Cloud Computing with z/VSE

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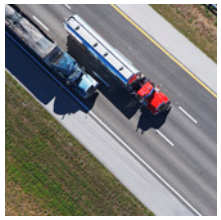
IT dynamics today

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



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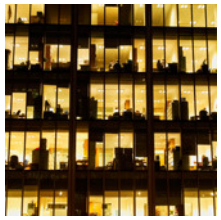
Facilities Infrastructure



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Production Infrastructure

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Technology Infrastructure

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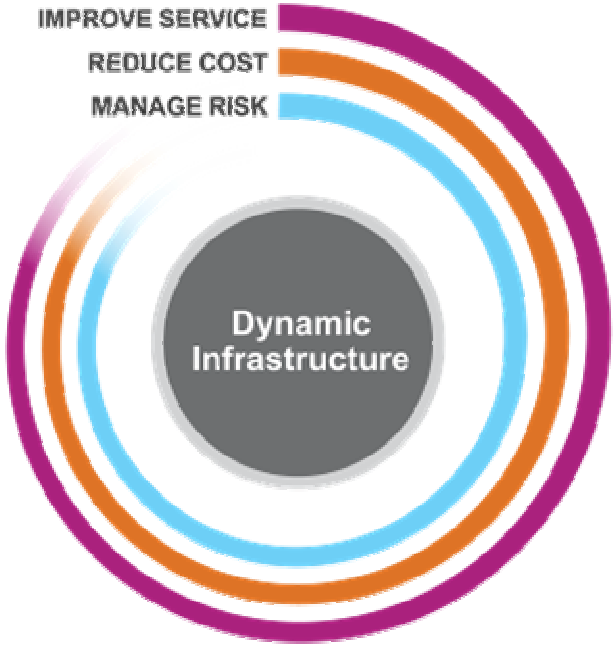
Communications Infrastructure

We need a *dynamic* infrastructure.

A dynamic infrastructure is required to address today's needs… and lay the foundation for the future.



Delivering superior business and IT services with agility and speed.

IMPROVE SERVICE

High availability and quality of existing services today …

… ***Providing for real-time, dynamic access to innovative new services.***

REDUCE COST

Containing operational cost and complexity today …

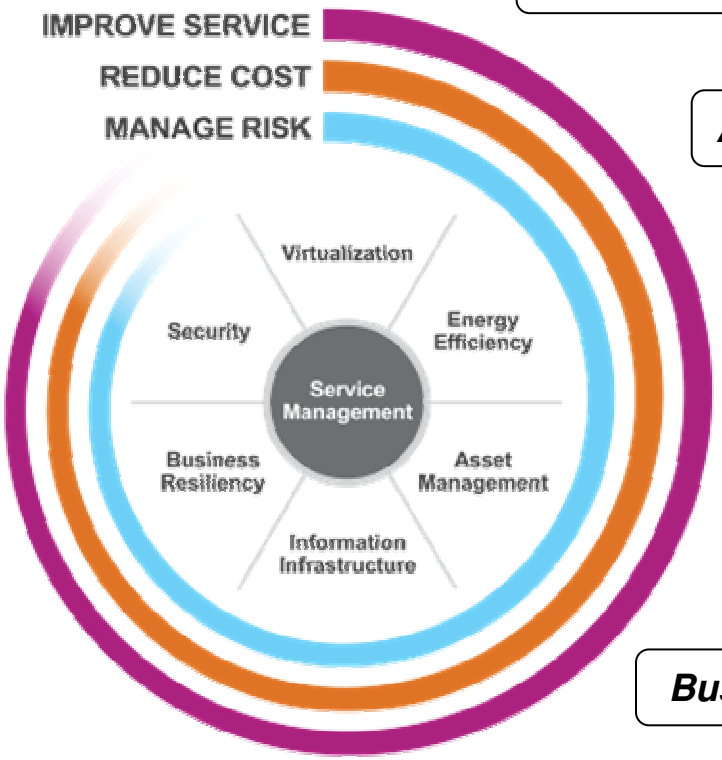
… ***Achieving breakthrough productivity gains tomorrow.***

MANAGE RISK

Addressing today's security, resiliency, and compliance challenges …

… ***Preparing for the new risks of a more connected and collaborative world.***

Building a dynamic 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, environment, and sustainability challenges 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

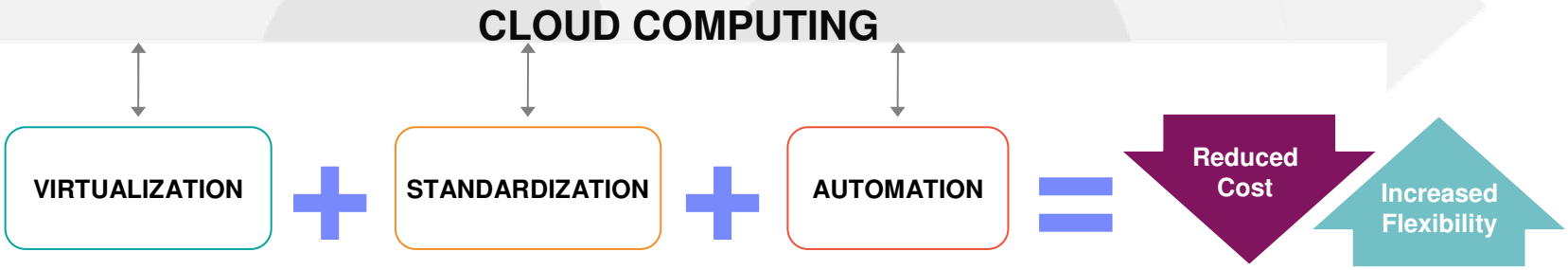
End to end industry customized governance, risk management and compliance solutions.

Information Infrastructure

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

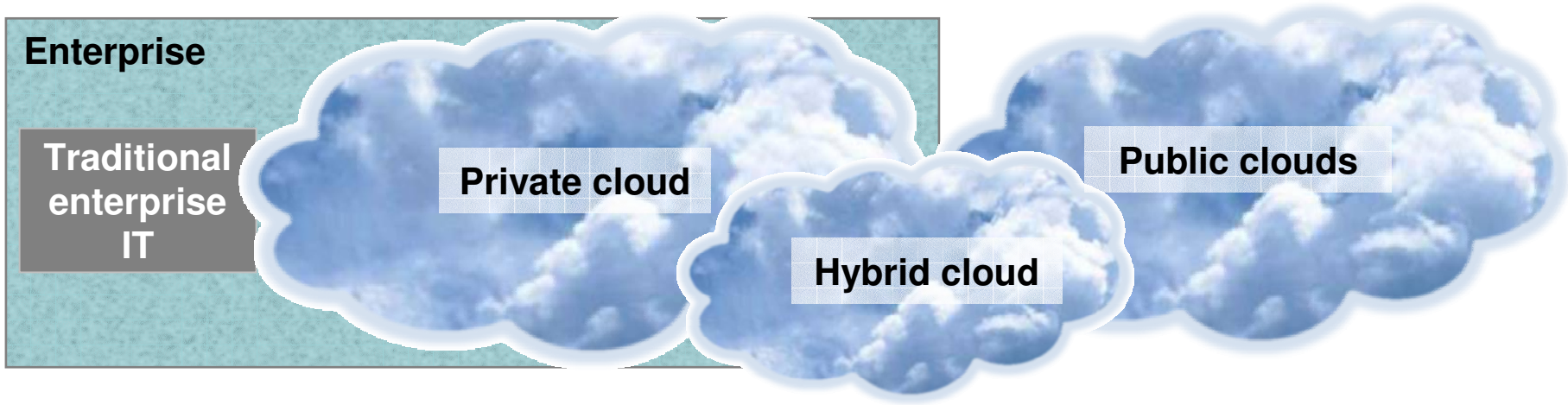
Cloud Computing - the new computing model

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



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

Three Cloud Computing delivery models deliver workload services



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

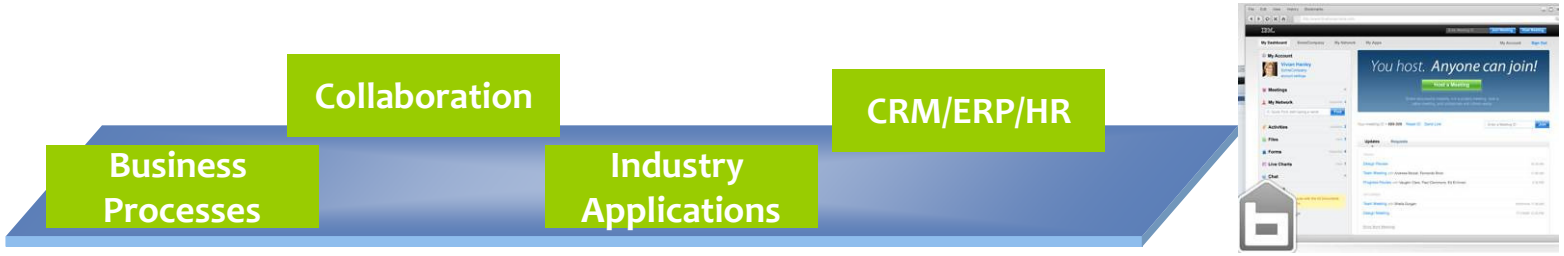
Workloads are provided "as a service," over the Internet

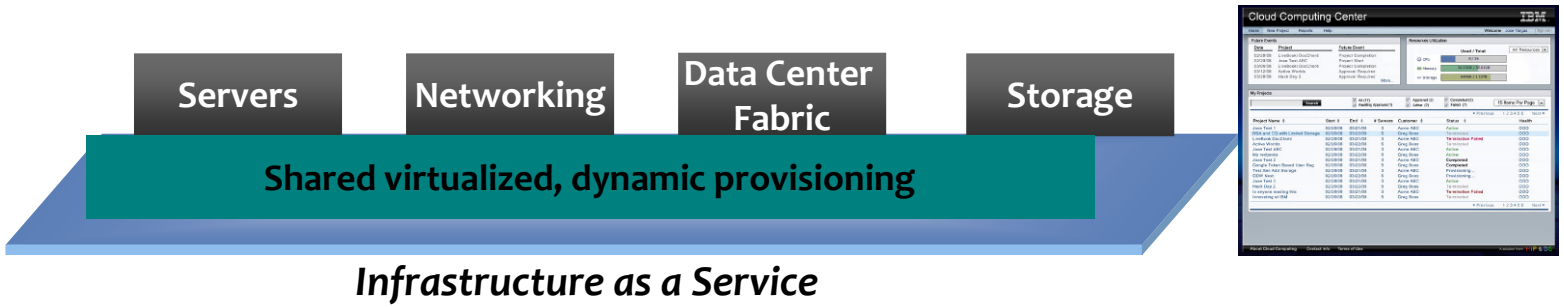
- *Clients prefer private clouds - 64% over public or hybrid clouds, however appeal of public and hybrid cloud is growing.**
- *Concerns about security and privacy of company data represent the most significant barrier to public cloud services.**

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

Cloud service layers

User



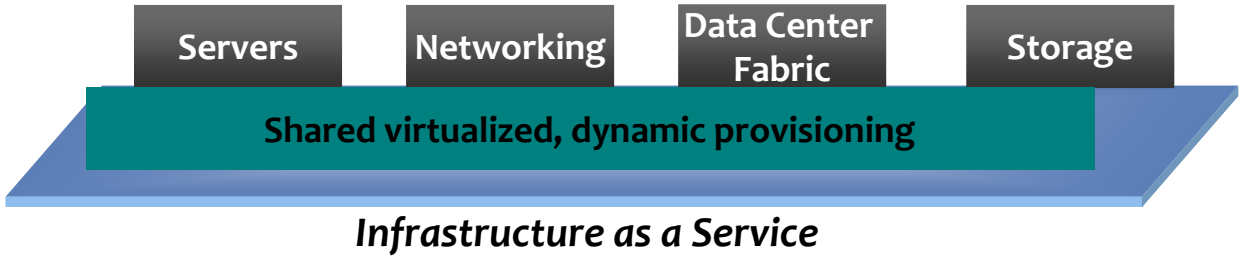


Infrastructure as a Service (IaaS) contains

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**

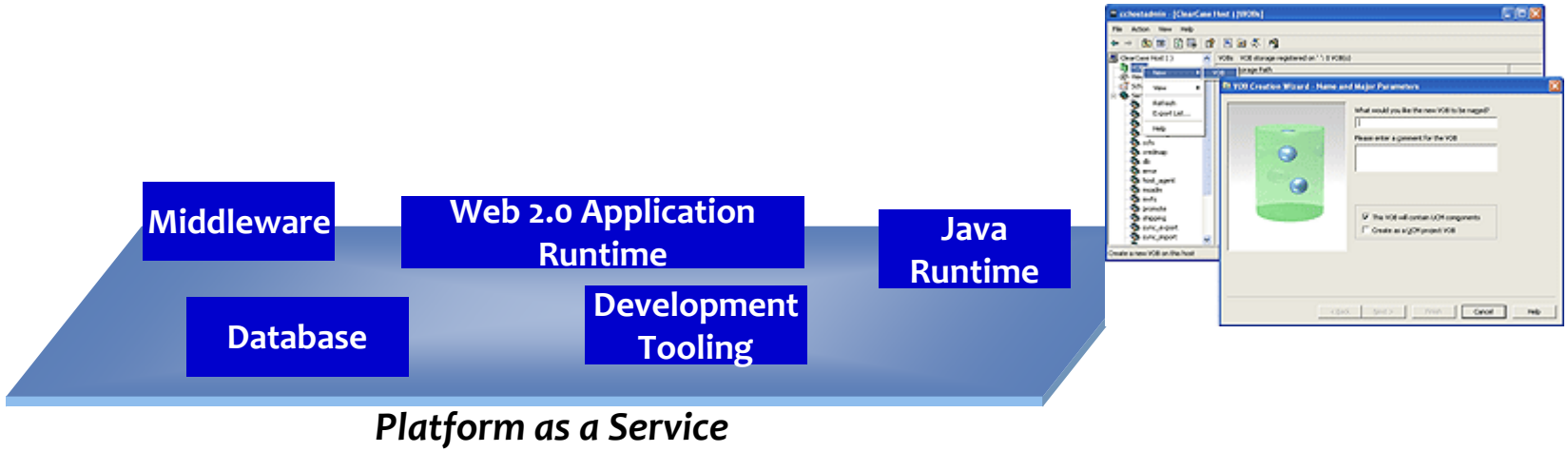


Infrastructure as a Service

Platform as a Service (PaaS) contains

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

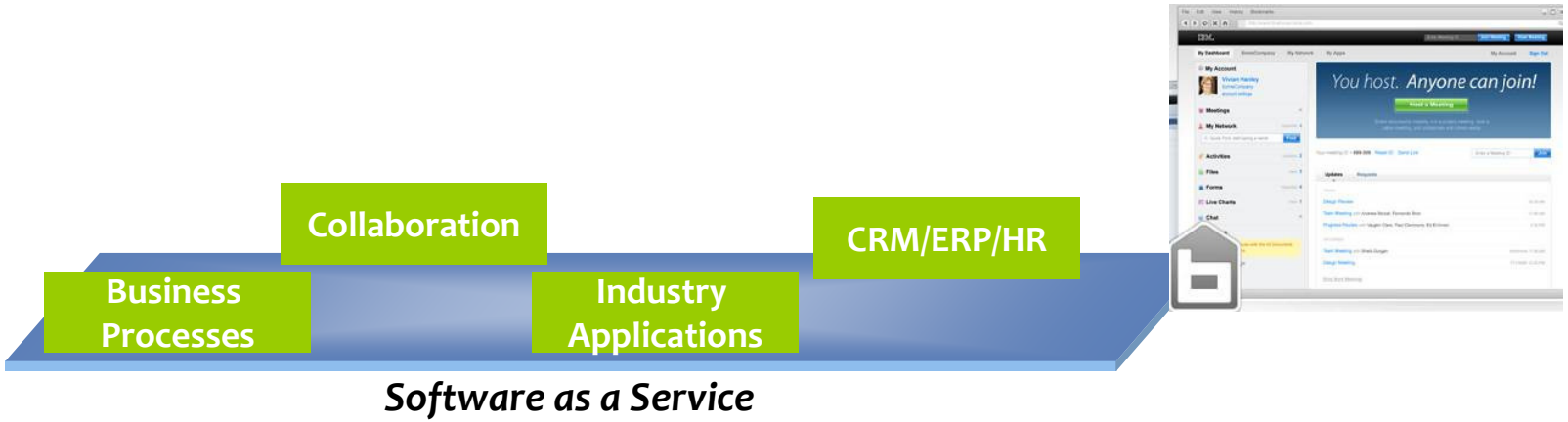
Characteristics
- Services to develop, test, deploy, host and maintain applications in the same integrated development environment
- Web based user interface creation tools
- Multi-tenant architecture
- Integration with web services and databases
- Support for development team collaboration
- Utility-grade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



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,

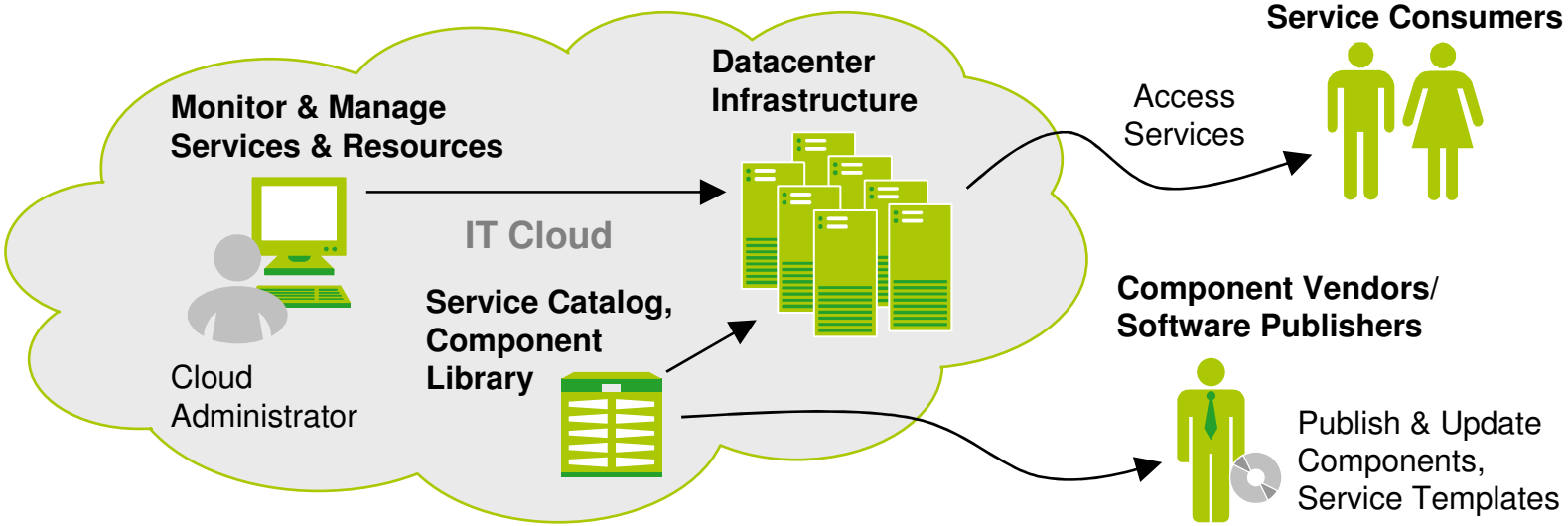


Cloud computing User Perspektive

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

Delivery of IT hardware, software, and services functions to client hardware devices over a standard user network, such as the Internet. Users do not own or control the IT assets used to host these functions “in the cloud”.

- **It is an 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 web
- **It is an 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.



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

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

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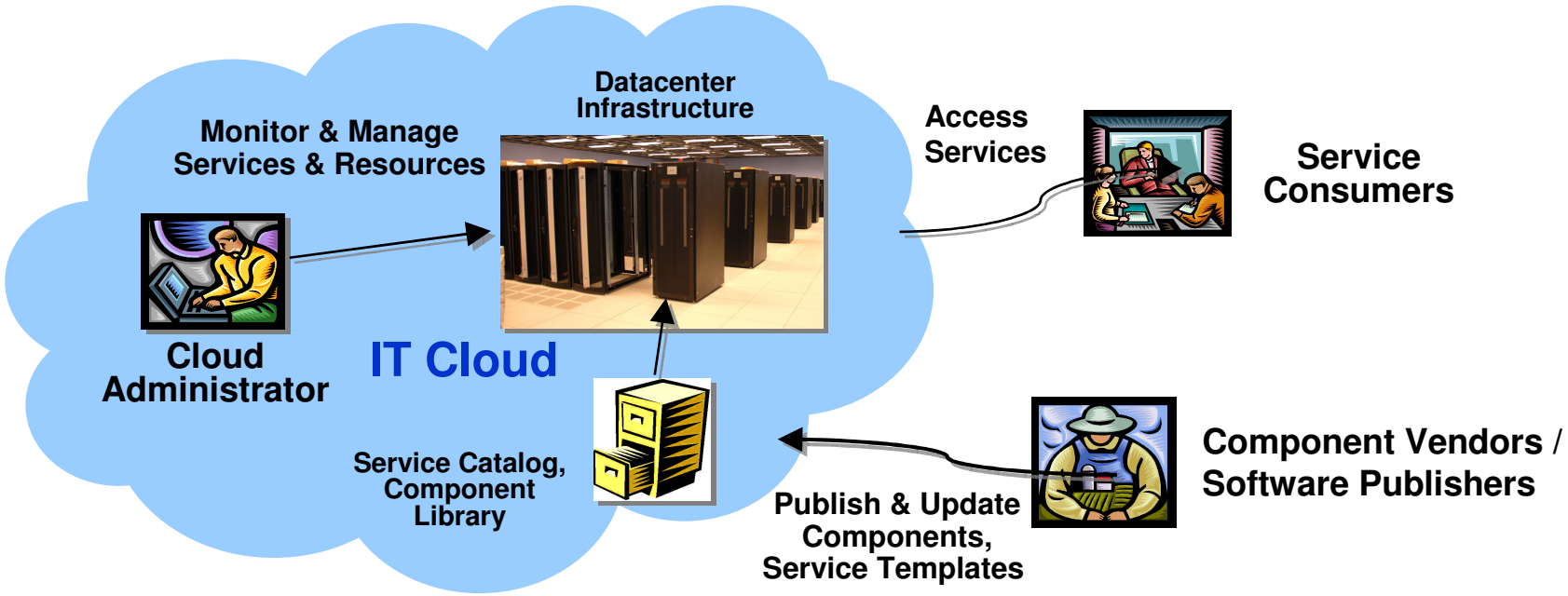
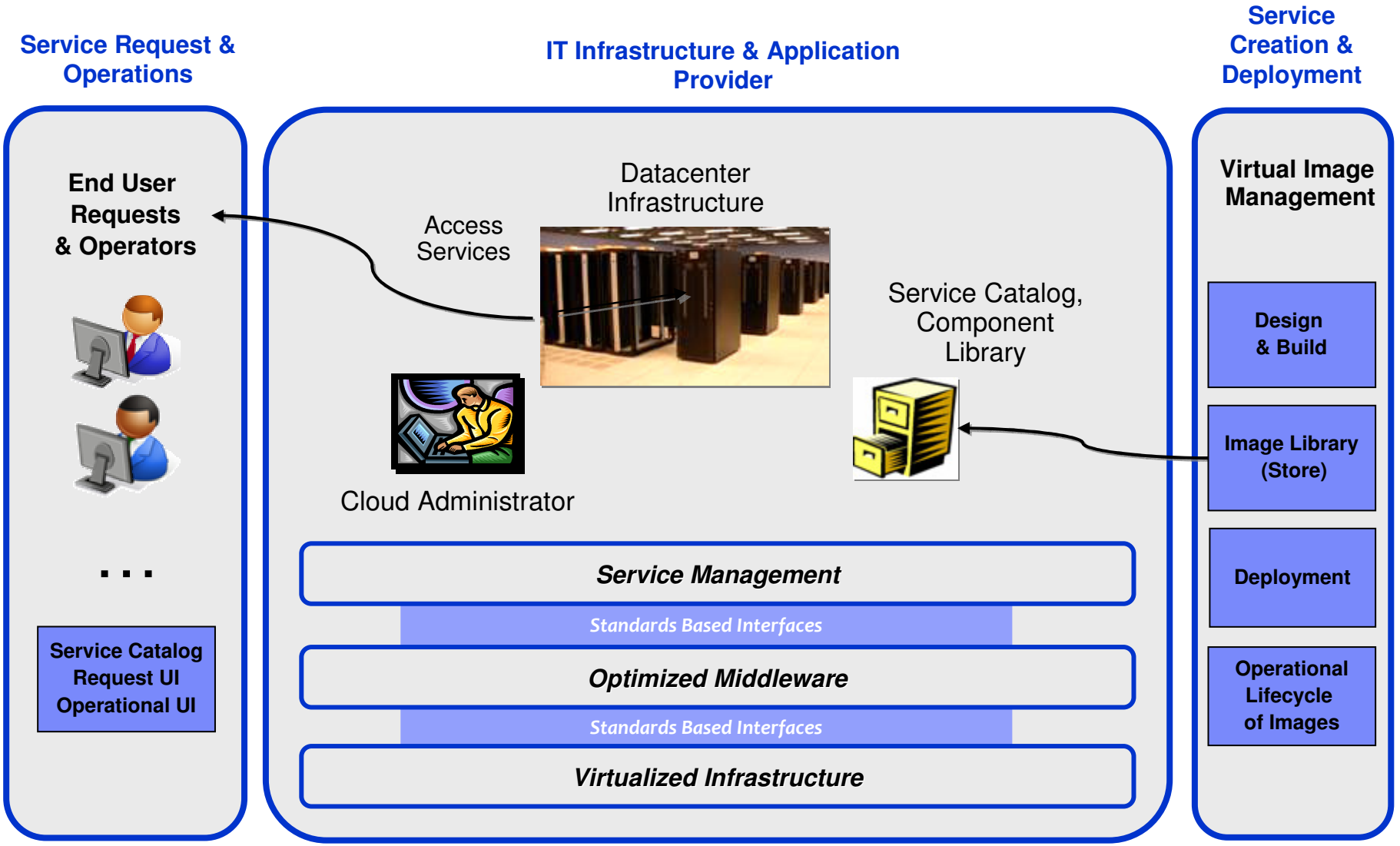
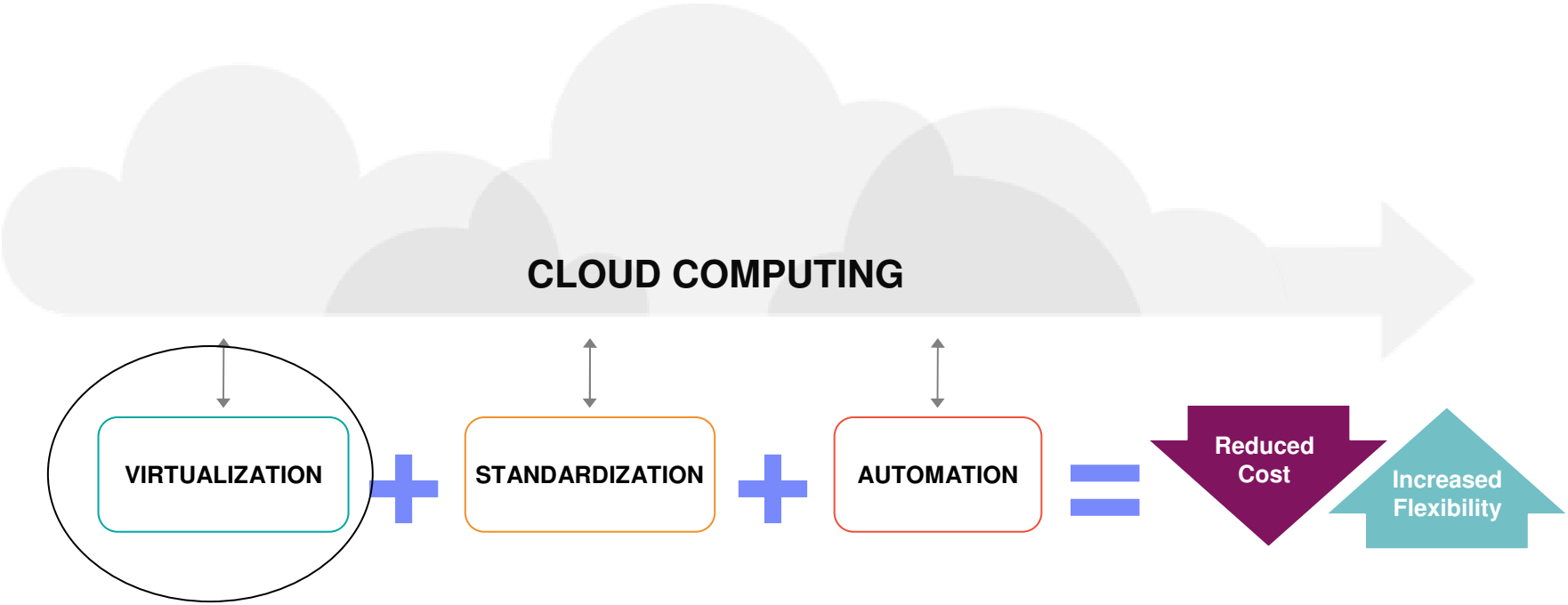


The Architectural View of Cloud Computing



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



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

The role of virtualization is expanding

A Dynamic Infrastructure can also provide a great foundation to construct a more efficient platform for delivering cloud based services

Physical Consolidation

- Improve utilization.
- Reduce costs.
- Lower power usage.

Advanced Virtual Resource Pools

- Decouple complexity from scale.
- Share resources optimally.
- Automate workload management.
- Simplify HA & DR.

Service Management

- Discover, monitor, meter, secure and automate deployment of virtualized resources.
- Assure SLA achievement.
- Optimize service placement.
- Integrated virtualization management with IT processes.

Cloud

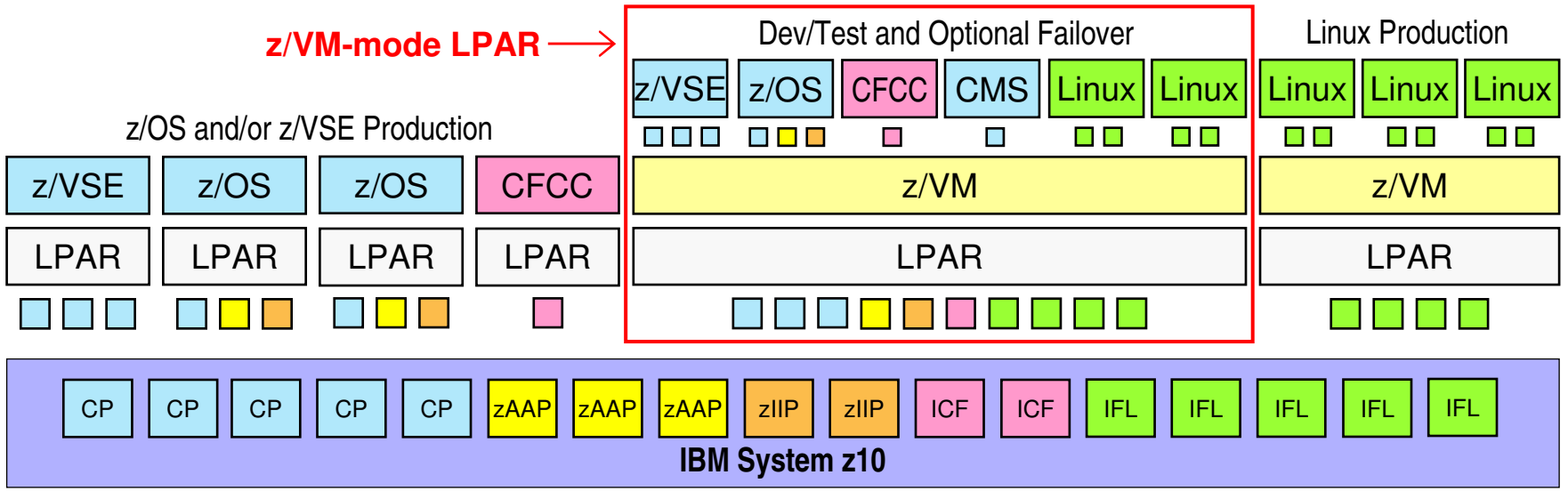
- Always available.
- Elastic scaling.
- Pay for use.
- Automated provisioning.
- Simplified user interface.

z/VSE participation

- z/VM – Platform Virtualization on System z
- Disk Virtualization (FCP-SCSI) - SVC
- Network Virtualization in System z and z/VM
- Data Virtualization (JDBC VSAM) – Federation Server

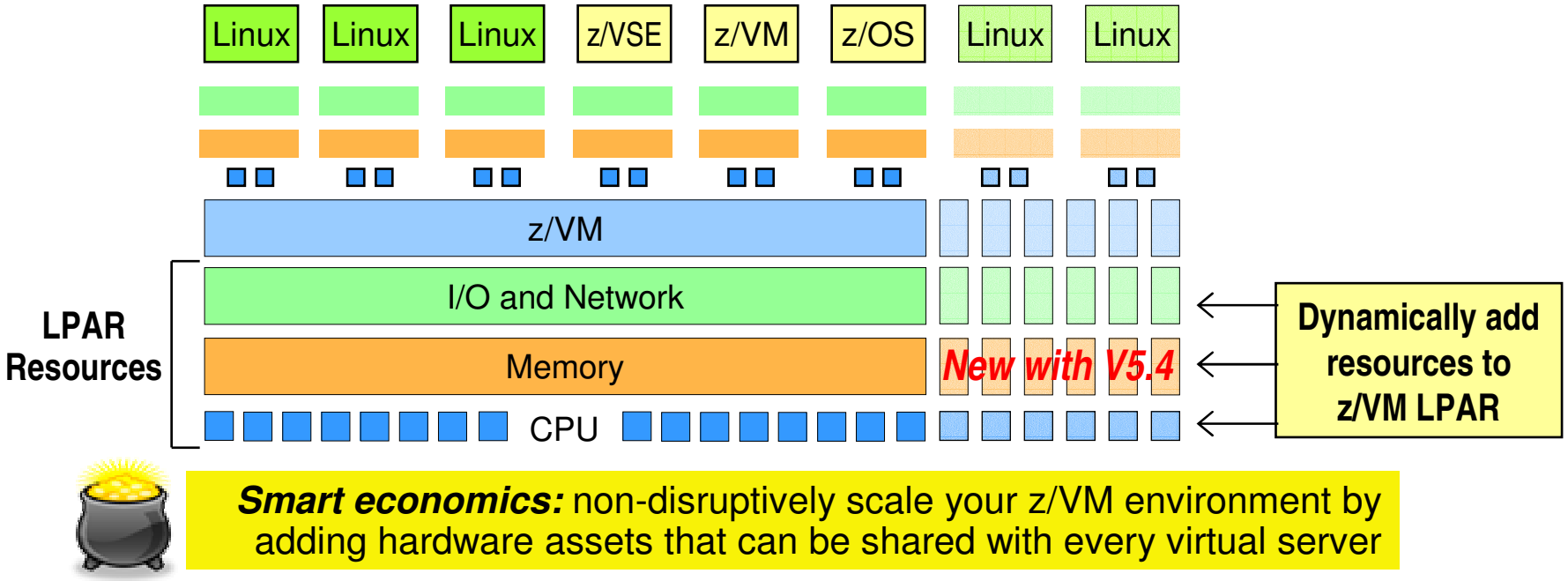
z/VM Virtualization for IBM System z10

- 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 Virtualization – scalability

- New z/VM V5.4 Function Enhances System Availability
- Users can non-disruptively add memory to a z/VM *LPAR*
  - **Additional memory can come from: *a)* unused available memory, *b)* concurrent memory upgrade, or *c)* an LPAR that can release memory**
  - **Memory *cannot* be non-disruptively removed from a z/VM LPAR**
- z/VM virtualizes this hardware support for *guest machines*
  - **Currently, only z/OS and z/VM support this capability in a virtual machine environment**
- Complements ability to dynamically add CPU, I/O, and networking resources

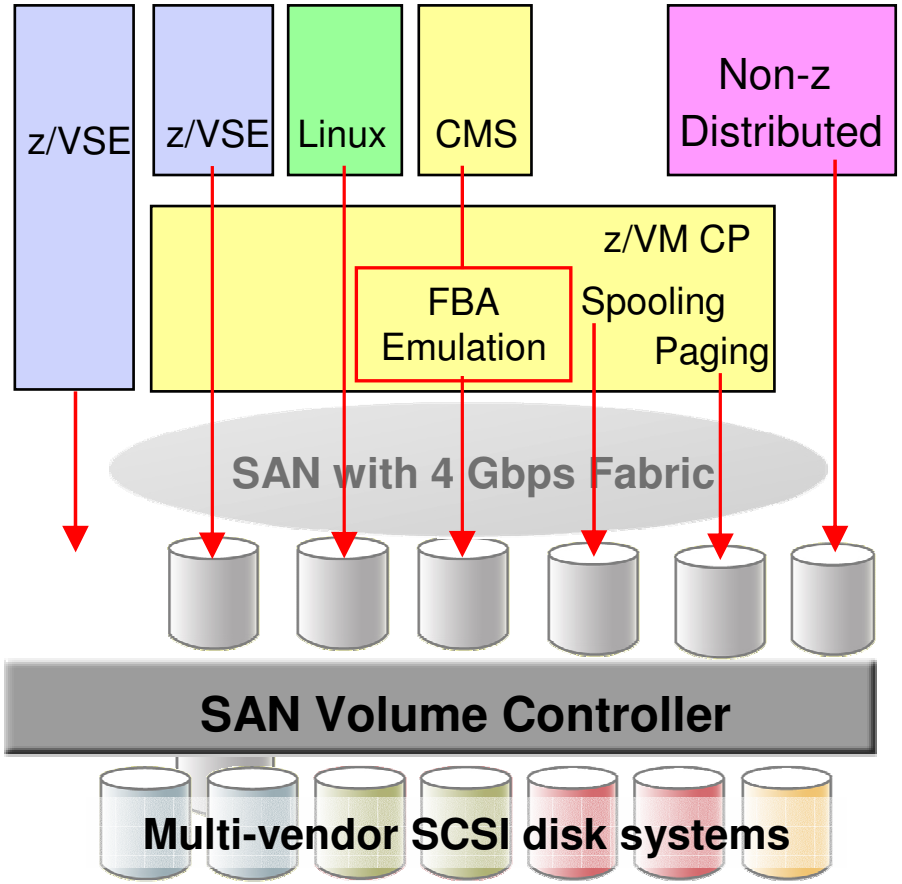


Smart economics: non-disruptively scale your z/VM environment by adding hardware assets that can be shared with every virtual server

Disk Virtualization
z/VSE V4.2 Enhancement: SAN Volume Controller (SVC)

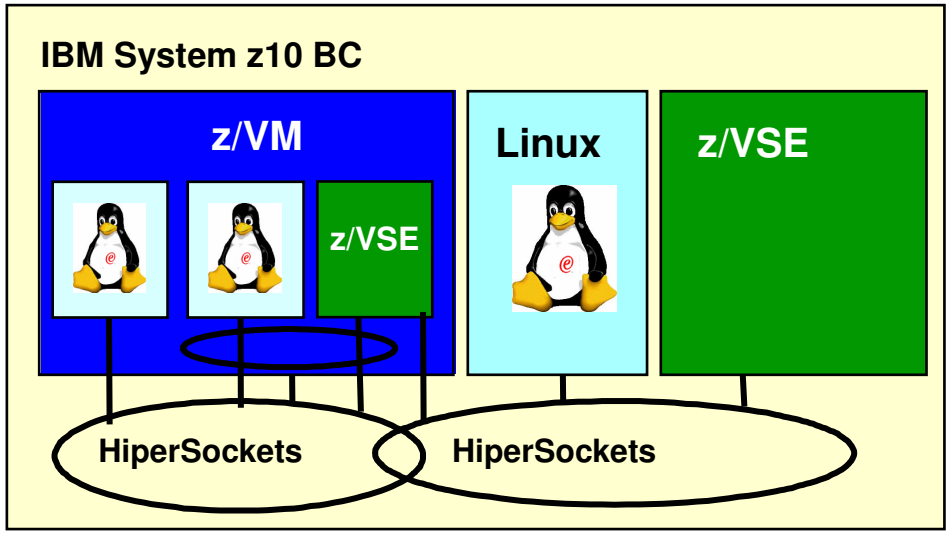
- SAN Volume Controller (SVC) creates a single pool of SCSI disk capacity
- Disk storage options include IBM DS8000, DS6000, ESS, DS4000, etc. plus qualified systems from various non-IBM vendors
- SVC *platform* includes both hardware and software components:
  - **SVC 'nodes' provide redundant components plus cache**
  - **Systems Storage Productivity Center (SSPC) software provides administrative and copy services**
- Supported in z/VM V5.3 and later, as well as Linux on System z
- Potential benefits include a simpler, more flexible, less costly disk storage infrastructure

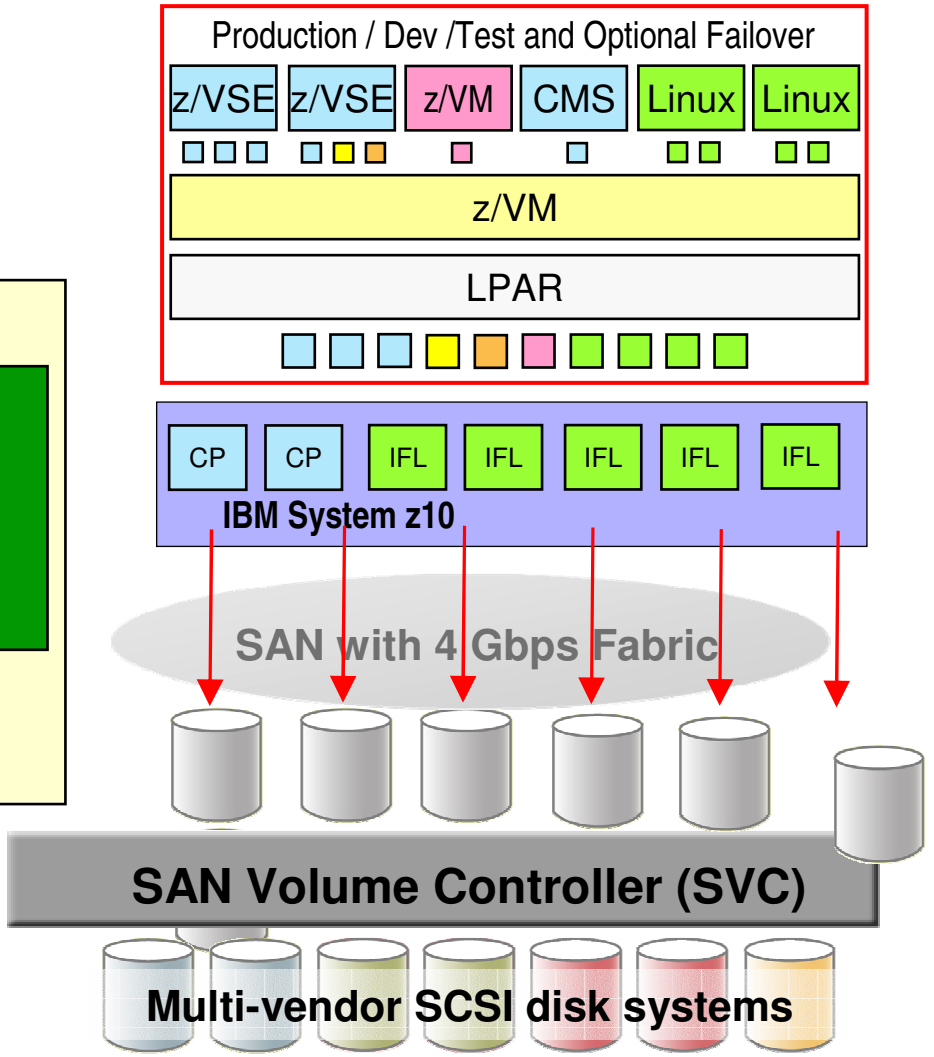
Learn more at: **ibm.com**/storage/support/2145



IT Infrastructure Virtualization and network

Network Virtualization

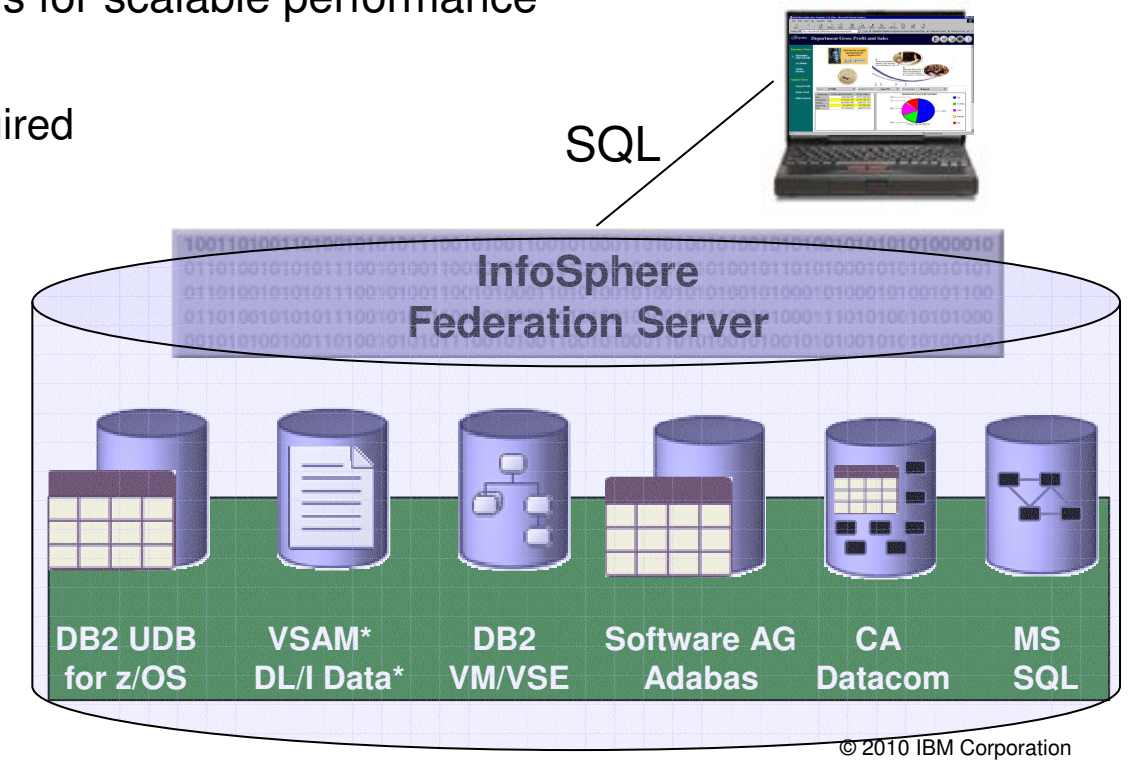




Data Virtualization

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



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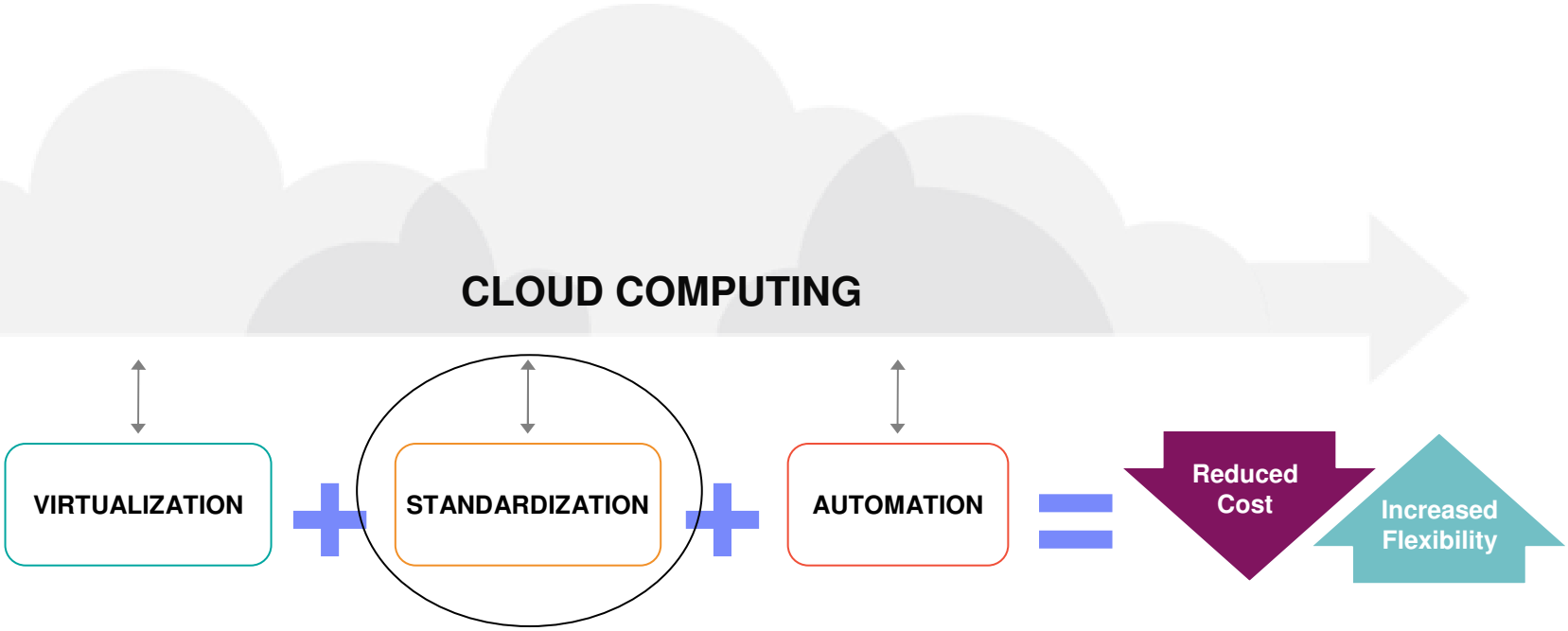


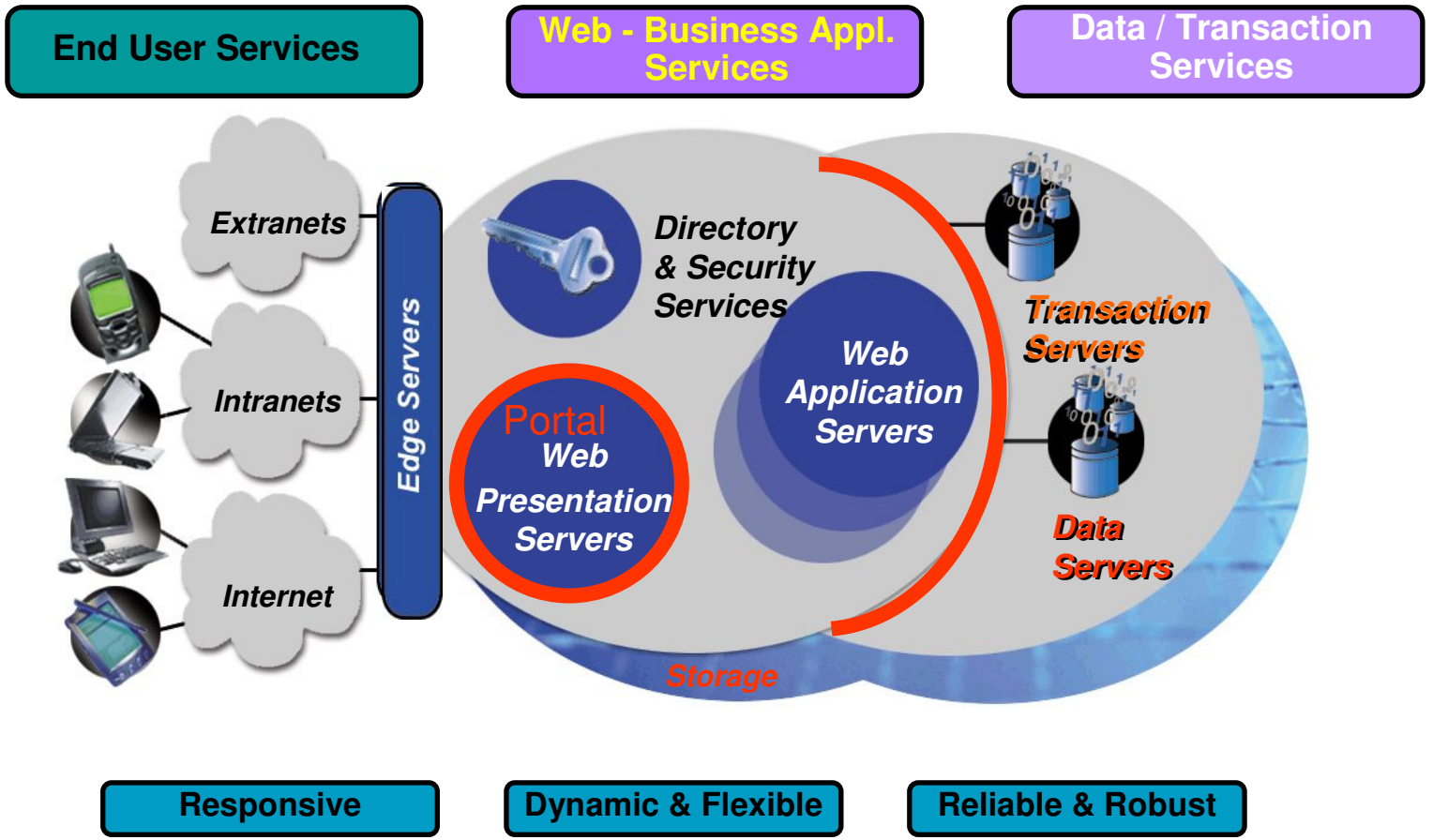
…leveraging virtualization, standardization and automation to free up operational budget for new investment.

Standardization

z/VSE participation

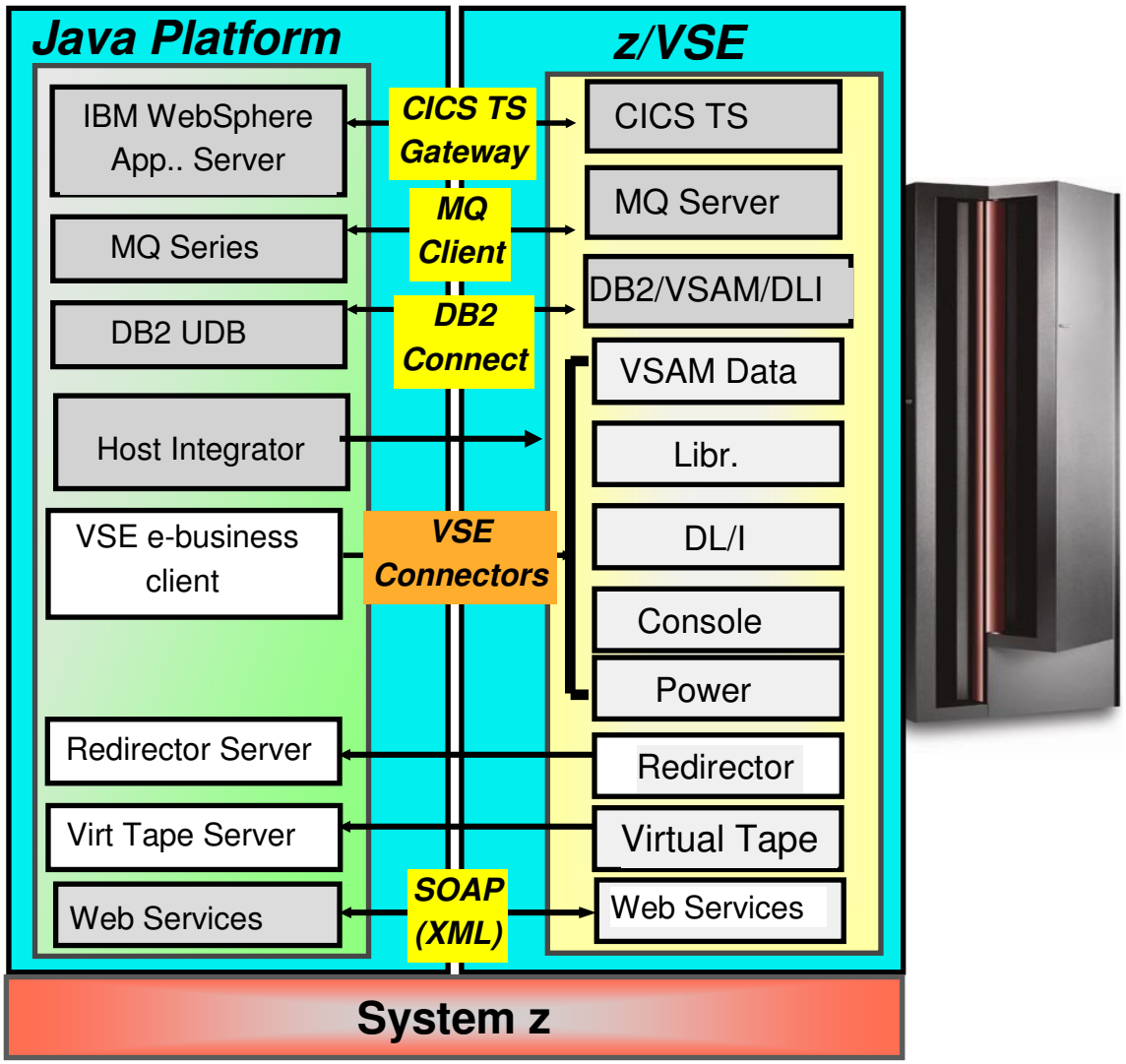
- Subsystem Interfaces in Java
- Data access (JDBC for VSAM)
- FCP-SCSI disk interface for SAN integration
- Security (LDAP, Crypto)

Infrastructure

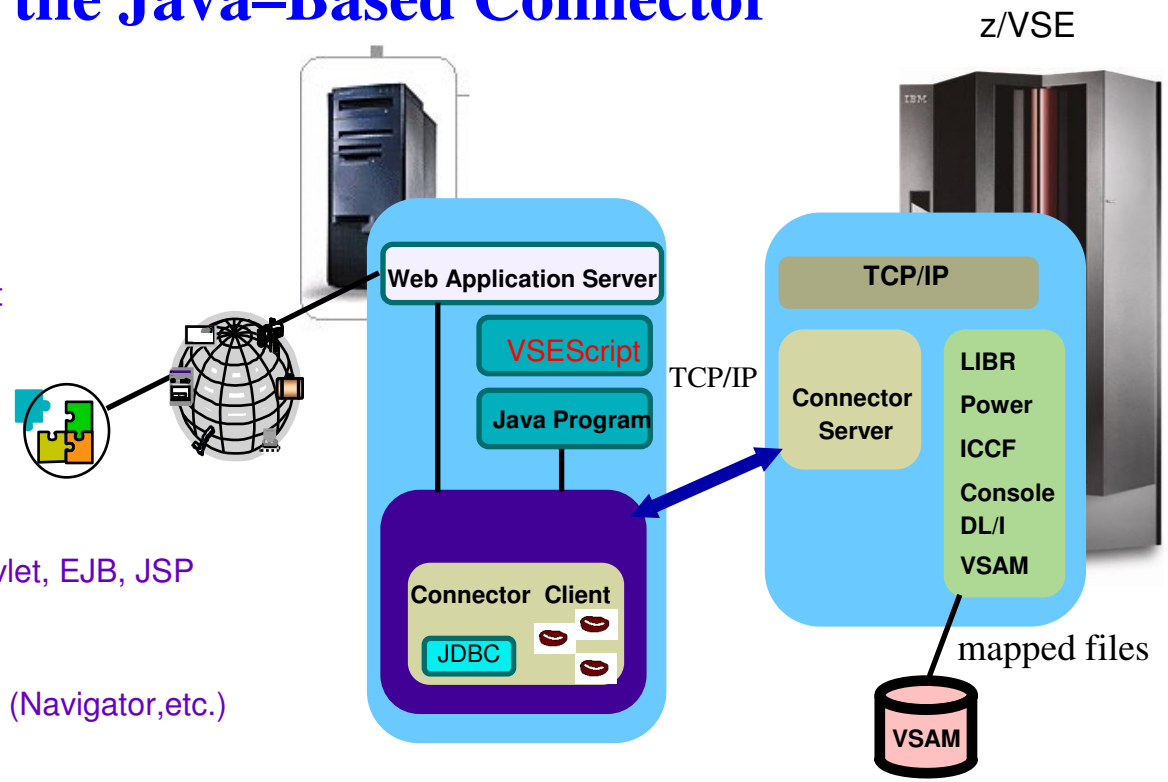


Middleware Relations to z/VSE

- Modern Applications with Linux on zSeries
- Most modern Technologies interact with VSE Services
- Modernisation of IT Infrastructures using Real-time access to data



Real time access to VSE resources using the Java–Based Connector

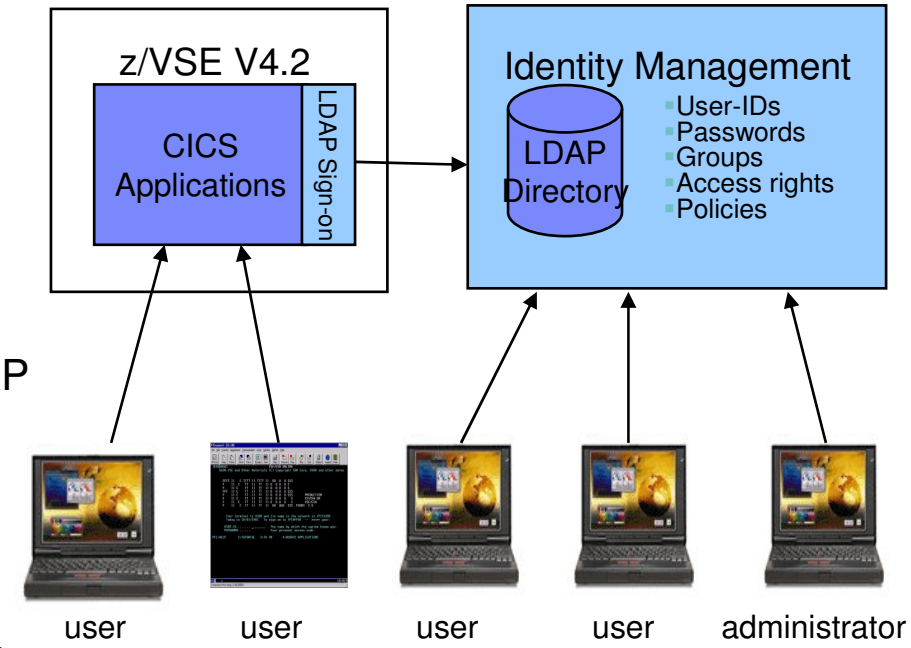


- HTML
- Java applet, servlet, EJB, JSP
- JDBC
- VSEScript
- specialized tools (Navigator,etc.)

- real time access to z/VSE resources from remote systems
- new possibilities for leveraging the VSE investment

z/VSE Enhancement: LDAP Client

- Enables users to sign on z/VSE using a single, comprehensive, corporate-wide 'Identity Management' systems (i.e. IBM Tivoli Identity Manager, etc.)
- LDAP user-IDs and passwords can be up to 64 characters. Helps overcome VSE internal limits
  - **4 character VSE/ICCF user-IDs**
  - **4 and 8 character CICS user-IDs**
  - **up to 8 character Passwords**
- LDAP sign on sits on top of existing z/VSE security manager (i.e. BSM, ESM, etc.)
- z/VSE LDAP client can work with common LDAP servers
  - **IBM Tivoli Directory server**
  - **z/VM LDAP server (with optional RACF repository)**
  - **Microsoft Active Directory, OpenLDAP, Apache Directory server, Novell eDirectory, and many others.**
- Potential benefits include improved protection, consistent access rules, ease of use for end-users



Details on Monday, April 12 at 5:30 PM in U3

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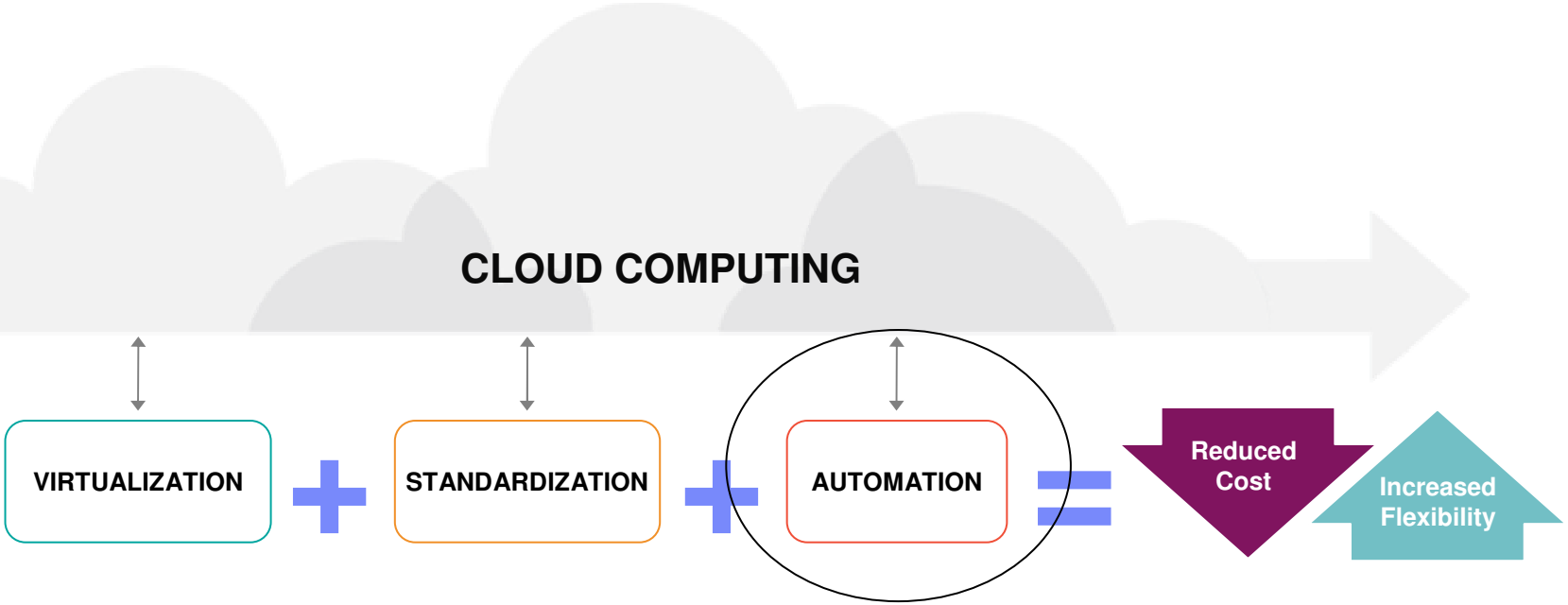
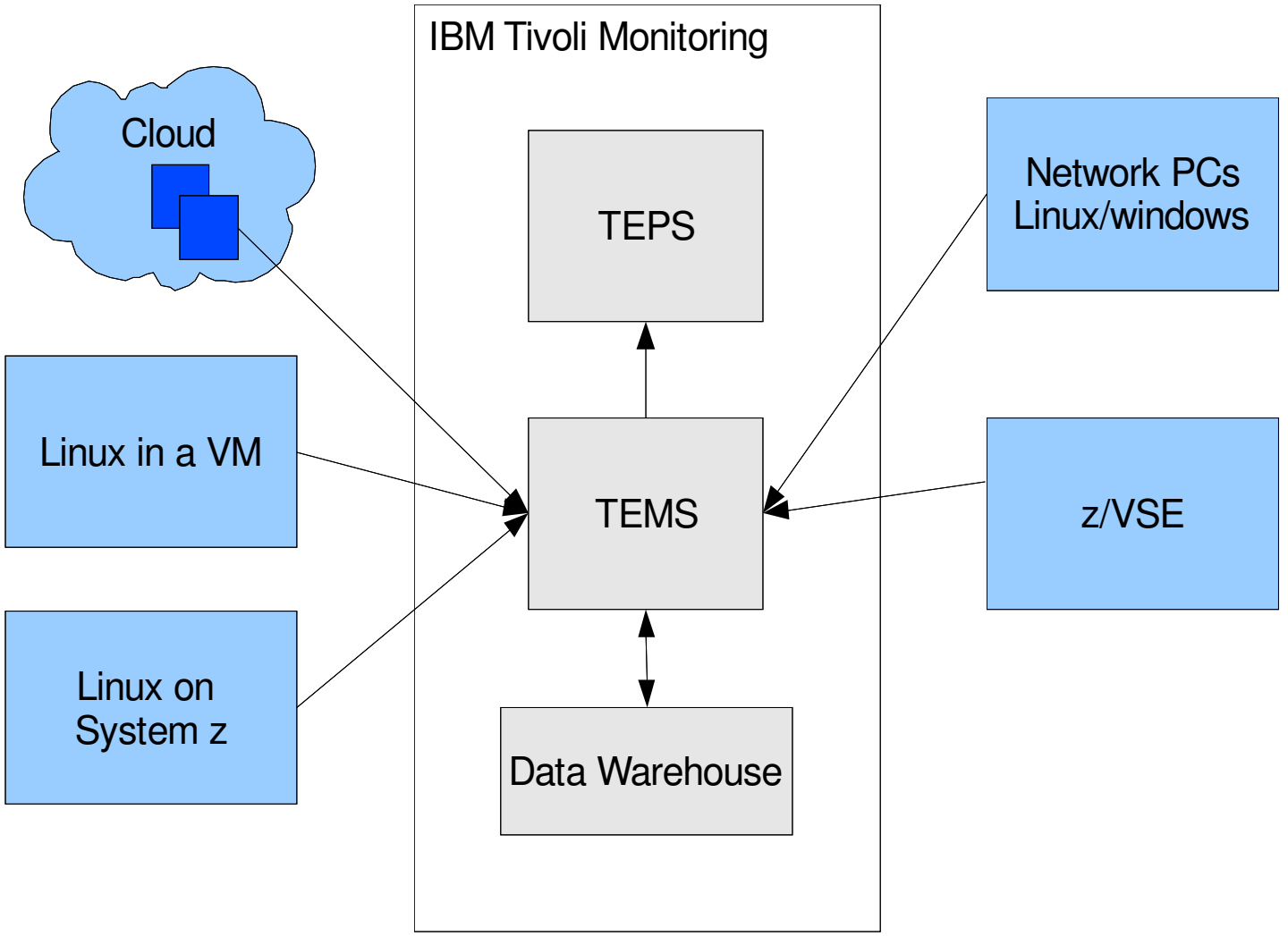


…leveraging virtualization, standardization and automation to free up operational budget for new investment.

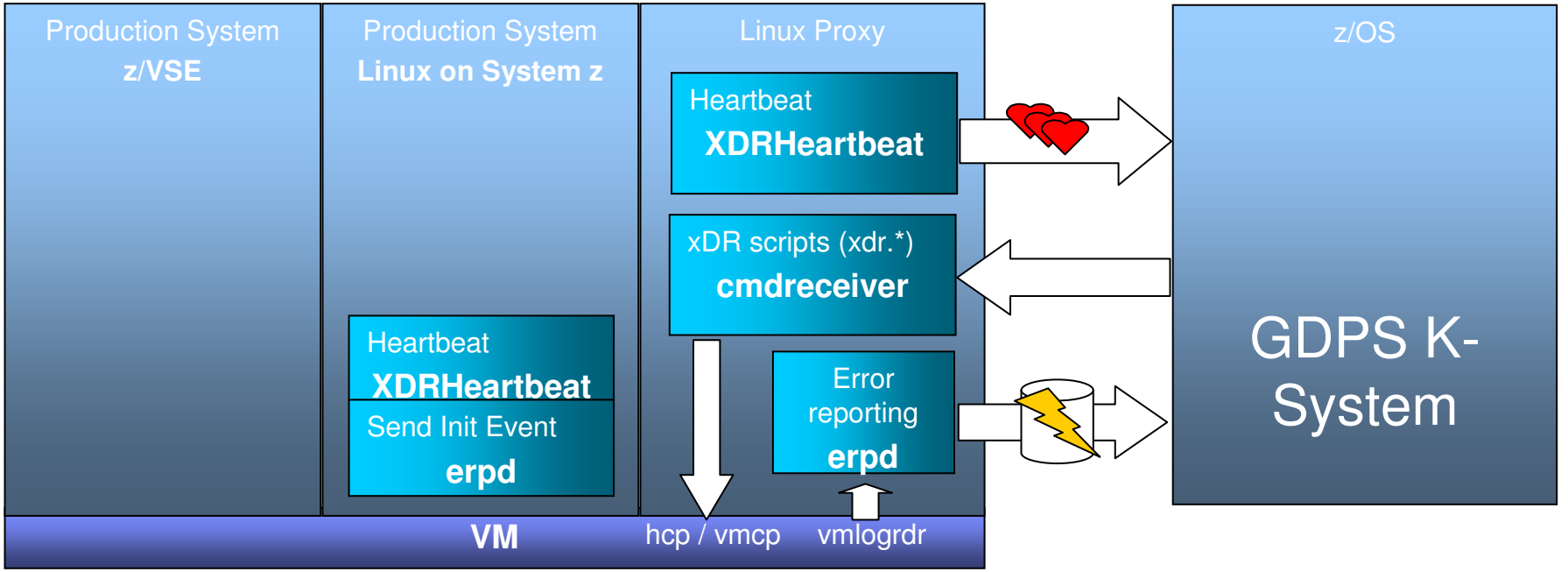
z/VSE participation

- Prerequisite for Automation is – Monitoring and Control
- The next z/VSE Release will support SNMP based monitoring and event monitoring with SNMP traps.
- z/VM Hiperswap
- Participate in HA and failover scenarios (GDPS)

Monitoring Facility (coming soon for z/VSE)



Support for z/VSE as passive guest in z/VM

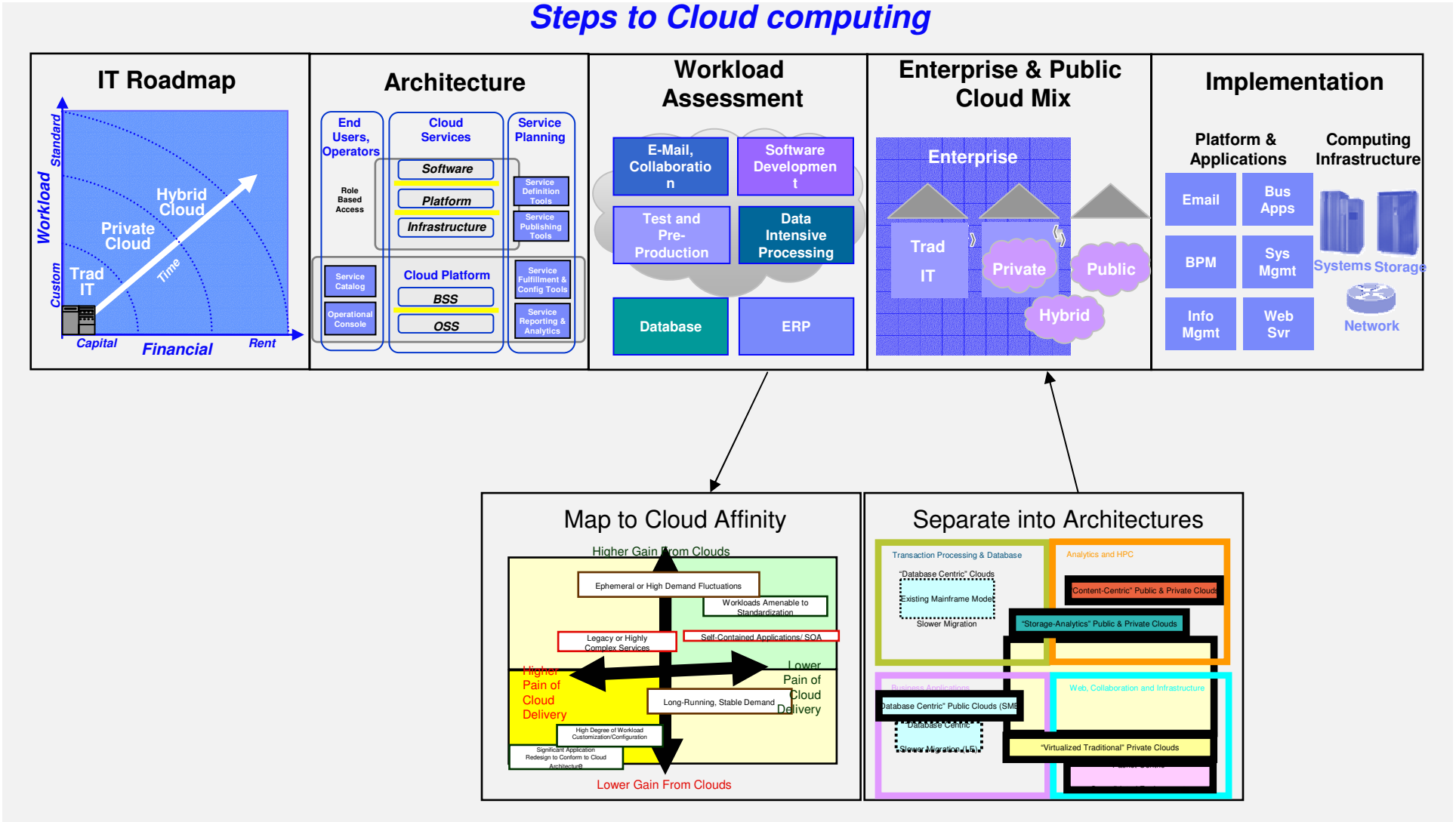


1. z/VSE as passive guest under z/VM and Linux Proxy
   - transparent HyperSwap of disks via z/VM triggered by GDPS
   - z/VSE as passive guest for GDPS
   - communication with GDPS via Linux Proxy only

Conclusion

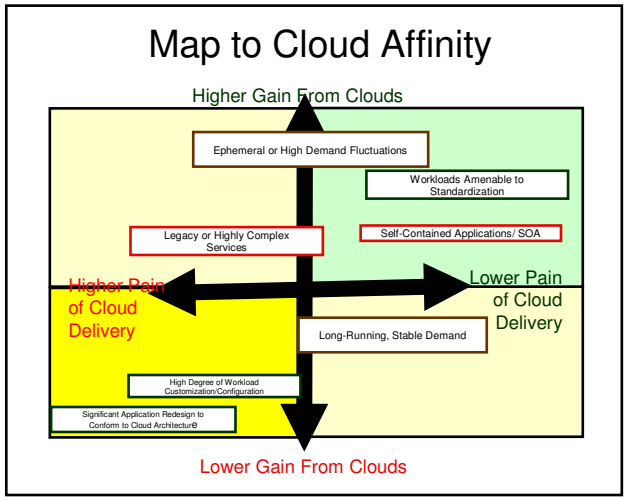
- With z/VSE you can participate in a Cloud Computing Environment

Developing the Cloud strategy and implementation plan



Workload assessment / analysis

I. Identify workloads best suited for cloud



EXAMINE FOR RISK

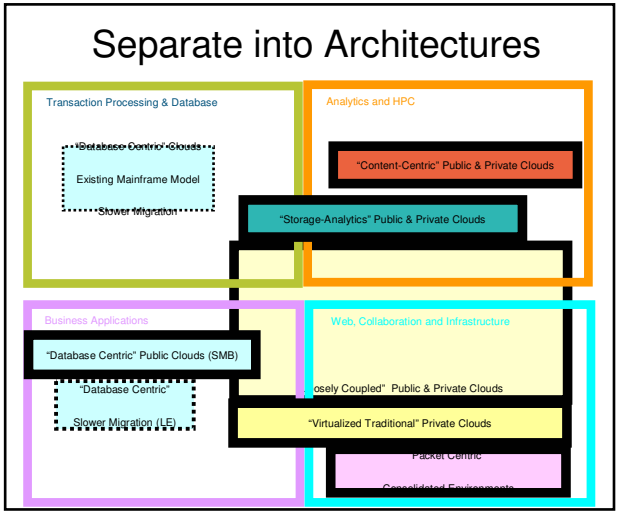
TEST FOR STANDARDIZATION

IDENTIFY INTEGRATION REQUIREMENTS

IDENTIFY BW & LATENCY REQUIREMENTS

EXPLORE NEW WORKLOADS

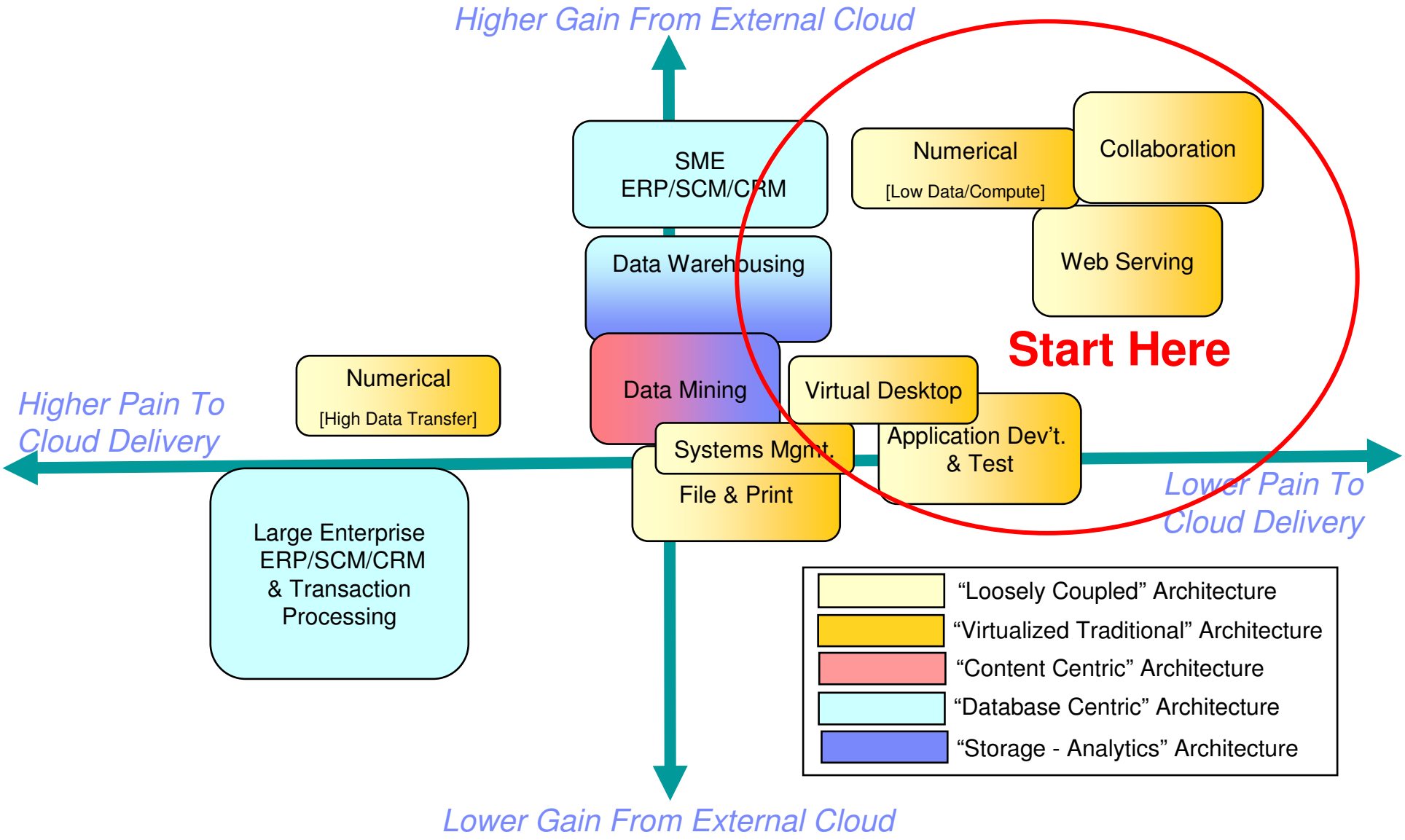
II. Separate workloads into appropriate cloud architectures



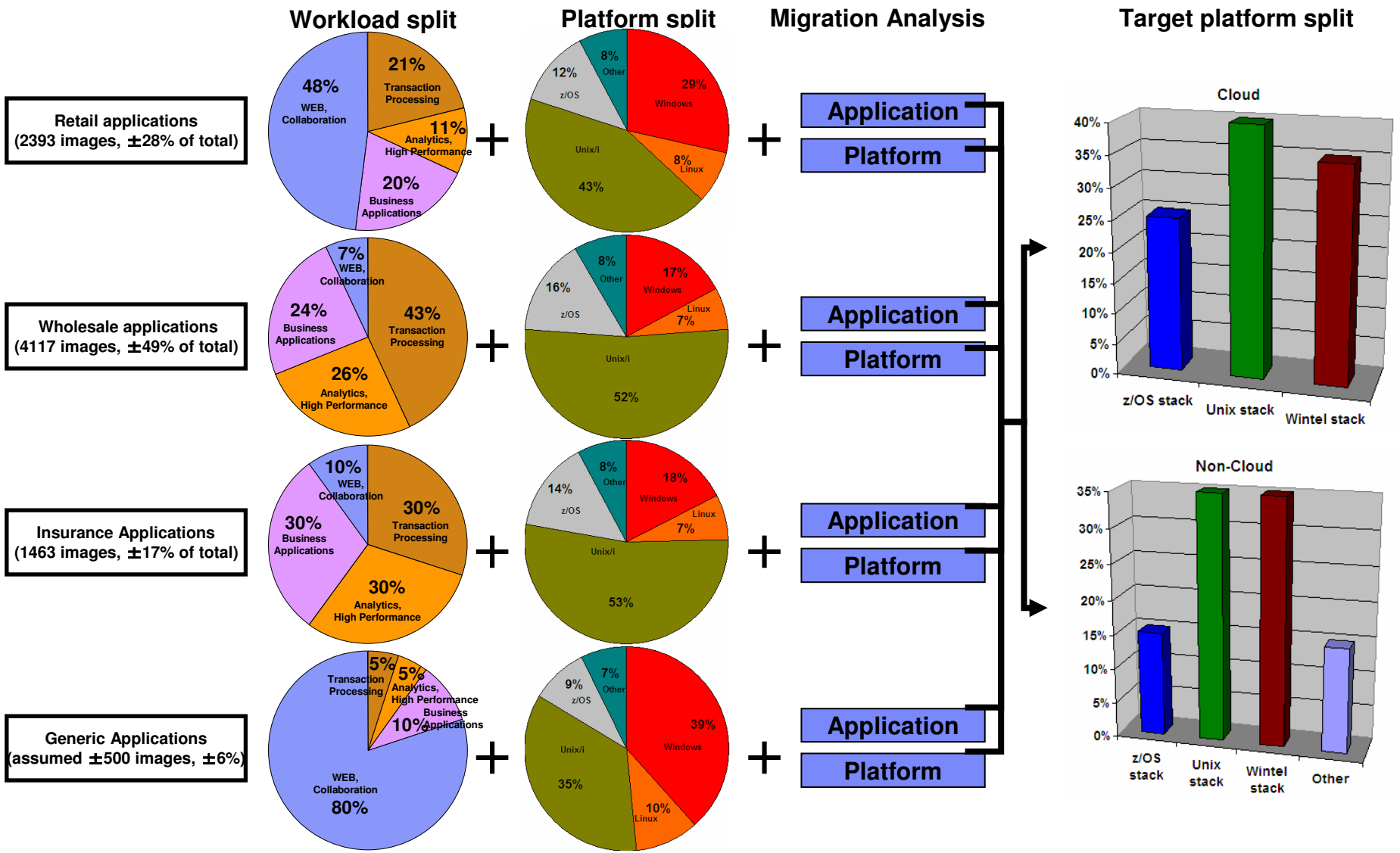
"Fit for purpose"
Group workloads based on similar technical & service level attributes

Multiple cloud architectures do & will exist

Workloads can be classified according to cloud affinity



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



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)

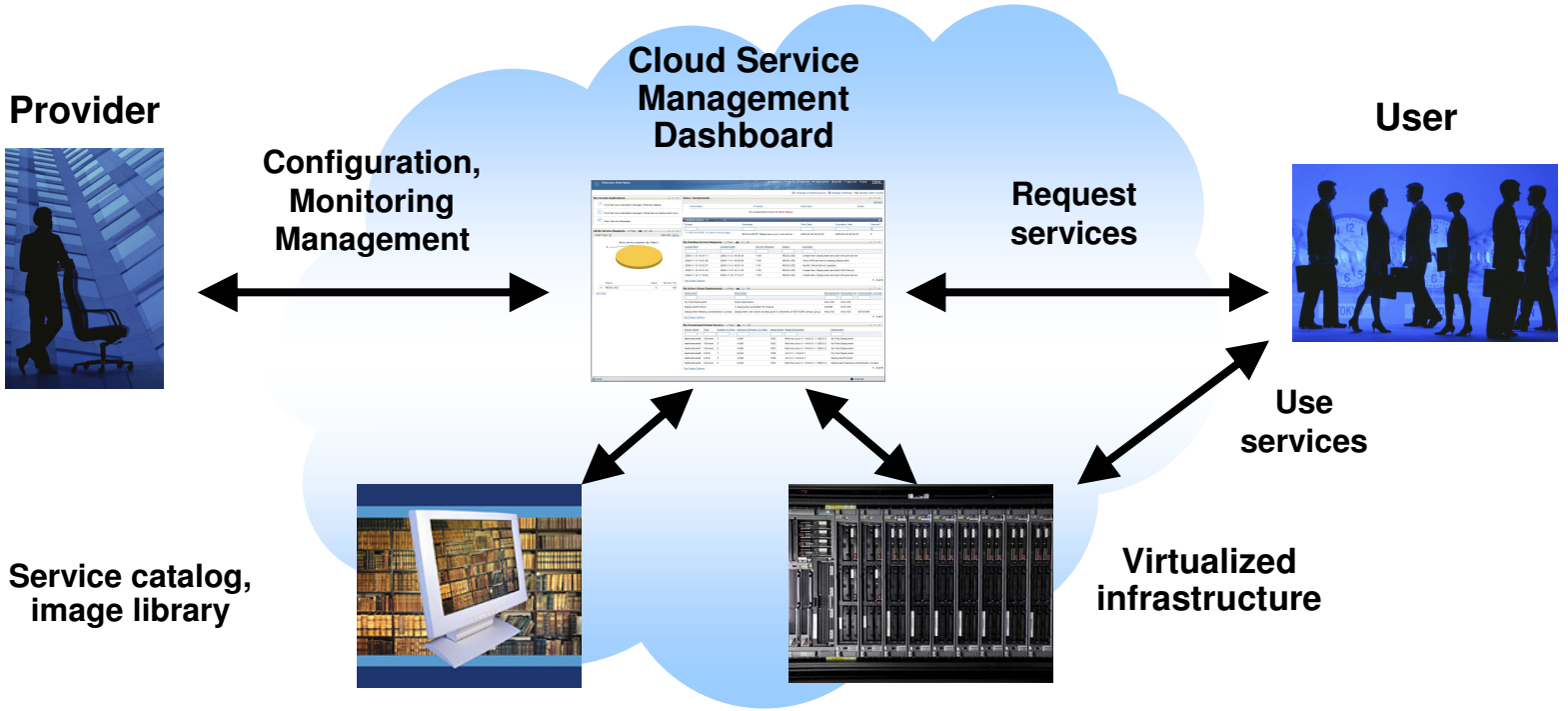
Cloud Computing offers a lot of benefits at a low risk for todays typical testing environments and economics

- 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

IBM Smart Business Development and Test Cloud Building Blocks

A private cloud—containing system, storage, network and images—is built at your site and includes:

- A self-service portal for catalog-based requesting of test resources
- A platform that combines service request management, provisioning and change and configuration management for an integrated process
- Extensible process automation platform



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

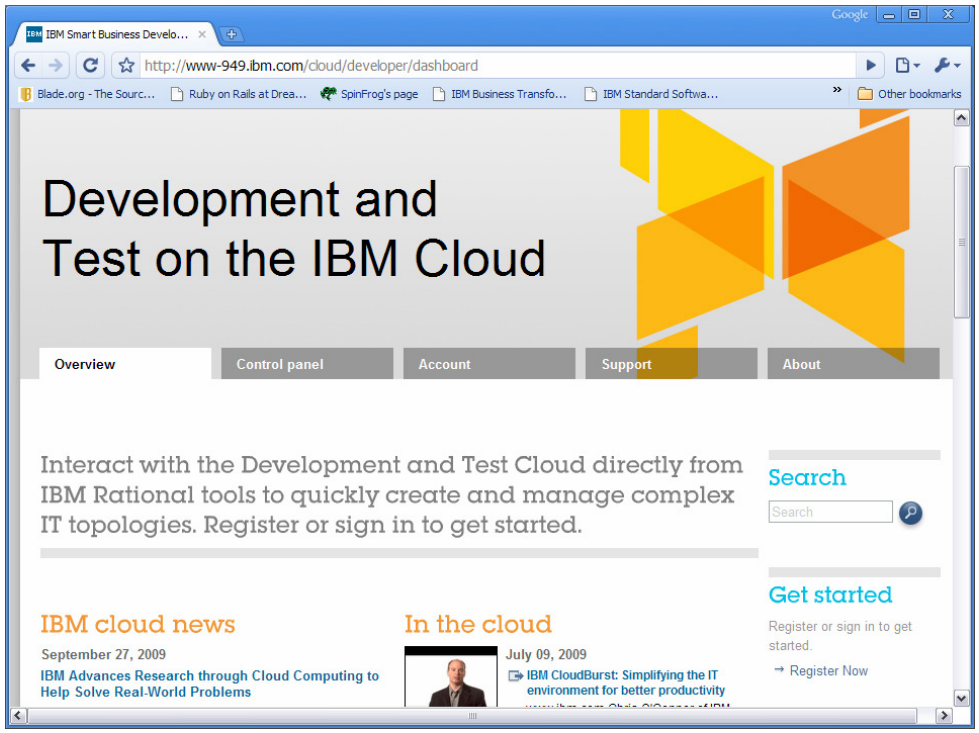
- Creates a more efficient environment that improves productivity and reduces costs
- Includes an operating system, middleware, storage, network and virtual images, along with pre-integrated set of services, from planning through implementation
- Clients can leverage their existing systems or IBM's new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

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



- 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

Why Cloud with IBM ...

Capabilities

- Deep business, technical architecture and infrastructure expertise
- Proven tools, assessments and workshops
- Extensive experience and best practices from client interactions
- Experiences from our own IBM transformation
- The broadest systems, storage, software and services cloud portfolio in the industry

IBM Worldwide Resources

- Executive Briefing Centers
- Proof of Concepts and Benchmark Centers
- Cloud Computing Centers
- IBM Research

http://www.ibm.com/ibm/cloud/

Thank you!