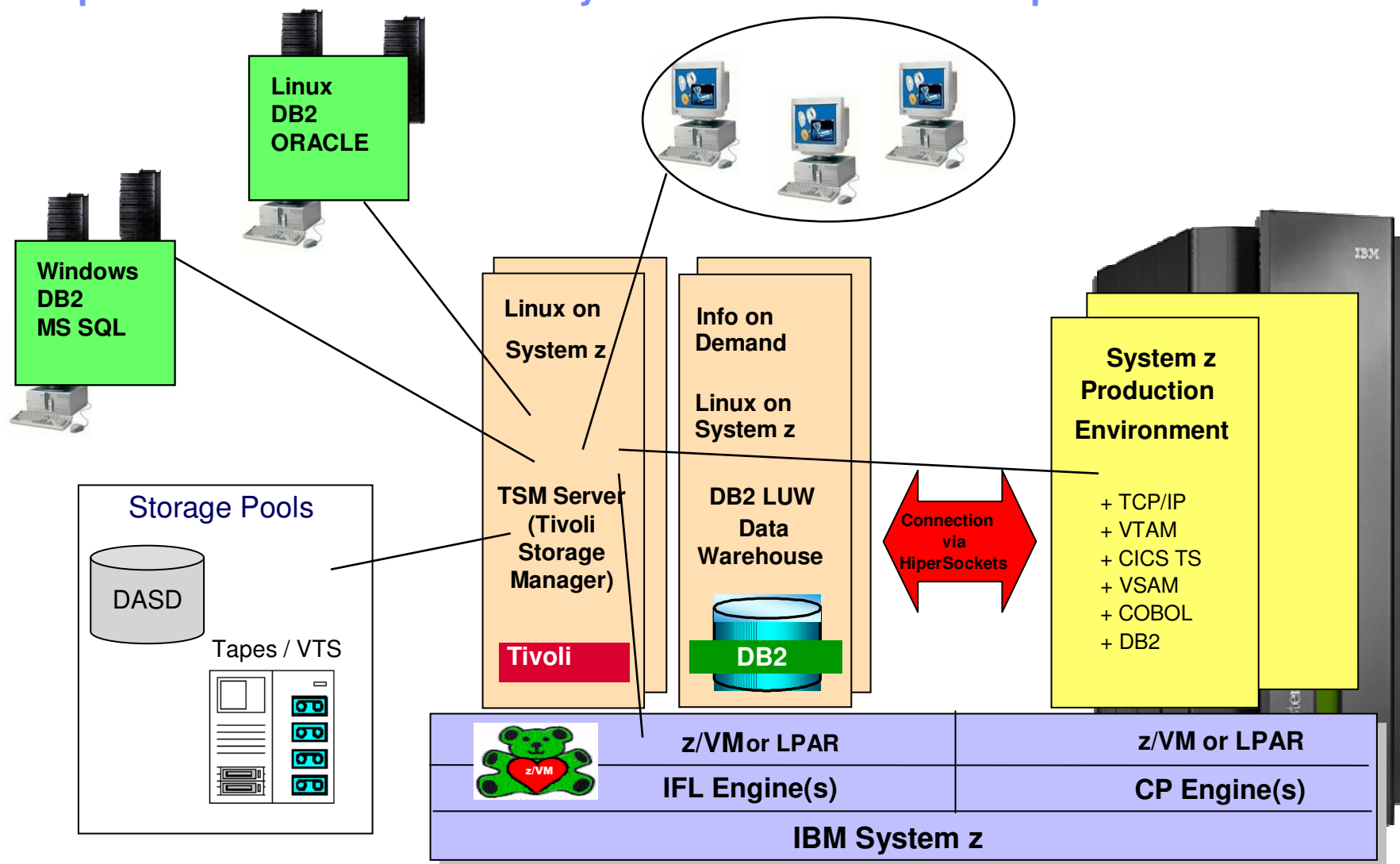


# Centralized Backup and System Storage / Tape support

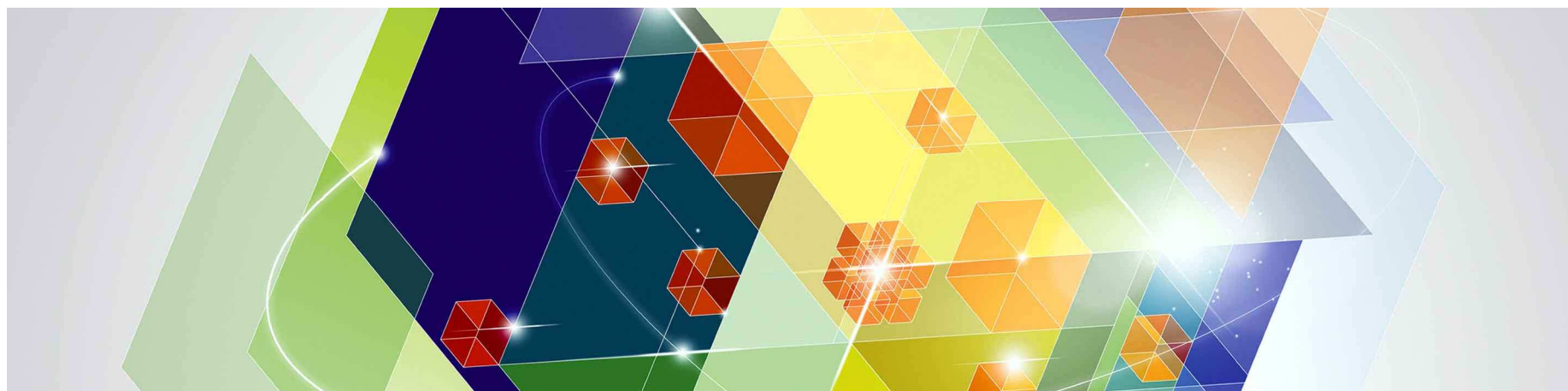


# Enterprise Backup with Linux on System z

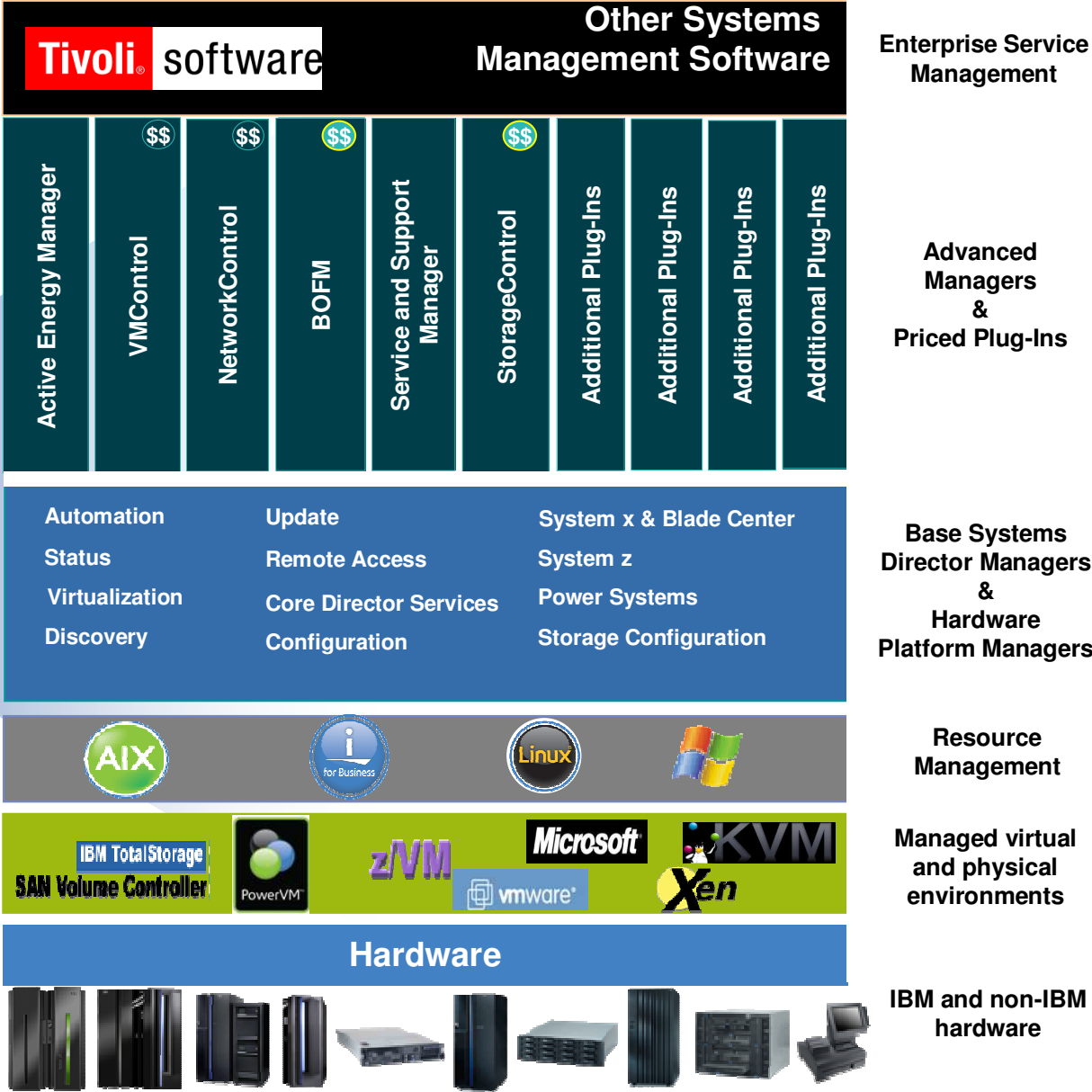
## Implement TSM on Linux on System z as central Backup Hub



# Automate cross platform workload with Linux on System z



# IBM Systems Director





## IBM Systems Director VMControl

*Software that delivers consistent management of single virtual systems or pools of cooperating systems across all IBM enterprise platforms*



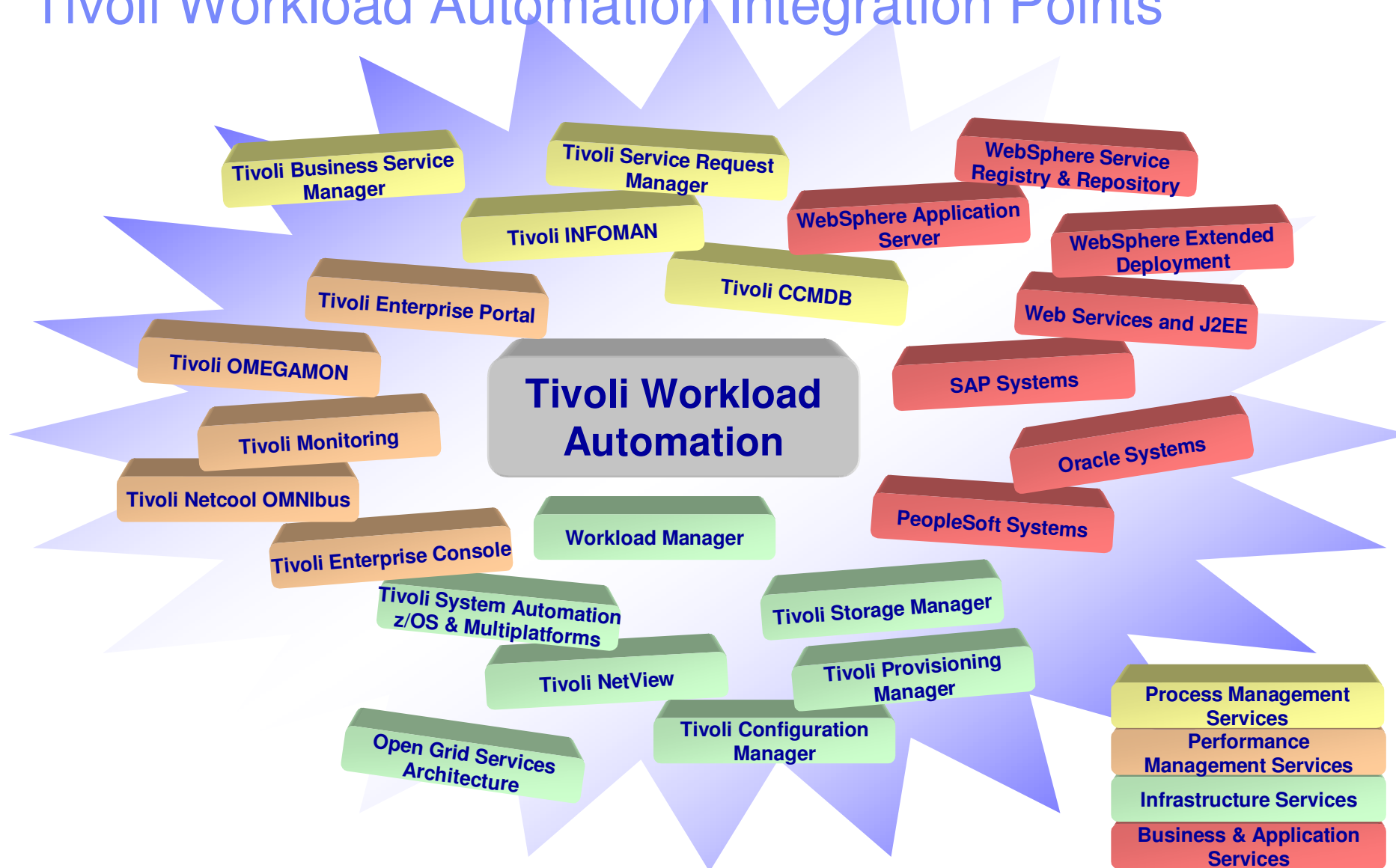
**IBM System x  
Power Systems  
System z**

### VMControl features:

- Discover virtual resources
- Display inventory and topology
- Monitor virtual resource health
- Relocate virtual resources
- Create and manage virtual servers
- Deploy and manage workloads
- Provision and manage virtual images
- Manage virtual resource pools

*VMControl encompasses virtual workload lifecycle management, image management and system pool management as an extension to IBM Systems Director.*

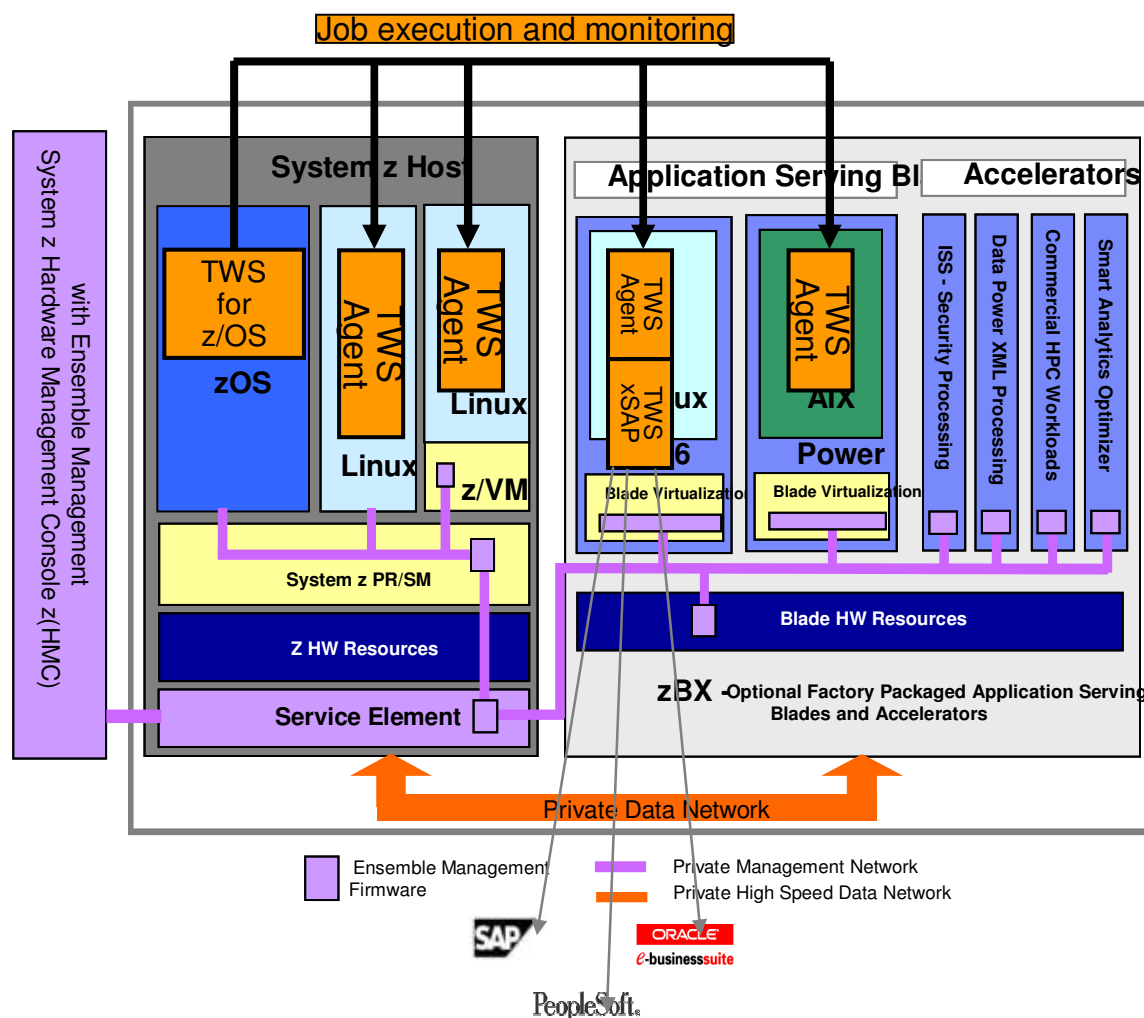
# Tivoli Workload Automation Integration Points





# Workload Automation on zEnterprise

## Fit for purpose workload deployment



- zCentric end-to-end solution ideal to manage heterogeneous workloads across System z and Blade extensions, under a single point of control and management
- Future option to exploit Unified Resource Management interfaces would provide unprecedented workload moving and optimization capabilities

## Business benefits

- ★ **Reduce costs with fit-for-purpose platform, and implement a virtualized and green data center**
- ★ **Realize data-proximity processing with high bandwidth for distributed applications**

# 250+ Companies around the World have migrated Workloads (incl. Oracle Workloads) to System z over the past 18 Months

BANKS	OTHER FINANCIAL INST.	RETAILERS	HEALTHCARE	UTILITIES / ENERGY
<b>Banco Itaú</b>	<b>DTCC</b> The Depository Trust & Clearing Corporation		<b>Aurora Health Care</b>	<b>nationalgrid</b>
<b>Bank of NZ</b>				<b>PETROL</b> [Slovenia]
<b>Bank of Montreal</b>				
<b>BCP</b> [Peru]	<b>Allianz</b>			
<b>Bank of China</b>				
<b>Central Bank of Russia</b>	GOVERNMENTS	TRANSPORTATION	HOSTING PROVIDERS	OTHERS
<b>FNB</b> First National Bank Namibia	<b>CAIXA</b> [Brazil]		<b>BRZ</b> BRZ Deutschland Business Information Technology	<b>HOPLON</b> infotainment [Gaming] [Brazil]
<b>IBK</b> <b>Industrial Bank of Korea</b>		<b>БЕЛОРУССКАЯ ЖЕЛЕЗНАЯ ДОРОГА</b> [Belarusian Railways]		
<b>PSBank</b> <b>Philippines Savings Bank</b>	<b>NBC</b> The National Business Center Government Shared Service Provider [USA]		<b>EFIS</b> FINANCIAL SOLUTIONS	[Russian Hydrometeorological Research Institute]
<b>Postbank</b> [Germany]				<b>BALDOR</b> [Manufacturer/USA]
<b>VietnBank</b> [Vietnam]				

Users of Linux on System z

## More than 850 New and Upgraded Applications added for z/OS and Linux Added 45 New ISV Partners in 1H2012



- z/OS
  - Over 650 New or Upgraded applications for z/OS
  - More than 4,400 total z/OS applications
- Linux
  - Over 240 New or Upgraded applications for Linux
  - More than 3,000 total Linux applications



---

## More information on zEnterprise

- IBM zEnterprise landing page: <http://www.ibm.com/systems/z/hardware/zenterprise/index.html>
- IBM zEnterprise 114 (z114): <http://www.ibm.com/systems/z/hardware/zenterprise/z114.html>
- IBM zEnterprise Events Landing Page: <http://www.ibm.com/systems/breakthrough>
- IBM software for zEnterprise: <http://www.ibm.com/software/os/systemz/announcements>
- IBM System Storage: <http://www.ibm.com/systems/storage/product/z.html>
- IBM Global Financing: <http://www.ibm.com/financing/us/lifecycle/acquire/zenterprise/>
- IBM Services for zEnterprise: <http://www.ibm.com/services/us/gts/zenterprise/index.html>
- IBM zEnterprise / System z Redbooks Portal: <http://www.redbooks.ibm.com/portals/systemz>

# Questions?



**Wilhelm Mild**  
IBM IT Architect



IBM Deutschland Research  
& Development GmbH  
Schönaicher Strasse 220  
71032 Böblingen, Germany

Office: +49 (0)7031-16-3796  
mildw@de.ibm.com



## IBM Systems Lab Services and Training

Helping you gain the IBM Systems skills  
needed for smarter computing

- Comprehensive education, training and service offerings
  - Expert instructors and consultants, world-class content and skills
  - Multiple delivery options for training and services
  - Conferences explore emerging trends and product strategies
- Special Programs:**
- IBM Systems 'Guaranteed to Run' Classes -- ***Make your education plans for classes with confidence!***
  - Instructor-led online (ILO) training ***The classroom comes to you.***
  - Customized, private training
  - Lab-based services assisting in high tech solutions

[www.ibm.com/training](http://www.ibm.com/training)

