IBM System z Technical University

October 4–8, 2010 — Boston, MA

Session Title:
Cloud computing with z/VSE

Session ID: zDG03

Wilhelm Mild, IBM

Authorized IBM Training

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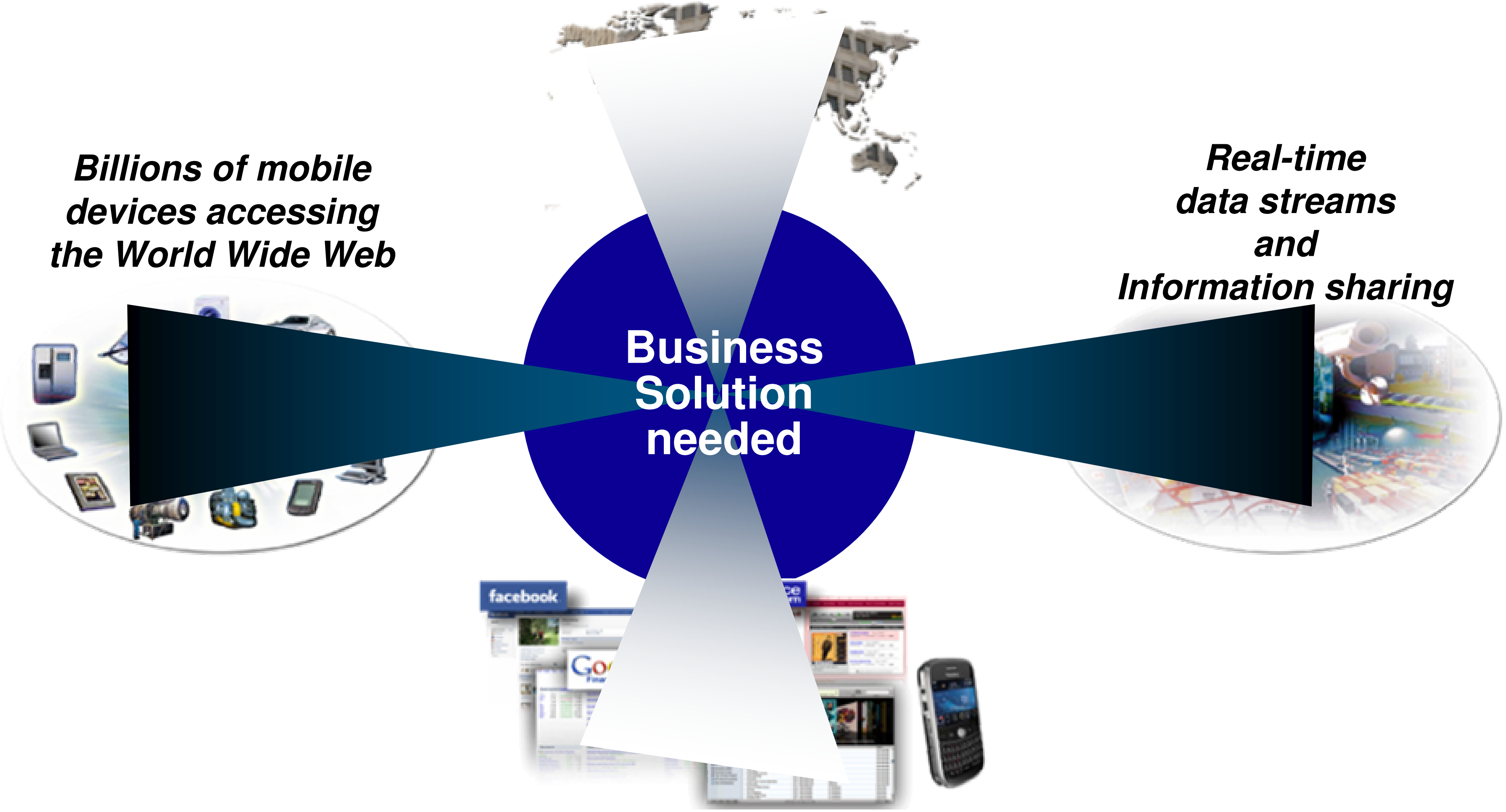
IT dynamics today

Globalization and Globally Available Resources



Billions of mobile
devices accessing
the World Wide Web

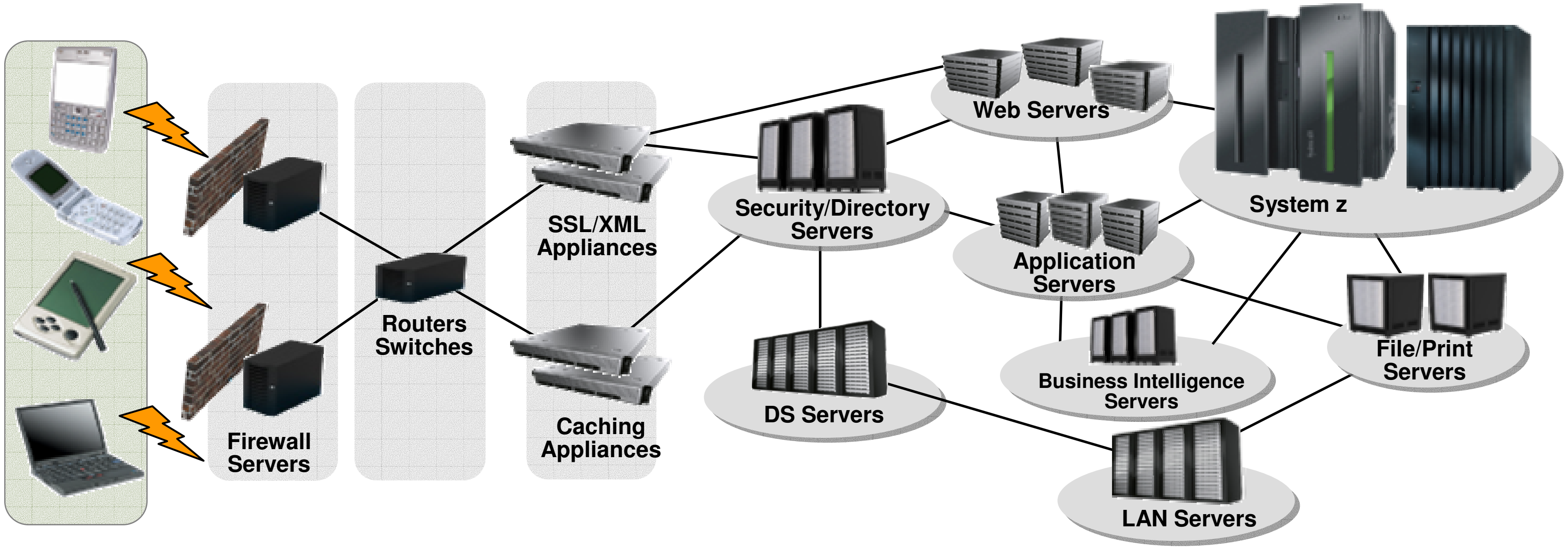
Business
Solution
needed

Real-time
data streams
and
Information sharing

Rise of social networking and social computing

Information Technology Today: Limitations

Information Technology today is limited by the technology and architecture configurations available

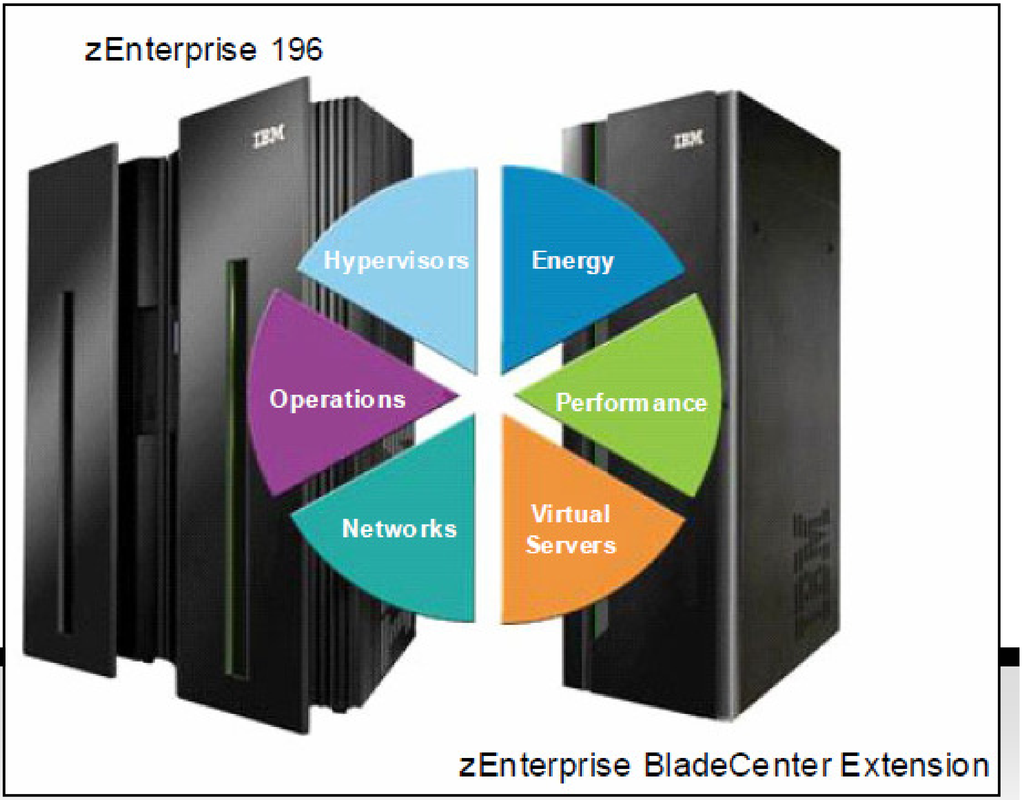

Firewall Servers
Routers Switches
SSL/XML Appliances
Caching Appliances
Security/Directory Servers
Web Servers
System z
Application Servers
DS Servers
Business Intelligence Servers
File/Print Servers
LAN Servers

Complexity and Limitations of Today's Environment

- Many tiers/nodes of **independent resources** connected over corporate network
- System management information typically **not end-to-end view**
- Automation Policies **are limited** to tier/node boundaries
- **Redundancy is pervasive** for Operational staff, HW, Software and policies across architectures
- Managing this complexity now consumes the majority if IT budgets

IBM zEnterprise System – one for everything !

Re-write the rulebook and set new standards for business-centric IT with IBM System z, to be the world's premier workload-optimized platform for enterprise applications.


zEnterprise 196
Hypervisors
Energy
Operations
Performance
Networks
Virtual Servers
zEnterprise BladeCenter Extension

Our Vision:

An IT environment driven with one centralized System
- IBM zEnterprise System -

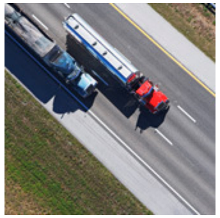
*Deliver the best of all worlds - Mainframe, UNIX, x86 and single function processors - integrated in a single system for ultimate flexibility and simplicity to optimize service, risk, and cost across multiple heterogeneous workloads***.**

In this smarter world, we need a future oriented infrastructure

Infrastructure that is instrumented, interconnected and intelligent.

Infrastructure that brings together business and IT to create new possibilities.

Mobility Infrastructure



+

Facilities Infrastructure

+

Production Infrastructure

+

Technology Infrastructure

+

Communications Infrastructure

We need a smart *and flexible* infrastructure.

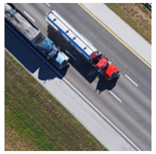
What is smart, flexible Infrastructure?

Technology

Production

Facilities

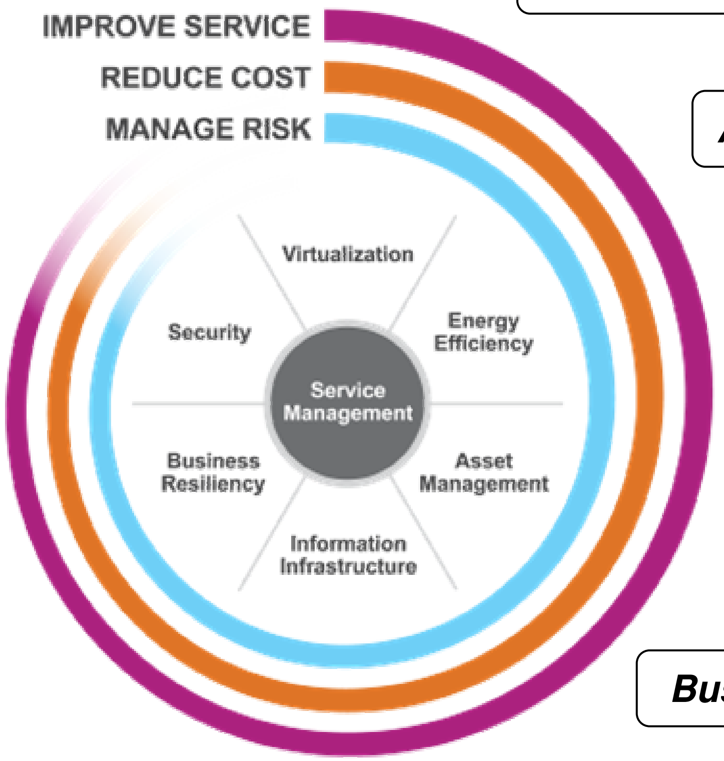
Mobility



Communications

- IBM’s strategy for building the infrastructure needed in the 21st century
- An approach to solving client’s most pressing operational issues today while building for the future
- 3 Client Imperatives:
  - Reduce Cost – Improve Service – Manage Risk
- Benefits
  - Consistent messaging and value proposition for customers
  - Framework that integrates all of IBM’s capabilities
  - Roadmap for connecting IBM offerings to client pain points

Building a smart, flexible infrastructure.


IMPROVE SERVICE
REDUCE COST
MANAGE RISK
Virtualization
Security
Energy Efficiency
Service Management
Business Resiliency
Asset Management
Information Infrastructure

Service Management

Provide visibility, control and automation across all the business and IT assets to deliver higher value services.

Asset Management

Maximizing the value of critical business and IT assets over their lifecycle with industry tailored asset management solutions.

Virtualization

Leadership virtualization and consolidation solutions that reduce cost, improve asset utilization, and speed provisioning of new services.

Energy Efficiency

Address energy challenges, environment, and sustainability and opportunities across your business and IT infrastructure.

Business Resiliency

Maintaining continuous business and IT operations while rapidly adapting and responding to risks and opportunities.

Security

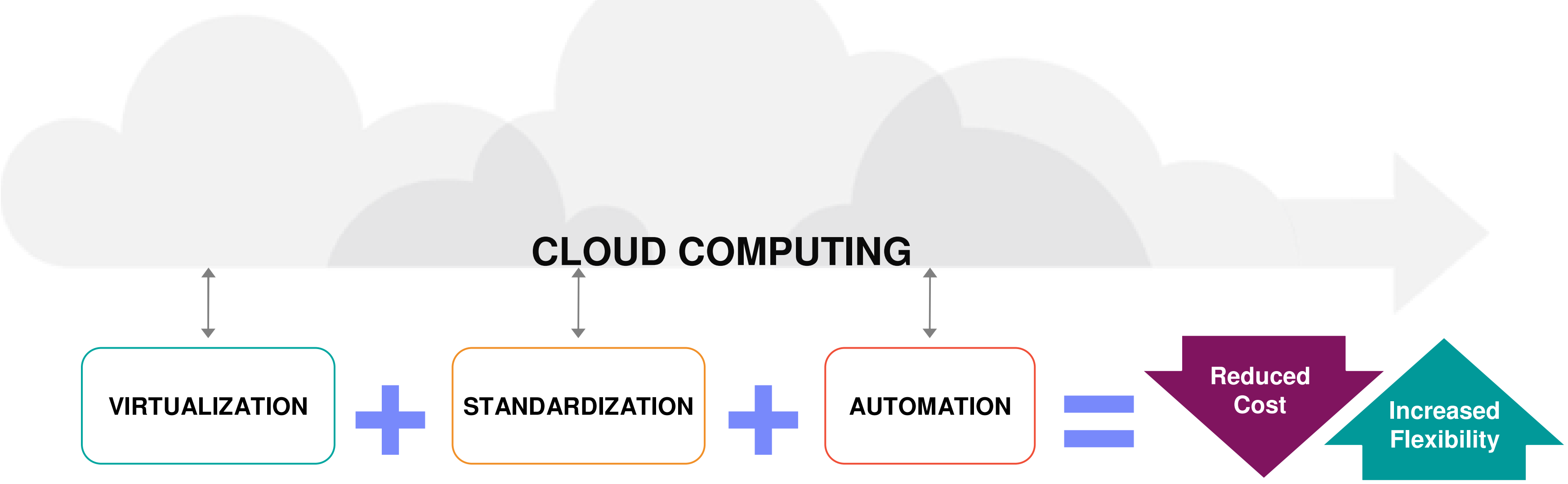
End to end industry customized governance, risk management and compliance solutions.

Information Infrastructure

Helping businesses achieve objectives. Information compliance, availability, retention, and security objectives.

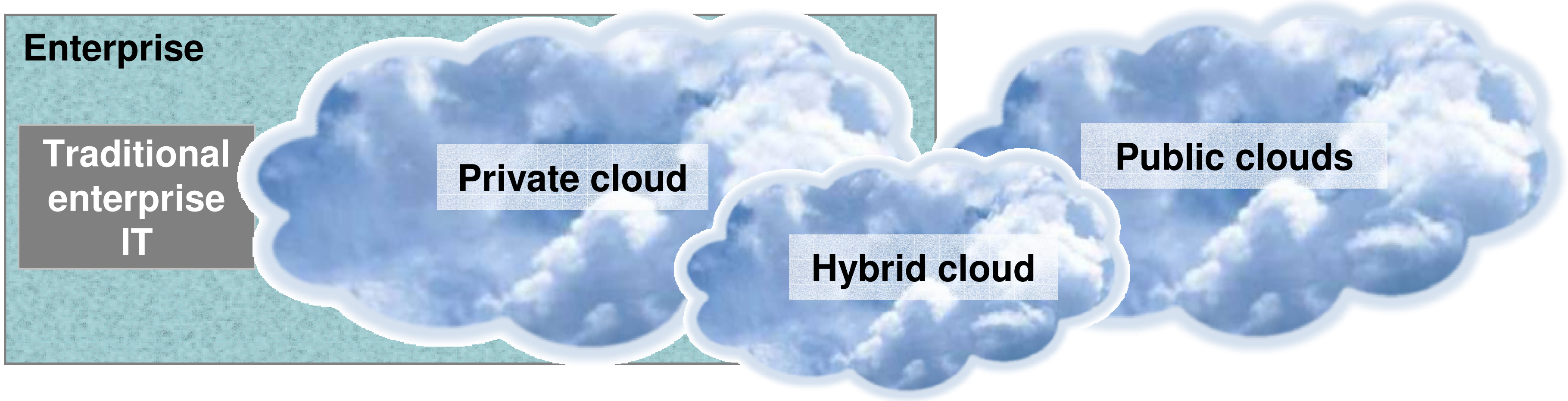
Cloud Computing - the new computing model

An effective Cloud Computing deployment is built on a Dynamic Infrastructure and is highly optimized to achieve more with less….


CLOUD COMPUTING
VIRTUALIZATION
+
STANDARDIZATION
+
AUTOMATION
=
Reduced Cost
Increased Flexibility

…leveraging virtualization, standardization and automation to free up operational budget for new investment.

Three Cloud Computing delivery models deliver workload services



Enterprise

Traditional enterprise IT

Private cloud

Hybrid cloud

Public clouds

Private cloud

Workloads are provided "as a service," over an intranet, within the enterprise and behind the firewall

Hybrid cloud

Internal and external service delivery methods are integrated activities/functions

Public cloud

Workloads are provided "as a service," over the Internet

- *Clients prefer private clouds - 64% over public or hybrid clouds, however appeal of public and hybrid cloud is growing.**
- *Concerns about security and privacy of company data represent the most significant barrier to public cloud services.**

Source: IBM Market Insights, *Cloud Computing Research*, July 2009. n=1,090

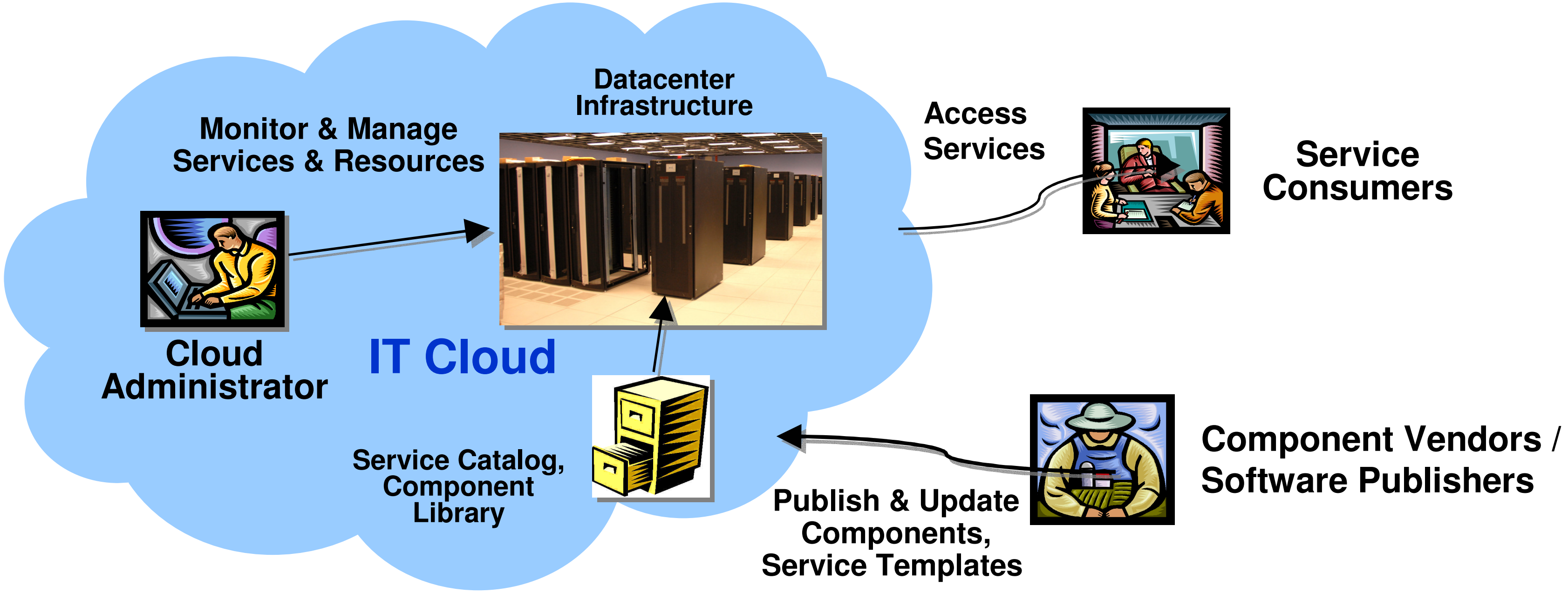
Cloud Computing - Definition from **IBM BlueCloud** Architecture Board

It is a user experience and a business model

- Cloud computing is an emerging style of computing in which applications, data, and IT resources are provided as services to users over the network.

It is a infrastructure management methodology

- Cloud computing is way of managing large numbers of highly virtualized resources such that from a management perspective, they resemble a single large resource. This can then be used to deliver services.

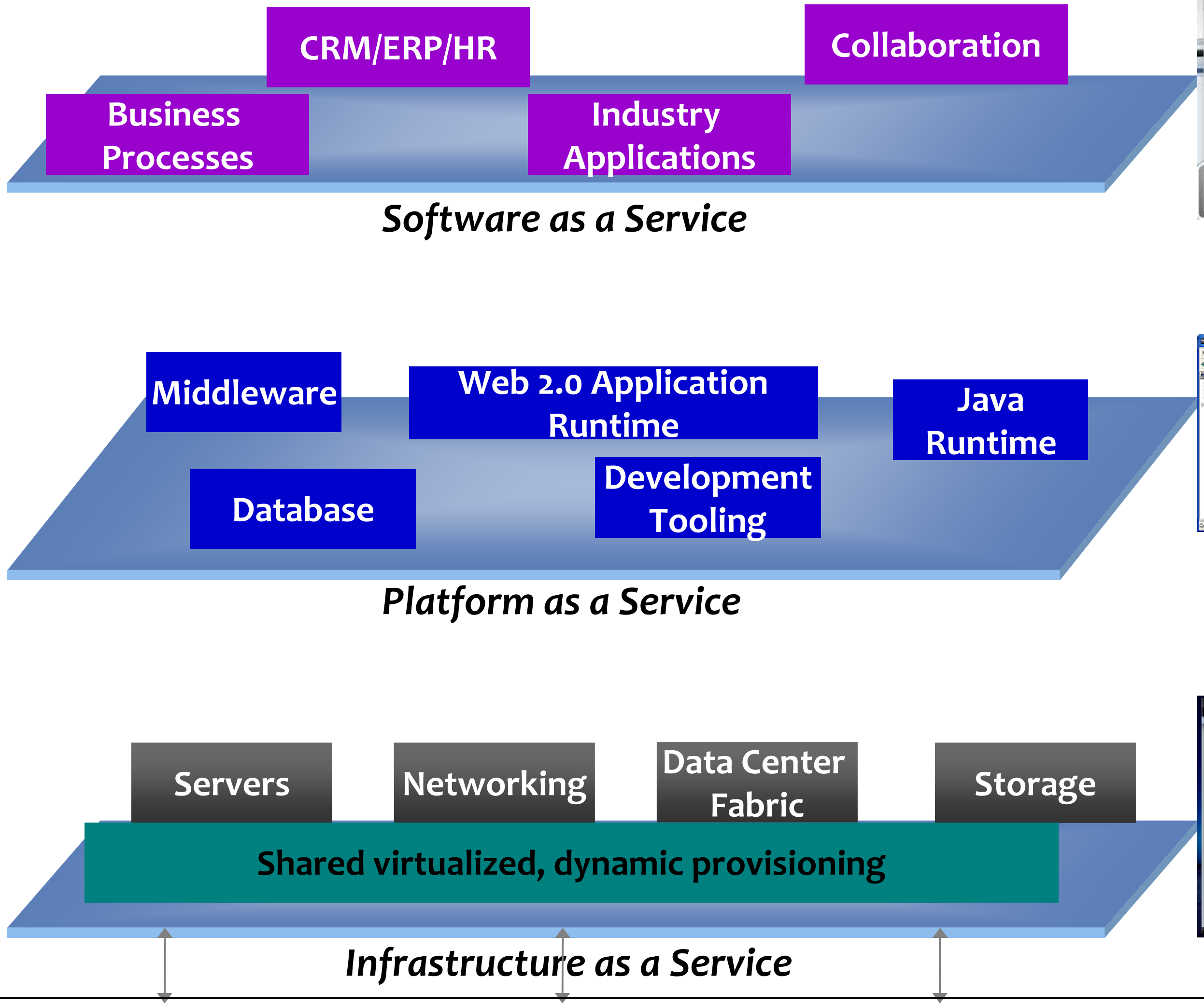


Datacenter Infrastructure
Monitor & Manage Services & Resources
Access Services
Service Consumers
Cloud Administrator
IT Cloud
Service Catalog, Component Library
Publish & Update Components, Service Templates
Component Vendors / Software Publishers

Cloud Computing as Service Provider and User

Cloud service Layer

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

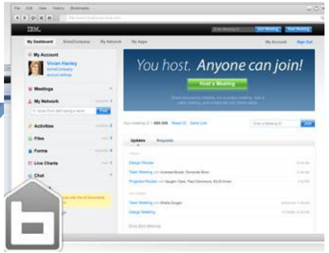
Networking

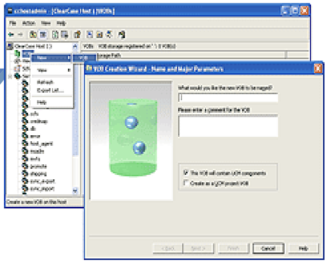
Data Center Fabric

Storage

Shared virtualized, dynamic provisioning

Infrastructure as a Service





Cloud Computing Center

VIRTUALISIERUNG + **STANDARDISIERUNG** + **AUTOMATION** = **smaller costs** **higher flexibility**

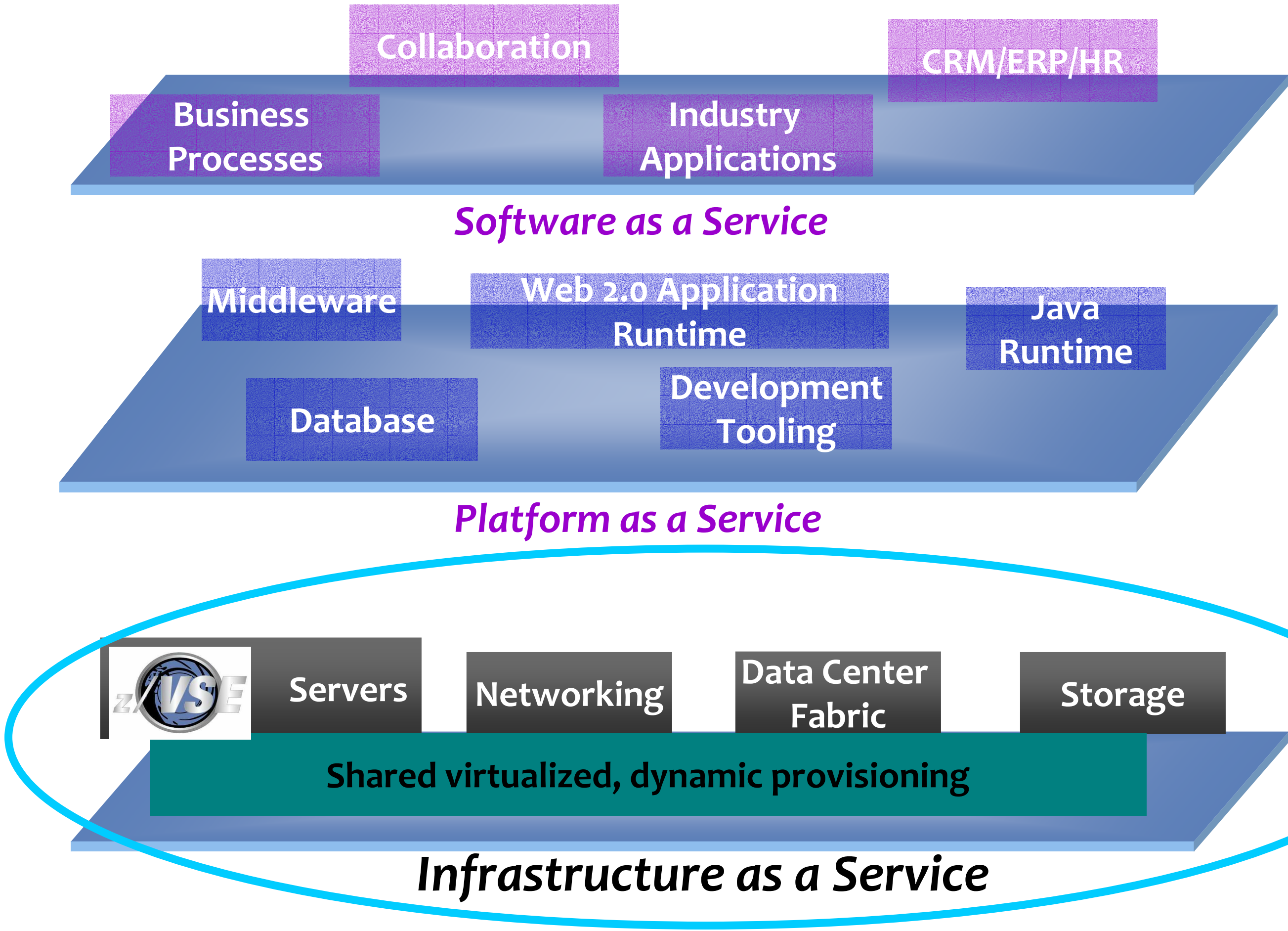
z/VSE can participate in all 3 Cloud Layer

- z/VSE in an Infrastrukture as a Service (IaaS)

- z/VSE in a Plattform as a Service (PaaS)

- z/VSE in a Software as a Service (SaaS)

Cloud Computing – Infrastructure as a Service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Infrastructure as a Service (IaaS) contains

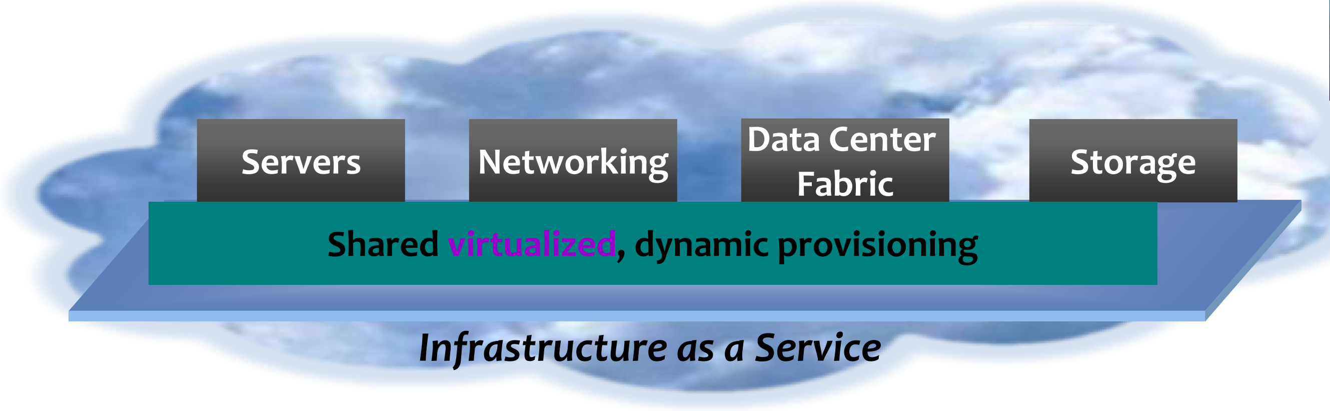
Service Provider

- **Server functionality**
- **Networking functionality**
- **Data center functionality**
- **Storage functionality**

- **Computer Infrastructure Delivery Model**
  - **Elemental technical services, accessing**

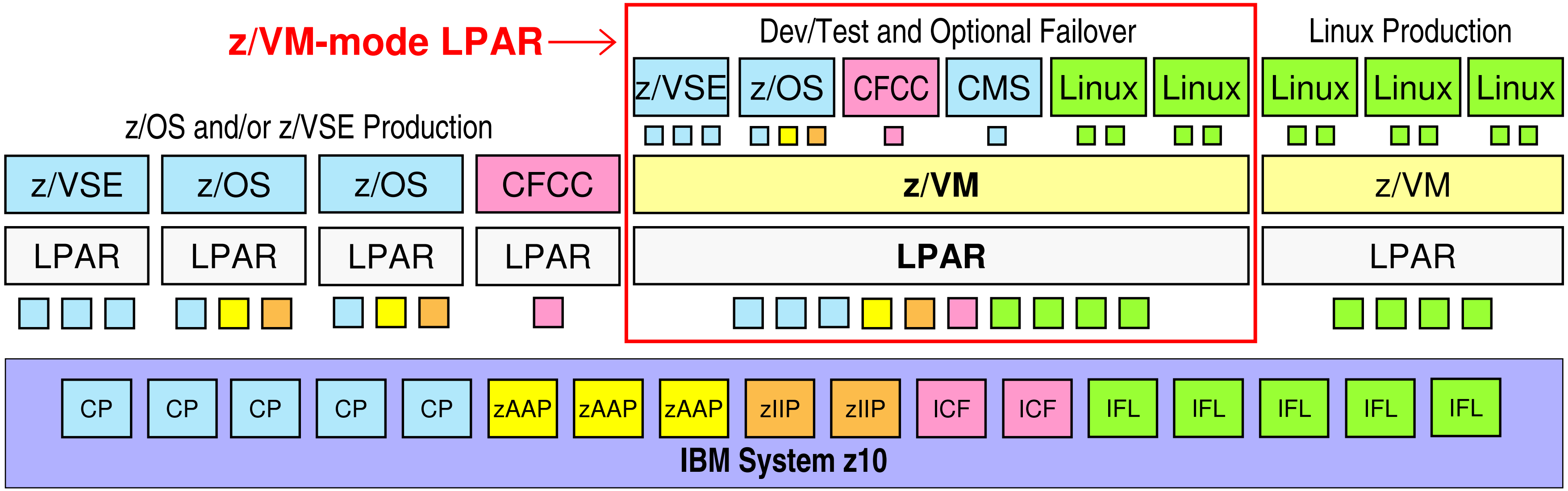
  hardware, e.g. server, storage, network devices
  - **Access to infastructure stack (OS plus Firewall, Routers, Load Balancers, etc.)**
- **• Advantage**
  - **Pay per use**
  - **Instant Scalability (up and down)**
  - **Reliability**
- **• Characteristics**
  - **Resources delivered as a service**
  - **Dynamic scaling of infrastructure**
  - **Variable cost**
  - **Multiple tenants**
  - **Enterprise grade infrastructure**

Cloud Computing Center
IBM


Servers
Networking
Data Center Fabric
Storage
Shared virtualized, dynamic provisioning
Infrastructure as a Service

z/VM Virtualization for IBM System z10

- New LPAR type for IBM System z10: *z/VM-mode*
  - **Allows z/VM V5.4 users to configure all CPU types in a z10 LPAR**
- Offers added flexibility for hosting mainframe workloads
  - **Add *IFLs* to an existing standard-engine z/VM LPAR to host Linux workloads**
  - **Add *CPs* to an existing IFL z/VM LPAR to host z/OS, z/VSE, or traditional CMS workloads**
  - **Add *zAAPs* and *zIIPs* to host eligible z/OS specialty-engine processing**
  - **Test integrated Linux and z/OS and z/VSE solutions in the same LPAR**
- No change to software licensing
  - **Software continues to be licensed according to CPU type**

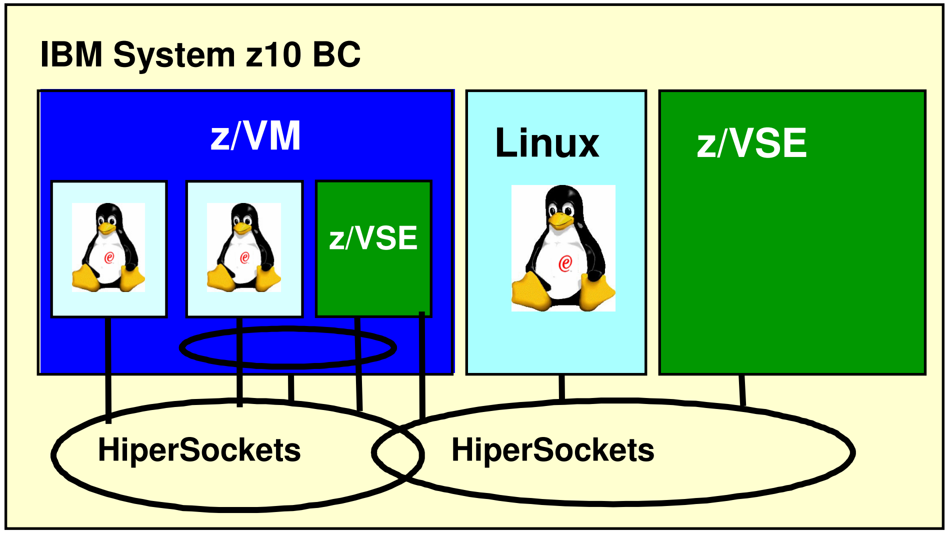


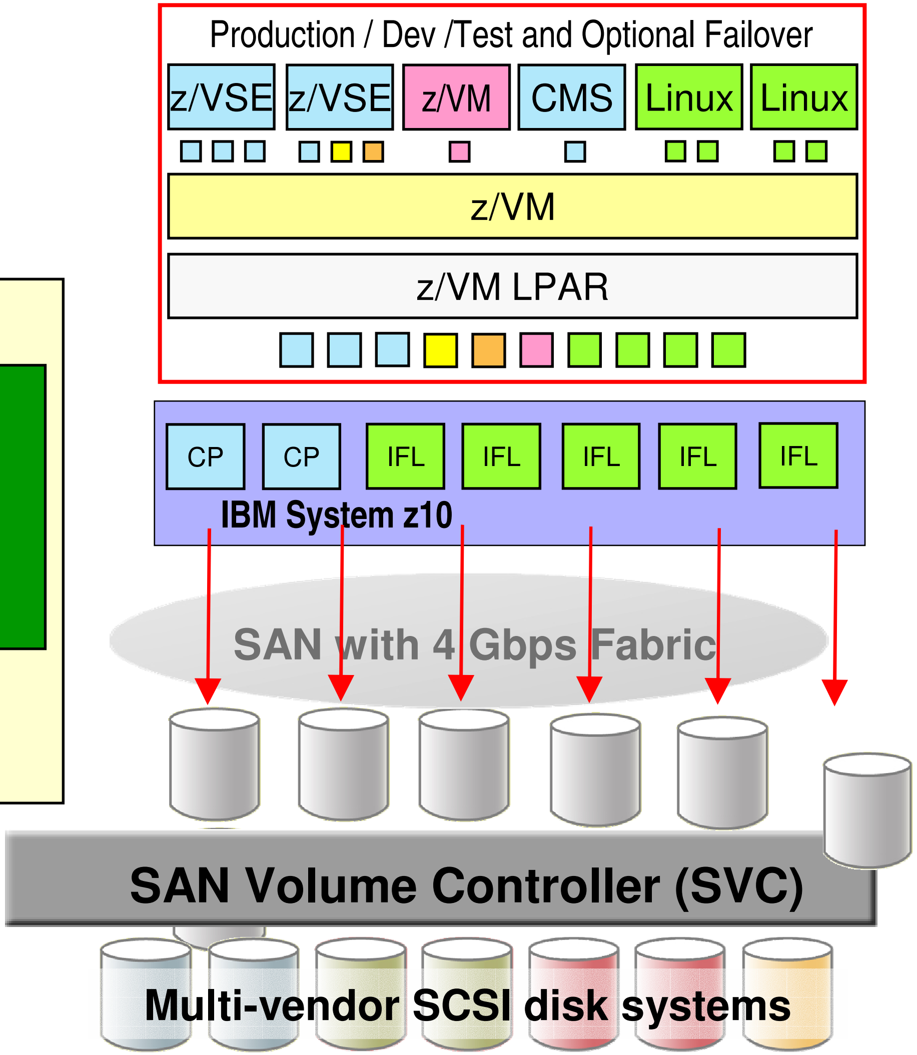
z/VM-mode LPAR
Dev/Test and Optional Failover
Linux Production
z/OS and/or z/VSE Production
z/VSE
z/OS
CFCC
CMS
Linux
Linux
Linux
Linux
Linux
z/VSE
z/OS
z/OS
CFCC
z/VM
z/VM
LPAR
LPAR
LPAR
LPAR
LPAR
LPAR
CP
CP
CP
CP
CP
zAAP
zAAP
zAAP
zIIP
zIIP
ICF
ICF
IFL
IFL
IFL
IFL
IFL
IBM System z10

IT Infrastructure Virtualization and network

- z/VSE can participate -

Network Virtualization


IBM System z10 BC
z/VM
z/VSE
Linux
z/VSE
HiperSockets
HiperSockets


Production / Dev /Test and Optional Failover
z/VSE
z/VSE
z/VM
CMS
Linux
Linux
z/VM
z/VM LPAR
CP
CP
IFL
IFL
IFL
IFL
IFL
IBM System z10
SAN with 4 Gbps Fabric
SAN Volume Controller (SVC)
Multi-vendor SCSI disk systems

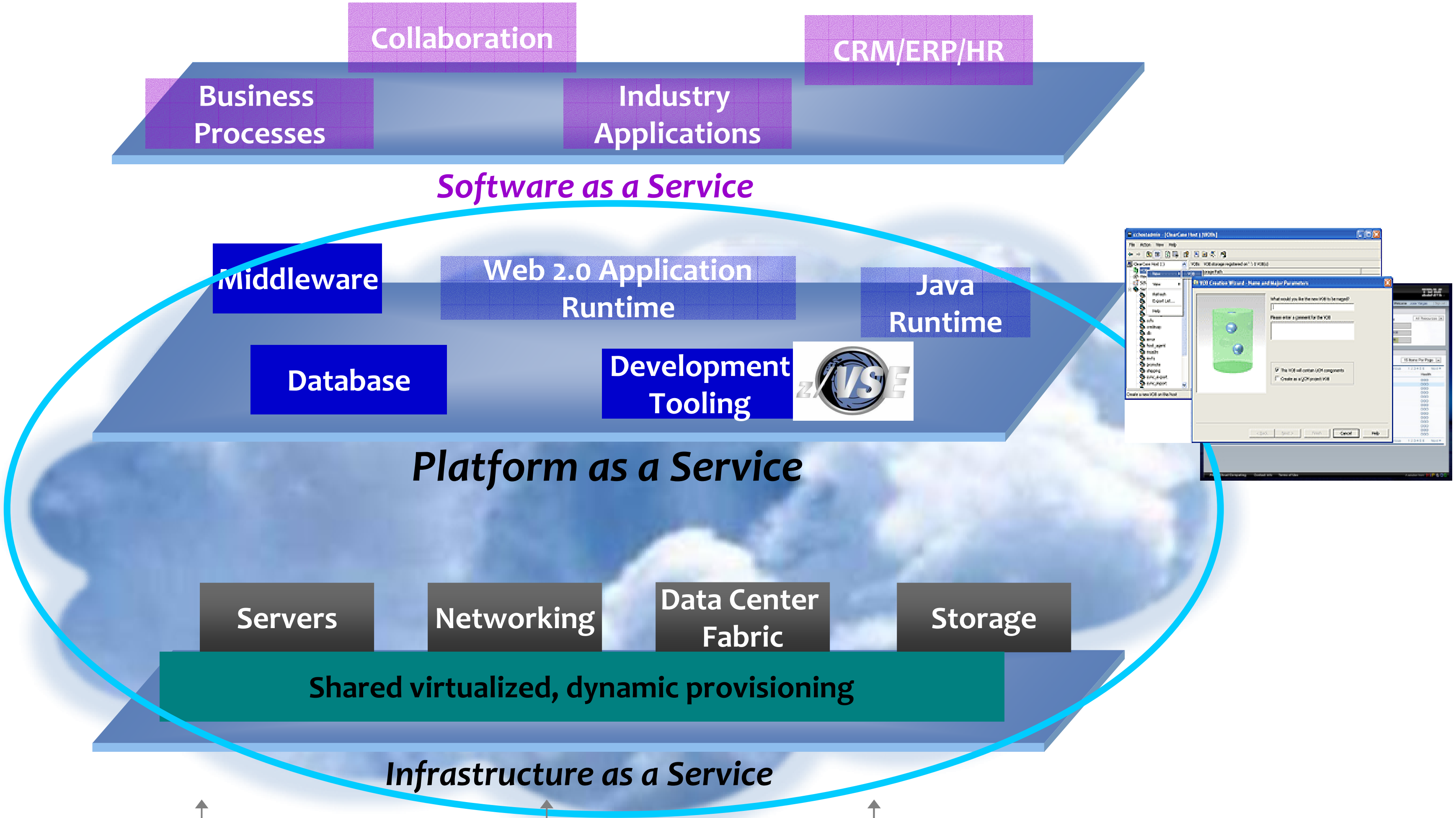
Cloud Computing – Infrastructure as a Service

z/VSE Cloud Scenario – Private Cloud

- Definition of System z Resources for the Cloud
- Service Catalog with different z/VSE Versions und sizes as z/VM guests
- Disc choices with different sizes and types (for enhancements)
- Network type decision as Hipersockets or z/VM
- Web Front End for Self-service
- SLA definitions for Availability Requirements
- Cost definitions for i.e inter - departmental payments

- Areas of use:
  - Test and Development Server - flexible, self-service, auto-managed (Today agreements are hand made with long wasted negotiation time)
  - Enhanced Server capacity for calculations at the end of month

Cloud Computing – Platform as a Service


Collaboration
CRM/ERP/HR
Business Processes
Industry Applications
Software as a Service
Middleware
Web 2.0 Application Runtime
Java Runtime
Database
Development Tooling
z/VSE
Platform as a Service
Servers
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Infrastructure as a Service

VIRTUALISIERUNG + STANDARDISIERUNG + AUTOMATION = smaler costs higher flexibility

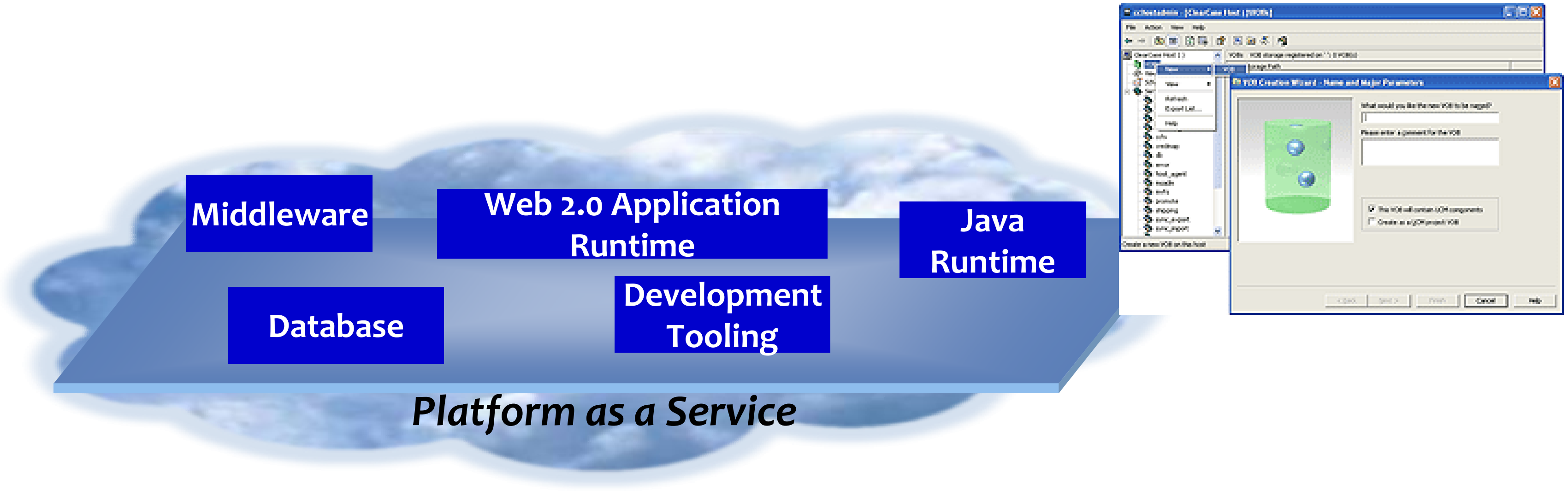
oration

Platform as a Service (PaaS) contains

- **Applications**
- **Middleware**
- **Development tools**
- **Java and Web 2.0 runtimes**

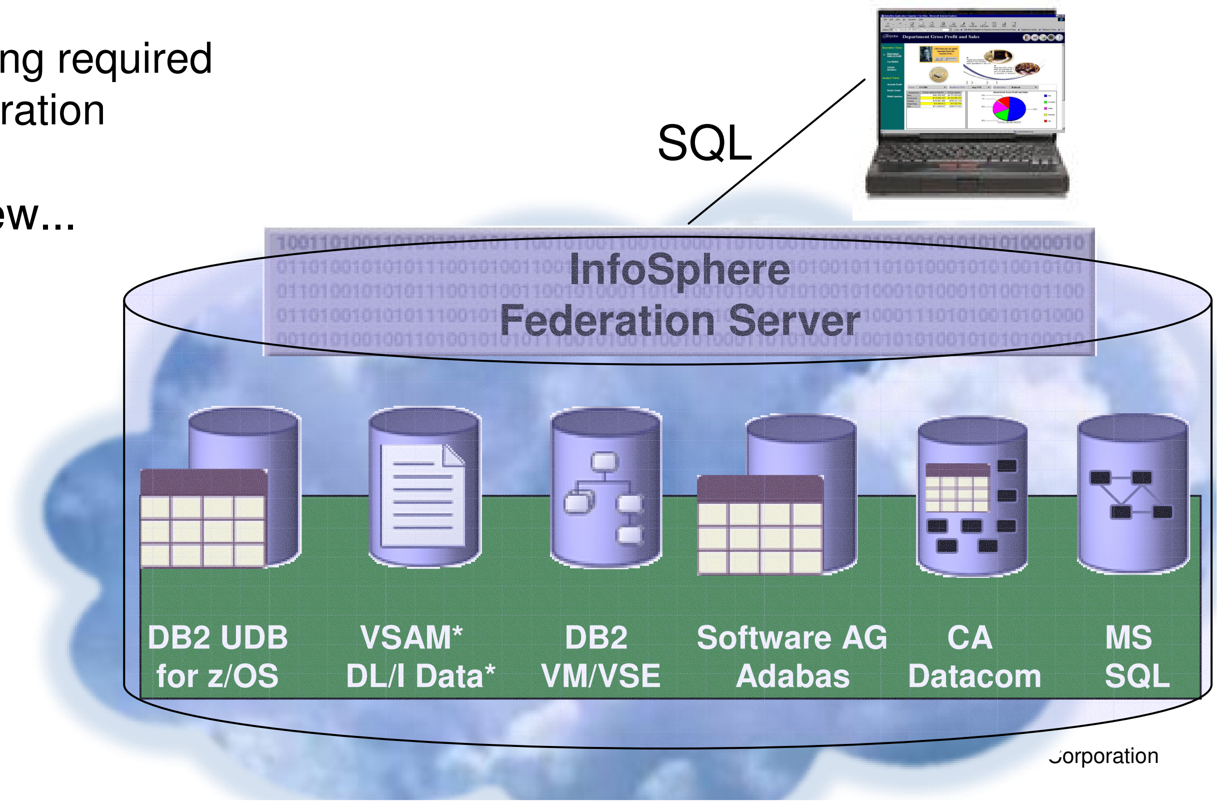
Characteristics

- Services to develop, test, deploy, host and maintain applications in the same integrated development environment
- Web based user interface creation tools
- Multi-tenant architecture
- Integration with web services and databases
- Support for development team collaboration
- Utility-grade instrumentation


Middleware
Web 2.0 Application Runtime
Java Runtime
Database
Development Tooling
Platform as a Service

Data Management Systems as Service
IBM InfoSphere Federation Server

- Integrating at the data layer – Federation of data
  - Read from and write to federated mainframe data sources using SQL
  - Standards-based access via JDBC, ODBC, or Call Level Interface
    - Including for VSAM
  - Multithreaded with native drivers for scalable performance
  - Metadata-driven means...
    - No mainframe programming required
    - Fast installation & configuration
    - Ease of maintenance
  - Works with existing and new...
    - Mainframe infrastructure
    - Application infrastructure
    - Toolsets

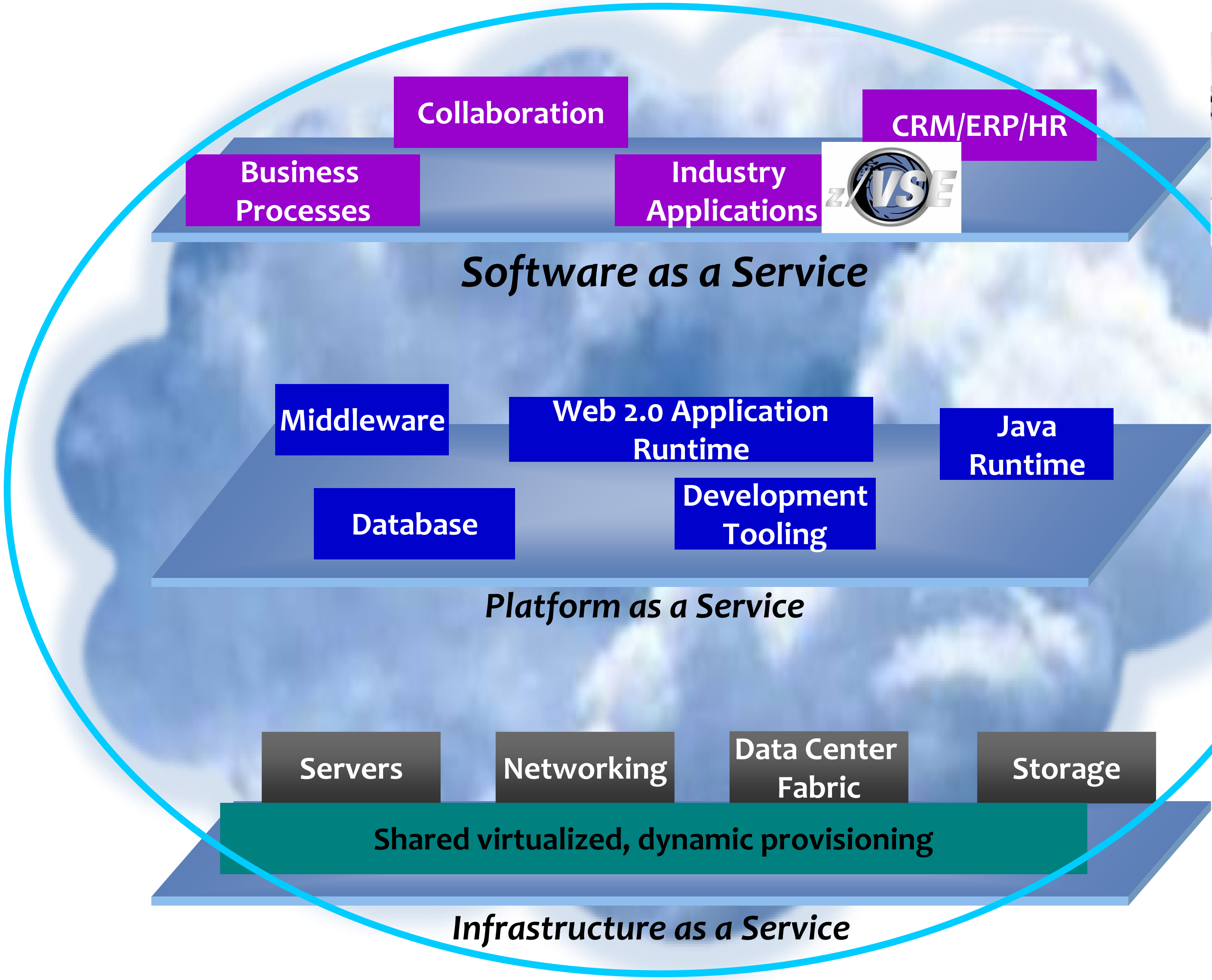

SQL
InfoSphere Federation Server
DB2 UDB for z/OS
VSAM* DL/I Data*
DB2 VM/VSE
Software AG Adabas
CA Datacom
MS SQL

Cloud Computing – ’Platform as a Service’

z/VSE Cloud Scenario – Mixed Cloud

- Definition of z/VSE Middleware that belongs to the Cloud
- Service Catalog with different software solutions or Database entities (which run on z/VSE as z/VM Guests)
  - i.e. a database server under z/VSE, or Web infrastructure that works with z/VSE transactions (i.e. Supreme Court IT – with PaaS for Courts- with their own appls/routines, with different law regulations)
- Web Front End choices for self definition
- SLA definitions for Availability Requirements of the platform
- Cost definitions for the platform services
- Areas of use:
  - Development platform (flexible, self definition)
  - Platform provider for external user with self-definition of the sizes, SLAs – Catalog for standard services, premium services, Clients handling process

Cloud Computing – Software as a Service



Collaboration

CRM/ERP/HR

Business Processes

Industry Applications

z/VSE

Software as a Service

Middleware

Web 2.0 Application Runtime

Java Runtime

Database

Development Tooling

Platform as a Service

Servers

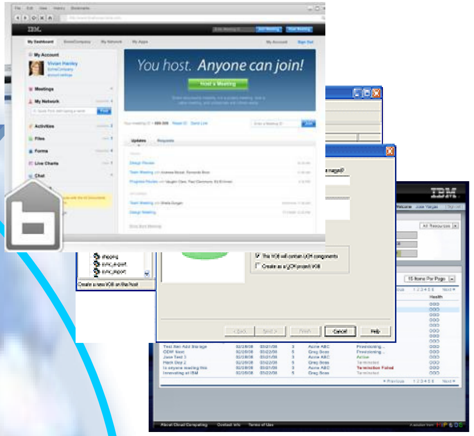
Networking

Data Center Fabric

Storage

Shared virtualized, dynamic provisioning

Infrastructure as a Service

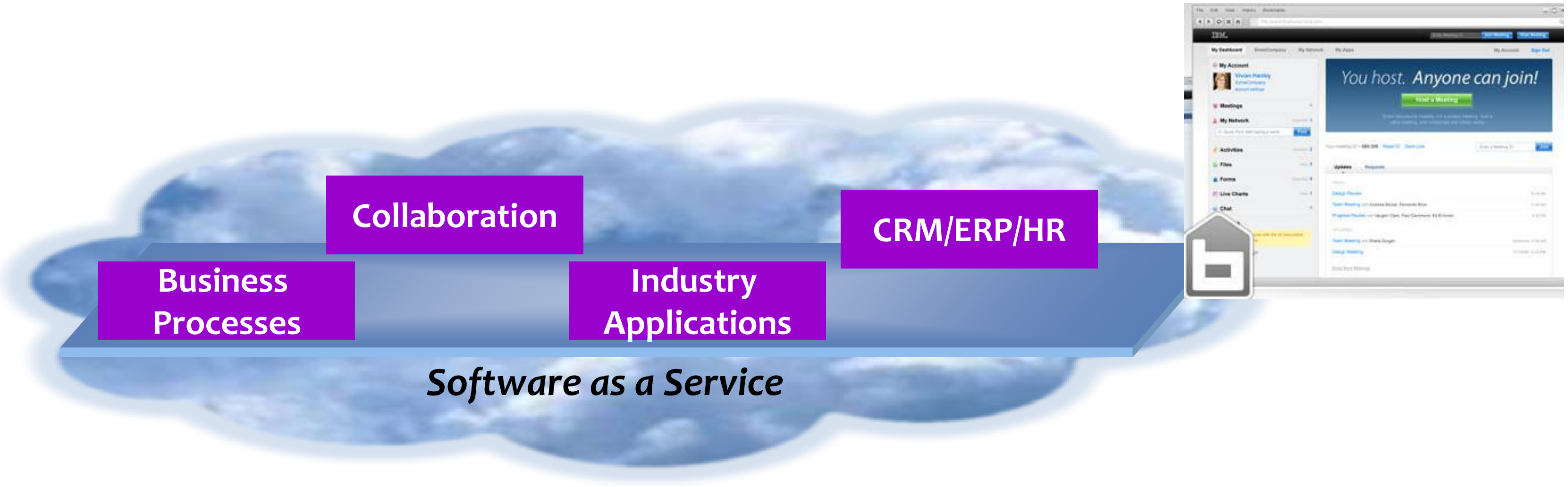


You host. Anyone can join!

Software as a Service (SaaS) contains

- **Business processes**
- **Enterprise applications**
- **Collaboration tools**

- Software Delivery Model
  - Service delivered through a browser
  - No hardware, OS and software to manage
- Characteristics
  - Reliability
  - Instant Scalability (up and down)
  - network-based access to, and management of,
  - commercially available software
  - activities managed from central locations
  - application delivery one-to-manymodel
  - centralized feature updating,

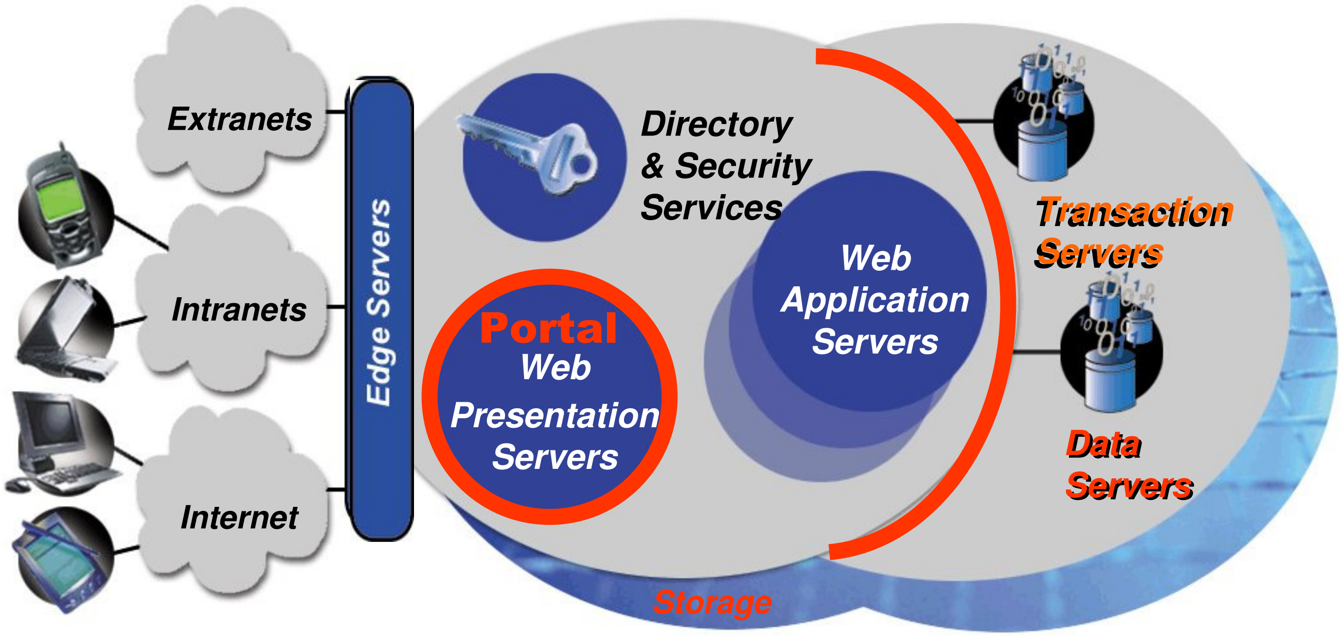

Collaboration
Business Processes
Industry Applications
CRM/ERP/HR
Software as a Service
You host. Anyone can join!

Software Infrastructure

End User Services

Web - Business Appl. Services

Data / Transaction Services


Extranets
Intranets
Internet
Edge Servers
Directory & Security Services
Portal
Web Presentation Servers
Web Application Servers
Transaction Servers
Data Servers
Storage

Responsive

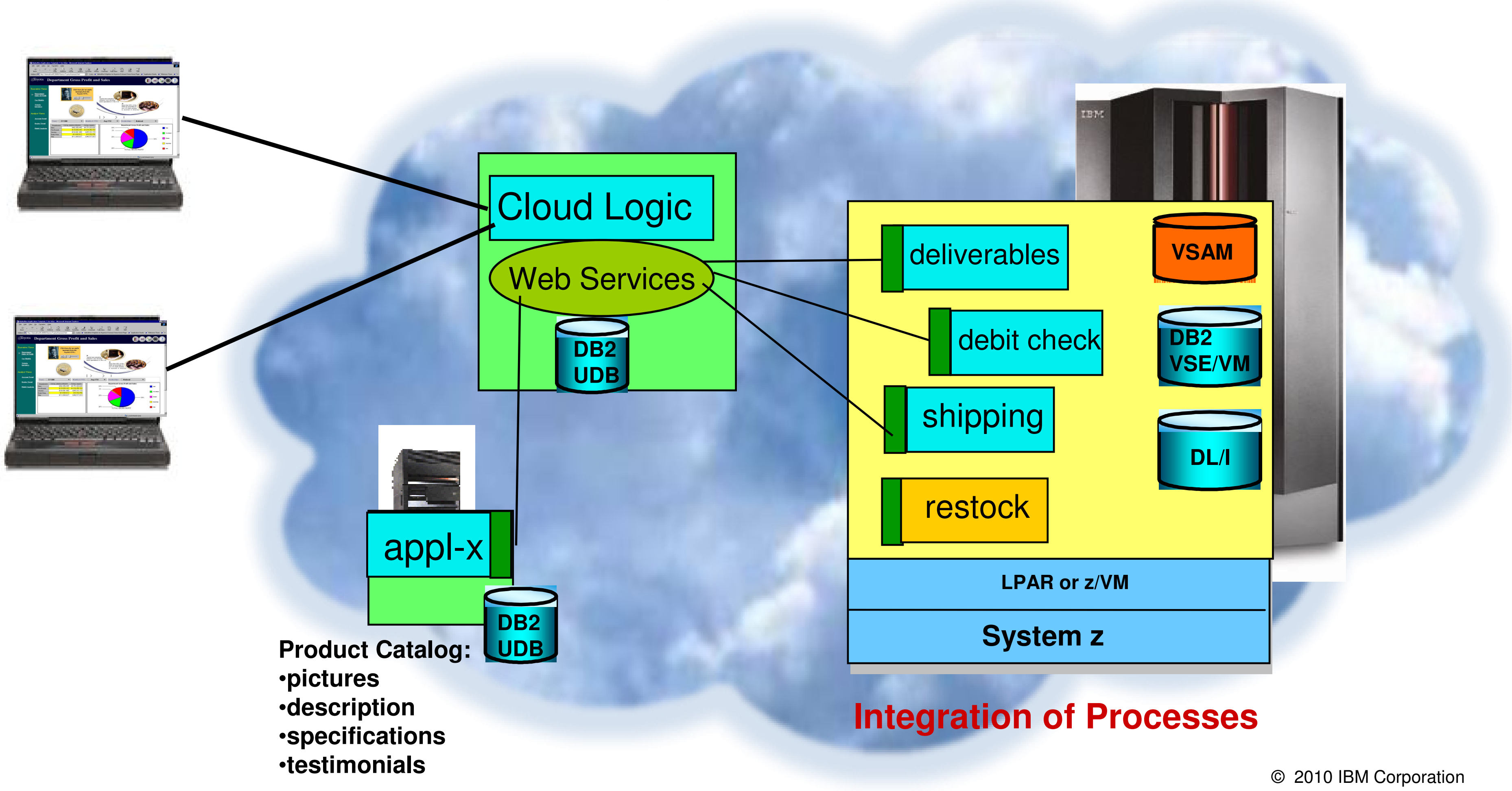
Dynamic & Flexible

Reliable & Robust

SOA – the standard way to New applications and processes

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

Increases business for the Company



Cloud Logic
Web Services
DB2
UDB
appl-x
DB2
UDB
deliverables
debit check
shipping
restock
VSAM
DB2
VSE/VM
DL/I
LPAR or z/VM
System z

Product Catalog:
- **pictures**
- **description**
- **specifications**
- **testimonials**

Integration of Processes

Cloud Computing – Software as a Service

z/VSE Cloud Scenario – Mixed Cloud

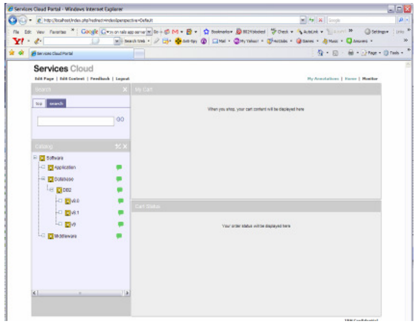
- Service Definition (C/S and z/VSE) which should belong to the cloud
- Service Catalog with different software services (which run on z/VSE in z/VM Guests)
  - i.e. a service under z/VSE for orders or payments, or Web infrastructure that works with z/VSE transactions (i.e. Supreme Court IT– with SaaS for payment service for police tickets)
- Web Front End for self definition and selection of the services
- SLA definitions for Availability Requirements of the applications
- Cost definitions for the software services per call of a service or CPU time

- Areas of use:
  - Areas where scalable applications will be used from a high number of users
  - Software Services Provider for internal and external users with definition of the SLAs – for Standard Software Services – Ordering, Processing of orders
- Samples: Credibility verification, Tax calculation, W&M Services call – for orderings and self-service automation

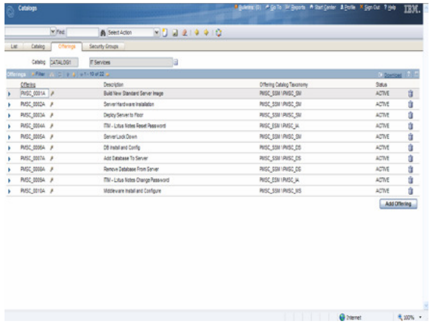
“Self-service” drives Process Standardization

End Users

Service Portal



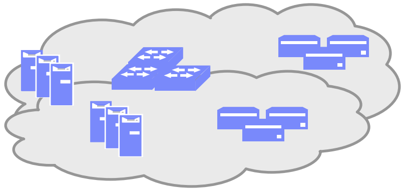
Service Request Catalog



Provisioning Engine
- Workflows
- Expert Systems
- Scripts

Optional Service Modules
- e.g. Metering/ Usage Billing, Monitoring, etc.

Virtualized Cloud Infrastructure



Advantages:

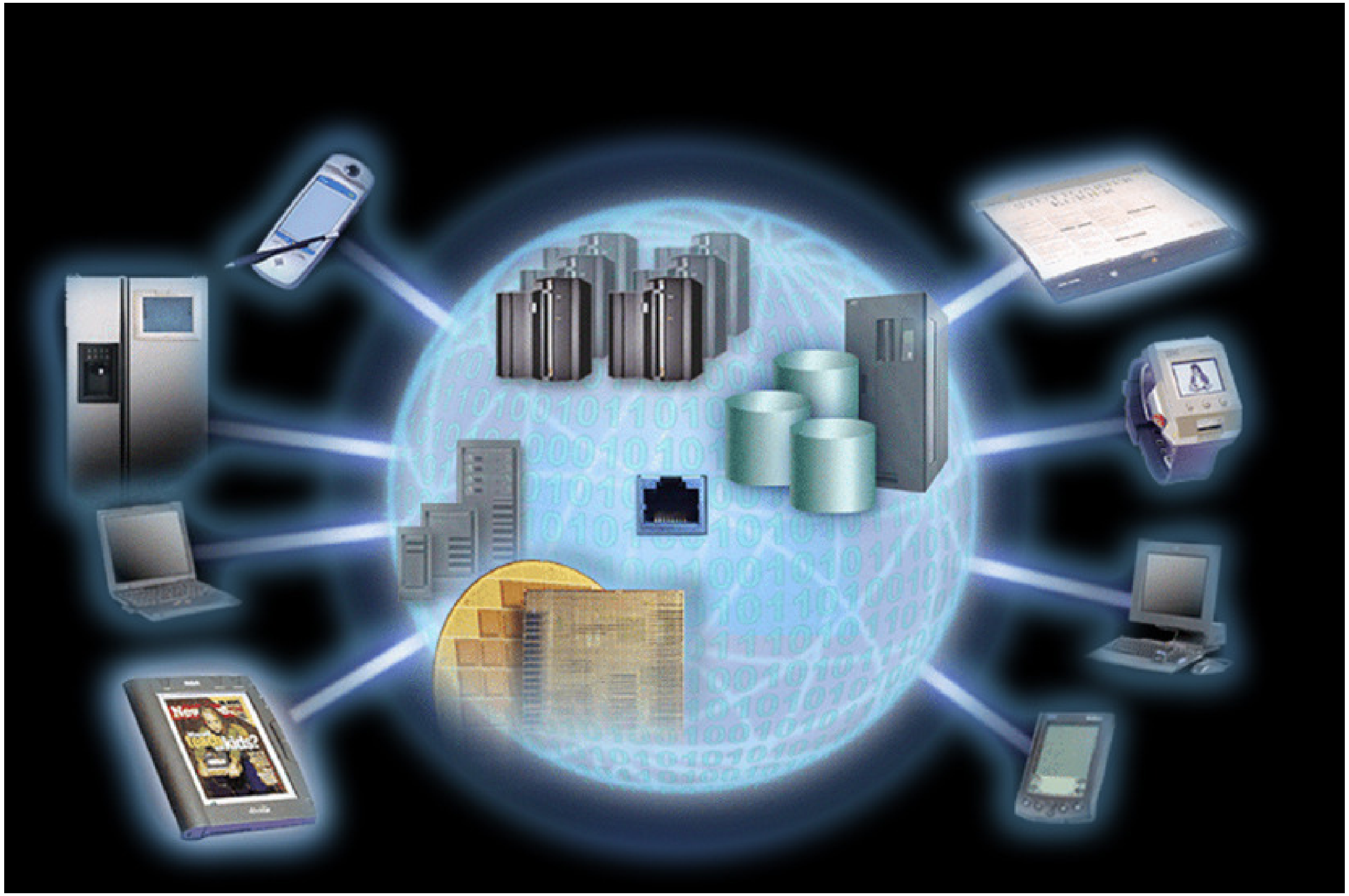
Cost Control

Access- and Handling- friendly

Process Automation / Transformation

Cloud computing User Perspective

- From anywhere, Always available, fast, scalable, standard access



Different groups see different Cloud benefits

IT Customers:
- Flexible pricing
- Outsourced, on demand provisioning
- Unlimited scaling
- SW developer platform
- Flexible

IT Analysts:
- Variable pricing
- No long term commitments
- Hosted, on demand provisioning
- Massive, elastic scaling
- Standard Internet technology
- Abstracted infrastructure
- Service-oriented

Common Attributes of Clouds

Flexible pricing
Elastic scaling
Rapid provisioning
Advanced virtualization

Press:
- Pay by consumption
- Lower costs
- On demand provisioning
- Grid and SaaS combination
- Massive scaling
- Efficient infrastructure
- Simple and easy

Financial Analysts:
- Utility pricing
- Multi-core chips
- Hosted, a-a-s provisioning
- Parallel, on demand processing
- Scalable
- Virtualized, efficient infrastructure
- Flexible

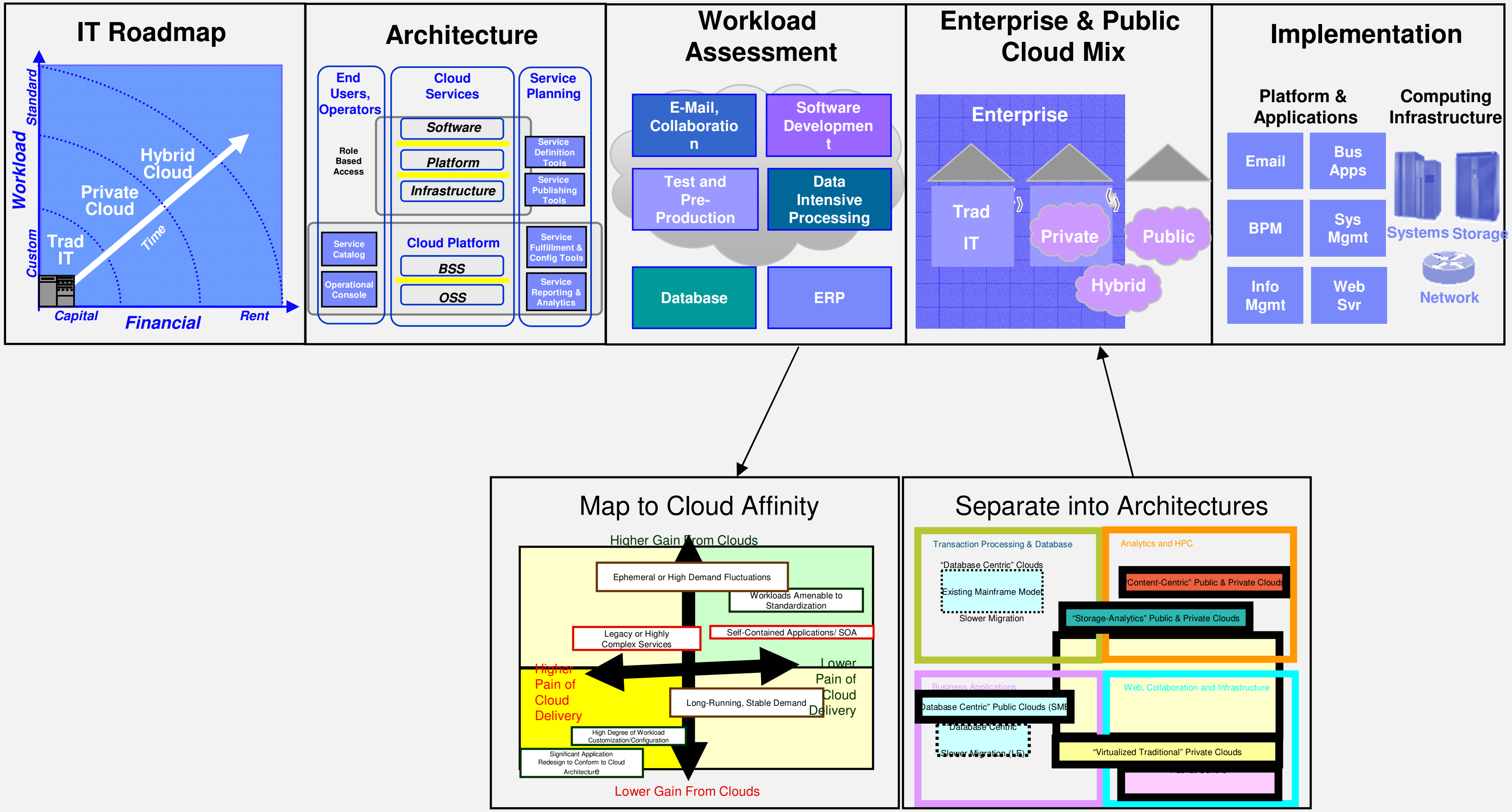
Source: IBM Corporate Strategy analysis of MI, PR, AR and VCG compilations

Conclusion

- With z/VSE you can participate in a Cloud Computing Environment

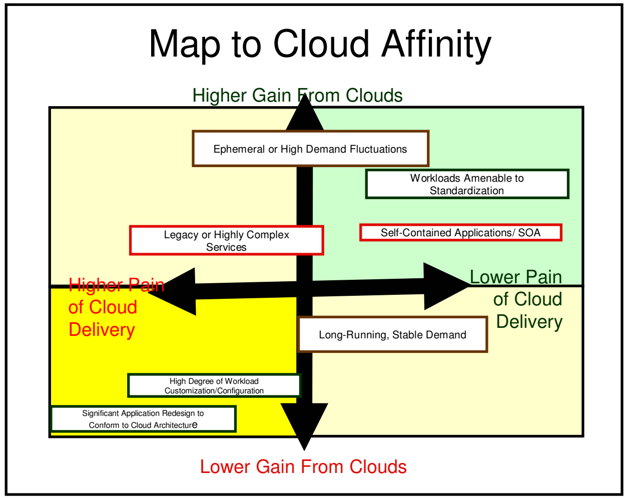
Developing the Cloud strategy and implementation plan

Steps to Cloud computing


IT Roadmap
Workload
Standard
Custom
Hybrid Cloud
Private Cloud
Trad IT
Time
Capital
Financial
Rent
Architecture
End Users, Operators
Role Based Access
Cloud Services
Software
Platform
Infrastructure
Service Planning
Service Definition Tools
Service Publishing Tools
Service Catalog
Operational Console
Cloud Platform
BSS
OSS
Service Fulfillment & Config Tools
Service Reporting & Analytics
Workload Assessment
E-Mail, Collaboration
Software Development
Test and Pre-Production
Data Intensive Processing
Database
ERP
Enterprise & Public Cloud Mix
Enterprise
Trad IT
Private
Public
Hybrid
Implementation
Platform & Applications
Computing Infrastructure
Email
Bus Apps
BPM
Sys Mgmt
Info Mgmt
Web Svr
Systems
Storage
Network
Map to Cloud Affinity
Higher Gain From Clouds
Ephemeral or High Demand Fluctuations
Workloads Amenable to Standardization
Legacy or Highly Complex Services
Self-Contained Applications/ SOA
Higher Pain of Cloud Delivery
Lower Pain of Cloud Delivery
Long-Running, Stable Demand
High Degree of Workload Customization/Configuration
Significant Application Redesign to Conform to Cloud Architecture
Lower Gain From Clouds
Separate into Architectures
Transaction Processing & Database
"Database Centric" Clouds
Existing Mainframe Model
Slower Migration
Analytics and HPC
"Content-Centric" Public & Private Clouds
"Storage-Analytics" Public & Private Clouds
Business Applications
"Database Centric" Public Clouds (SME
"Database Centric"
Slower Migration (LE)
Web, Collaboration and Infrastructure
"Virtualized Traditional" Private Clouds

Workload assessment / analysis

I. Identify workloads best suited for cloud


Map to Cloud Affinity
Higher Gain From Clouds
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Higher Pain of Cloud Delivery
Lower Pain of Cloud Delivery
Long-Running, Stable Demand
High Degree of Workload Customization/Configuration
Significant Application Redesign to Conform to Cloud Architecture
Lower Gain From Clouds

EXAMINE FOR RISK

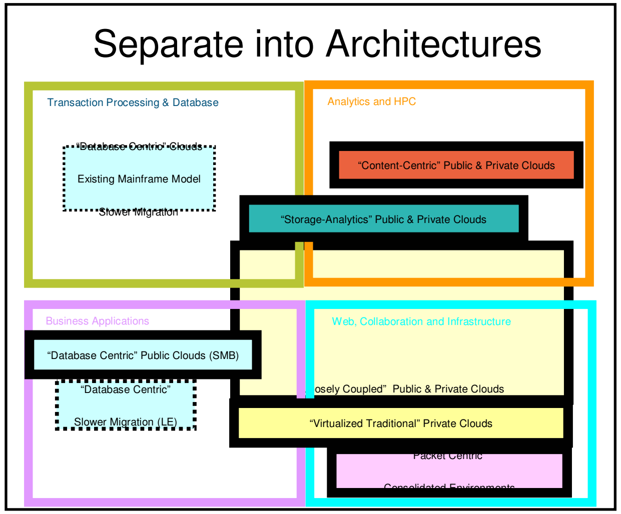
TEST FOR STANDARDIZATION

IDENTIFY INTEGRATION REQUIREMENTS

IDENTIFY BW & LATENCY REQUIREMENTS

EXPLORE NEW WORKLOADS

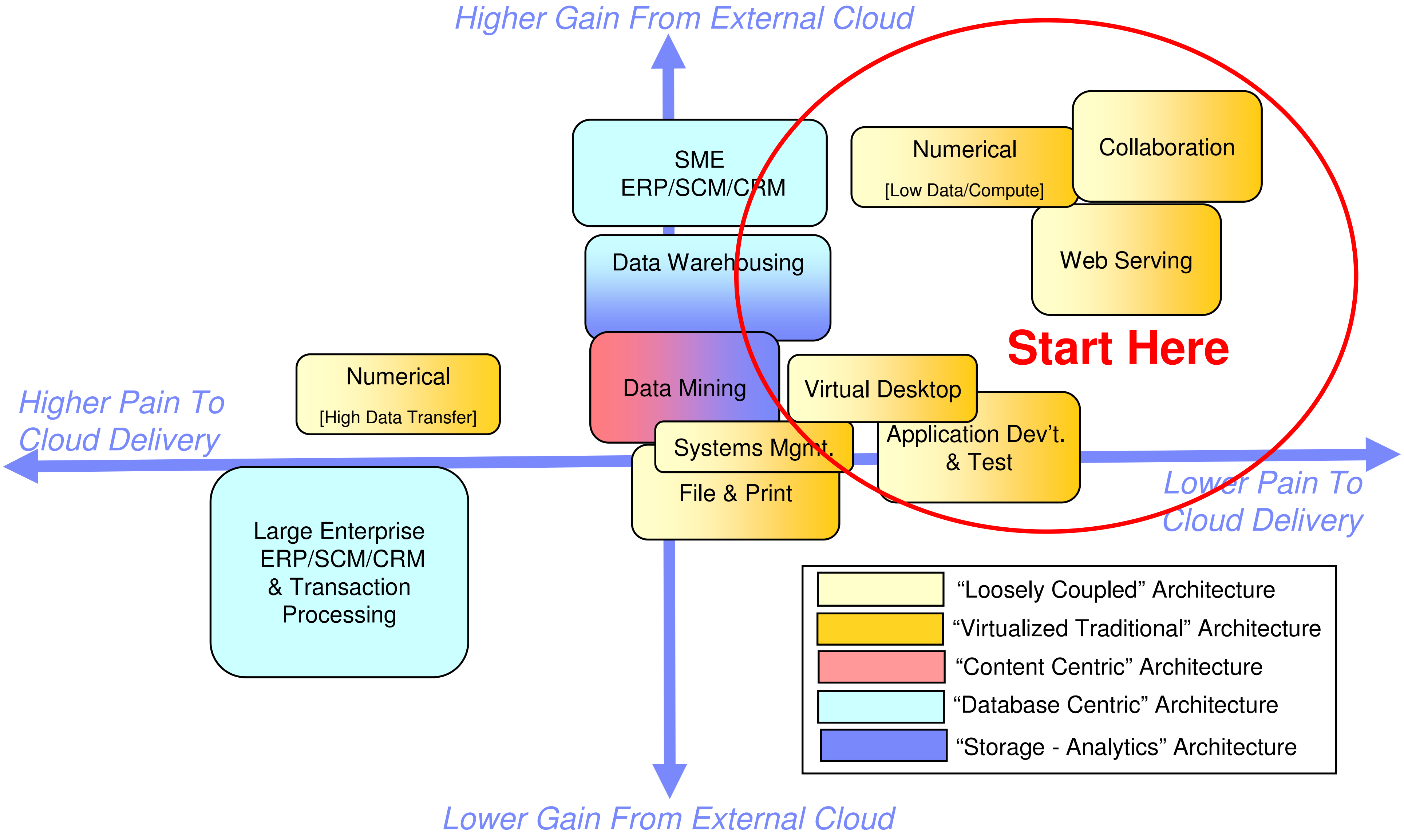
II. Separate workloads into appropriate cloud architectures


Separate into Architectures
Transaction Processing & Database
"Database Centric" Clouds
Existing Mainframe Model
Slower Migration
Analytics and HPC
"Content-Centric" Public & Private Clouds
"Storage-Analytics" Public & Private Clouds
Business Applications
"Database Centric" Public Clouds (SMB)
"Database Centric"
Slower Migration (LE)
Web, Collaboration and Infrastructure
osely Coupled" Public & Private Clouds
"Virtualized Traditional" Private Clouds
Packet Centric
Consolidated Environments

"Fit for purpose"
Group workloads based on similar technical & service level attributes

Multiple cloud architectures do & will exist

Workloads can be classified according to cloud affinity



Higher Gain From External Cloud

SME ERP/SCM/CRM

Numerical [Low Data/Compute]

Collaboration

Web Serving

Data Warehousing

Start Here

Numerical [High Data Transfer]

Data Mining

Virtual Desktop

Higher Pain To Cloud Delivery

Systems Mgmt.

Application Dev't. & Test

File & Print

Lower Pain To Cloud Delivery

Large Enterprise ERP/SCM/CRM & Transaction Processing

🟨 "Loosely Coupled" Architecture

🟧 "Virtualized Traditional" Architecture

🟥 "Content Centric" Architecture

🟦 "Database Centric" Architecture

🟪 "Storage - Analytics" Architecture

Lower Gain From External Cloud

Customer Example: Workload Mapping suggests split of ~60% Cloud / 40% Legacy

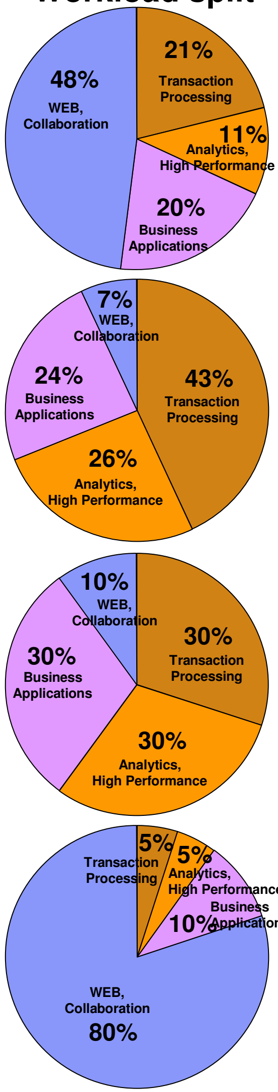
Workload split | **Platform split** | **Migration Analysis** | **Target platform split**

Retail applications
(2393 images, ±28% of total)

Wholesale applications
(4117 images, ±49% of total)

Insurance Applications
(1463 images, ±17% of total)

Generic Applications
(assumed ±500 images, ±6%)



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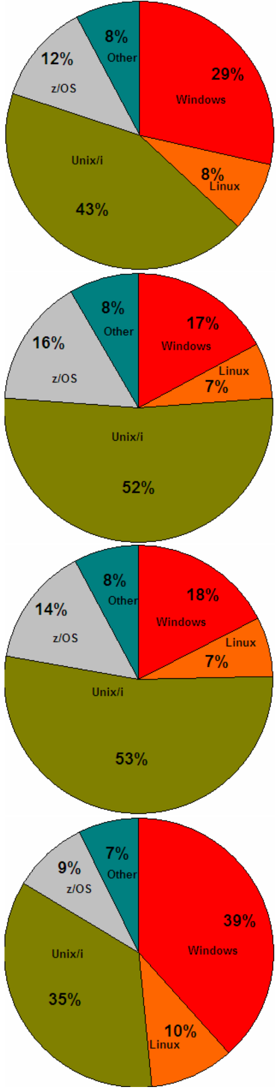

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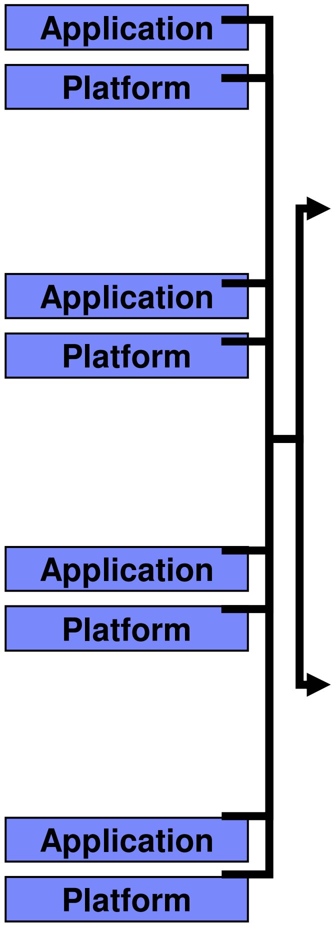
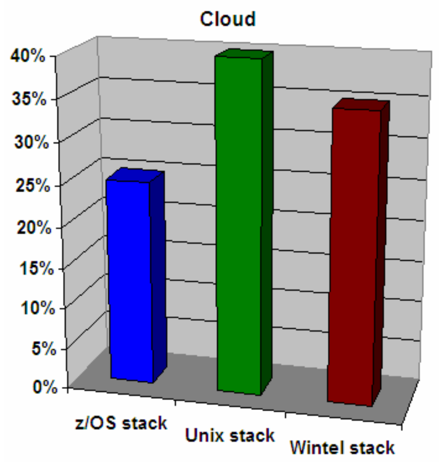


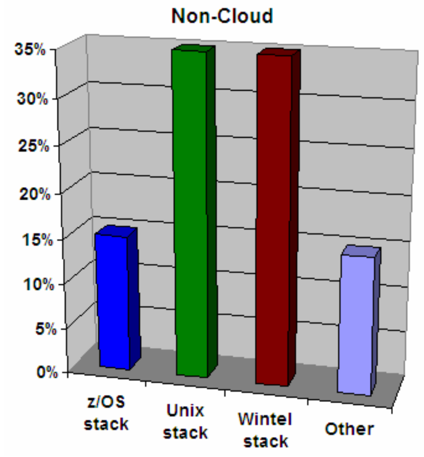
Application
Platform

Application
Platform

Application
Platform

Application
Platform





A practical approach to cloud computing

Plan & Prepare

Condition your existing infrastructure for cloud

- Virtualize and automate existing systems
- Add service management, service catalog

Define cloud strategy & roadmap

- Assess cloud deployment models, service options and workloads
- Plan cloud strategy and roadmap
- Choose initial project

Test & Deploy

Start with an isolated cloud deployment

- Choose low-risk workload such as test and development
- Standardize applications and systems
- Deploy self-service portal

Extend & Evolve

Use trusted cloud services to supplement data center capabilities for:

- Infrastructure as a Service (IaaS)
- Platform as a Service (PaaS)
- Software as a Service (SaaS)

Cloud Computing offers a lot of benefits at a low risk for today's typical testing environments and economics

- 30% to 50% of all servers within a typical IT environment are dedicated to test
- Most test servers run at less than 10% utilization, if they are running at all!
- IT staff report a top challenge is finding available resources to perform tests in order to move new applications into production
- 30% of all defects are caused by wrongly configured test environments
- Testing backlog is often very long and single largest factor in the delay new application deployments
- Test environments are seen as expensive and providing little real business value

Benefit
Risk

IBM Smart Business Development and Test Cloud Offering

A secure, private cloud environment clients can use to develop and test applications before sending them to production

- Creates a more efficient environment that improves productivity and reduces costs
- Includes an operating system, middleware, storage, network and virtual images, along with pre-integrated set of services, from planning through implementation
- Clients can leverage their existing systems or IBM's new CloudBurst

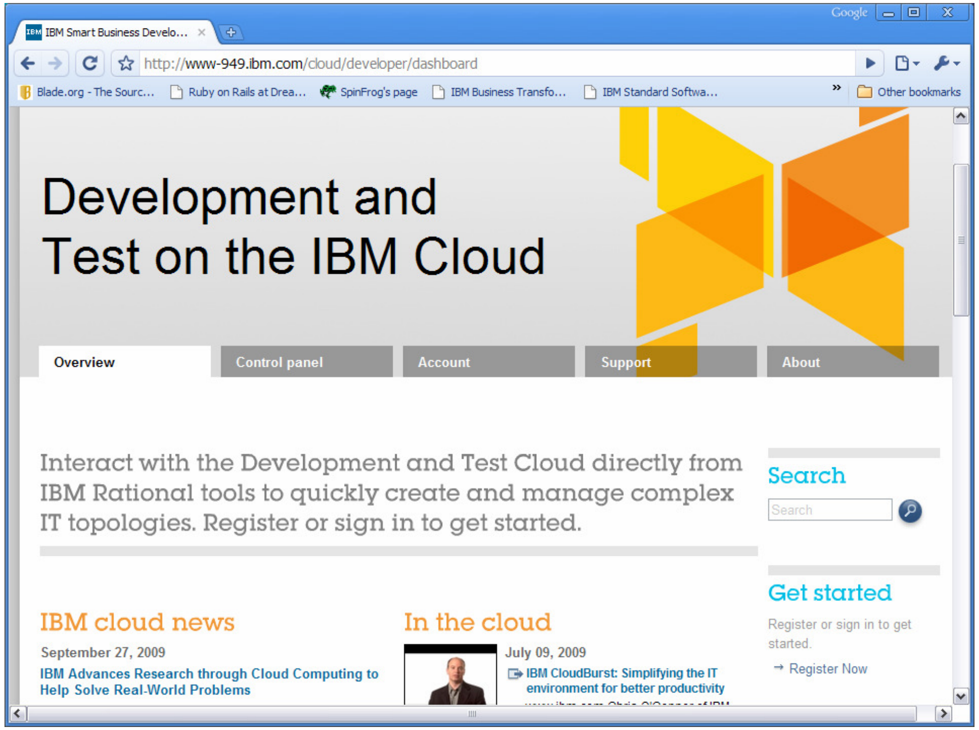
Development and Test
Environments
In the Cloud

Customer Benefits:

- **Reduce IT labor cost by 50% + - reduce labor for configuration, operations, management and monitoring of the environment**
- **75% + Capital utilization improvement; Significant license cost reduction**
- **Reduce Provisioning cycle times from weeks to minutes**
- **Reduce risk and improve Quality- eliminate 30% + of all defects that come from faulty configurations.**

Smart Business Development & Test on the IBM Cloud

External beta


IBM Smart Business Develo...
http://www-949.ibm.com/cloud/developer/dashboard
Blade.org - The Sourc...
Ruby on Rails at Drea...
SpinFrog's page
IBM Business Transfo...
IBM Standard Softwa...
Other bookmarks
Overview
Control panel
Account
Support
About
Search
Search
→ Register Now

Development and Test on the IBM Cloud

Interact with the Development and Test Cloud directly from IBM Rational tools to quickly create and manage complex IT topologies. Register or sign in to get started.

Get started

Register or sign in to get started.

IBM cloud news

September 27, 2009

IBM Advances Research through Cloud Computing to Help Solve Real-World Problems

In the cloud

July 09, 2009

IBM CloudBurst: Simplifying the IT environment for better productivity

- Available in 106 countries
- Self-signup, first come-first served system
- Externally routable
- Can use for customer demos
- Can use to help customers experience IBM software
- http://www.ibm.com/cloud/developer

Thank you!