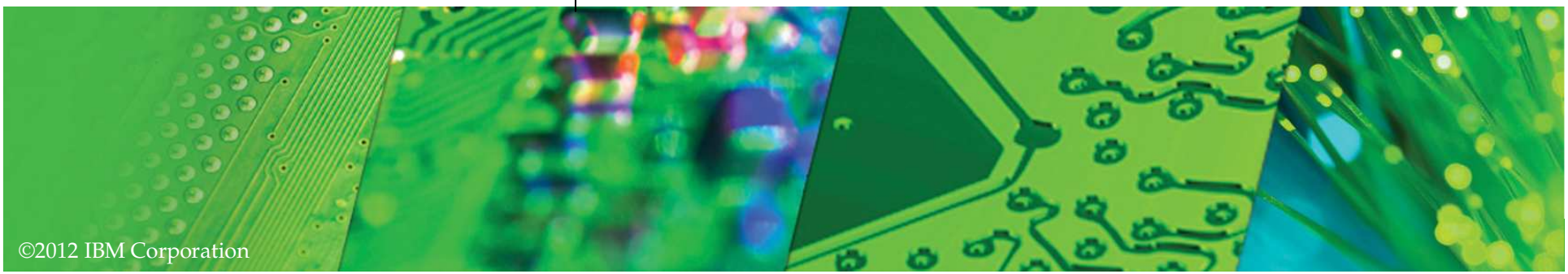
2012
IBM System z Technical University

Enabling the infrastructure for smarter computing

zEnterpise integration of Linux and traditional workload

zLG06

Wilhelm Mild



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Notes:

Performance is in Internal Throughput Rate (ITR) ratio based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput that any user will experience will vary depending upon considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve throughput improvements equivalent to the performance ratios stated here.

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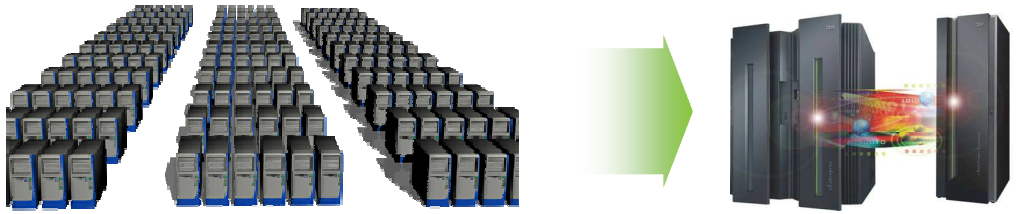
The Data Center Challenge - Controlling IT complexity and cost while maintaining daily operations

- **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/ 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.

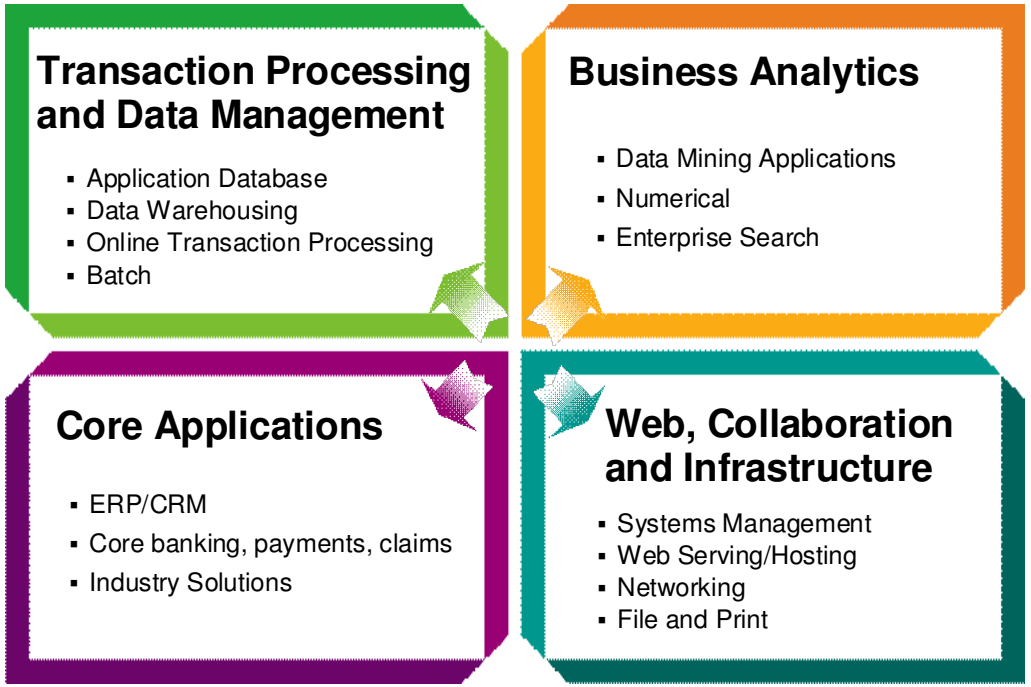
IBM zEnterprise System

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

Explosive systems and data growth inhibit responsiveness to client needs, and market opportunities

zEnterprise

1. Enables mixed workload business processes to be deployed and centrally managed
2. Allows optimized single system integration of data, applications, and web serving
3. Delivers dynamically responsive IT
4. Meets the need of heterogeneous data centers



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

IBM zEnterprise System

zEC12

The broadest systems architecture

Enabling integration and centralized management of multi-platform systems, applications, and data

zEnterprise

- Industry's most robust design for systems and data continuously availability
- Optimized to host large-scale database, transaction, and mission critical applications
- The most efficient platform for large-scale Linux® consolidation
- Massive scale up

Unified Resource Manager

- Unifies management of resources, extending IBM System z® qualities of service end-to-end across workloads
- Provides platform, hardware and workload management

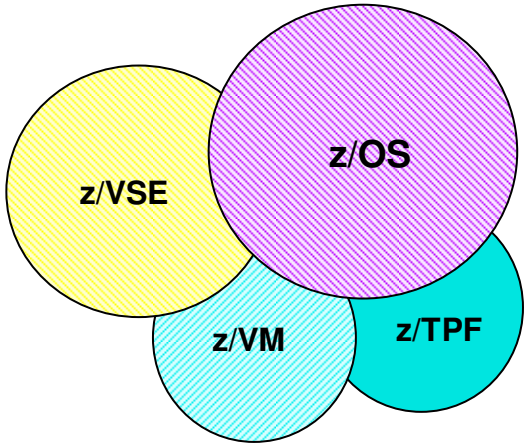
BladeCenter Extension (zBX)

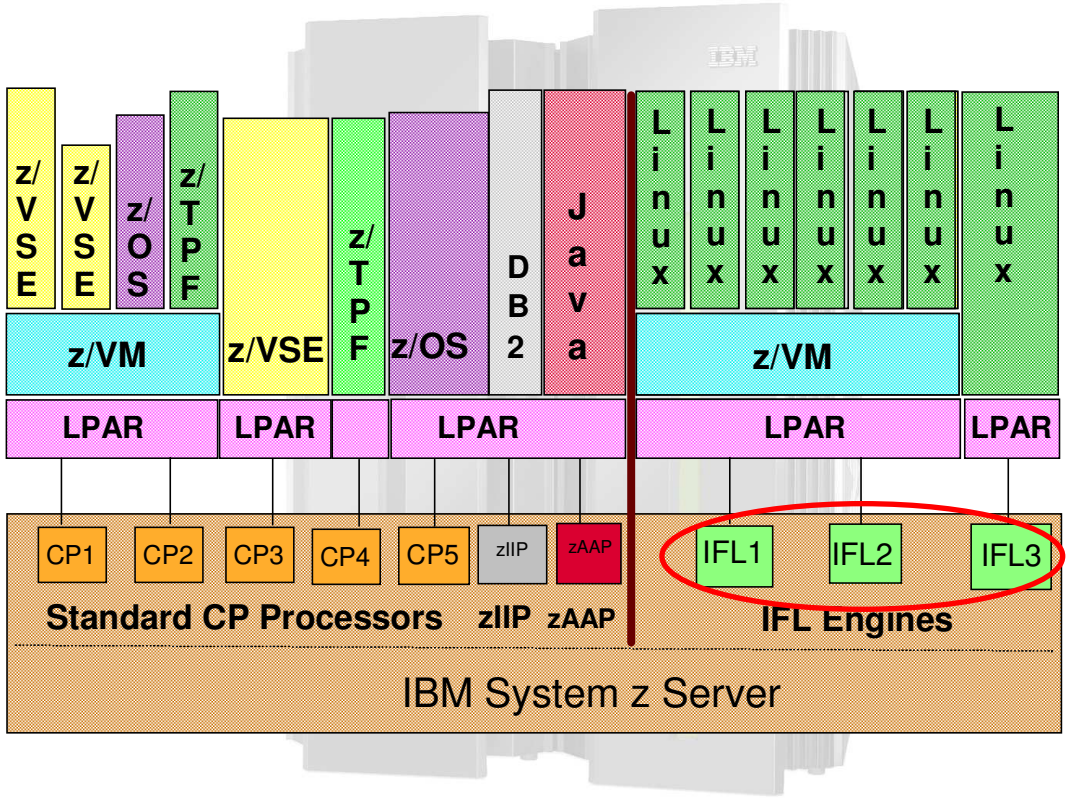
- AIX®, Linux®, and Microsoft® Windows®* applications
- Appliance Blades - Smart analytics, DataPower®
- Dedicated high-performance private network
- Massive scale out

*(Statement of Direction) on S

Major Operating Systems on IBM System z

Traditional Mainframe Operating Systems





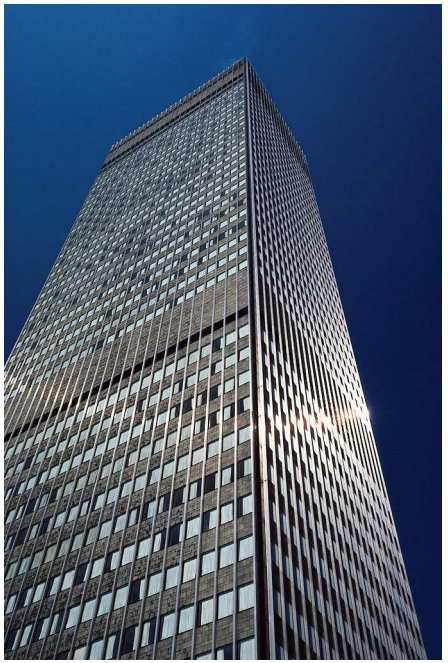
Standard Processors

- CP
  - For z/OS, z/VSE, TPF, 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

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

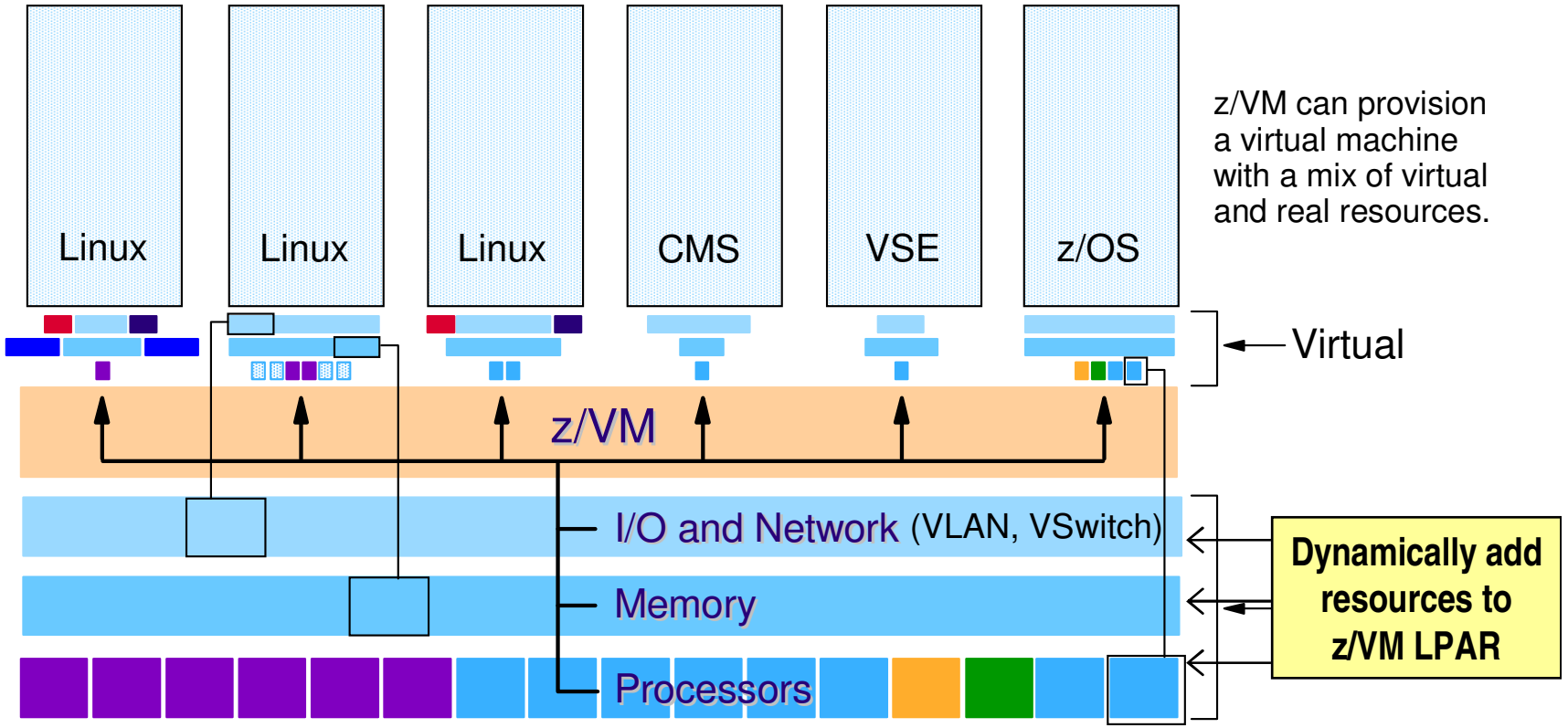


- **z/VM Virtualization**
  - **Vertical virtualization** - Grow workloads without linearly growing number of virtual guest machines
    - one guest can be increased by allocating more resources (CPUs, memory)
  - **Horizontal virtualization** – for isolation between servers
    - isolation of guests 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

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.

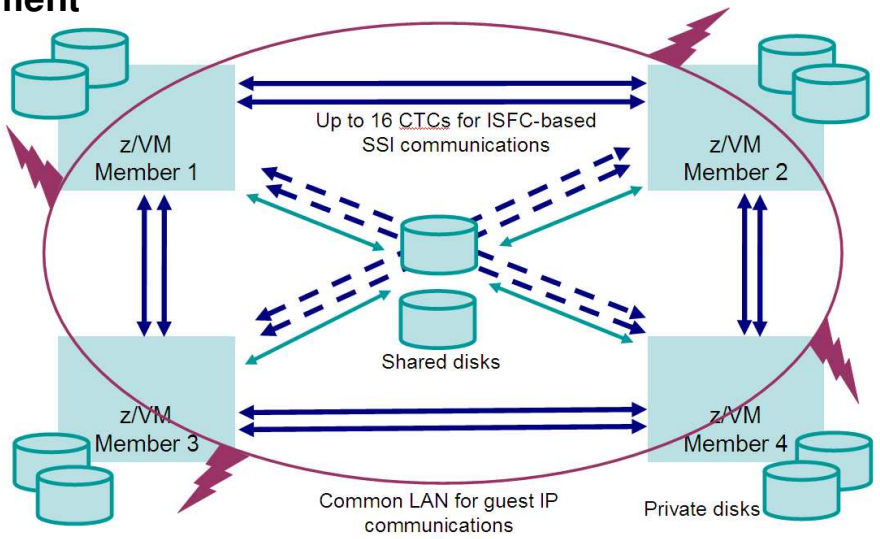


Linux on z/VM is the industry's most advanced virtual solution

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

Single System Image, Clustered Hypervisor, Live Guest Relocation

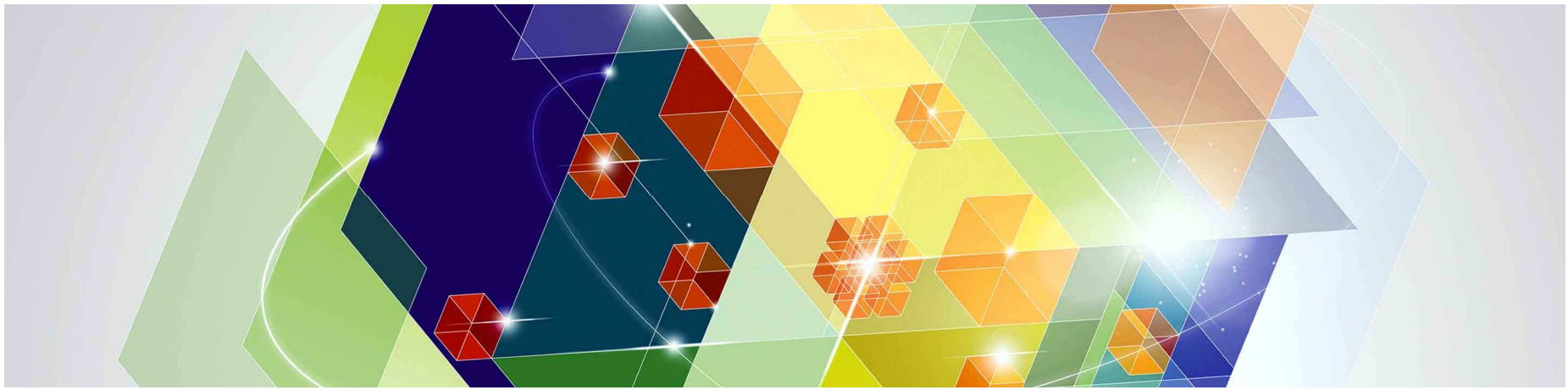
- **Single System Image (SSI) - connect up to four z/VM systems as members of a cluster**
- **Provides a set of shared resources for member systems and their hosted virtual machines**
  - Directory, minidisks, spool files, virtual switch MAC addresses
- **Cluster members can be run on the same or different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

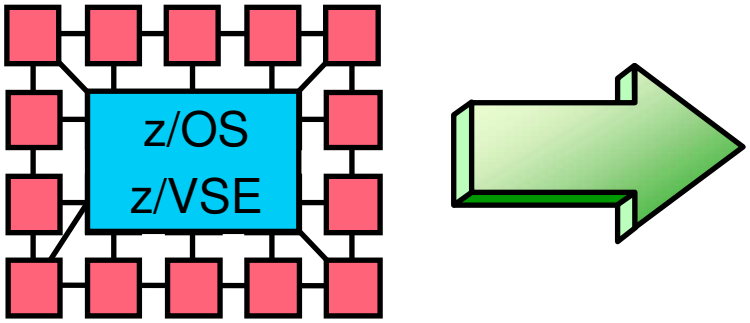
  Reduce planned outages; enhance workload management
  - Non-disruptively move work to available system resources **and** non-disruptively move system resources to work
  - When combined with Capacity Upgrade on Demand, Capacity Backup on Demand, and Dynamic Memory Upgrade, you will get the best of both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

Mixed workload consolidation with zEnterprise

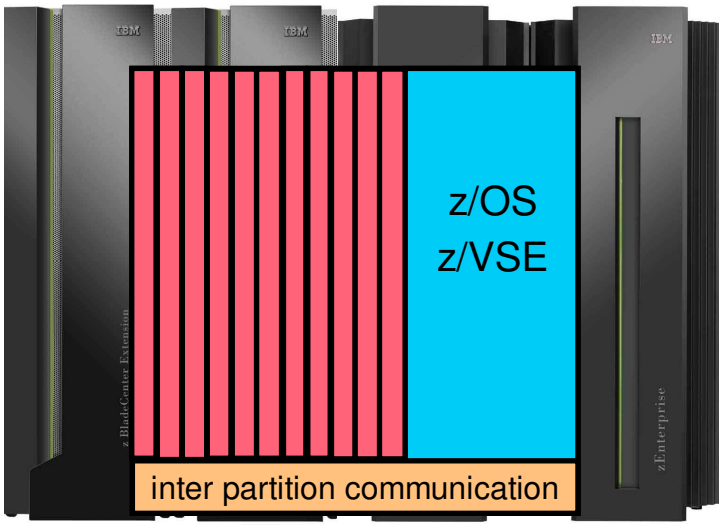


Mixed Workload integration and consolidation on zEnterprise

Consolidation



zBX + Linux on z + zEnterprise



For System z customers, zEnterprise opens new horizons:

- Integration of multiple platforms of the Enterprise
- The integration of existing applications and data using Connector components
- Reduction of network components (Router,switch)
- Maintain isolation in an fully integrated environment
- Centralized Management of the entire Ensemble

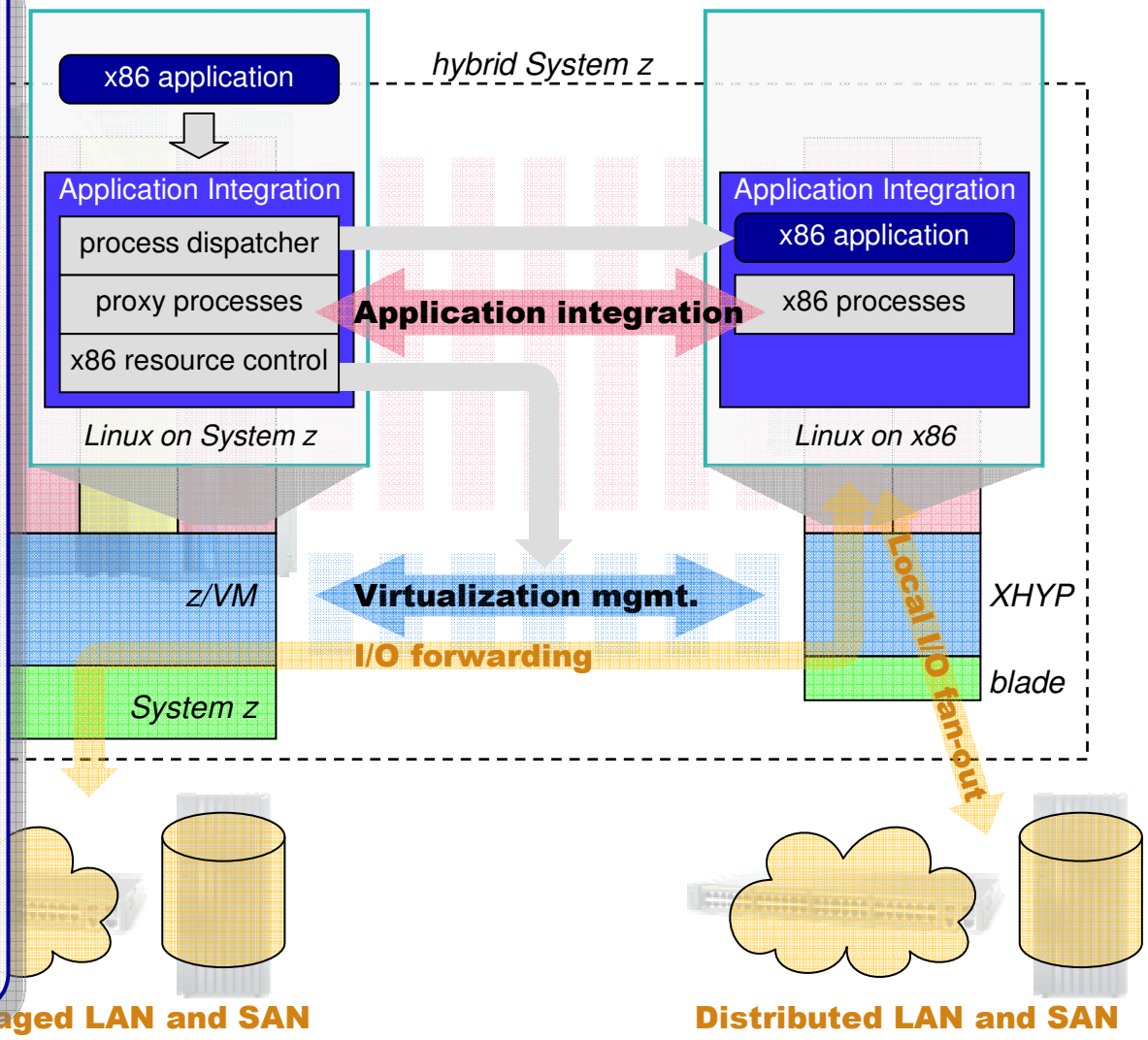
Linux Application Integration

Capabilities:

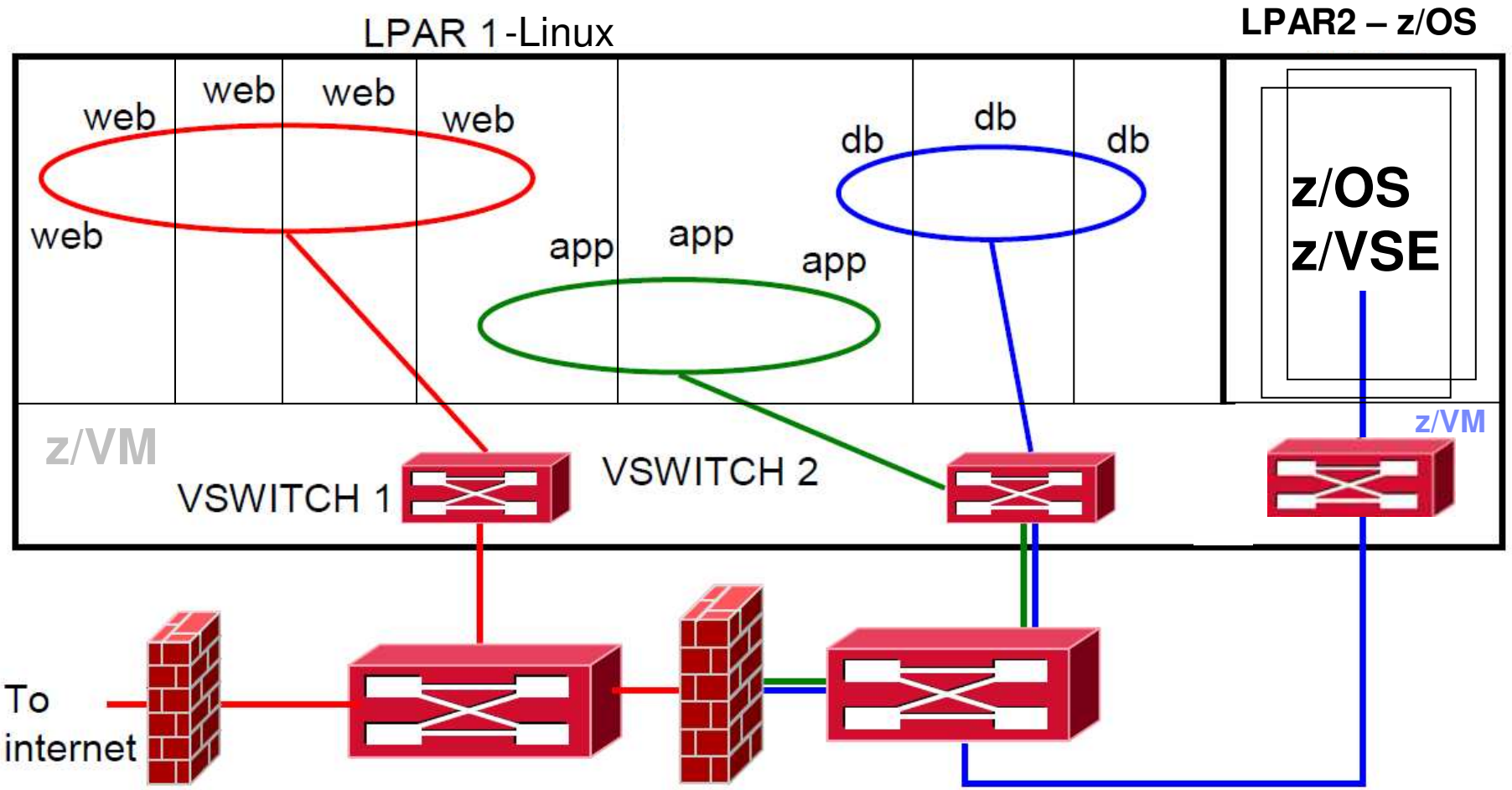
- Reduce complexity: present single system image
- run x86 Linux applications from Linux on System z
- x86 blades feel like additional processor and memory capacity

Values:

- reduced number of application management endpoints
- retains certified x86 distribution environments
- leverage Linux on System z security model for x86 systems
- can integrate with eWLM, TSA, Energy Management
- converged data management to better comply to regulatory requirements
- offline and online package management for both sides
- complete consolidation scenarios



Multi-zone Network VSWITCH (red zone physical isolation)

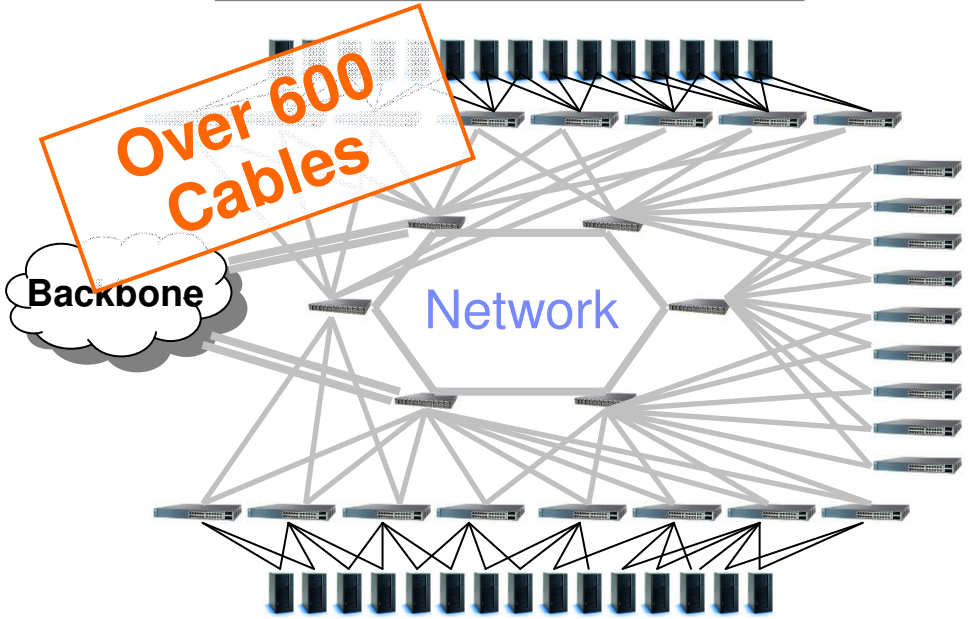


With 2 VSWITCHes, 3 VLANs, and a multi-domain firewall

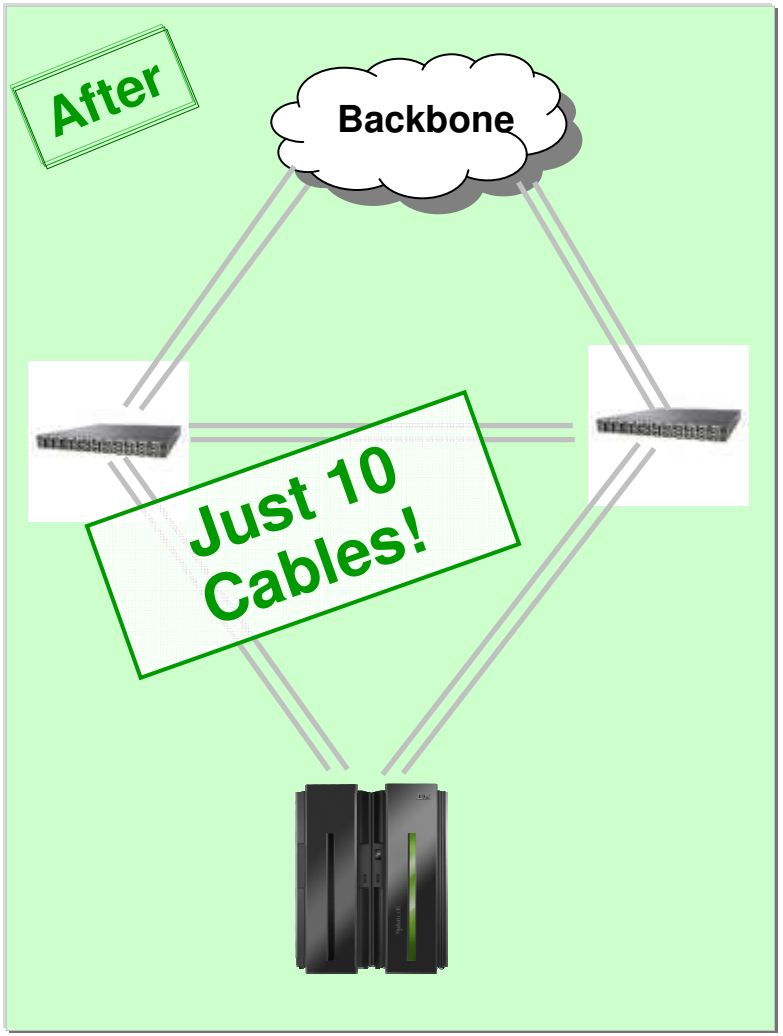
Insurance Company Consolidated 292 Servers to a z10

Before

3560E-24TD	8
3560E-24TD	17
3560E-12D	6
50 Ft UTP Cable	584
10GB Eth Fiber Cable	60

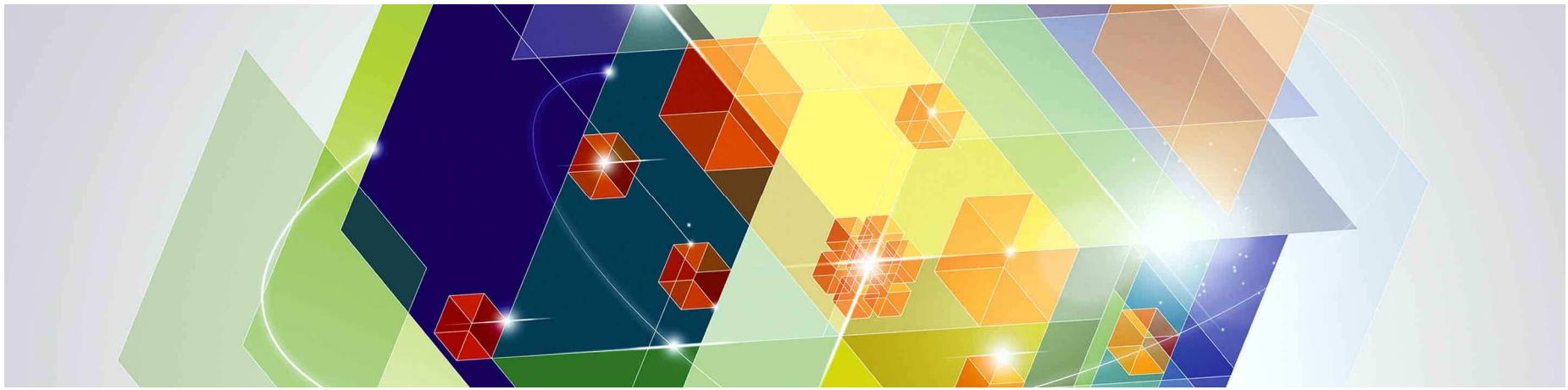


The diagram only shows **30** of **292** servers



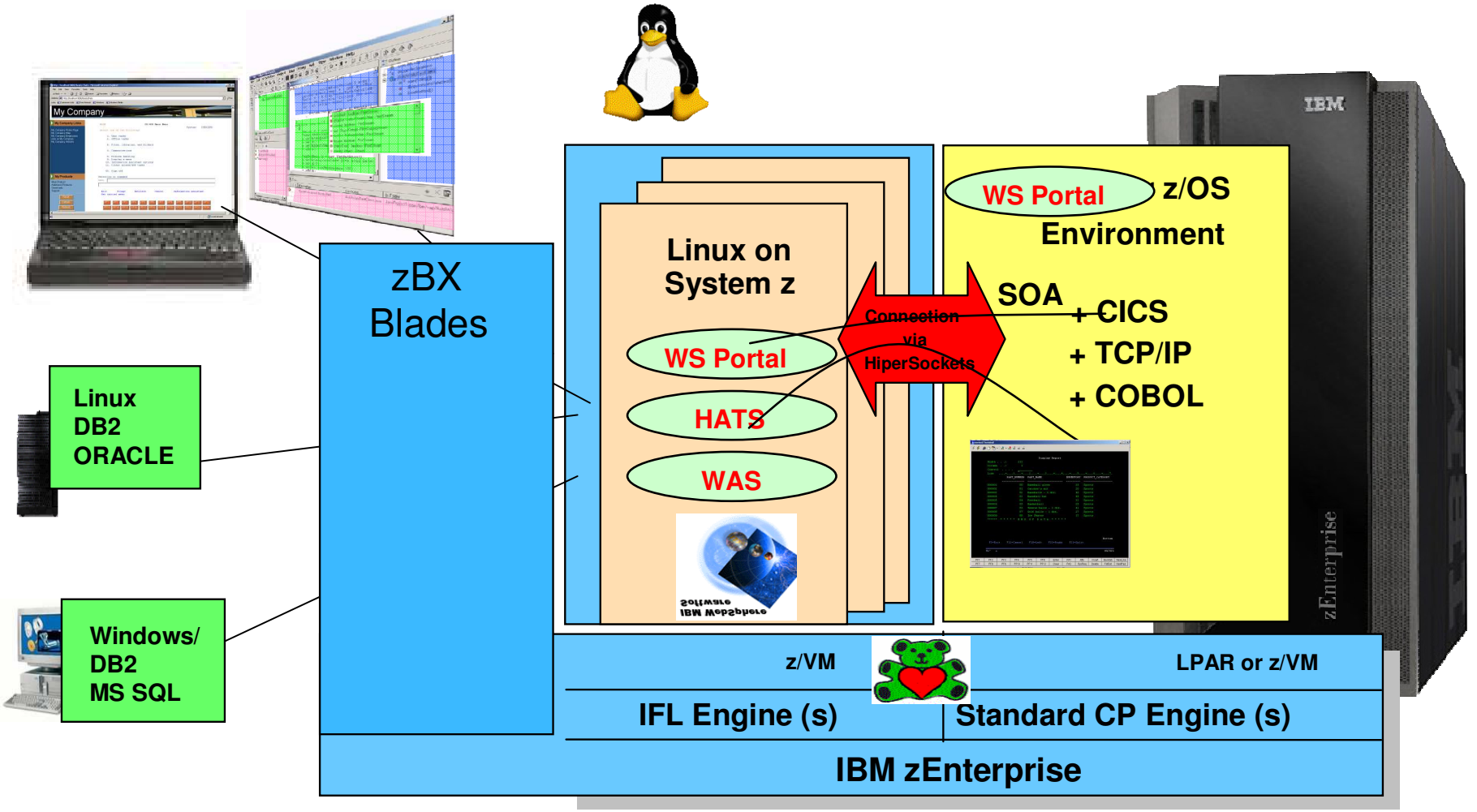
Data is based on real client opportunity and on internal standardized costing tools and methodologies.
Client results will vary by types of workloads, technology level of consolidated servers, utilization factor, and other implementation requirements. Savings will vary by client.

Web integration with Linux and traditional

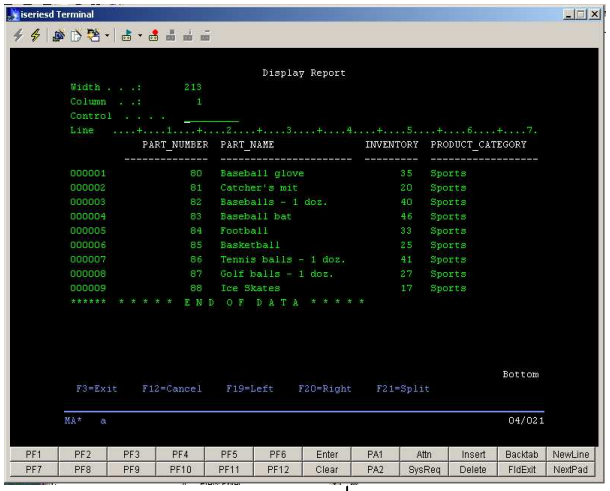


Linux on System z as Central Access Point

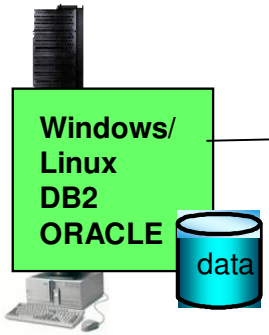
Web enable, improve interface, simplify, extend existing applications

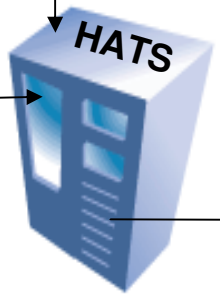


Application Integration with Host Access Transformation Services (HATS)



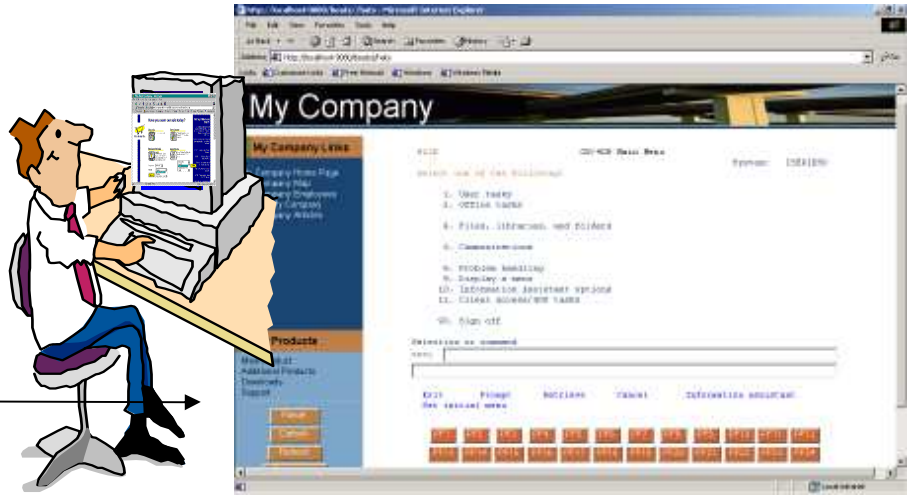
3270 or 5250
data stream





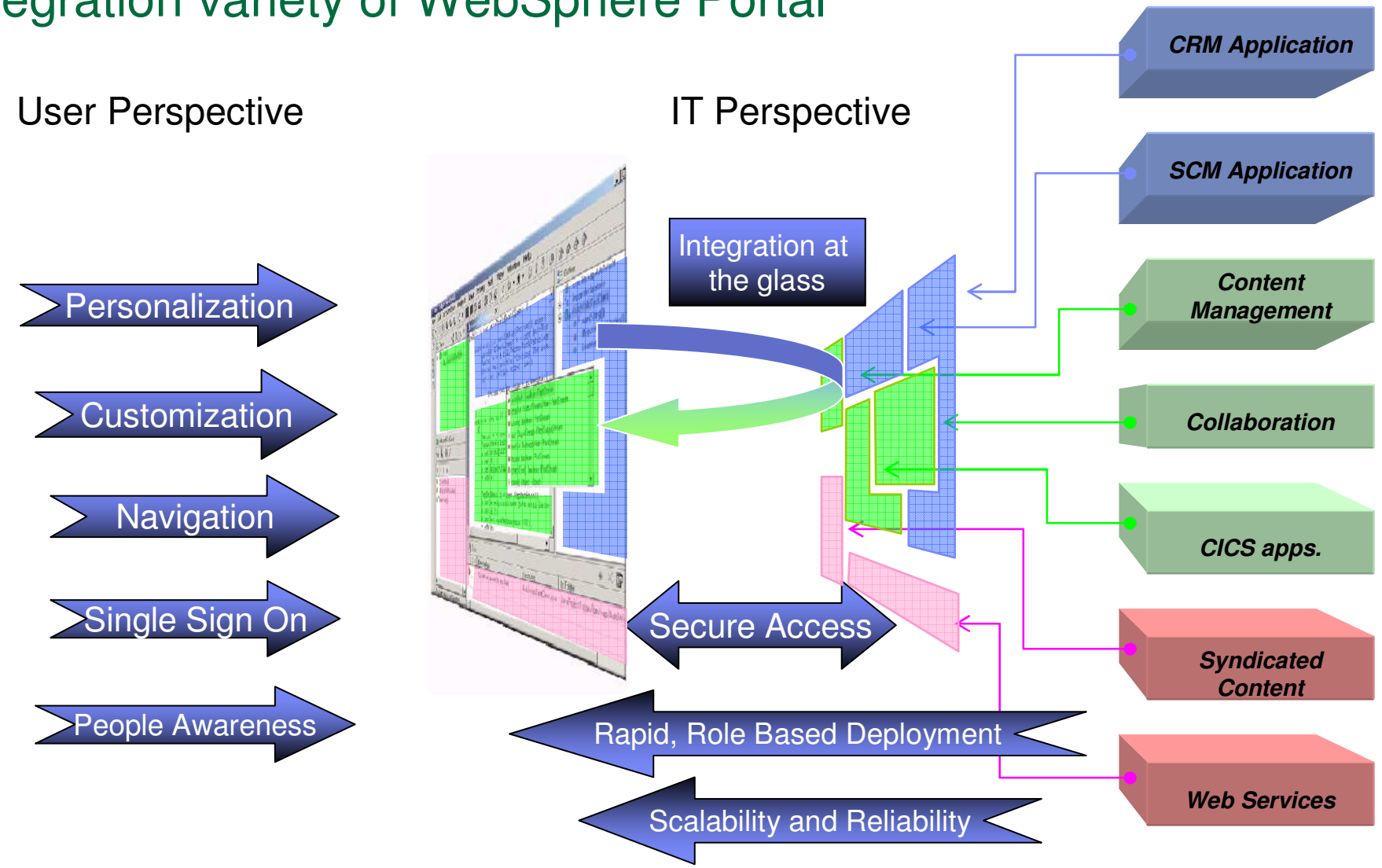
Screen transformation rules running on
WebSphere Application Server

- 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

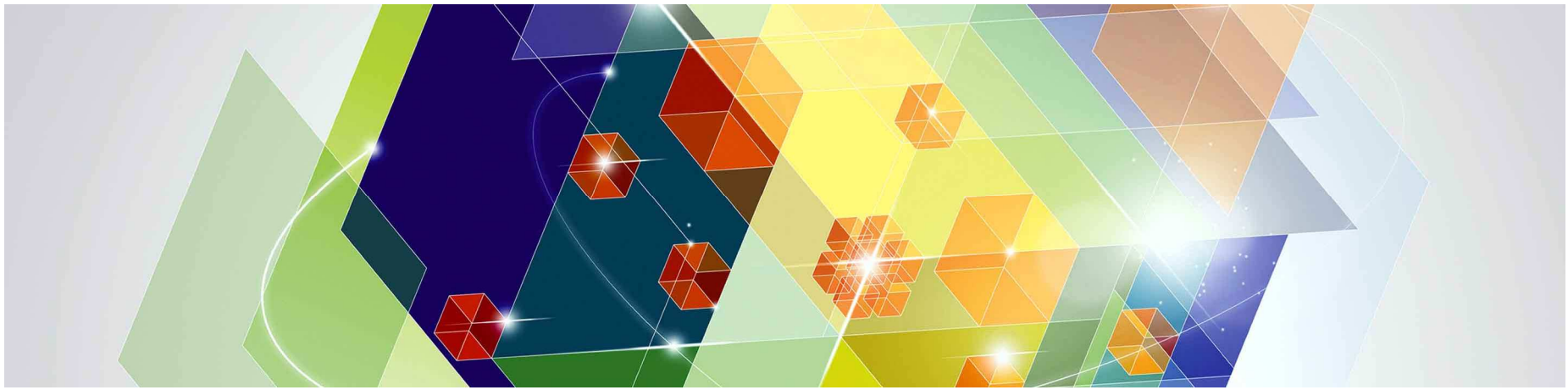


HTML in a Browser

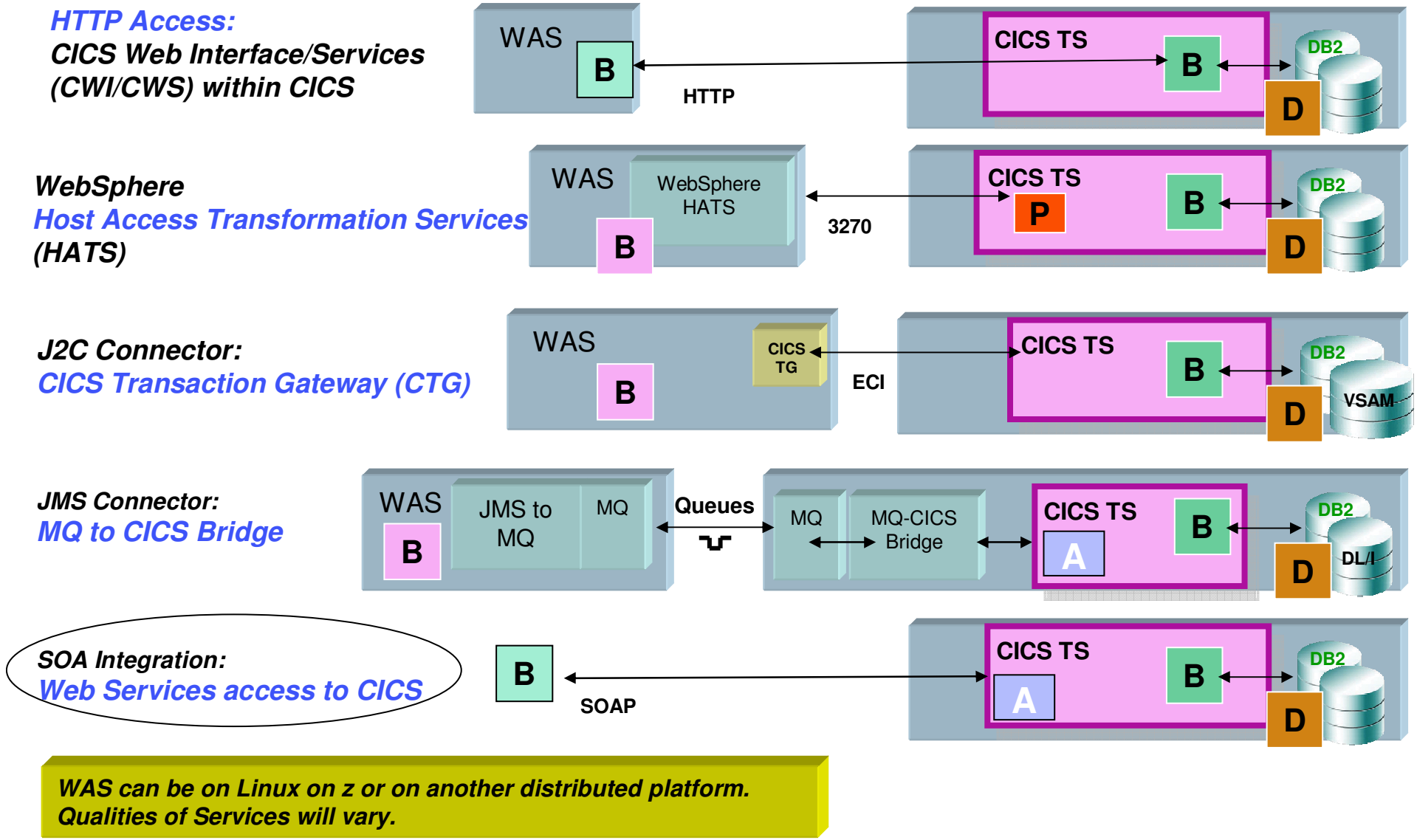
Integration variety of WebSphere Portal



CICS workload integration with Linux on System z

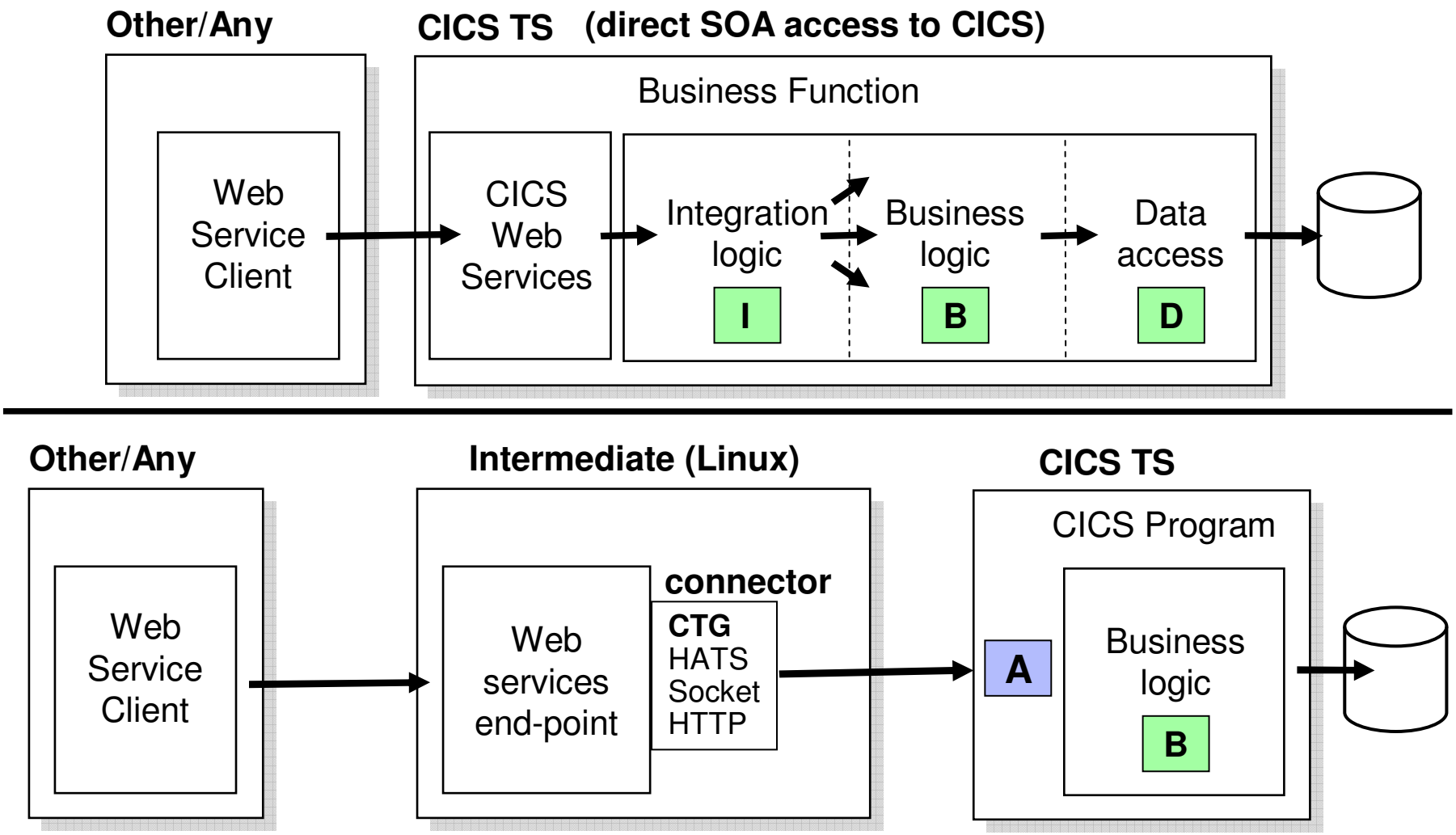


Connectivity to CICS transactions



WAS can be on Linux on z or on another distributed platform. Qualities of Services will vary.

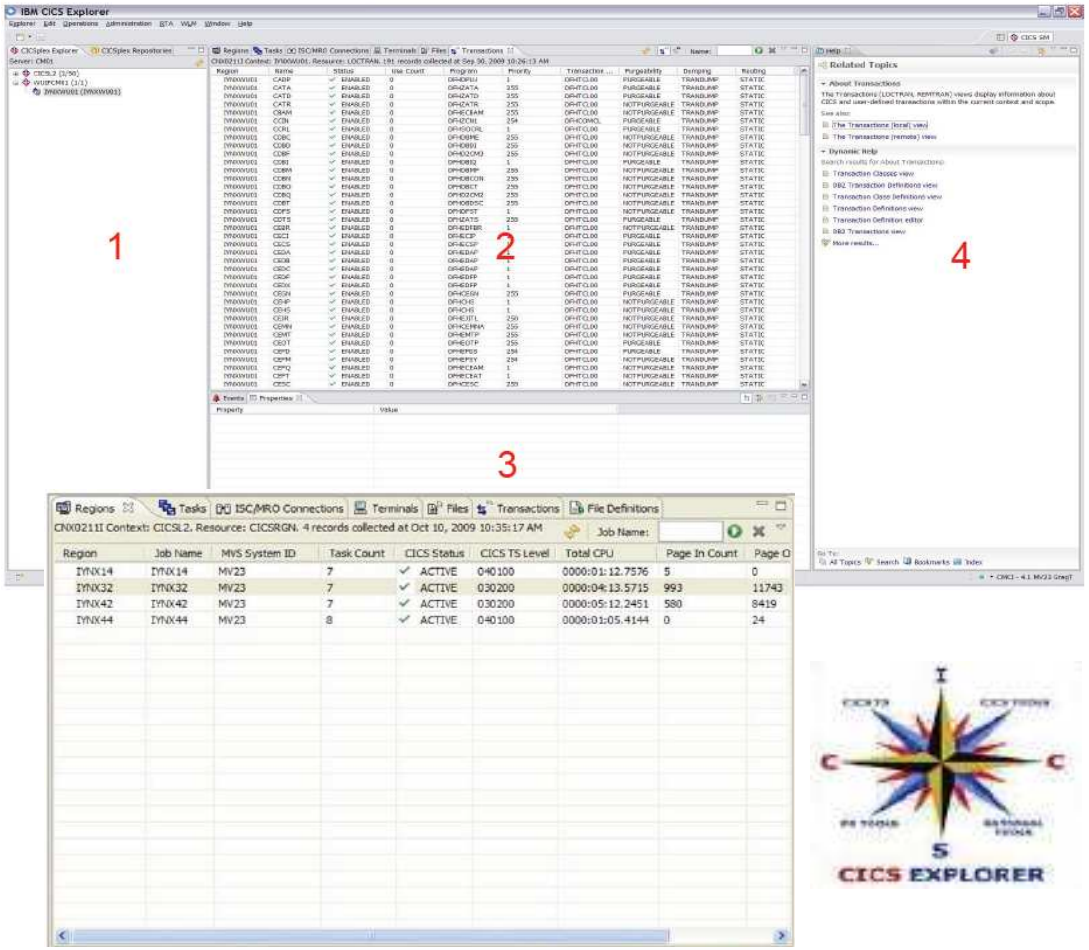
The Two Models of SOA CICS Integration via Web Services



IBM CICS Explorer – The “new face of CICS Transaction Server“

CICS Explorer

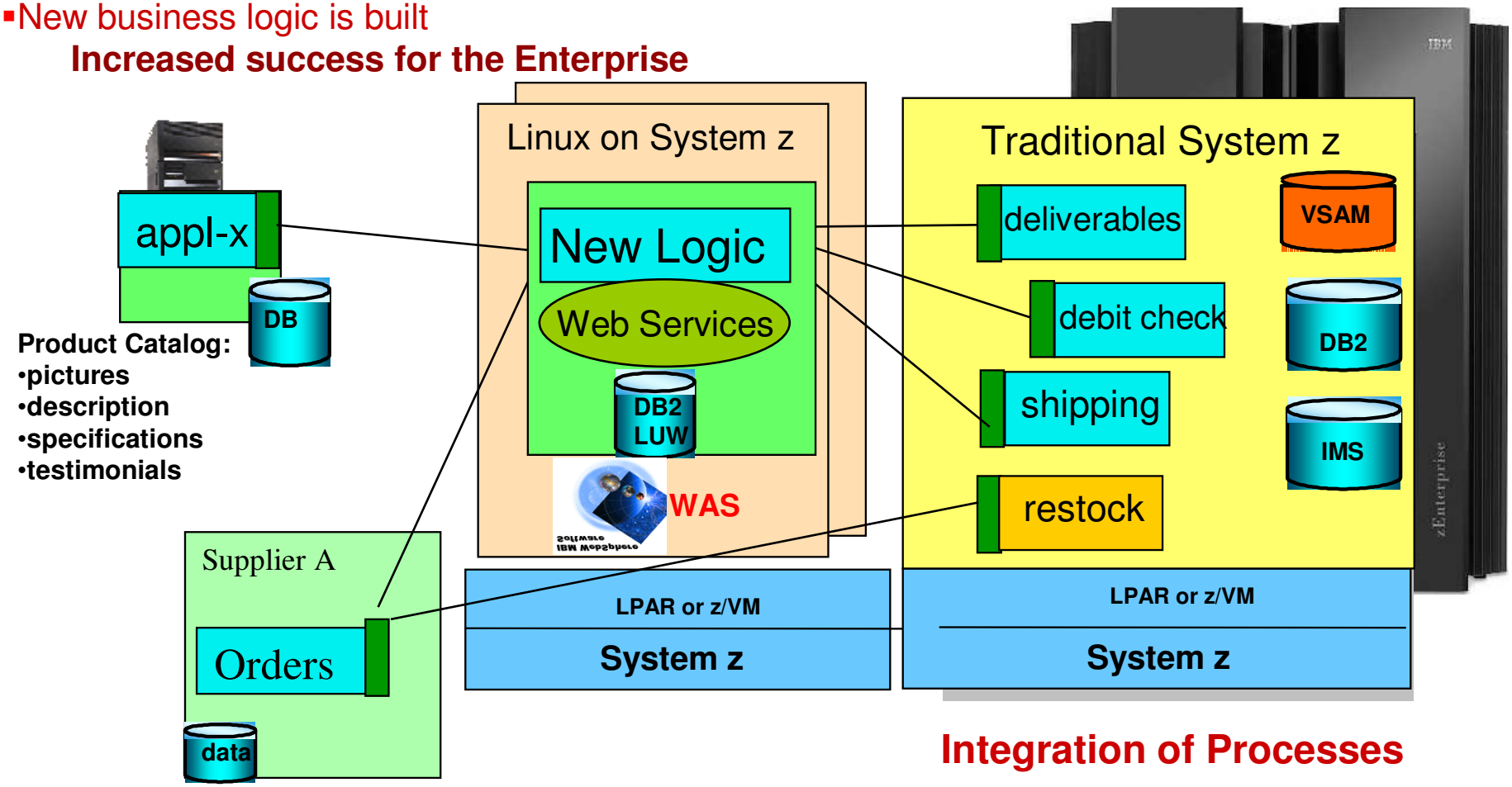
- **New systems management framework for CICS TS**
- **Consists of client and server part**
- **Based on the Eclipse Rich Client Platform (RCP)**
- **Provides integration platform**
- **Scalable and intuitive way to monitor CICS systems**
- **Can be extended via plug-ins**
- **Client part of CICS Explorer common for z/OS and z/VSE**
- **Server part requires CICS TS and z/VSE 5.1**



Service Oriented Architecture (SOA) – the way to new processes

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

Increased success for the Enterprise



Integration of Processes

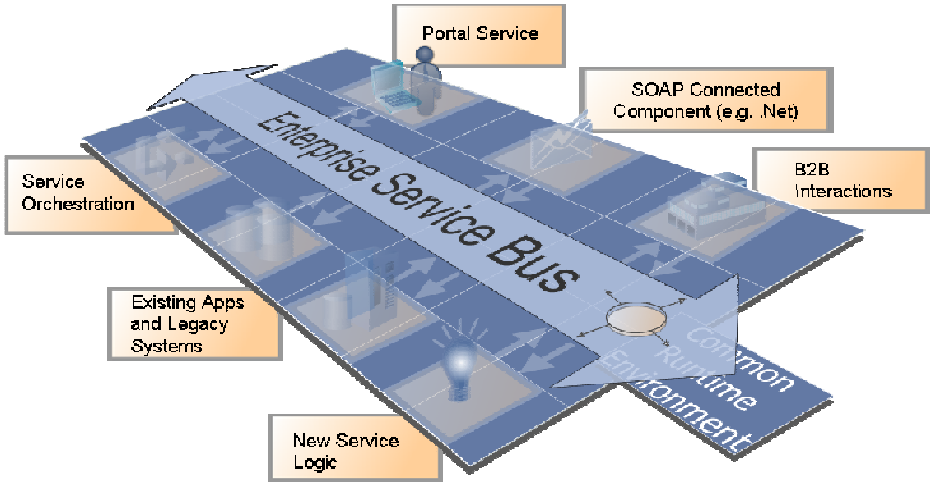
What is an Enterprise Service Bus?

An Enterprise Service Bus (ESB) is a flexible Infrastructure for services and application integration

An ESB reduces the number, size and complexity of your interfaces in a SOA solution.

An ESB realizes following tasks between requestor und service

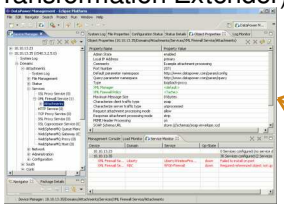
- **ROUTING of messages between Services**
- **CONVERTING the transport protocol between requestor and service**
- **TRANSFORMING message formats between requestor and service**
- **HANDLING of business events between different types of services**



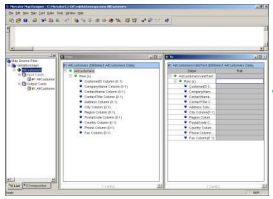
Integrated SOA Tooling Across ESB Runtimes

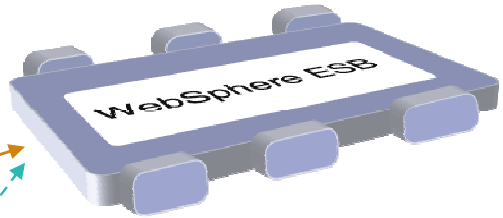
All 3 ESBs integrate with Eclipse, WTX, ITCAM for SOA and WSRR

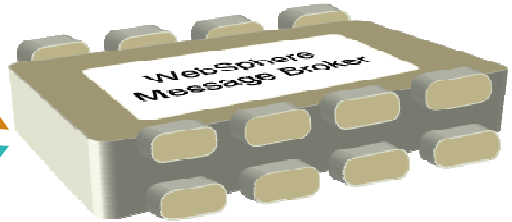
Legacy Mapping Tool:
WebSphere TX
(Transformation Extender)



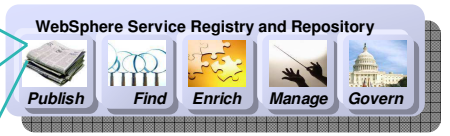
Development Tools:
Eclipse/RAD/RDz



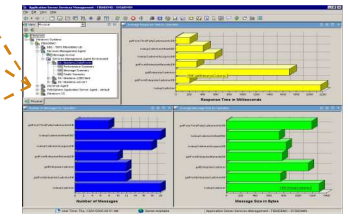




SOA Registry:
WSRR



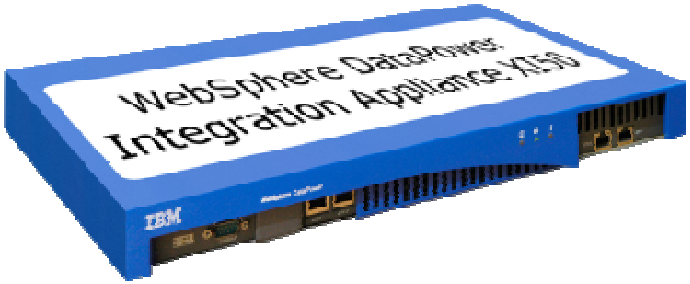
SOA Management:
ITCAM for SOA

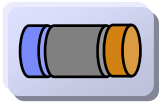


Integration Appliance XI50

Purpose-built hardware for Enterprise Service Bus functionality

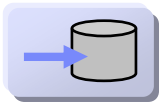
- SOA Integration / ESB Message Enrichment / Web Service virtualization for legacy applications
- Enforce high levels of security independent of protocol or payload format
- Integrate with enterprise monitoring systems
- Service level management options to shape traffic





- 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

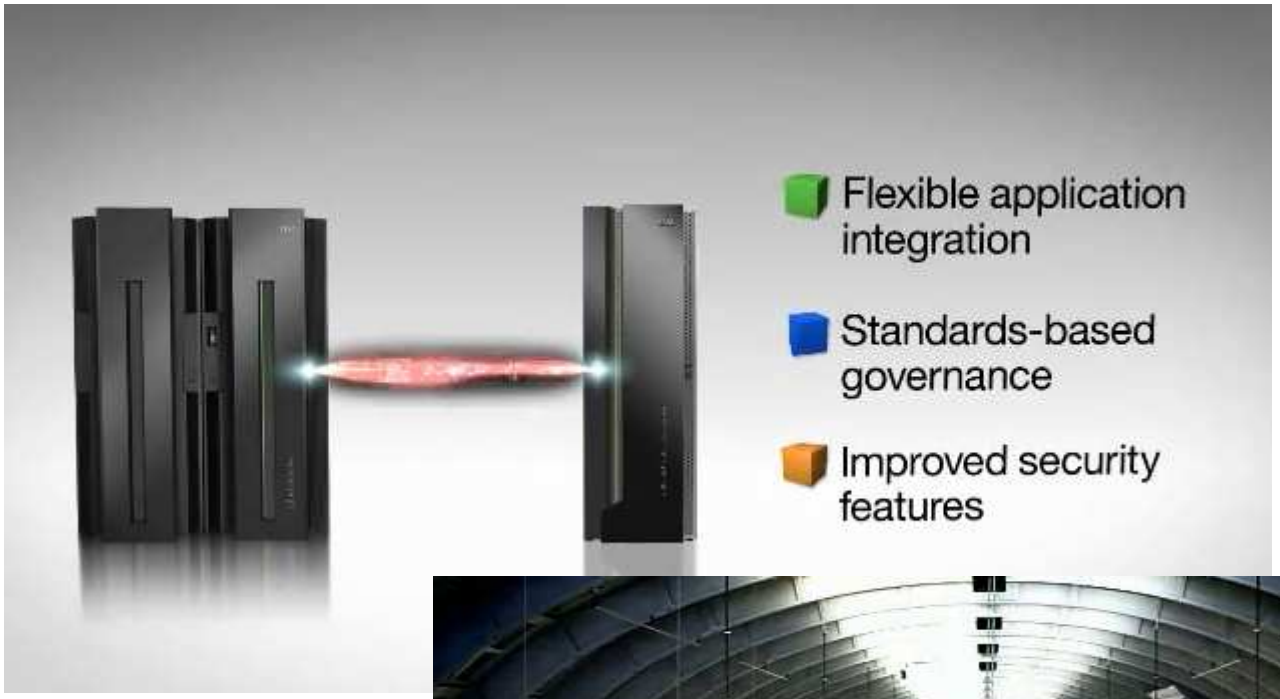


- Direct database access enables message-enrichment and data-as-a-service messaging patterns (DB2, Oracle, MS-SQL, Sybase)

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

Cross platform Application Integration

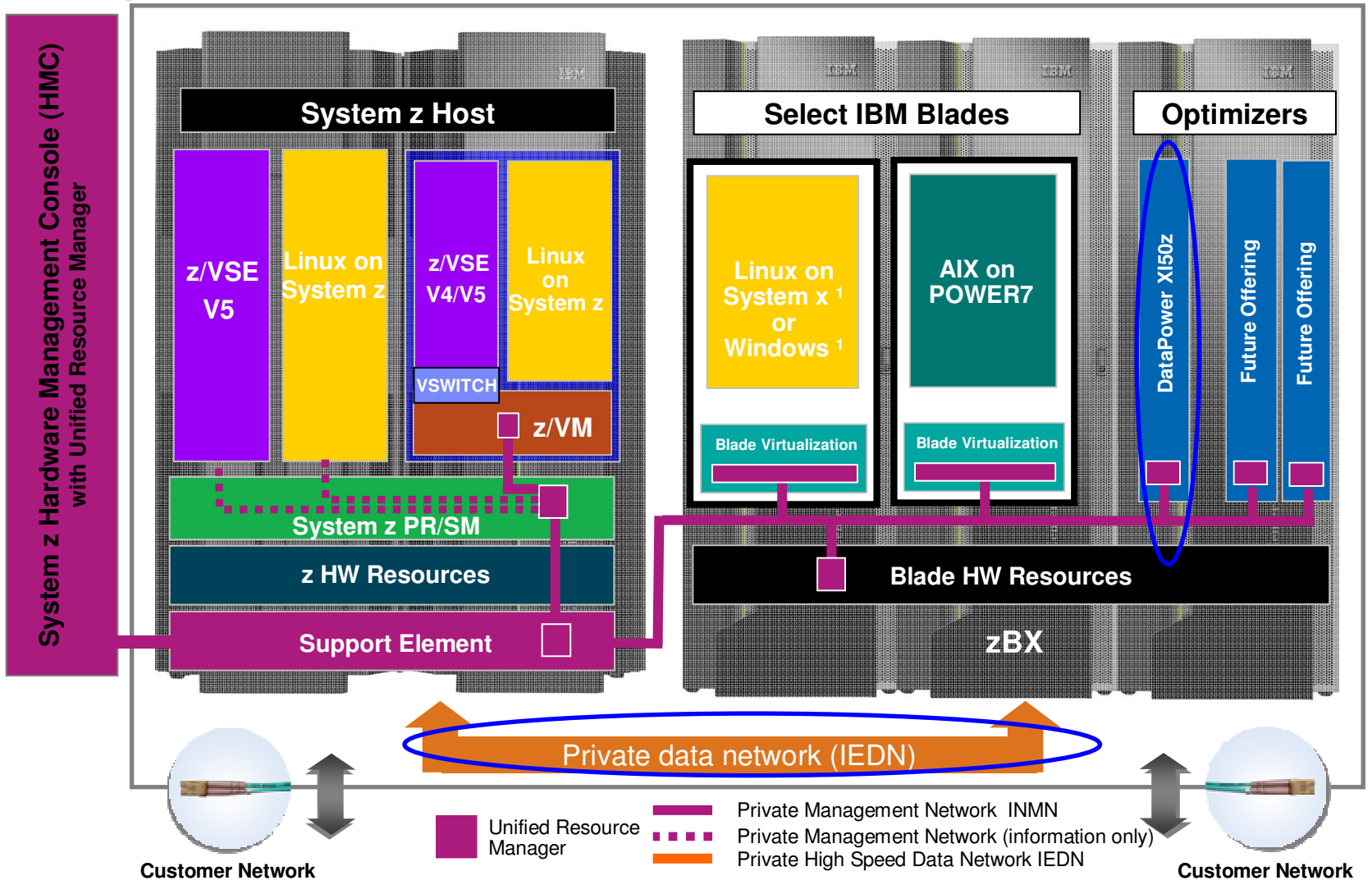
SOA with ESB – Enterprise Service Bus on zEnterprise



Quickly connects:

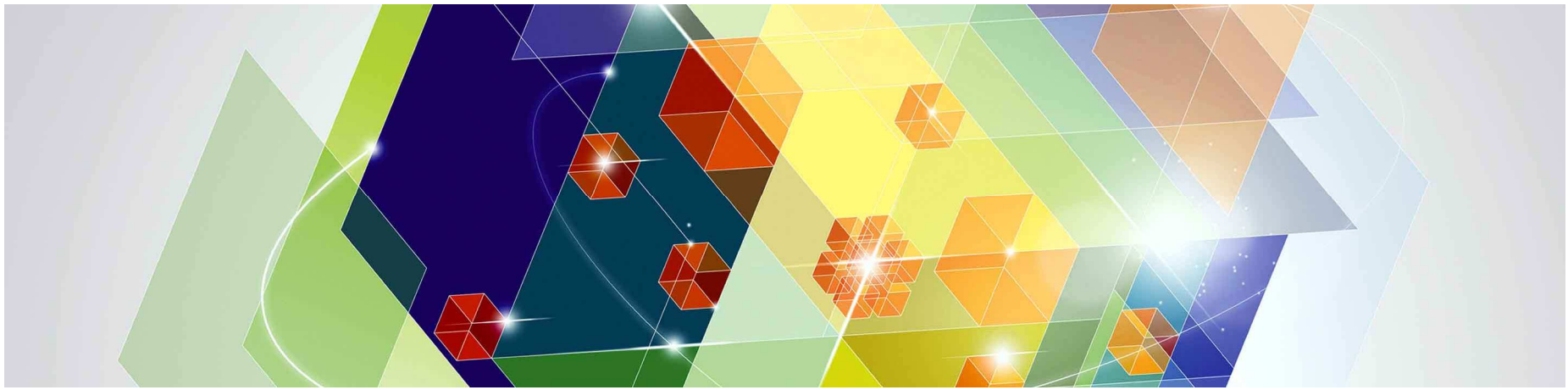
- CICS®-based services
- IMS™-based services
- DB2® database

The SOA ESB with Datapower in zEnterprise connecting via IEDN to traditional environment and Linux on z



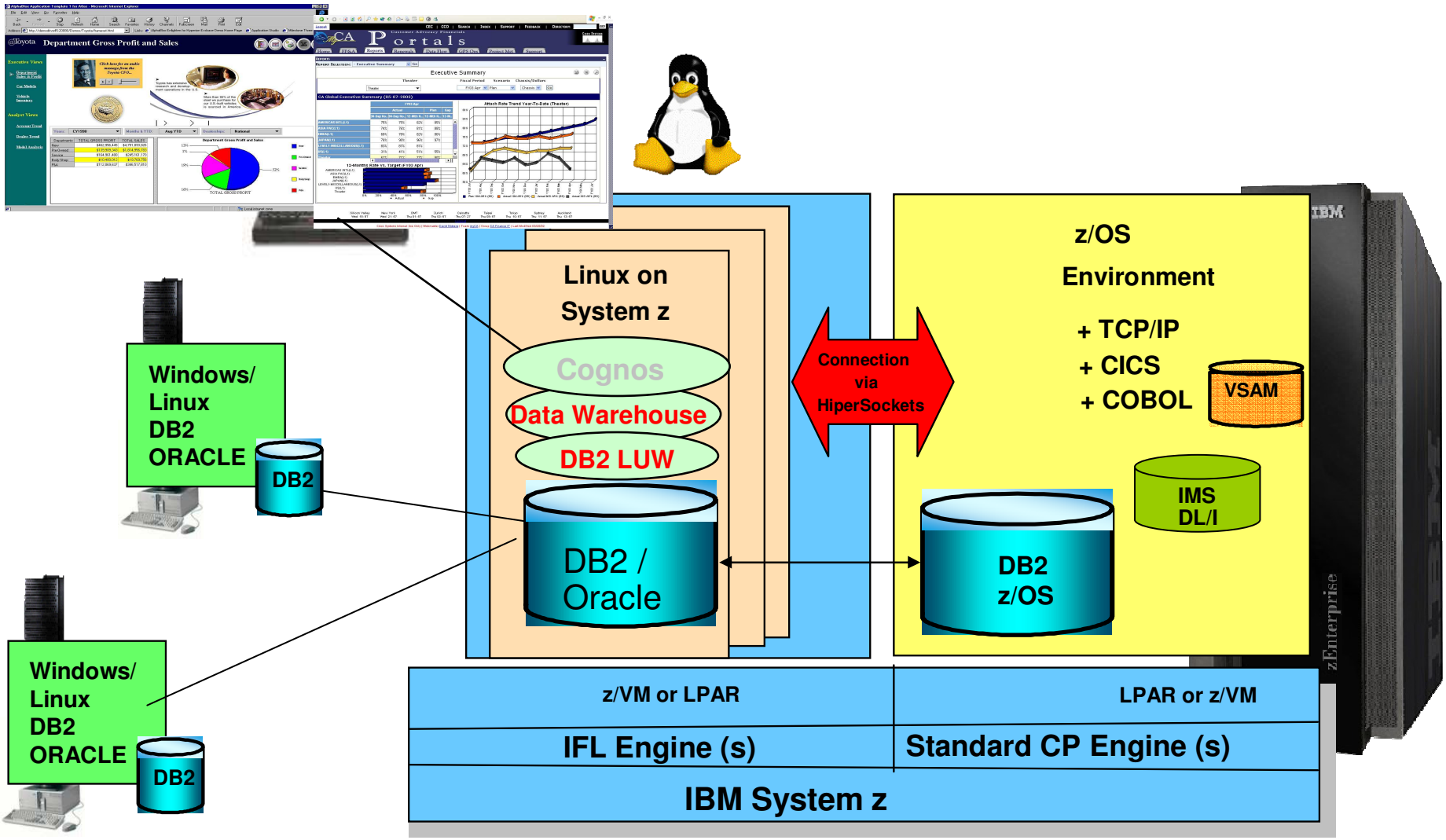
[1] All statements regarding IBM future direction and intent are subject to change or withdrawal without notice, and represents goals and objectives only.

Data Warehouse and BI Solutions with Linux on System z



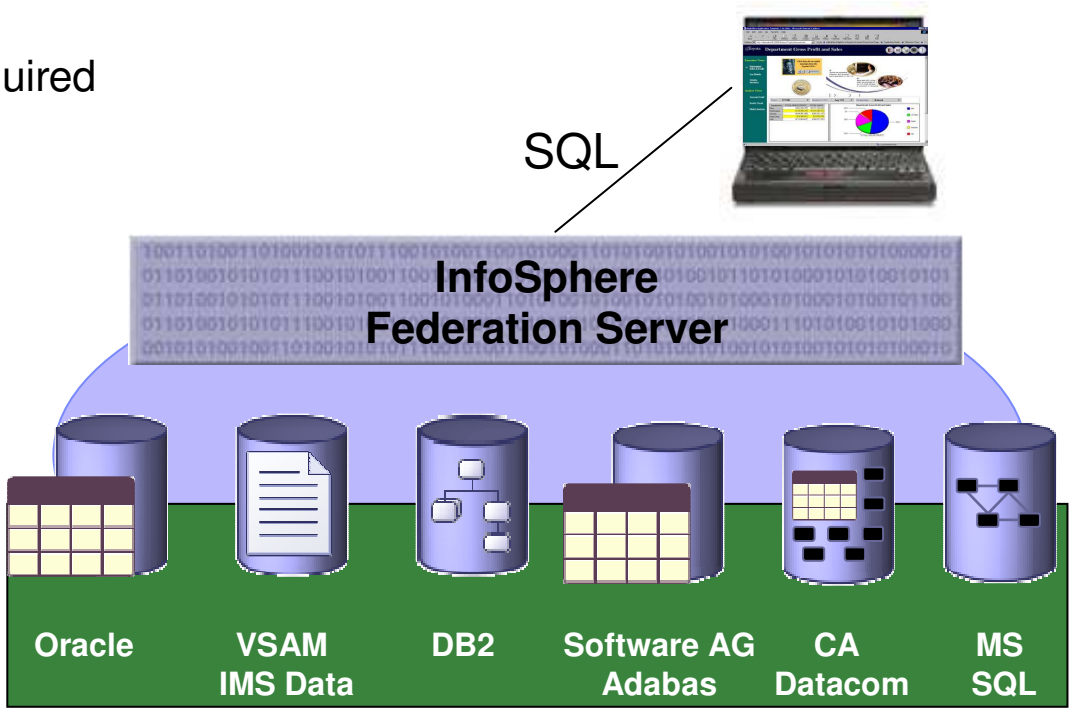
Linux on System z as Data Warehouse and BI

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

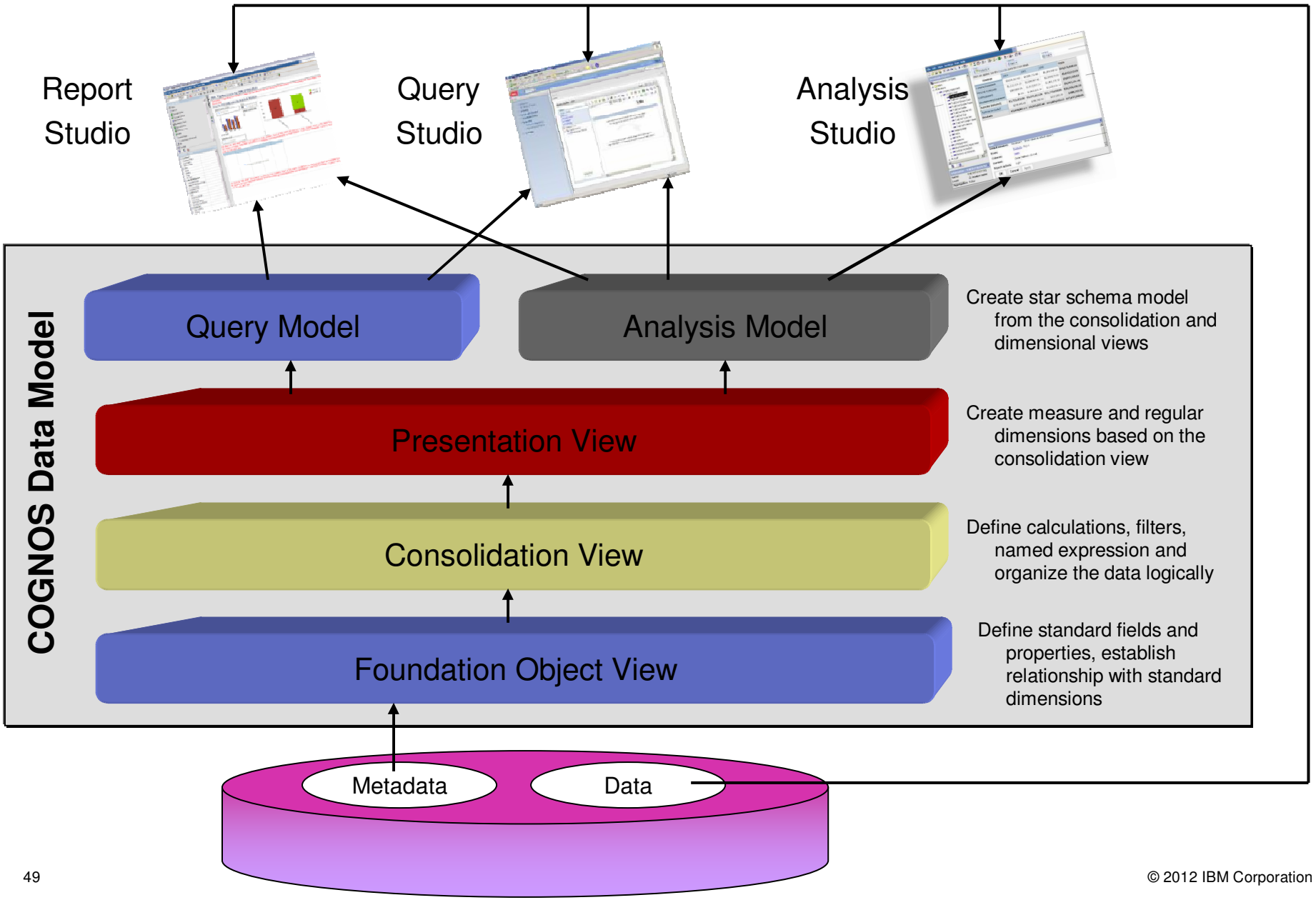


InfoSphere Federation Server on Linux on System z

- **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 mainframe VSAM data and flat files
  - 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



COGNOS Model Elements



IBM DB2 Analytics Accelerator *V2.1*

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

What is it?

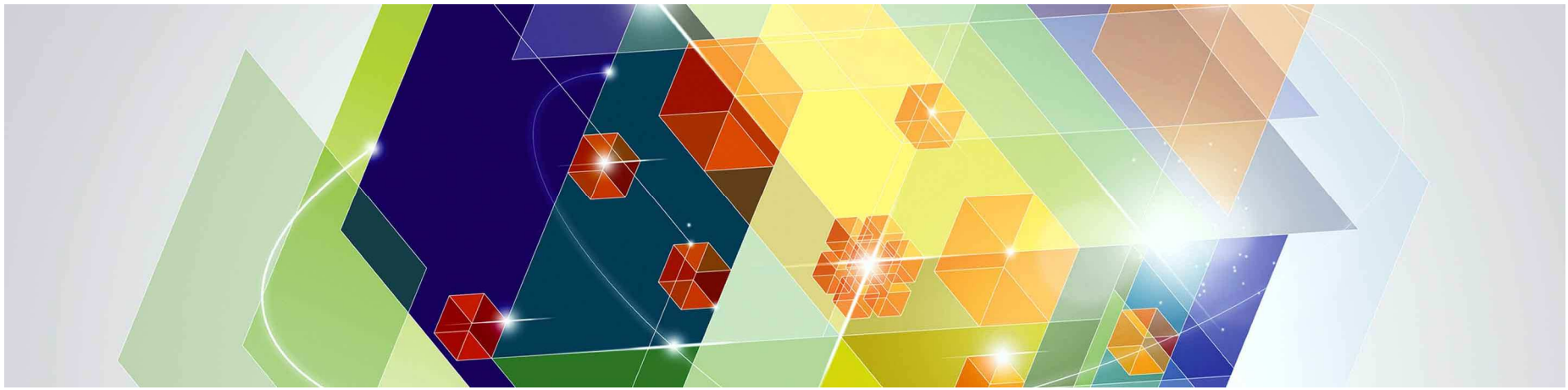
The IBM Smart Analytics Optimizer is a workload optimized, appliance add-on, that enables the integration of business insights into operational processes to drive winning strategies. It accelerates select queries, with unprecedented response times.

How is it different

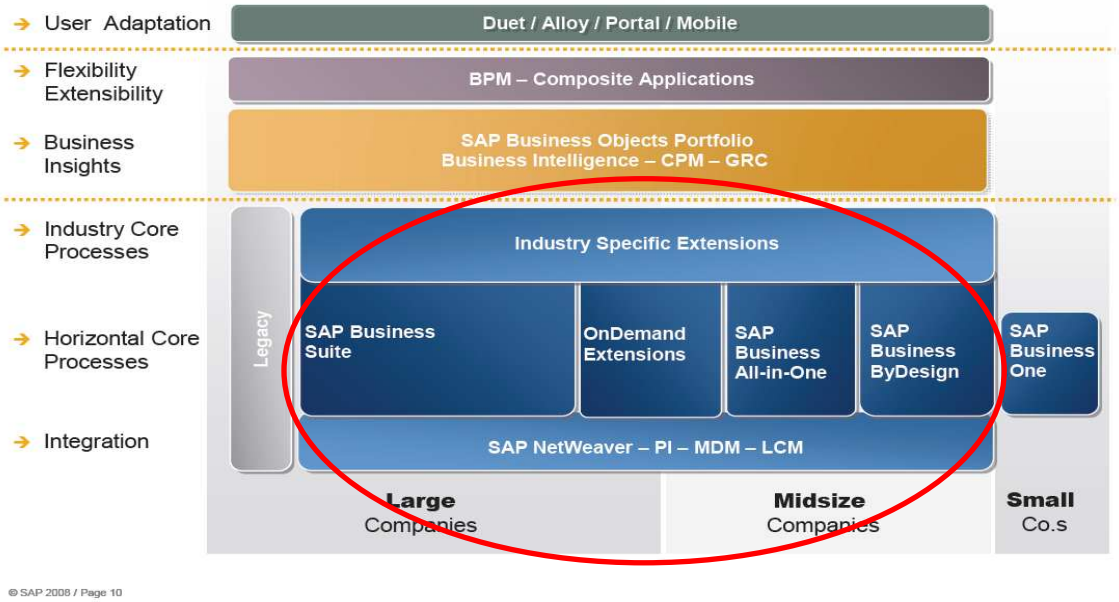
- ***Performance:*** Unprecedented response times to enable 'train of thought' analyses frequently blocked by poor query performance.
- ***Integration:*** Connects to DB2 through deep integration providing transparency to all applications.
- ***Self-managed workloads:*** queries are executed in the most 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

SAP Solutions on IBM zEnterprise System



SAP solutions remain In high demand to meet client requirements for business insight, improved productivity, and innovation



SAP on System z:

- **ERP financials, HR, CRM/SCM /SRM**
- **Industry solutions, like:**
  - Banking, core banking, Bank Analyzer (reporting), risk and compliance
  - Insurance
  - Retail
  - Automotive

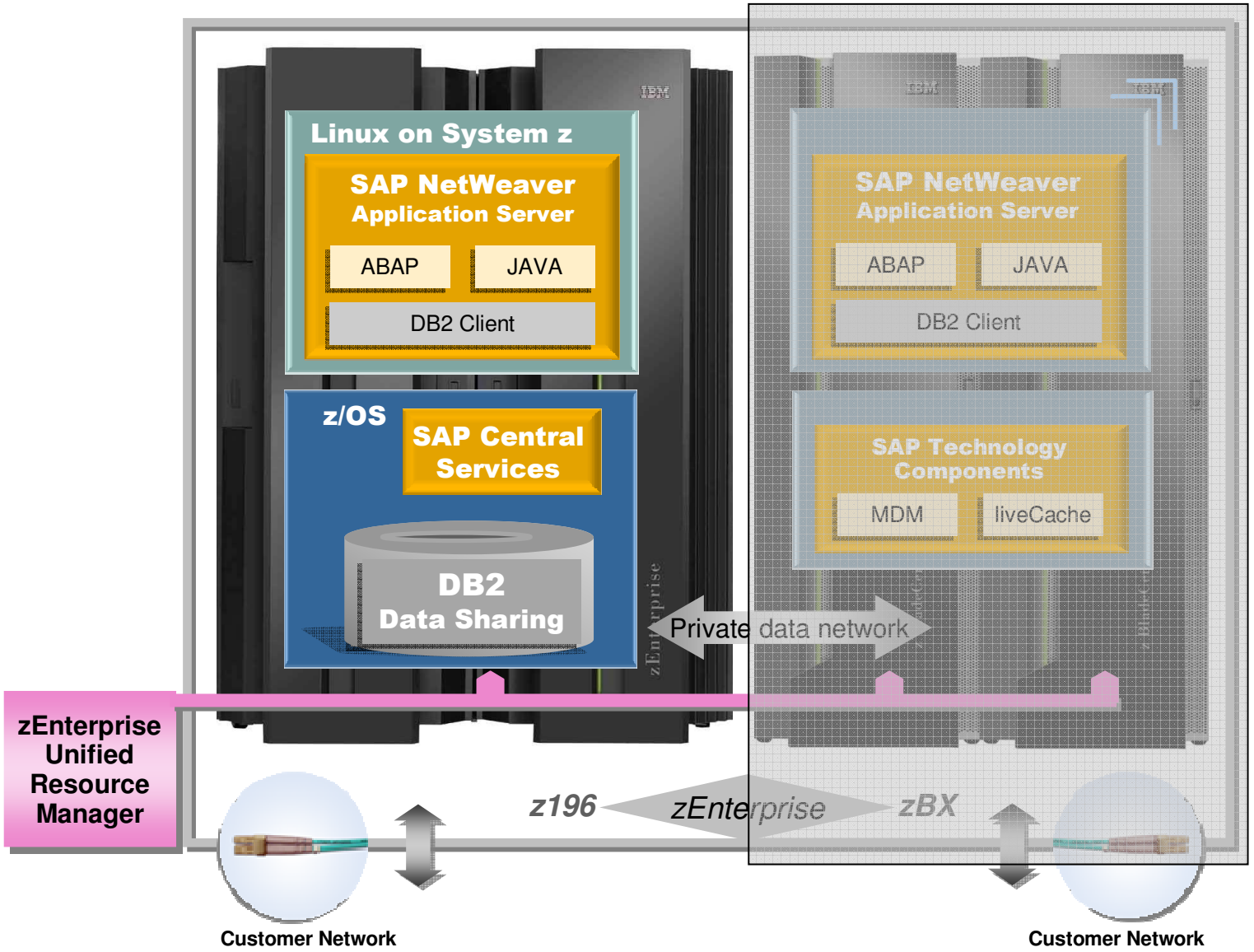
Improve visibility, empower better decision making

Expand and innovate without disruption

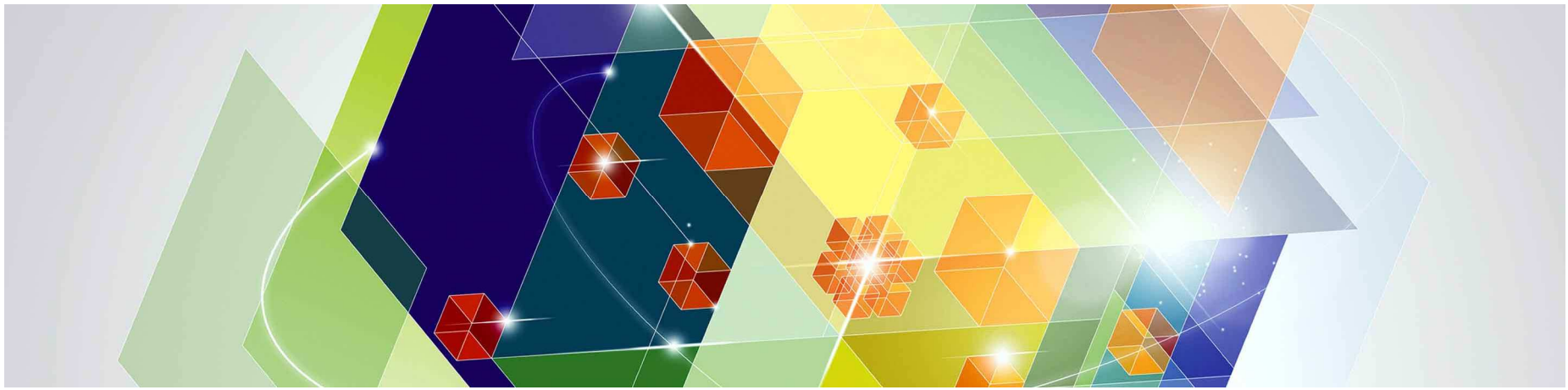
Improve mission critical industry business processes

Today there are over 1500 installations of SAP on System z,
and plenty of IT organizations looking to consolidate their SAP instances.

SAP on IBM zEnterprise System



Core Banking on IBM System zEnterprise



113 of top 120 banks by asset size choose System z…

To directly impact the bottom line

SMART IS

Reducing costs and serving the client

Caixa Galicia: Dramatic growth and national success, spurred by lean , efficient System z to deliver bank transaction costs 30% below Spain Average

To serve the customer

SMART IS

Business continuity, security and agility

Handelsbanken (Sweden): *"Customers entrust us with their hard earned savings so it's paramount that we select one of the industry's most powerful and secure servers - the IBM System z,"* said Roger Rydberg, technical manager at Handelsbanken. *"[System z] allows us to keep up with business climate changes because we can add or eliminate capacity any time based on customer demands. We can even make changes easily without having to stop any services."*

To deliver growth

SMART IS

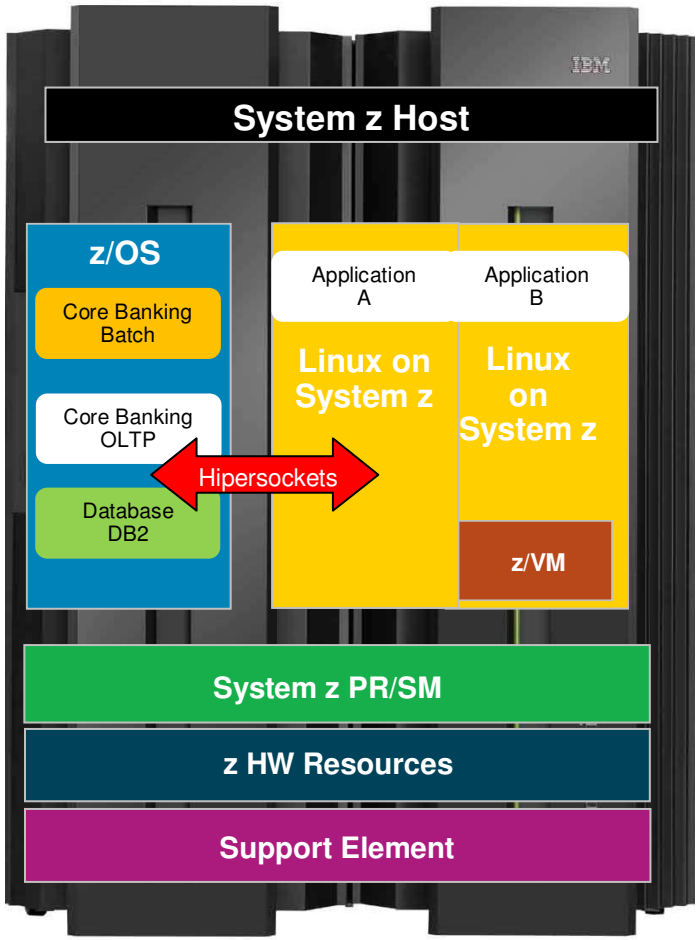
Improved speed to market with integration

St Georges Bank: Integration of disparate systems and data to improve customer service, bringing new products to market. *"We no longer want to invest the time and resources in two or three year initiatives. Business is changing so fast these days that we can't afford to roll something in production that represents the thinking of three years ago."*

Smart is not just for existing mainframe clients:

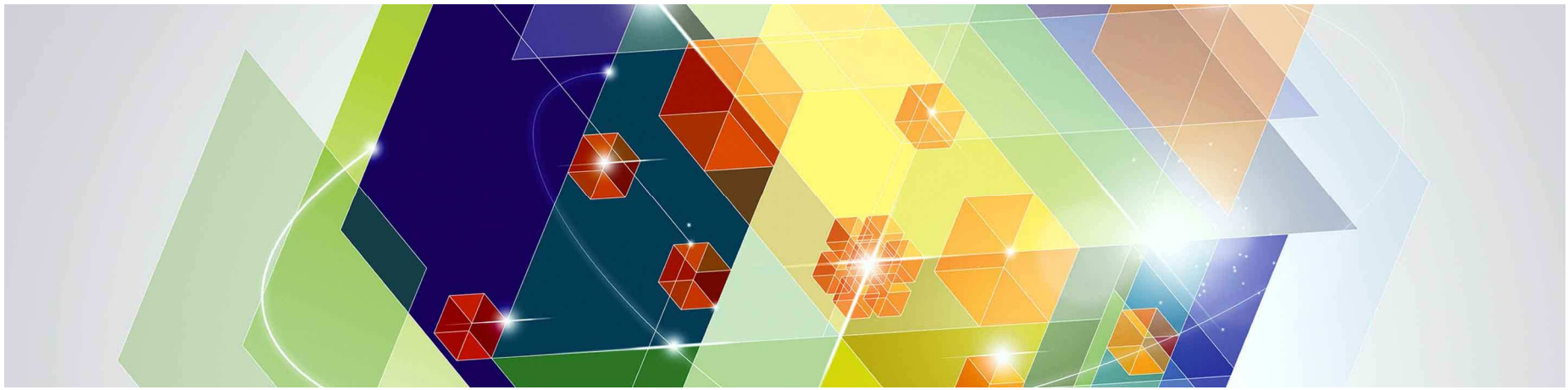
Vietnam: Protecting data from risks, while allowing responsiveness to the high demands of banking

Core Banking Solutions on IBM System zEnterprise



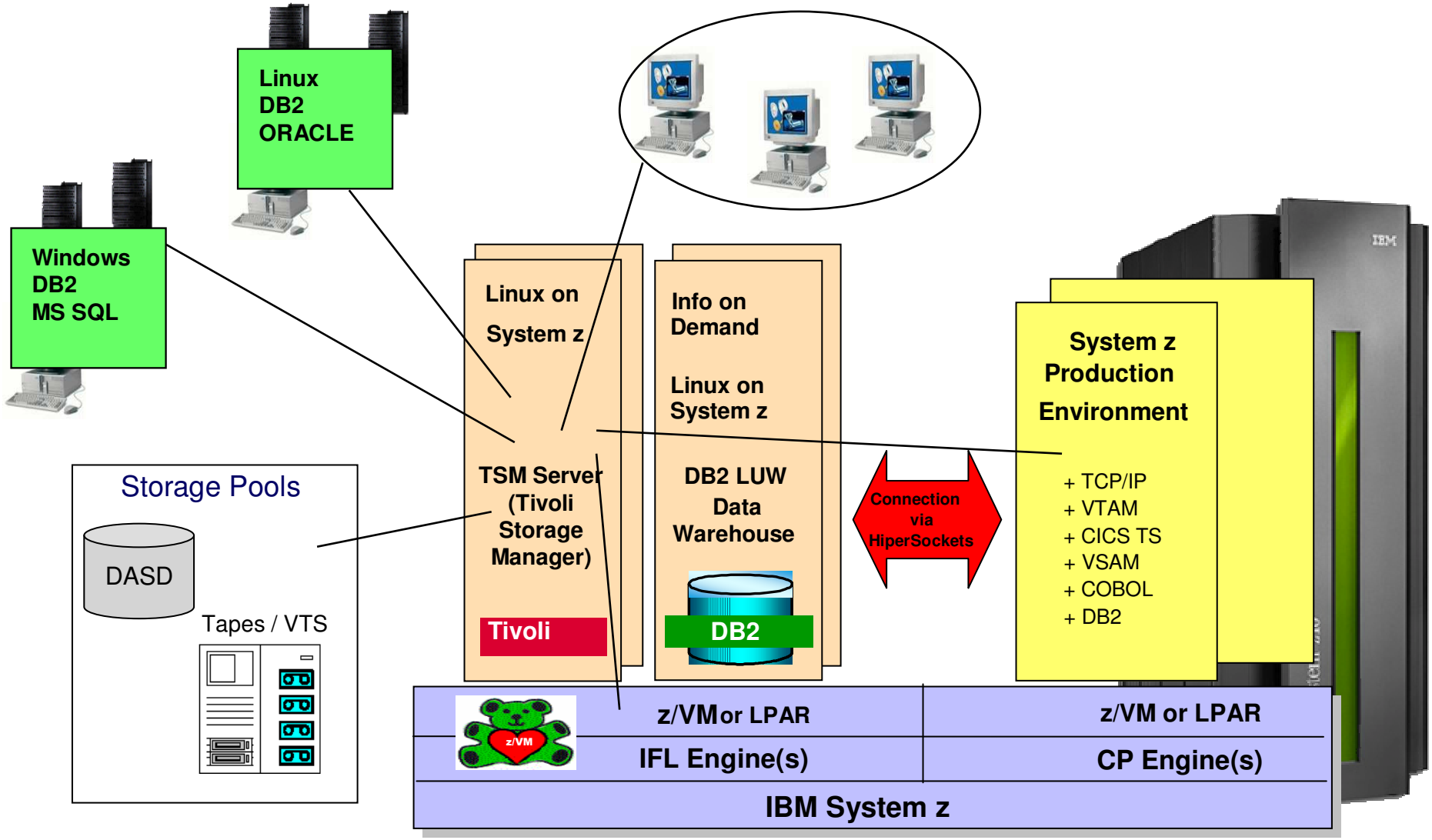
1 All statements regarding IBM future direction and intent are subject to change or withdrawal without notice, and represents goals and objectives only. (Statement of Direction) on System x blades in 4th quarter 2011

Central Backup for the Enterprise with Linux on System z

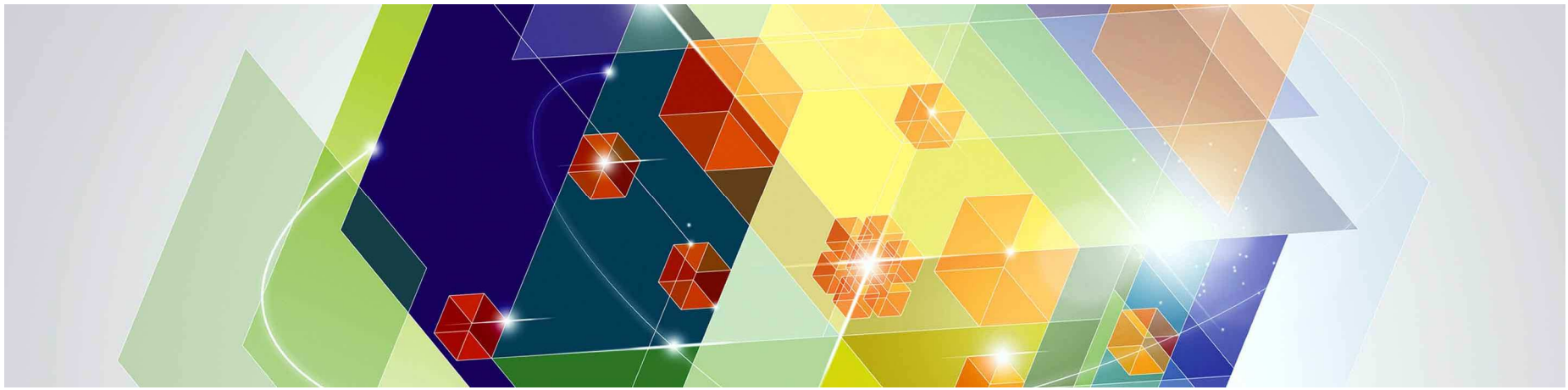


Enterprise Backup with Linux on System z

Implement TSM on Linux on System z as central Backup Hub



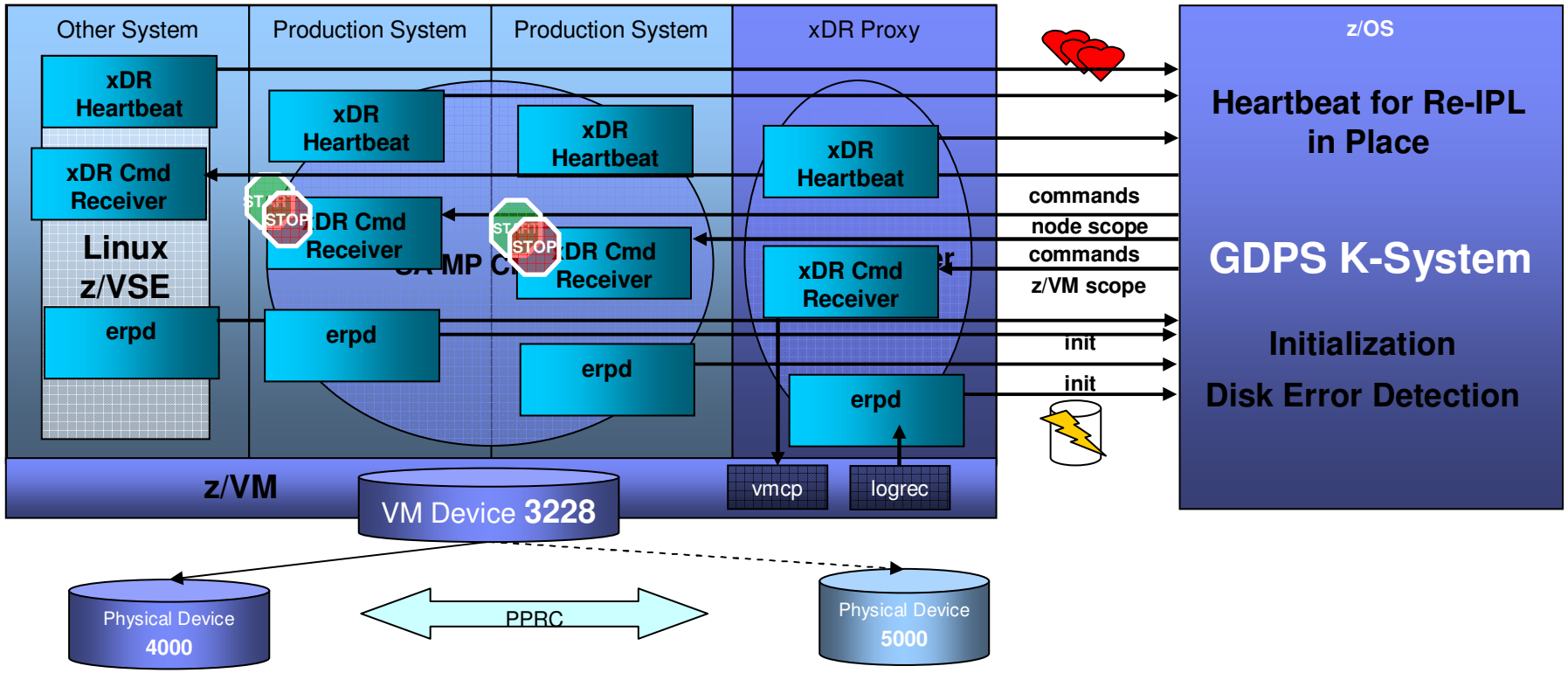
High Availability integration of z/OS and Linux on System z using GDPS



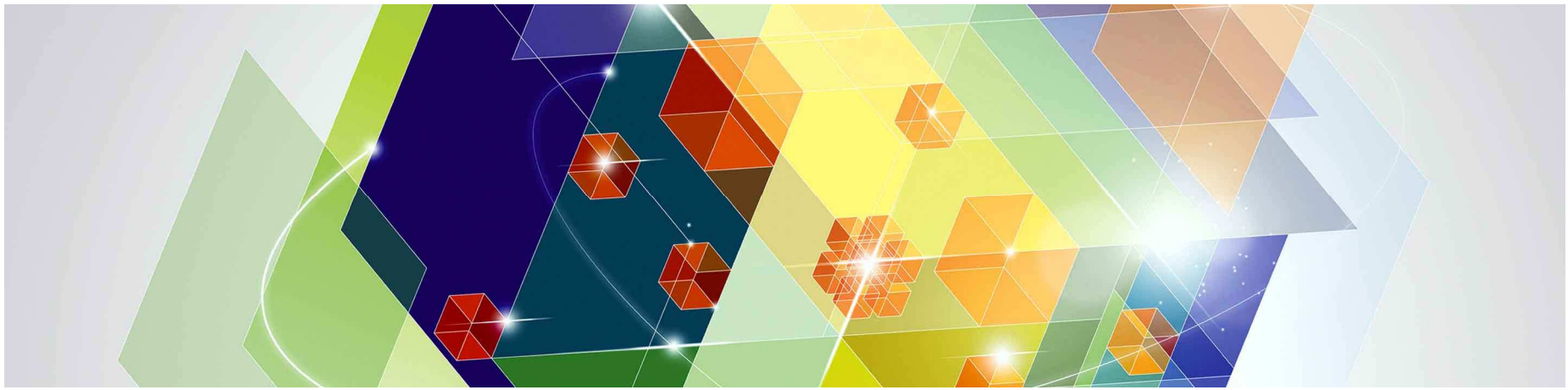
GDPS and xDR with z/VM guests – High availability

- Proxy
  - One linux system is configured as Proxy for GDPS which has special configuration
    - (Memory locked, Access rights to VM, One-Node-Cluster)
  - Is used for tasks that have z/VM scope
    - HyperSwap, shutdown z/VM, IPL z/VM guest

- Production Nodes
  - Run Linux Workload
  - Are used for local actions (Shut down node, Maintenance Mode)
- Other Systems
  - Enabled for HyperSwap via xDR Proxy (Linux, z/VSE)
  - No re-IPL in place, no start/stop via GDPS (init, reipl, maint)

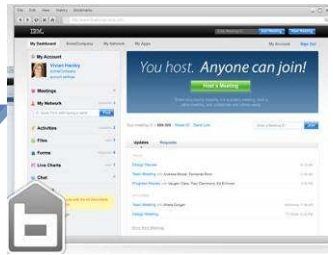


Cloud Computing with Linux on System z and integration of cloud and traditional



Cloud computing service Layers

User



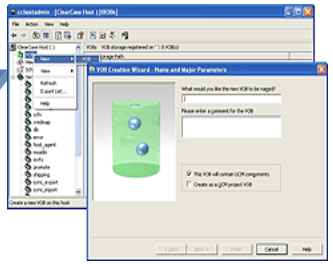
CRM/ERP/HR

Collaboration

Business Processes

Industry Applications

Software as a Service



Middleware

Web 2.0 Application Runtime

Java Runtime

Database

Development Tooling

Platform as a Service

Servers

Networking

Data Center Fabric

Storage

Shared virtualized, dynamic provisioning

Infrastructure as a Service

VIRTUALIZATION + STANDARDIZATION + AUTOMATION = smaller costs, higher flexibility

oration

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

Solution Edition for Cloud Computing

Solve community challenges

BENEFITS to Clients

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

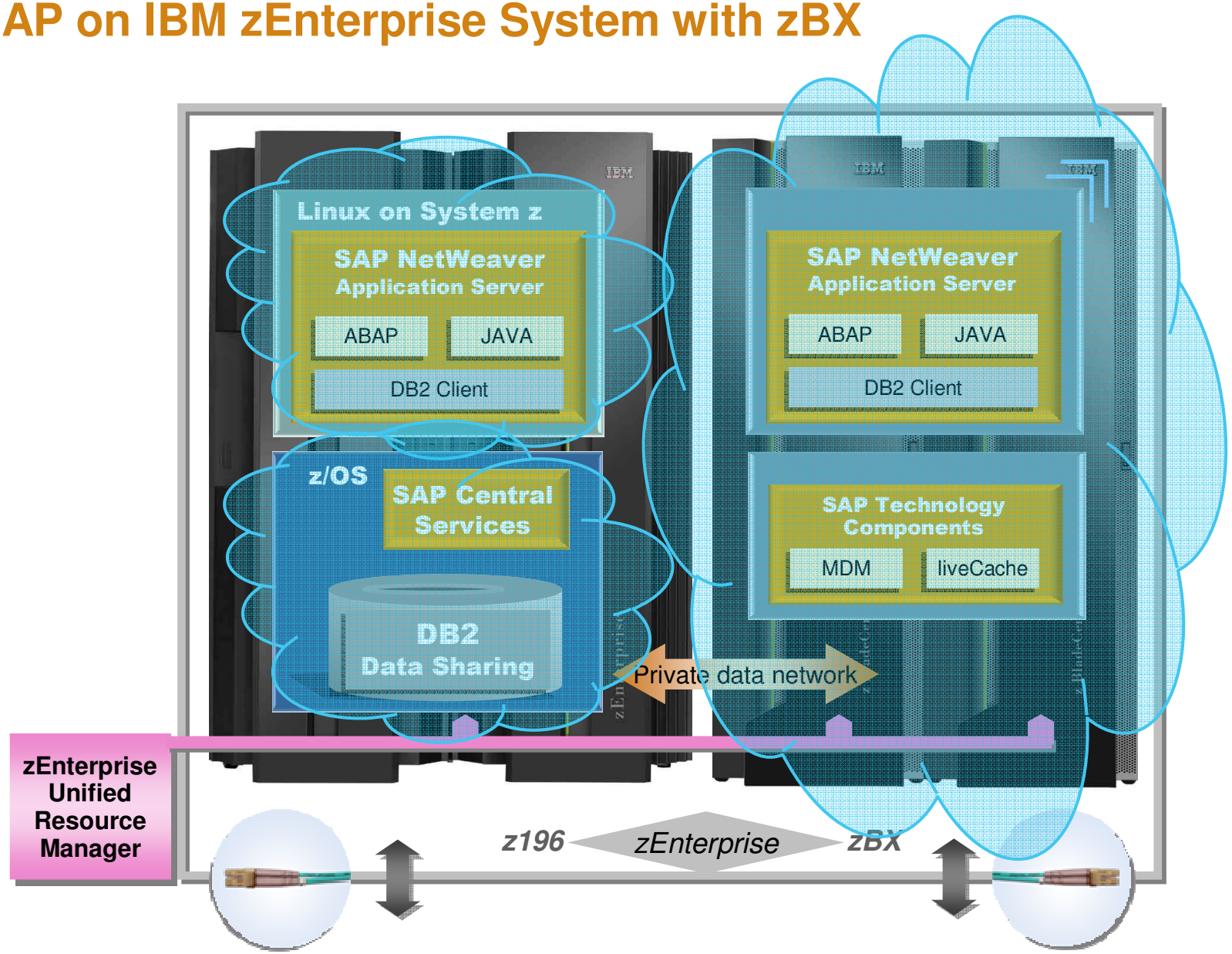
It lowers the barrier for local businesses to benefit from this technology.

UNIVERSITÀ DEGLI STUDI DI BARI ALDO MORO

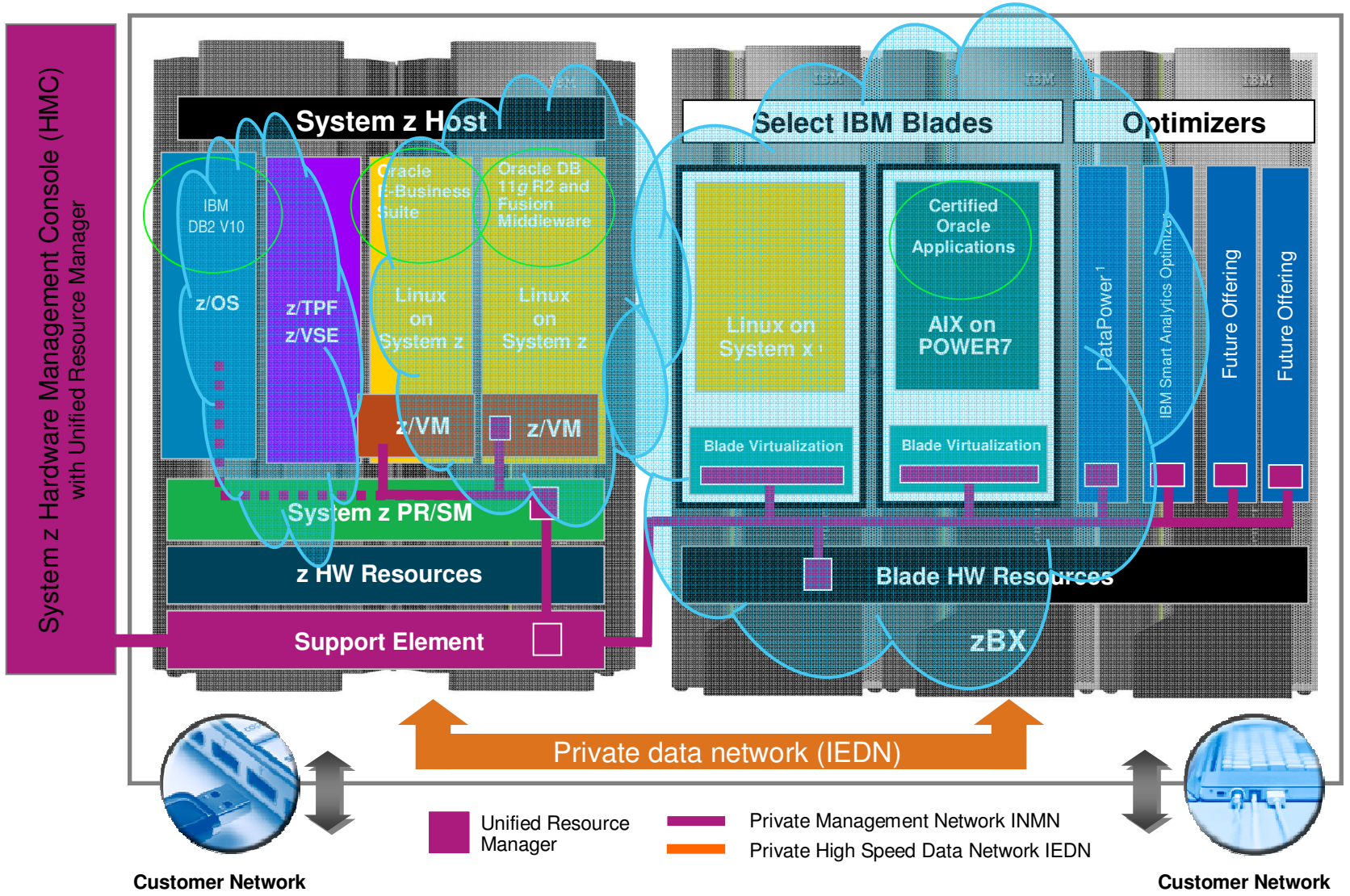
Universita di Bari, established in 1924, is developing cloud-based solutions for a consortium of companies and universities from five regions of southern Italy.

 Press release: http://www-03.ibm.com/press/us/en/pressrelease/32051.wss

SAP on IBM zEnterprise System with zBX

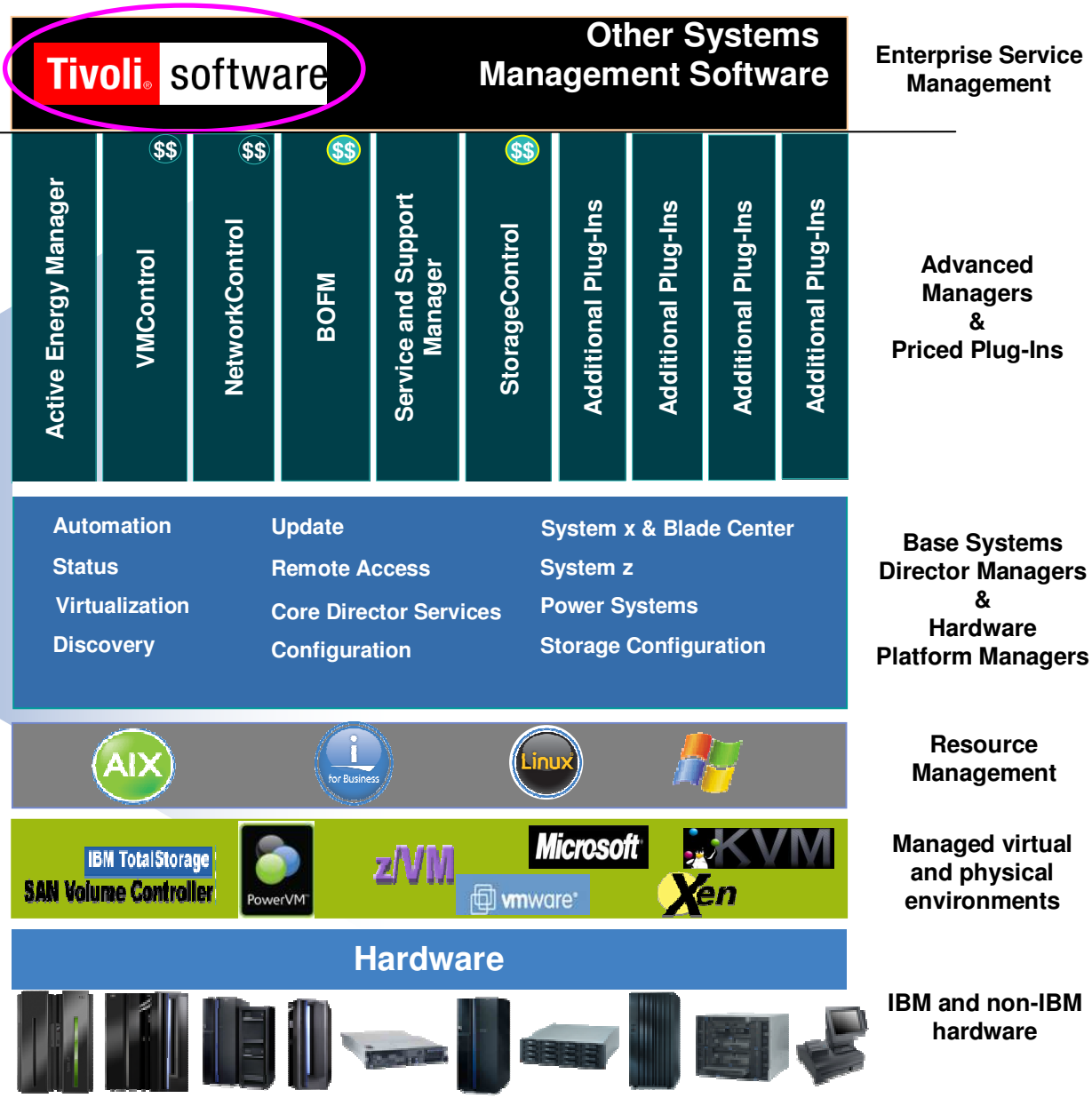


Examples of Oracle Solutions on IBM System zEnterprise



Systems Management

IBM Systems Director



From Infrastructure to Cloud Management Control point with Tivoli

Workloads

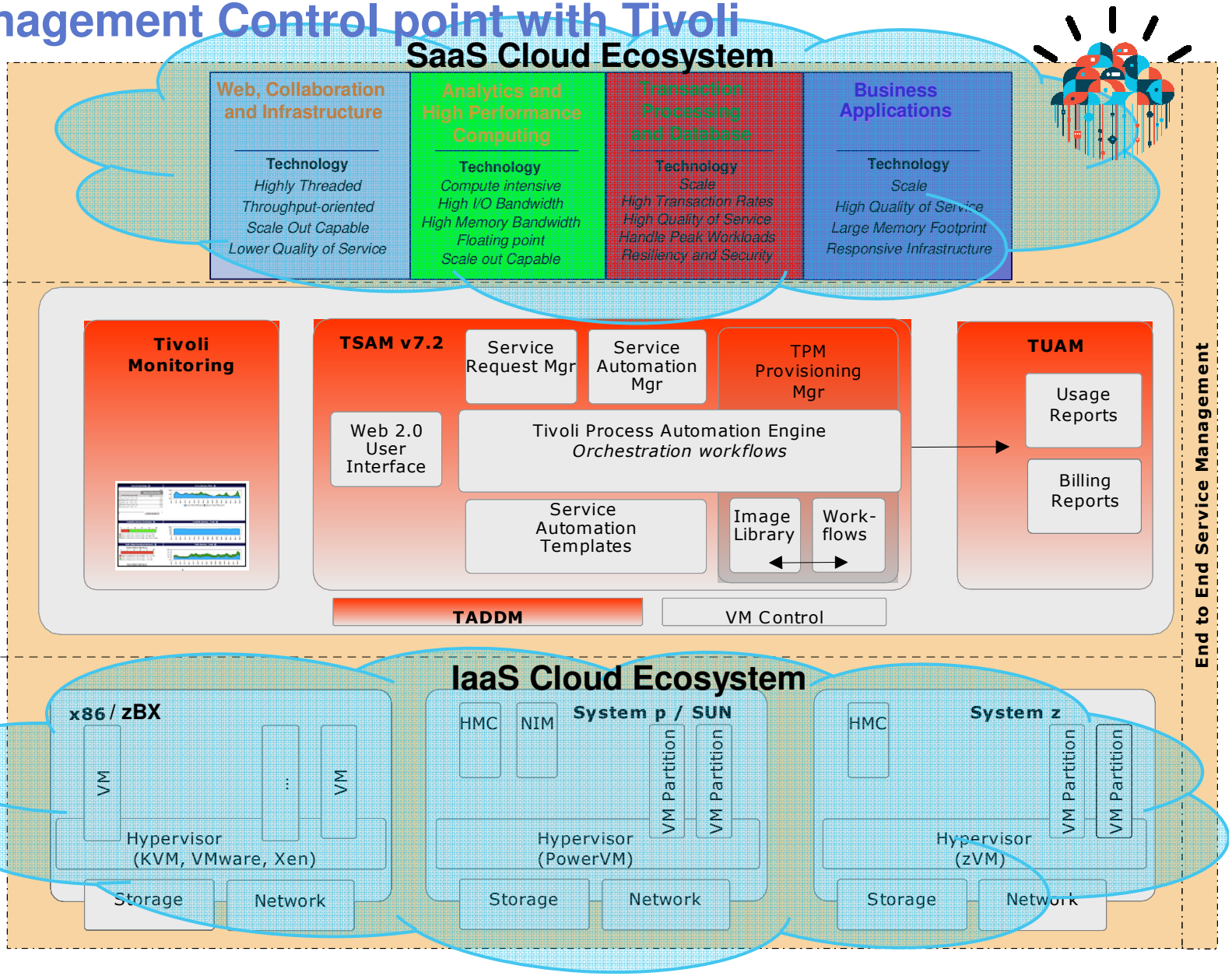
- Service measurement
- Service reporting
- Usage accounting
- Auditing and controls

Tivoli Service Automation Layer

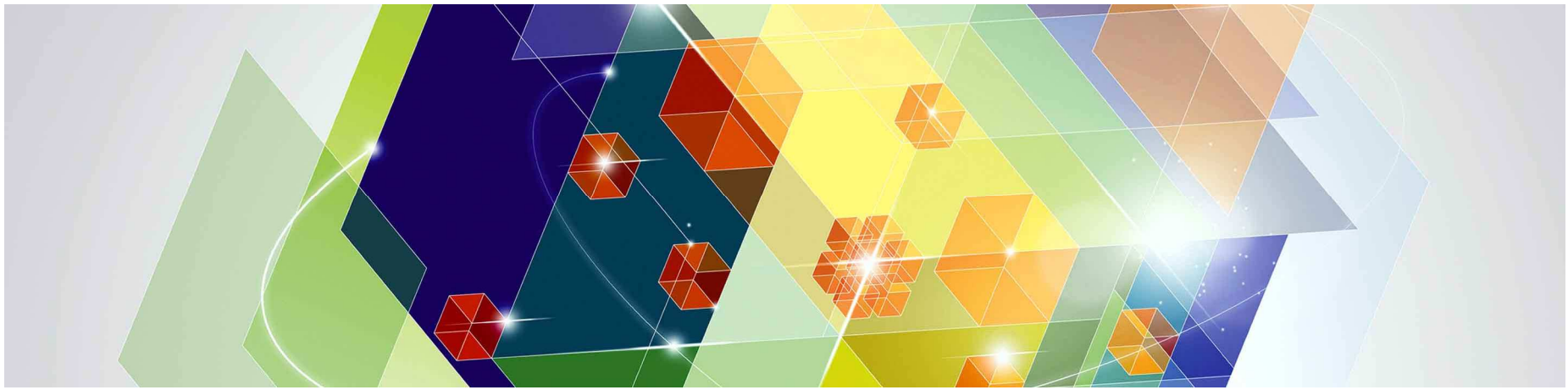
- Automate process of instantiating and managing a distributed IT environment.

Virtualized Infrastructure Layer

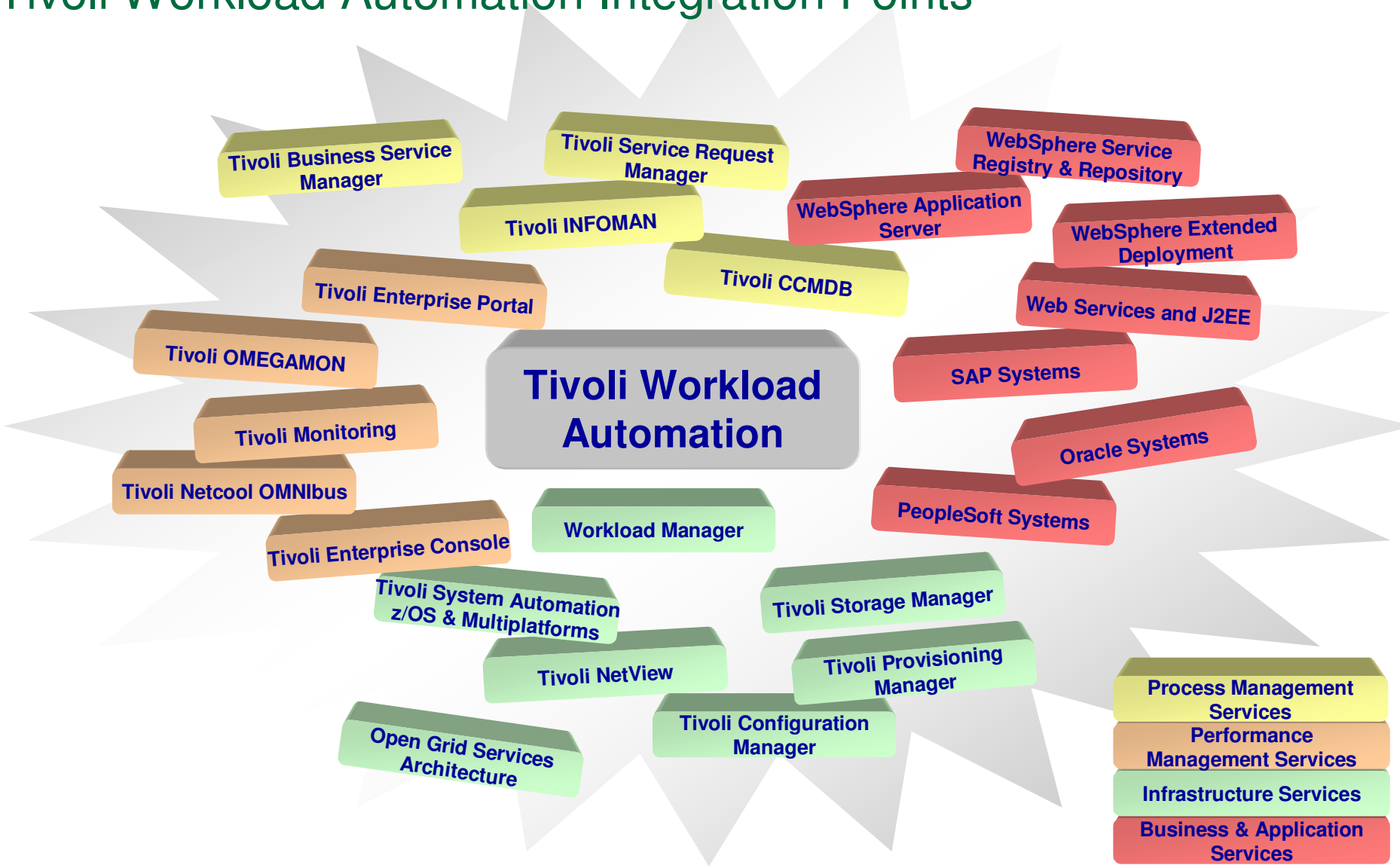
- Virtualized resources
- Virtualized aggregation
- Physical infrastructure



Automate cross platform workload with Linux on System z

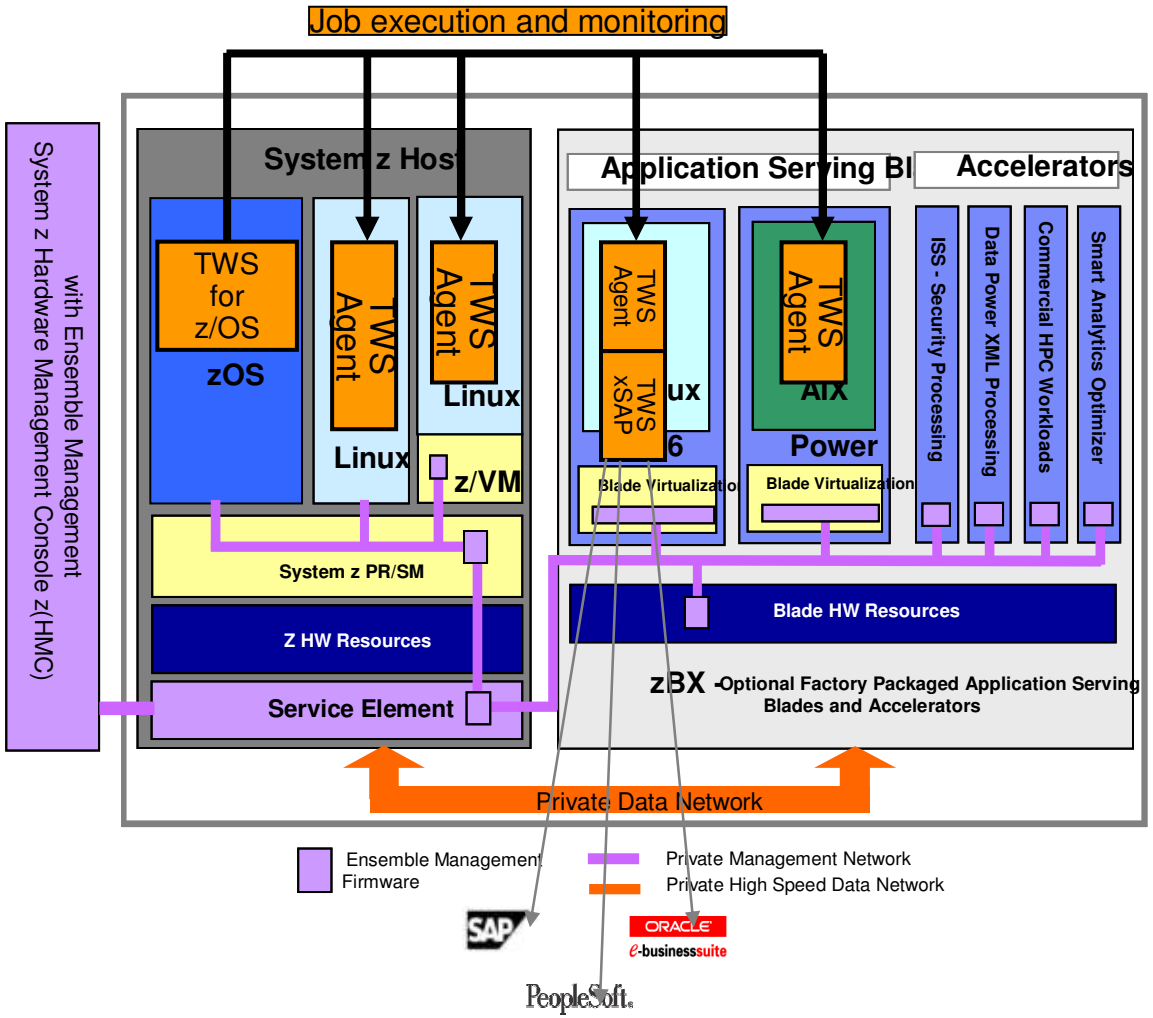


Tivoli Workload Automation Integration Points



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

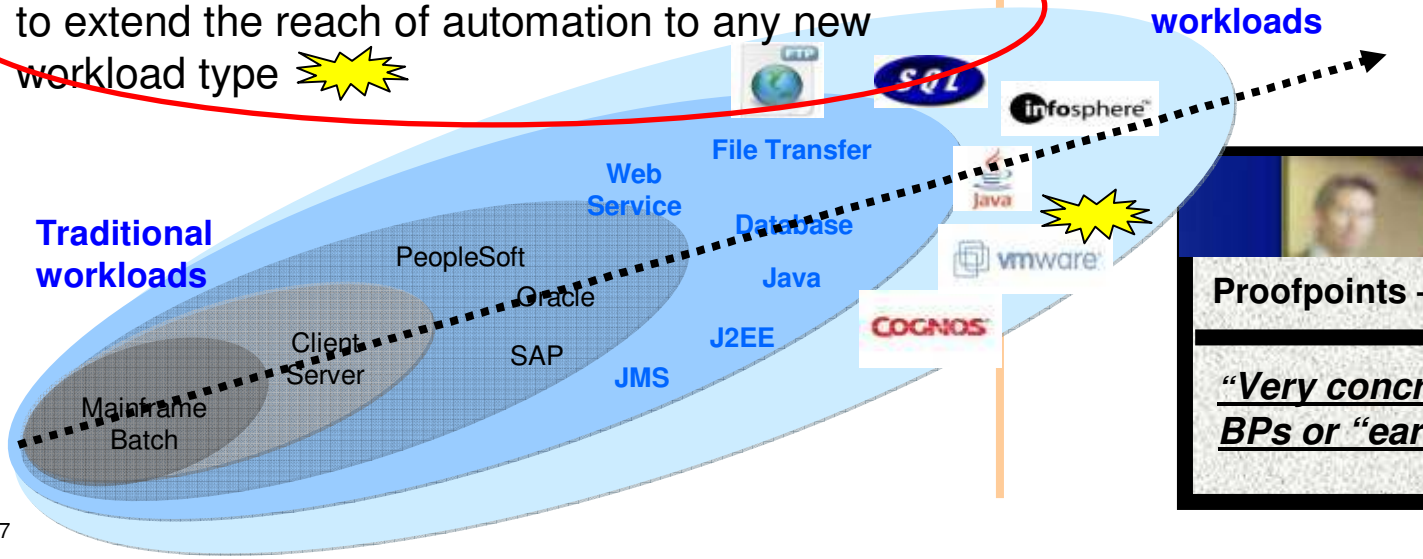
★ ***Reduce costs with fit-for-purpose platform, and implement a virtualized and green data center***

★ ***Realize data-proximity processing with high bandwidth for distributed applications***

Application Extensions allow business users to take advantage of processes in a managed approach

New Tivoli Workload Automation application extensible framework

- Customers shifting from traditional backend transaction focused systems to modern systems running web applications and heterogeneous applications
- Workload Automation role is maintaining a single point of control over workloads
- TWS 8.6 easily build and deploy application plugins to extend the reach of automation to any new workload type



Business benefits

- ★ ***Share infrastructure among applications***
- ★ ***Reduces labor costs, enabling to automate new workloads with the same staff of people***
- ★ ***No request for new skill: re-using of workload automation processes and procedures already in place***

Proofpoints – Customer quotes

"Very concrete needs" from BPs or "early adopters"

Summary

The demands placed on the data center have never been greater.

IBM System zEnterprise:

1. **Enables** mixed workload Business Processes **to be deployed, and centrally managed**
2. Allows **optimized integration** of data, applications, and web serving
3. Delivers **dynamically responsive IT** with **lower acquisition and operating costs**
4. **Meets the need** of **heterogeneous data centers**

A strategic systems platform….
Helping to free up resources for critical projects and establish a base for the future

Links to Information on System z

IBM System z Data sheets:

IBM System z Solution Edition for Enterprise Linux

Enterprise Linux Server

IBM zEnterprise System

Linux on System z

z/VM virtualization and Linux on IBM zEnterprise System

IBM Offerings:

Financing

Client Case Studies For Oracle On Linux For System Z Servers:

Transzap

Bank of New Zealand

Clabby Analytics Whitepapers:

ELCOT

KMD

Other Client Studies:

Dundee

Ziff Davis Enterprise Whitepaper:

Scaling Your Oracle E-Business Suite with IBM System z and Linux

Video

Oracle on System z Enterprise - YouTube

Oracle Solutions on System z Server Data Sheets:

FAQ Running Oracle Database 11g Release 2 on Linux on IBM System z Servers

Oracle and System z FAQ

- Link is also available on Oracle website

IBM System z running Linux Oracle Database and Middleware Solutions

Oracle E-Business Suite on Linux for IBM System zEnterprise

Siebel on Oracle on Linux for IBM System z Servers

Siebel on DB2 z/OS on IBM System z Servers

PeopleSoft on Oracle on Linux for IBM System z Servers

PeopleSoft on DB2 z/OS on IBM System z Servers

Questions?

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