Session 10318 Cloud Computing with IBM System z

118 Share Conference Atlanta March 15, 2012

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Agenda

- **Cloud Computing Introduction**
  - On it‘s Way to Become a Standard ... NIST and DMTF
  - An Evolution from Known Technologies It‘s More than Virtualization
  - Delivery Models – Private -> Public Clouds
- **IBM System z Cloud Option‘s/Solution‘s**
  - A World Wide Federated Cloud project on IBM System z
  - Boeblingen Tivoli Service Automation Manager setup and example
  - Solution Edition for Cloud Computing and Data Cloud
- **Summary & Discussion**

Today's Challenges

85% idle

In distributed computing environments, up to 85% of computing capacity sits idle.

70¢ per $1

70% on average is spent on maintaining current IT infrastructures versus adding new capabilities.

1.5x

Explosion of information driving 54% growth in storage shipments every year.

$40 billion

Consumer product and retail industries lose about $40 billion annually, or 3.5 percent of their sales, due to supply chain inefficiencies.

33%

33% of consumers notified of a security breach will terminate their relationship with the company they perceive as responsible.

It's time to start thinking

Differently

about infrastructure

Defining Cloud Computing …

Cloud computing is a new **consumption and delivery model** inspired by consumer Internet services. Cloud computing exhibits the following 5 key characteristics:

- On-demand self-service
- Ubiquitous network access
- Location independent resource pooling
- Rapid elasticity
- Pay per use

Multiple Types of Cloud Exist

- Private, Public & Hybrid

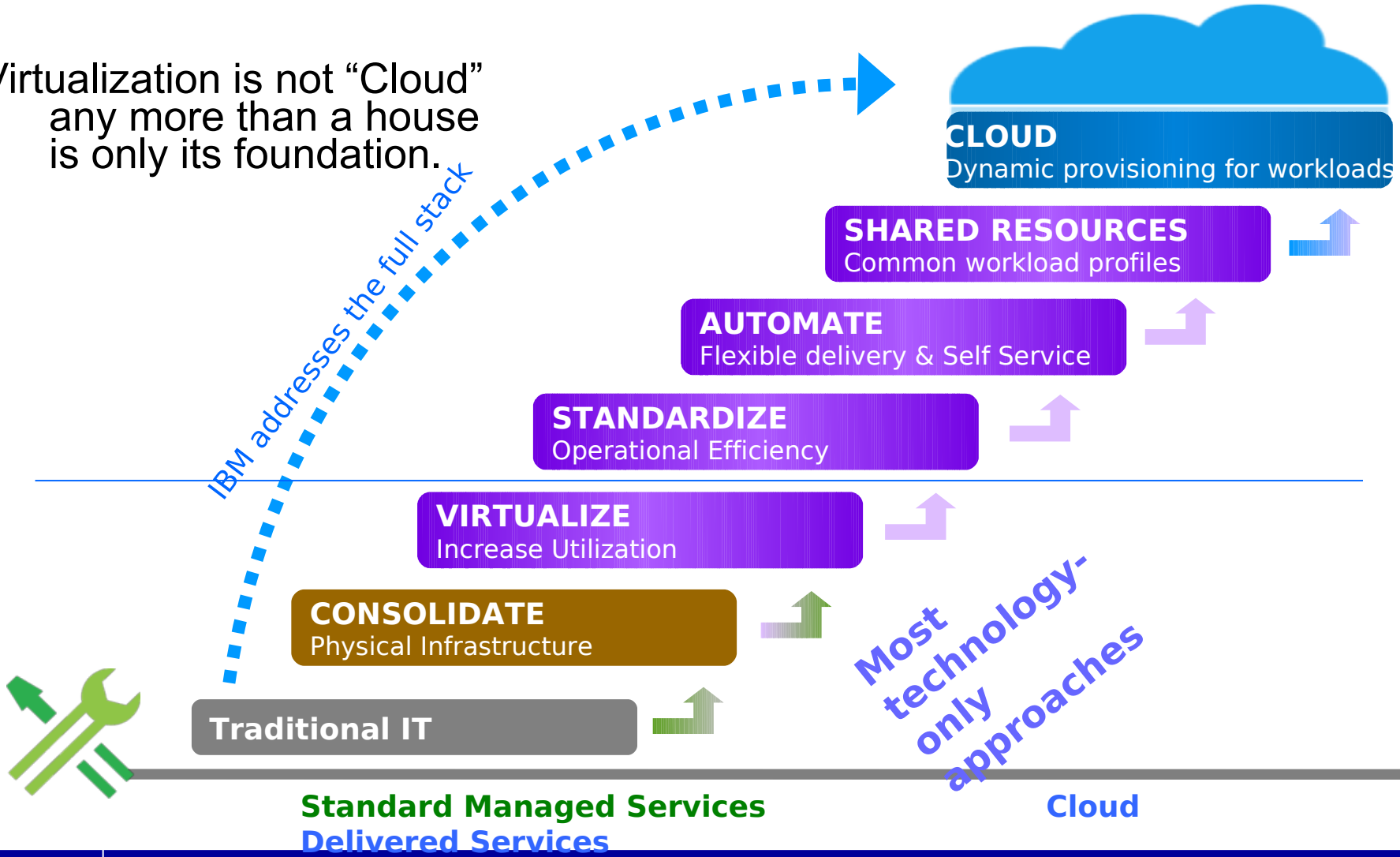
A User Experience

A Deployment Model

Business Model

This is a Natural Progression

Virtualization is not “Cloud” any more than a house is only its foundation.



Cloud Computing: The next step in the evolution of IT

1.Centralized Computing: 1960 –

- Optimized for sharing, industrial strength, systems management, …
- Managed by central IT organization
- Back office applications involving transactions, shared data bases, …
- Mainframes, supercomputers, minicomputers, …

1.Client/Server: 1985 –

- Optimized for low costs, simplicity, flexibility, …
- Distributed management across multiple departments and organizations
- Large numbers of PC-based applications
- PC-based clients and servers, Unix, Linux, ...

1.Cloud Computing: 2010 –

- **New consumption and delivery model**
- Optimized for massive scalability, delivery of services, …
- Centralized model, hybrid service acquisition models
- Supports huge numbers of mobile devices and sensors
- Internet technology-based architecture

Just like introducing the Client/Server model impacted almost everything we did in IT (operation IT, developing applications, …), Cloud computing has severe impact on the IT industry

IBM Premise: Cloud Computing Must Have

Common Attribute	Details
Flexible pricing	*Utility pricing, variable payments, pay-by-consumption and subscription models make pricing of IT services more flexible*
Elastic scaling	*Resources scale up and down by large factors as the demand changes*
Rapid provisioning	*IT and network capacity and capabilities are – ideally automatically – rapidly provisioned using Internet standards without transferring ownership of resources*
Advanced virtualization	*IT resources from servers to storage, network and applications are pooled and virtualized to provide an implementation independent, efficient infrastructure*
Standardized offerings	*Uniform offerings readily available from a services catalog on a metered basis*

The Harsh Reality of Cloud Computing

Lines of business are leveraging public clouds today

- "Submarine Projects" are currently underway in your business

IT has been here before

- Remember when those pesky Windows based Web Servers did this?

Users views IT as a commodity.

Users think Cloud can do Everything.

- Who needs traditional IT?

Lines of business are focusing on short term cost.

Enterprises desire the benefits of cloud – but are not willing to compromise on their requirements

Availability and performance tuned to workloads

Technology platform choices built on standards

Flexible payment and billing options

Varying degrees of Security and Isolation

From self service to fully managed environments

44%

are concerned with the lack of or limited ability for customization of public clouds

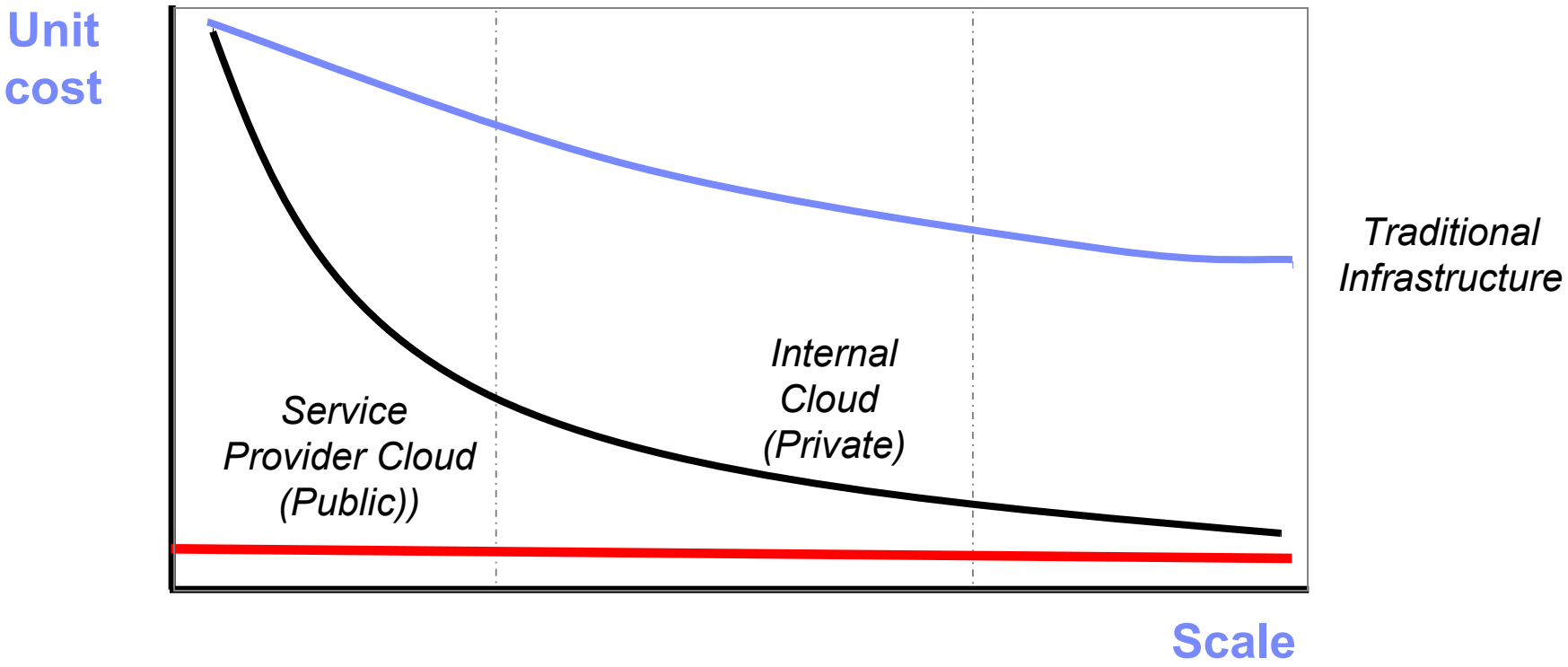
50%

concerned about the loss of control over IT activities/ business processes

56%

believe that service level agreements are not detailed enough

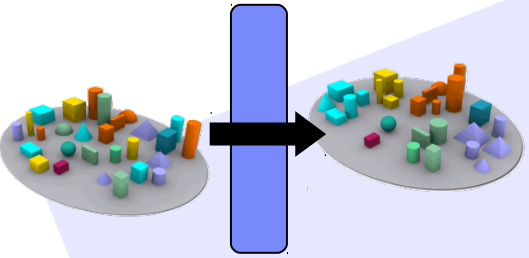
Standardisation and optimisation by workload enables economies of scale …



Large enterprises can significantly reduce costs for some workloads compared with traditional IT.

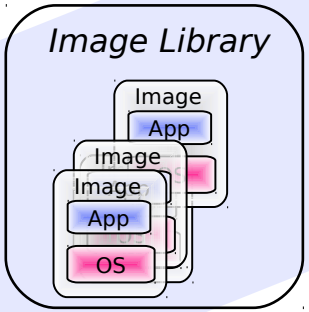
Building a Cloud Foundation

Consolidate and Virtualize



- Virtualization must become strategic across all platforms – servers and storage
- Monitor the virtualized environment
- Discovery, dependency and change tracking

Automate and Manage



- Automated provisioning / de-provisioning
- Pool standardized virtualized building blocks
- Capture and catalog virtual images used in the data center
- Management of the virtualized environment

Optimize Cloud Ready

- Integrated virtualization management with IT service delivery processes
- Elastic scaling
- Pay for use
- Self-service provisioning
- Simplified deployment with virtual appliances

STANDARDIZATION

LIFE CYCLE MANAGEMENT

Definition – National Institute of Standards and Technology

Number	Date	Title
SP 800-153	Sept. 26, 2011	DRAFT Guidelines for Securing Wireless Local Area Networks (WLANs) Draft-SP800-153.pdf
SP 800-147	Apr. 2011	Basic Input/Output System (BIOS) Protection Guidelines NIST-SP800-147-April2011.pdf
SP 800-146	May 12, 2011	DRAFT Cloud Computing Synopsis and Recommendations Draft-NIST-SP800-146.pdf
SP 800-145	Sept. 2011	A NIST Definition of Cloud Computing SP800-145.pdf
SP 800-144	Jan. 28, 2011	DRAFT Guidelines on Security and Privacy in Public Cloud Computing Draft-SP-800-144_cloud-computing.pdf

http://csrc.nist.gov/publications/PubsSPs.html

DMTF's OVF Becomes National Standard

DMTF's Open Virtualization Format (OVF) has been adopted by the American National Standards Institute (ANSI), paving the way for adoption as an international standard by the International Standards Organization/International Electrotechnical Commission (ISO/IEC).

OVF is intended to simplify interoperability, security and machine lifecycle management in virtual environments.

Learn More About OVF

OVF = Open Virtual Format

ANSI
American National Standards Institute

http://www.dmtf.org/

Cloud Management

DMTF's Cloud Management Working Group is developing a set of standards to improve cloud management interoperability between service providers and their consumers and developers.

Conformance Programs

DMTF conformance programs allow vendors to test products for conformance to DMTF specifications. Both DASH and CDM conformance programs are currently available. Conformant products are listed in the DMTF Certification Registry.

Management Standards & Technology

DMTF provides standard management tools supported by numerous hardware, software and services vendors.

Standards-based management allows you to select the best products for today without worrying about propietary hassles in the future.

Search for Standards

Narrow by Standard

Search

DMTF Standards & Initiatives

Alert Standard Format	ASF
ıon Diagnostic Model	CDM
ıon Information Model	CIM
ı Management	CLOUD
guration Management Database Federation	CMDBf
top and Mobile Architecture for System Hardware	DASH

DMTF News & Updates

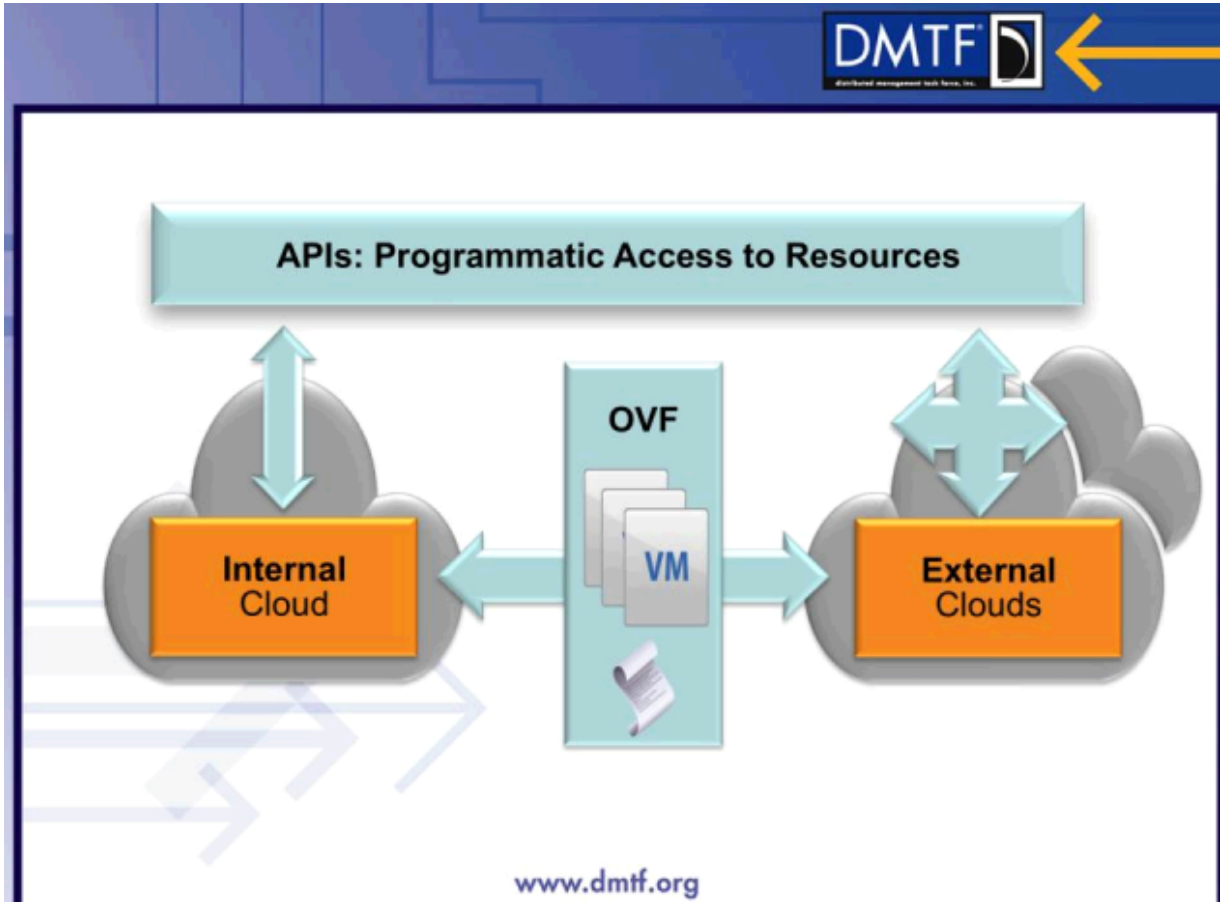
DMTF's Open Virtualization Format Achieves ANSI Adoption

Aug 31

PORT
organi
develc
(OVF)
Interna
marks
virtual

PORTLAND, Ore. – August 31, 2010 – Distributed Management Task Force, Inc. (DMTF), the organization bringing the IT industry together to collaborate on systems management standards development, validation, promotion and adoption, today announced that its Open Virtualization Format (OVF) standard version 1.1 has been adopted as an American National Standards Institute (ANSI) International Committee for Information Technology Standards (INCITS) standard. This achievement marks a major milestone in DMTF's efforts to enable interoperable, platform-independent cloud and virtual management solutions.

Distributed Management Task Force (DMTF) –



Cloud Computing –Standardization DMTF, SNIA, OGF, OMG,...
Cloud is not a Hype anymore

- **DMTF – Distributed Management Task Force**

  Open Virtual Format (OVF)

  ← Infrastructure Virtual Server

- **SNIA - Storage Networking Industry Association**

  Cloud Data Management Interface (CDMI)

  ← Infrastructure Storage

- **OGF – Open Grid Forum**

  Open Cloud Computing Interface (OCCI)

  ← Cloud Management

- **OMG**

  Unified Modeling Language (UML)

  ← Application

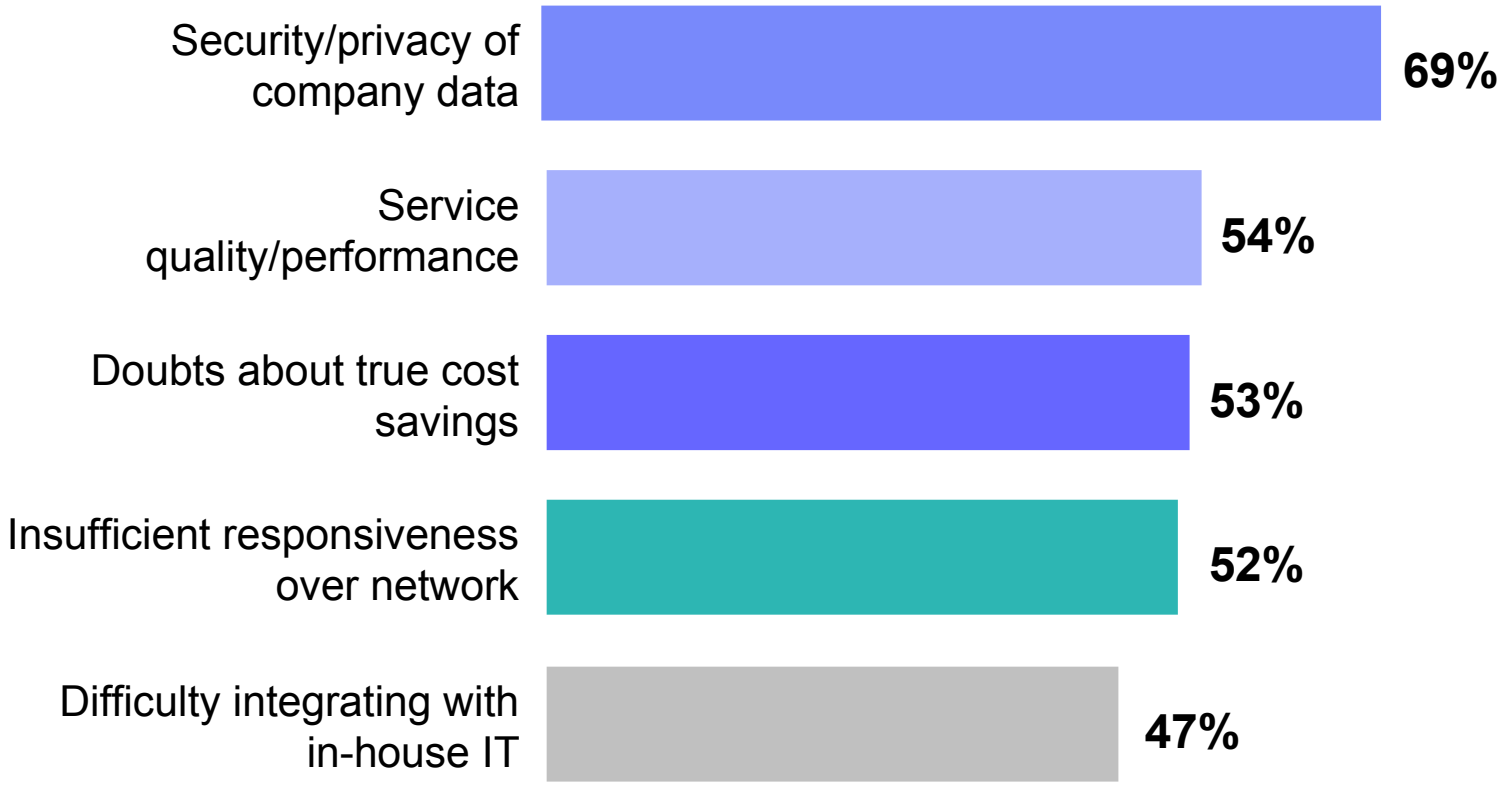
Webtalk May 2010 at
http://www.brighttalk.com/webcast/20535

Security – Grand Challenge for the Adoption of Cloud Computing

Security Is Limited By The Weakest Link

Concerns about data security and privacy are the primary barriers to public cloud adoption

What, if anything, do you perceive as actual or potential barriers to acquiring public cloud services?



Percent rating the factor as a significant barrier (4 or 5)

Respondents could select multiple items

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

Specific Customer Concerns Related to Security

Protection of intellectual property and data	30%
Ability to enforce regulatory or contractual obligations	21%
Unauthorized use of data	15%
Confidentiality of data	12%
Availability of data	9%
Integrity of data	8%
Ability to test or audit a provider's environment	6%
Other	3%

Source: Deloitte Enterprise@Risk: Privacy and Data Protection Survey

Cloud Data Integrity is Critical

October 11, 2009: Microsoft Cloud Loses T-Mobile customer data

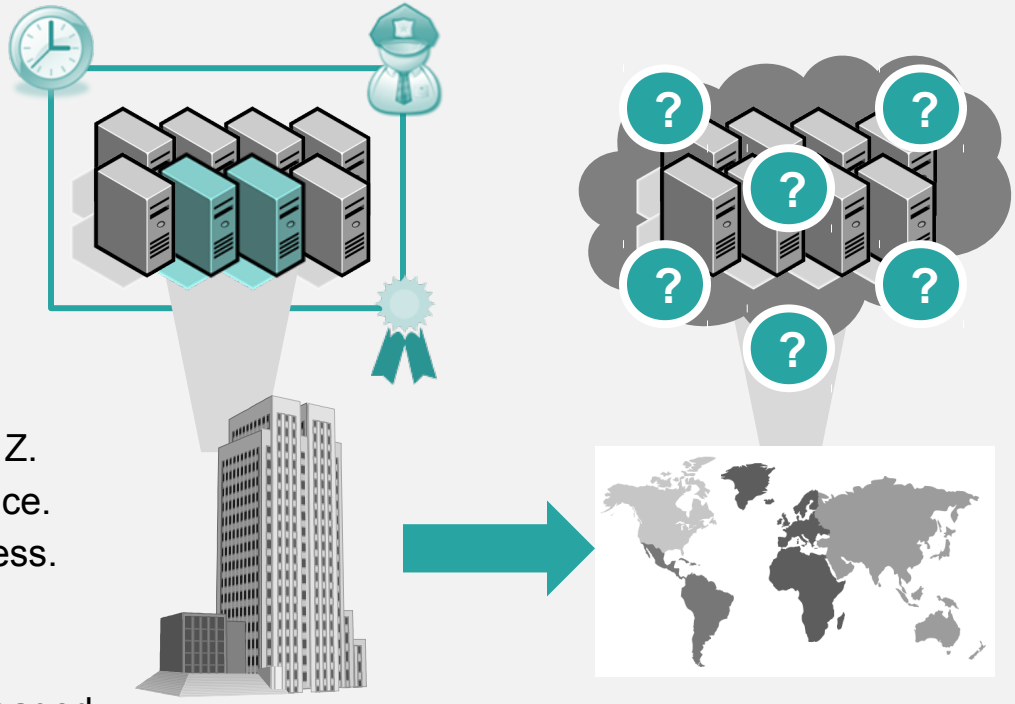
October 2nd, 2007: Amazon E[illegible] Outage Wipes Out Data

Piecing together islands of data from multiple locations involves synchronization and is not simply a data restore

Cloud Security 101: Simple Example

TODAY

TOMORROW



We Have Control

It's located at X.
It's stored in server's Y, Z.
We have backups in place.
Our admins control access.
Our uptime is sufficient.
The auditors are happy.
Our security team is engaged.

Who Has Control?

Where is it located?
Where is it stored?
Who backs it up?
Who has access?
How resilient is it?
How do auditors observe?
How does our security team engage?

What is Cloud Security?

Confidentiality, integrity, availability of business-critical IT assets

Stored or processed on a cloud computing platform

Categories of Cloud Computing Risks

Control

Many companies and governments are uncomfortable with the idea of their information located on systems they do not control.

Providers must offer a high degree of security transparency to help put customers at ease.

Data

Migrating workloads to a shared network and compute infrastructure increases the potential for unauthorized exposure.

Authentication and access technologies become increasingly important.

Reliabil

will be a key concern.
loss of service should outages occur.

Compliance

Complying with SOX, HI
and other regulations may prohibit the clouds for some applications.

Mission critical applications may not run in the cloud without strong availability guarantees.

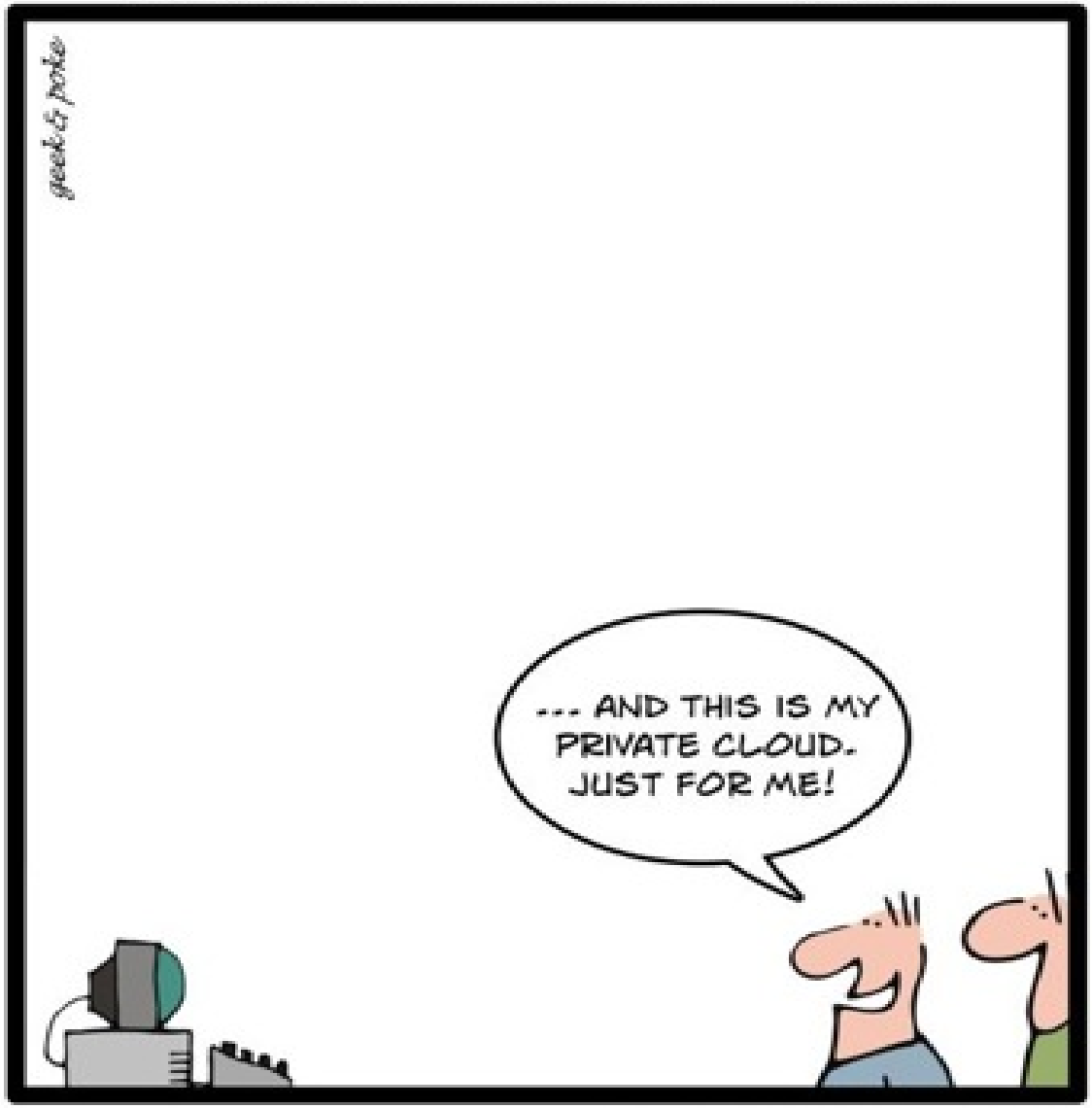
Security Management

n the simplest of tasks may be behind layers of abstraction or performed by someone else.

Comprehensive auditing capabilities are essential.

Providers must supply easy controls to manage security settings for application and runtime environments.

THE HISTORY OF THE CLOUD - PART 1



When thinking about “Cloud”, think about workloads

- Workload characteristics will drive the rate and degree of standardization of IT and business services.
- Complex transaction and information management processes, for example, will likely present challenges and risks of migration to standardized services. Other workloads will move faster, presenting rapid return-on-investment and productivity gains.
- For most enterprises, the best opportunities will be clear.

Analytics

Collaboration

Development and Test

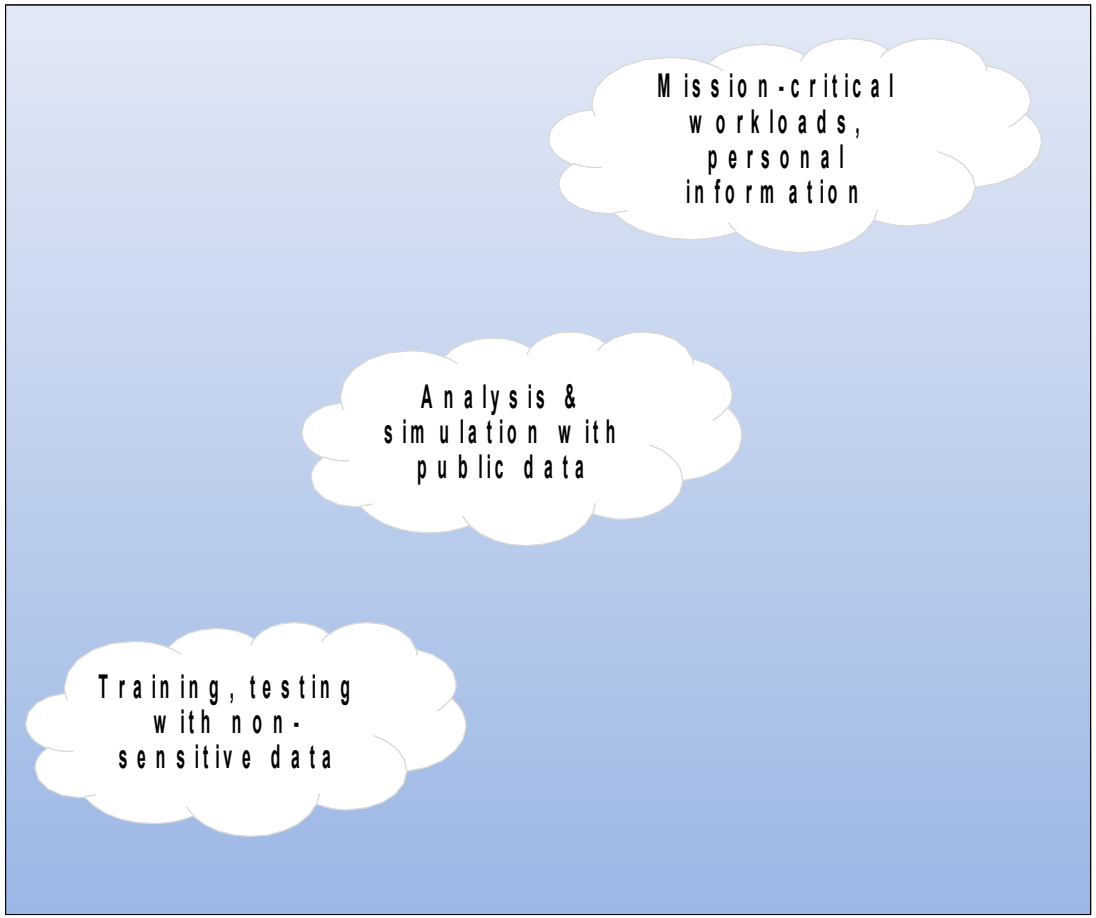
Desktop & Devices

Infrastructure

Business Services

One-size does not fit-all:

Different cloud workloads have different risk profiles



Tomorrow's high value / high risk workloads need:

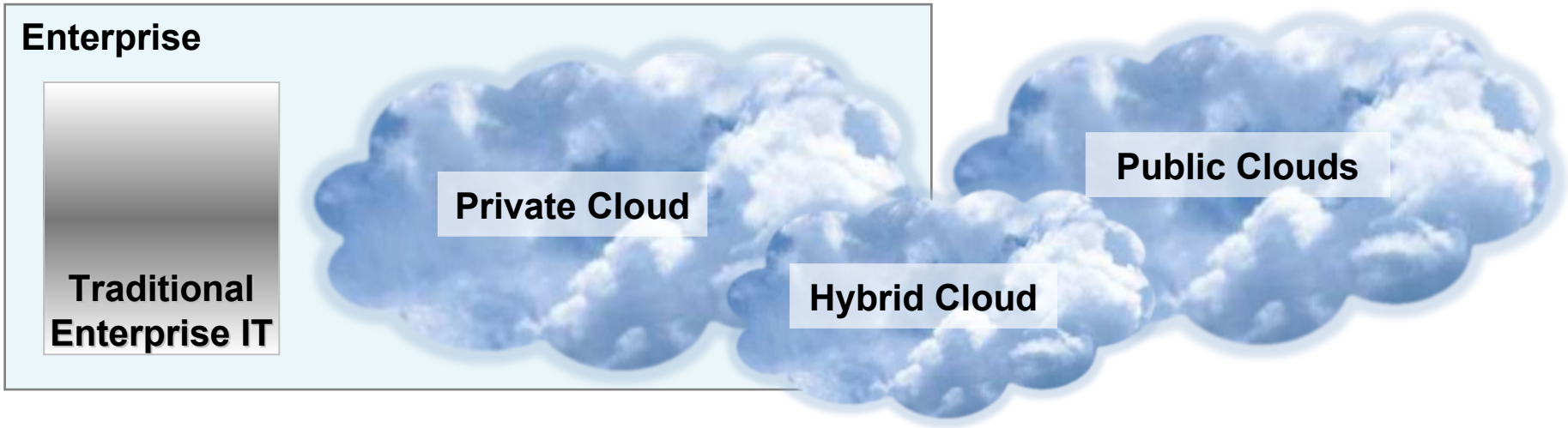
- Quality of protection adapted to risk
- Direct visibility and control
- Significant level of assurance

Today's clouds are primarily here:

- Lower risk workloads
- One-size-fits-all approach to data protection
- No significant assurance
- Price is key

One Size Does Not Fit All

Today there are three primary delivery models that companies are implementing for cloud …



Private Cloud

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

- Key features include:
  - Scalability
  - Automatic/rapid provisioning
  - Widespread virtualization
  - Chargeback ability

Hybrid Cloud

Internal and external service delivery methods are integrated, with activities/functions allocated to based on security requirements, criticality, architecture and other established policies.

Public Cloud

IT activities/functions are provided "as a service," over the Internet

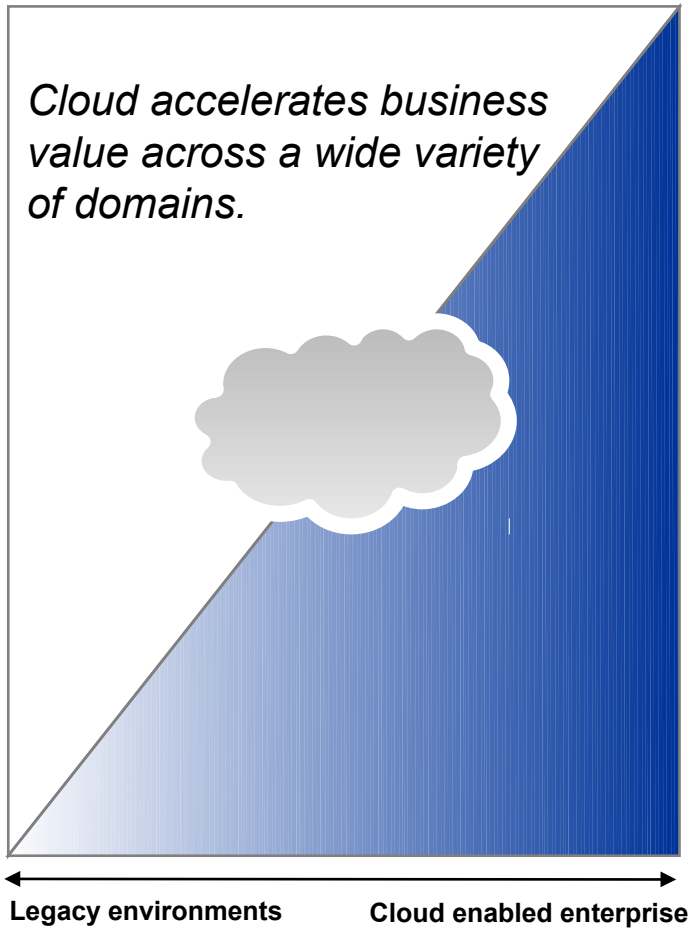
- Key features:
  - Scalability
  - Automatic/rapid provisioning
  - Standardized offerings
  - Consumption-based pricing
  - Multi-tenancy

Source: IBM Market Insights, *Cloud Computing Research*, July 2009.

Enterprises Have Achieved Significant Benefits through Cloud Computing

Most of the financial benefits are due to standardization and service management automation

Capability	From	To
Server/Storage Utilization	10-20%	70-90%
Self service	None	Unlimited
Test Provisioning	Weeks	Minutes
Change Management	Months	Days/Hours
Release Management	Weeks	Minutes
Metering/Billing	Fixed cost model	Granular
Standardization	Complex	Self-Service
Payback period for new services	Years	Months



Developing the Cloud strategy and implementation plan is key

- Define cloud i
  terms, what it
  you, and look
  on the value t
- Cost Reductio
- Service improv

- Look at how te
  changed and u
  this can be lev
  business adva
- Revisit your en
  architecture to
  how new IT tre
  computing can

- Analyse worklo
  identify those t
  deliver most be
  cloud delivery
- High volatility i
- Low Security e
  workloads

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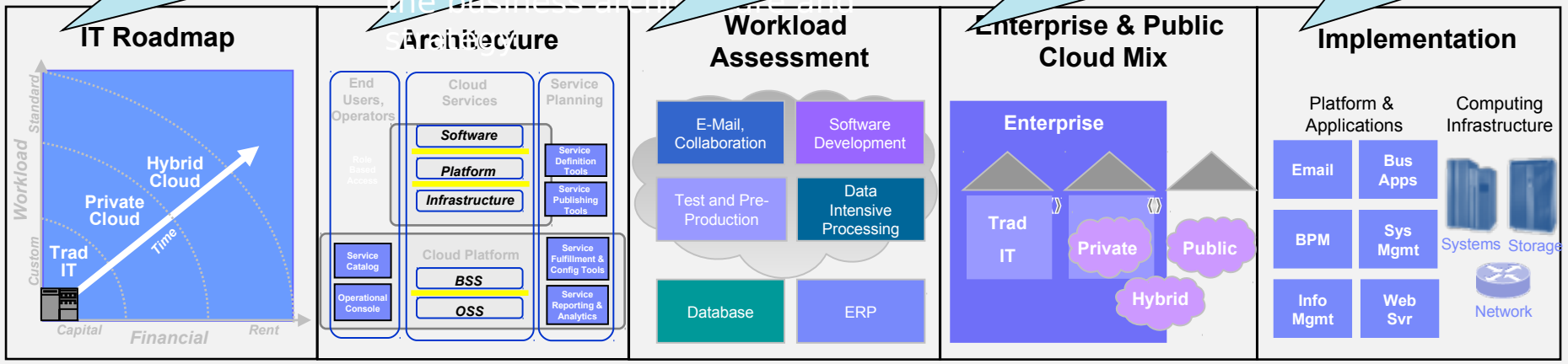
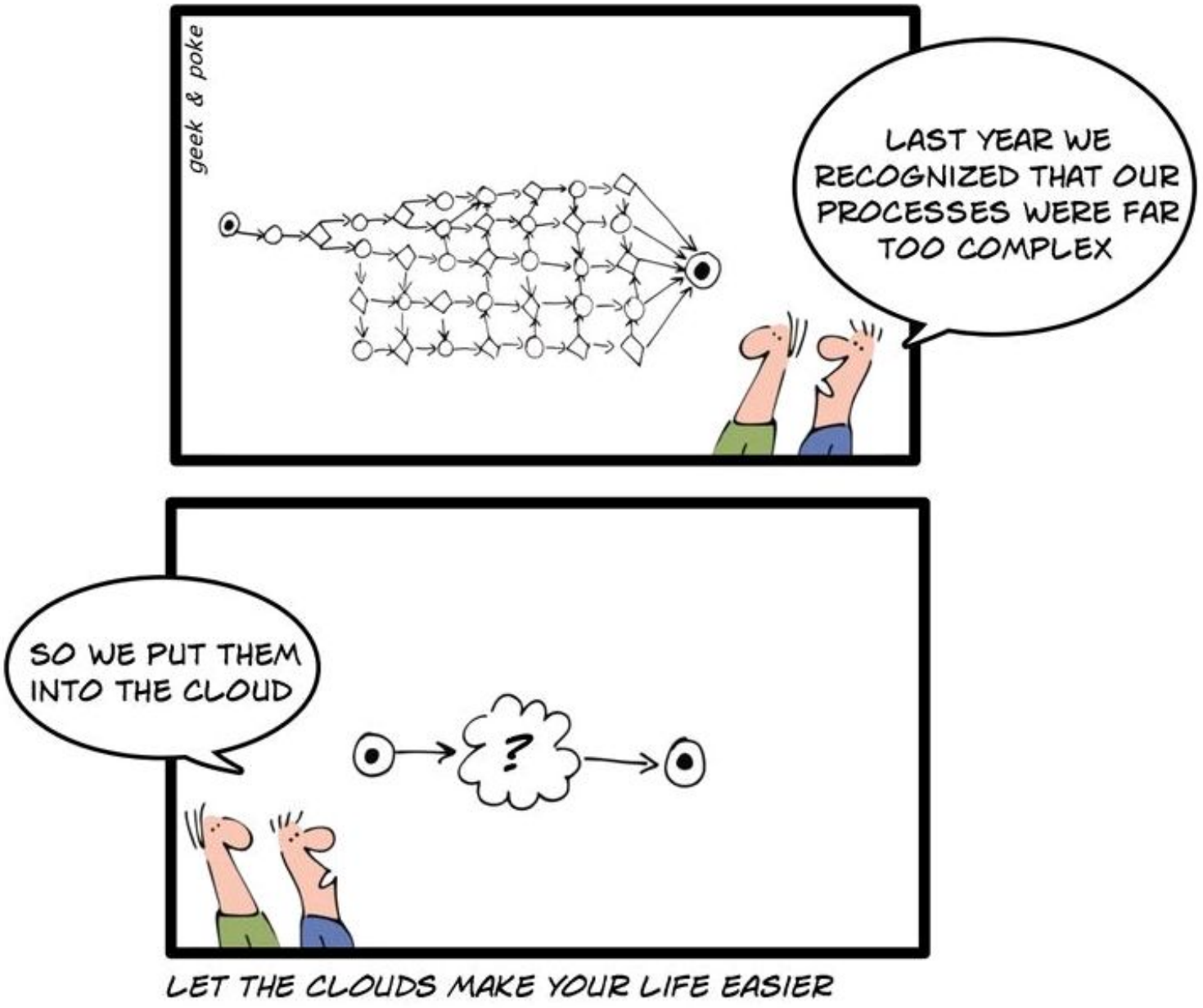
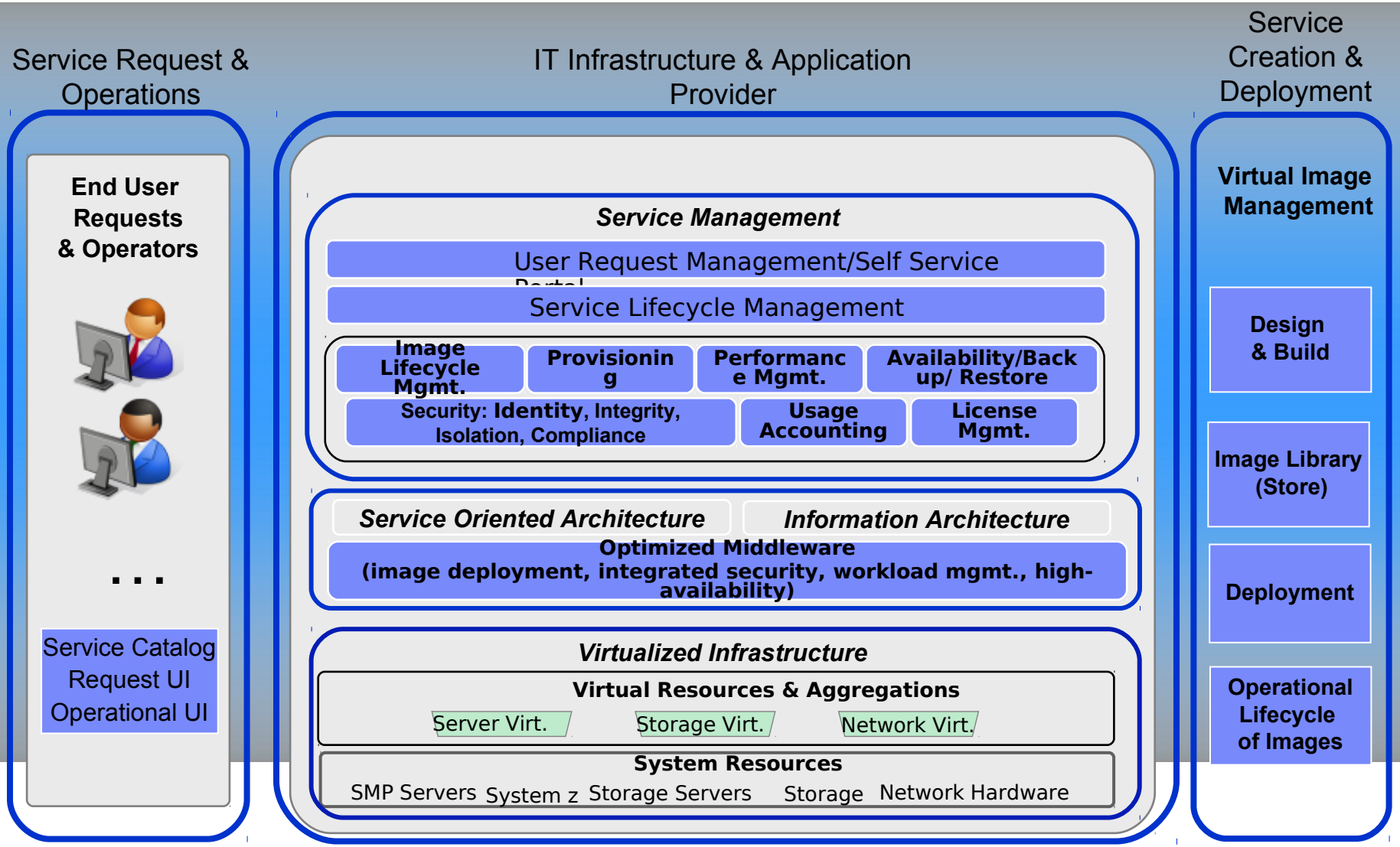
- Initiate pilot initiatives
- Adapt applications to run as virtualised images



Does Cloud Computing solve (all) problems ?

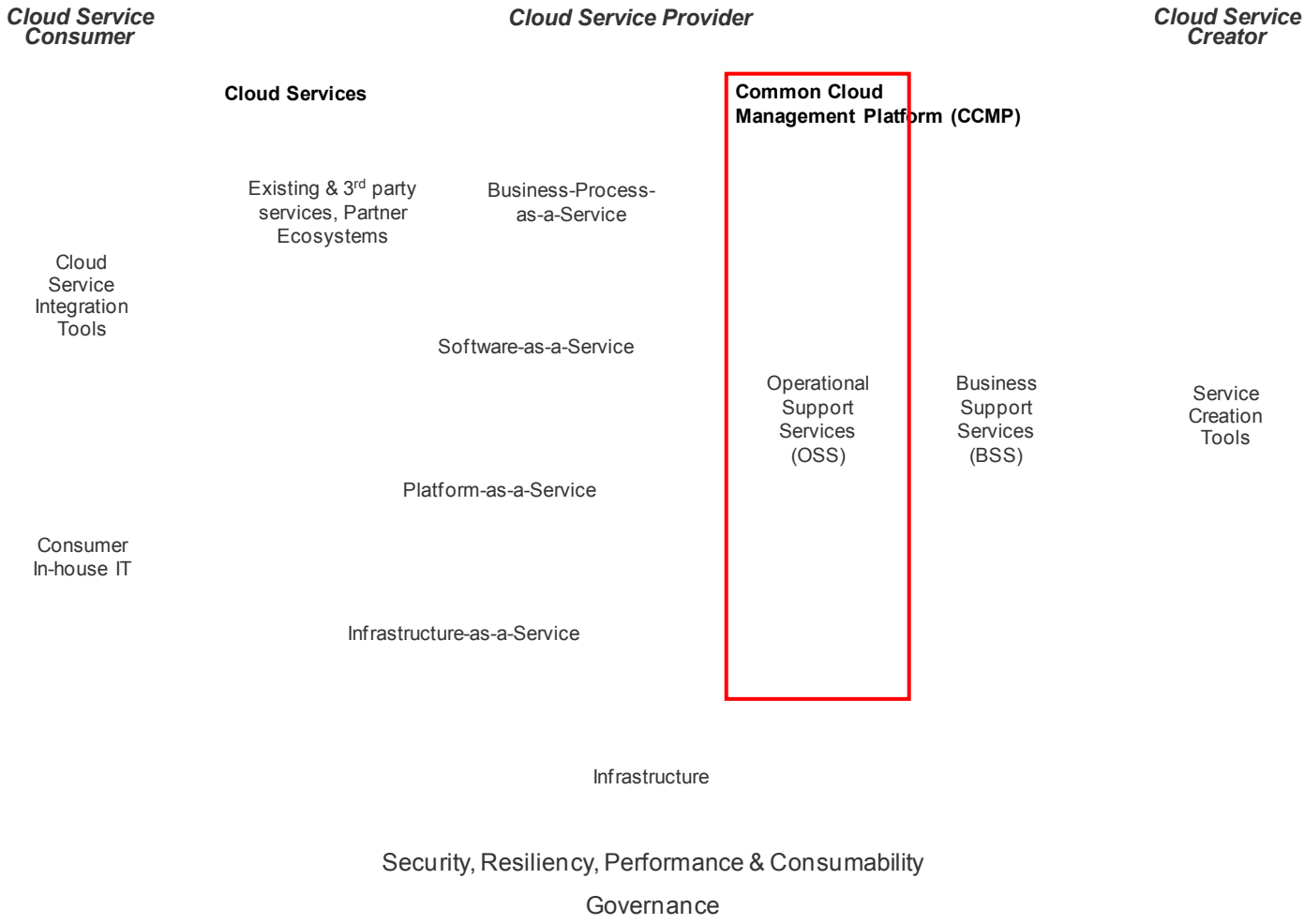


An Architectural Model for Cloud Computing

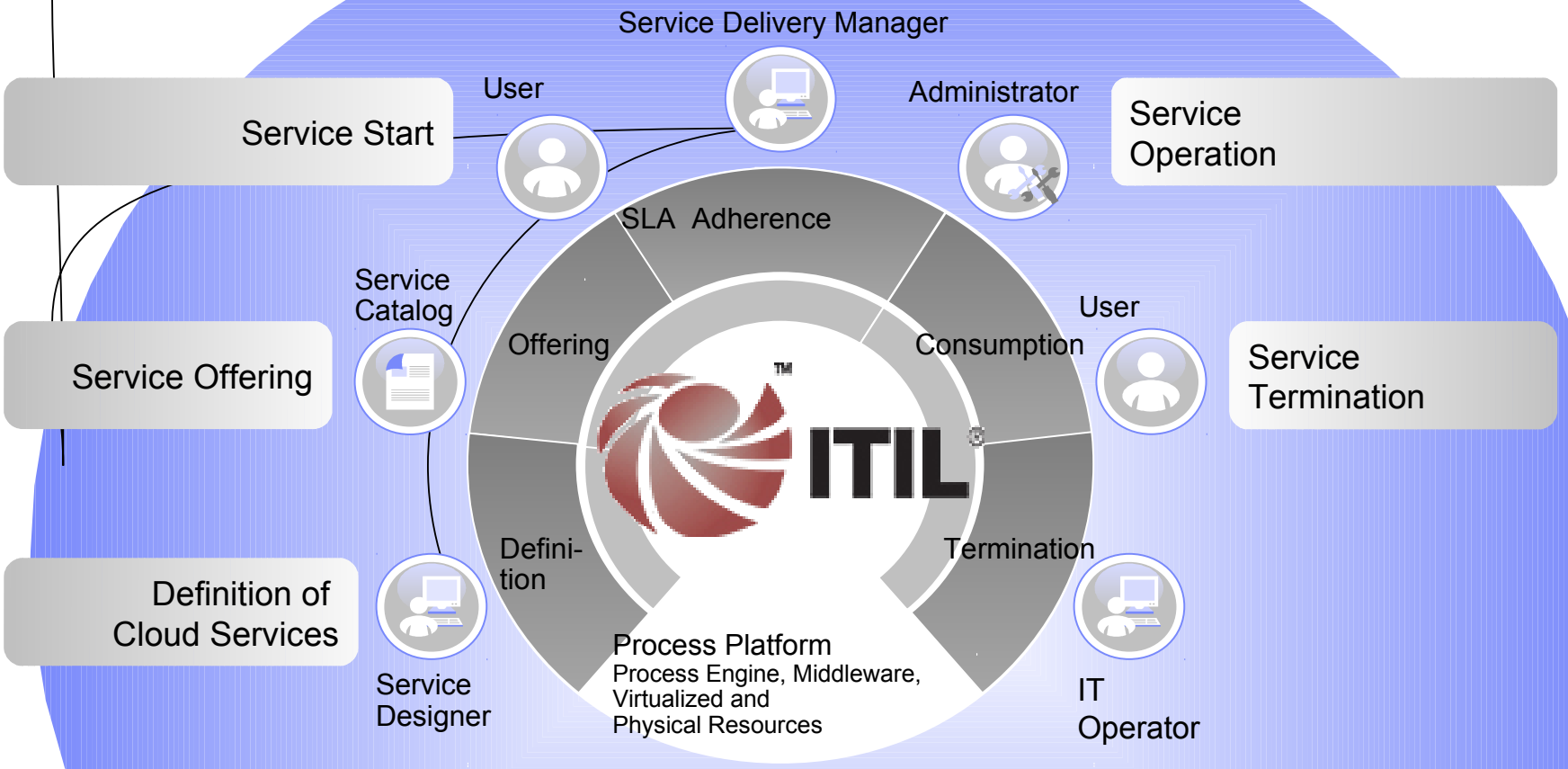


IBM Cloud Computing Reference Architecture – Best Practices Cloud Life Cycle Management

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



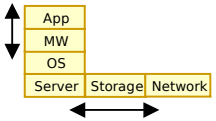
Cloud Life Cycle Management - Delivery & Consumption of IT Resources as Cloud Service



Based on IT Service Management ITIL Best Practices

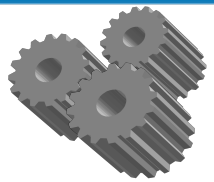
12 steps towards creating a cloud service

1. Specify cloud service description



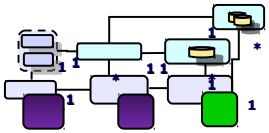
Describe function, price , SLA of cloud service, incl. management scope

2. Implement runtime functionality



Examples: Select off-the-shelf hypervisor (VMaaS), implement custom app (e.g. LotusLive)

3. Define unit of delivery & rating



Examples: VM, file system, distributed app, virtual IP address, queue, web conference, RDBMS, 3-tier business app, etc.

4. Implement self-service delivery & management functionality

Examples: “Create VM, add more nodes to WAS cluster, change max # of seats for LotusLive web conf

5. Implement monitoring metrics & event correlation rules

Select existing agent / implement new agent for monitoring JVM heapsize, hypervisor swap file size, # of processes, etc.

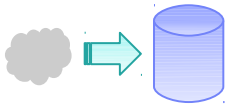
6. Implement incident, problem and asset mgmt processes

Incident, problem & asset mgmt process is specific to cloud service → customization needed

7. Implement resiliency SLA

Examples: HA for management system, delivered WAS cluster must be highly available

8. Implement backup approach

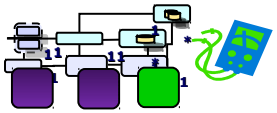


Examples: Backup all VMs, backup DB of LotusLive application

9. Implement security functions

Implement authentication, auditing, data protection, governance & audit

10. Implement cloud service specific billing metrics



Examples: CPU/hour, # of DB transactions, GB/month, # of users/webconf/hour, etc.

11. Implement rates for charging cloud service consumption

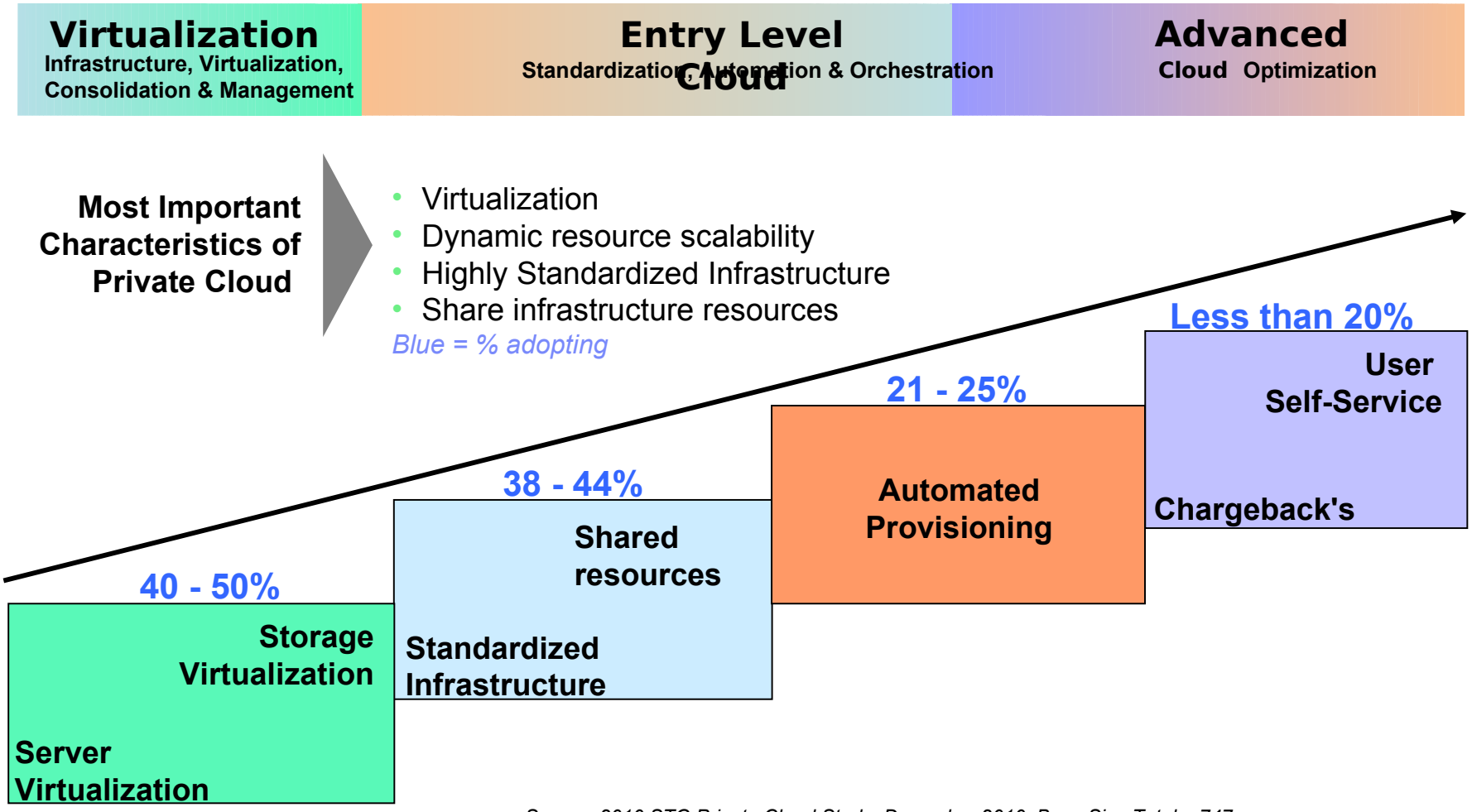
Examples: $0.11/VMhour; $0.19/MBsTransferred; $0.02/webconference; $0.05/fraudAnalysis

12. Register cloud service to service catalog

A cloud service must be registered to the service catalog to be externally accessible, entitlements need to be configured,

Market View - Clients Approach Cloud as a Journey

Most are in the early stages of adoption



Source: 2010 STG Private Cloud Study, December 2010, Base Size Total = 747

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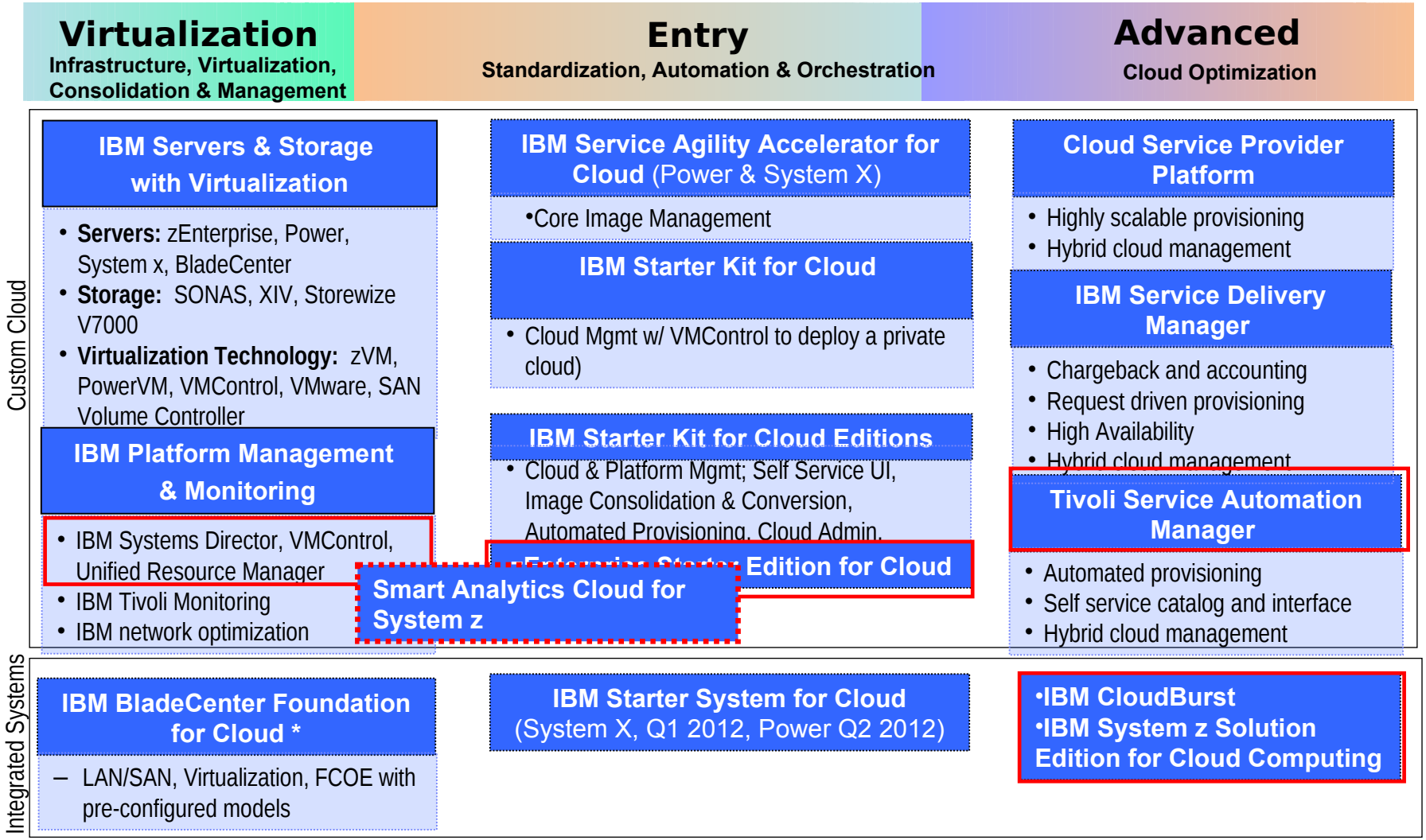
IBM Offerings – Virtualization, Entry and Advanced in Support of the Client' Cloud Journey



* IBM BladeCenter Foundation for Cloud - chassis-level integration in August, rack-level integration in 4Q

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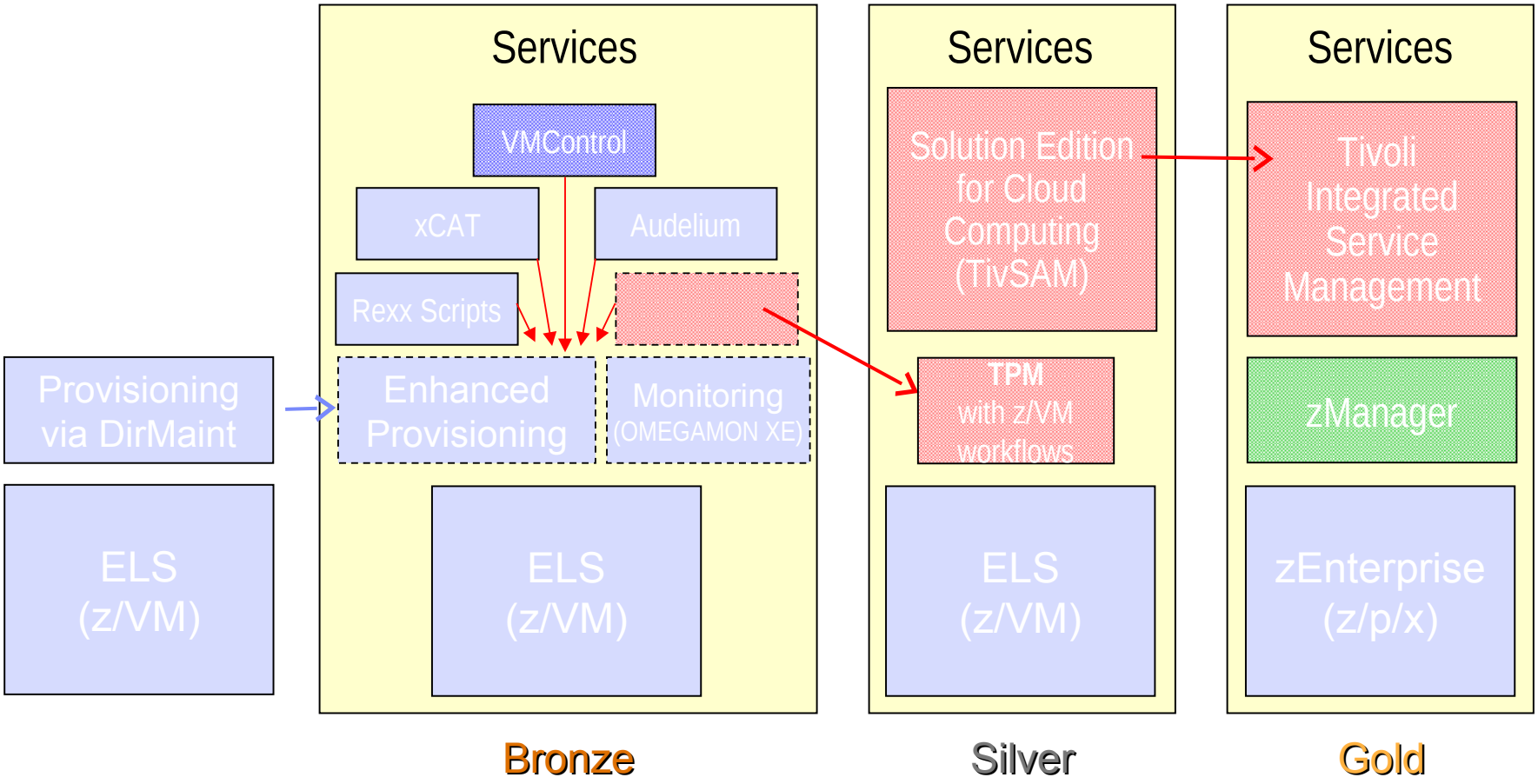
Cloud on System z and zEnterprise Offerings – Perspective



What is IBM Systems Director VMControl?

VMControl encompasses virtual server lifecycle management, image management and resource pool management as an extension to IBM Systems Director.

IBM System x

Power Systems

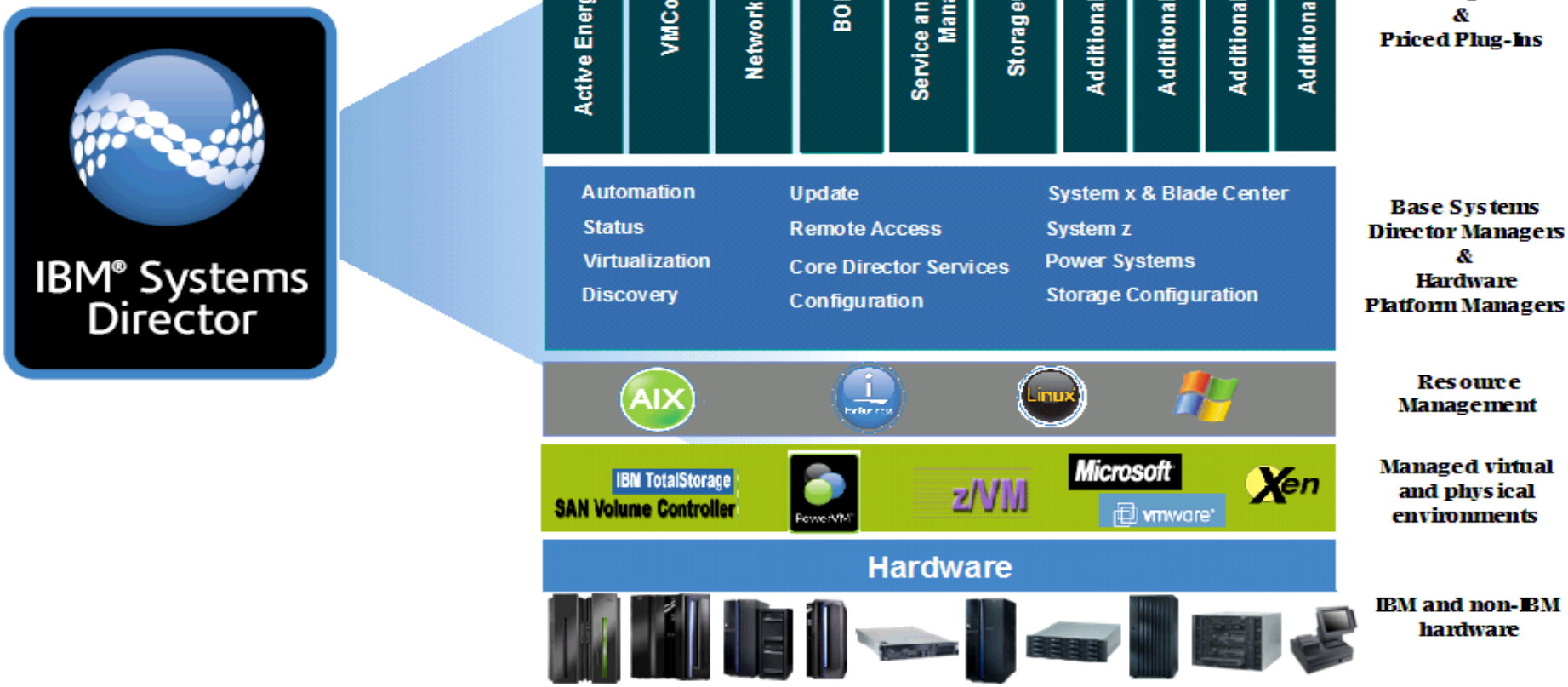
System z

VMControl features:

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

Using VMControl as an extension of IBM Systems Director it is possible to combine management of physical and virtual resources in one management tool

IBM Systems Director



IBM zEnterprise Starter Edition for Cloud - Details

Solution focused on establishing Infrastructure as a Service (IaaS) delivery model

Services

Tivoli Provisioning Manager (TPM 7.2.0.2)

with zVM Automation Package

Monitoring (OMEGAMON XE)

Enterprise Linux Server Solution Edition for Enterprise Linux

Supported:
- **z/VM 5.4 or 6.1**
- **Linux SLES V10, V11**
- **Linux RHELV4, V5**

zVM Virtual Infrastructure Automation Package

IBM

NavCode®: 1TW101098

Version: 7.2.0.2

Support level: Not supported

Provided by: IBM

Views: 83 | Referrals: 20

Rating: ☆☆☆☆☆

Last updated: Sep 22, 2011

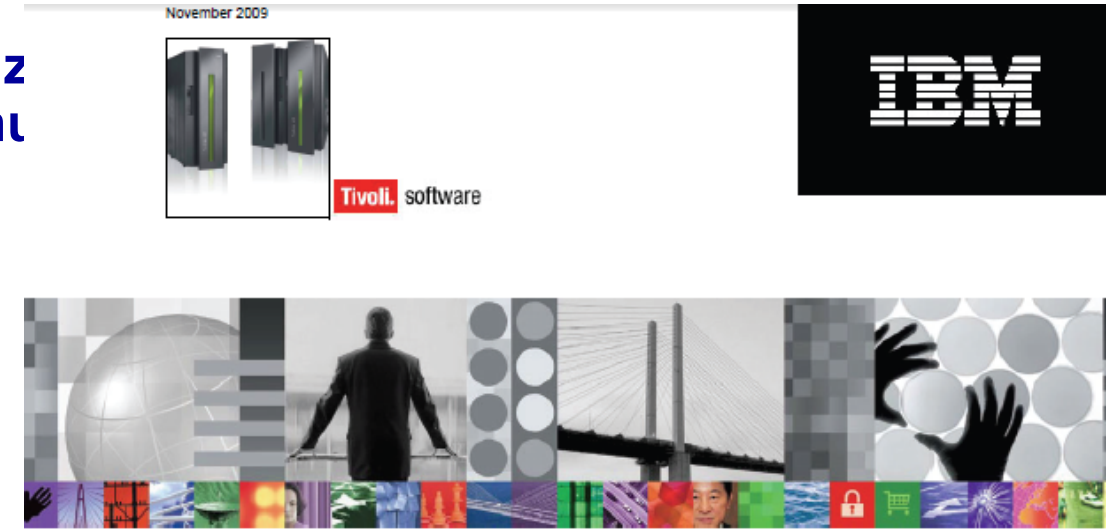
Description

The ***zVM_Virtual_Infrastructure*** automation package provides necessary workflows and scripts to provision Linux servers on z/VM, supporting the following:

- Define a z/VM LPAR or a z/VM second-level system to Tivoli Provisioning Manager.
- Define master images that can be provisioned by Tivoli Provisioning Manager.
- Provision new instances of a master image.
- Provide scripts that set the properties of the newly provisioned server during the initial boot.
- De-provision or delete servers.
- Discover existing Linux servers running on z/VM.

https://www-304.ibm.com/software/brandcatalog/ismlibrary/details?catalog.label=1TW101098

Set-up on Linux on System z
Benchmark for TPM on zLinu



64 Bit Benchmark Results

The benchmark results will be broken down into the following result sets.

- CPU scaling for DB2.
- CPU scaling for TPM.
- Network utilization.
- Transaction and page response times.

Tivoli Provisioning Manager 5.1.1.1:
64 Bit System z10 Benchmark Results

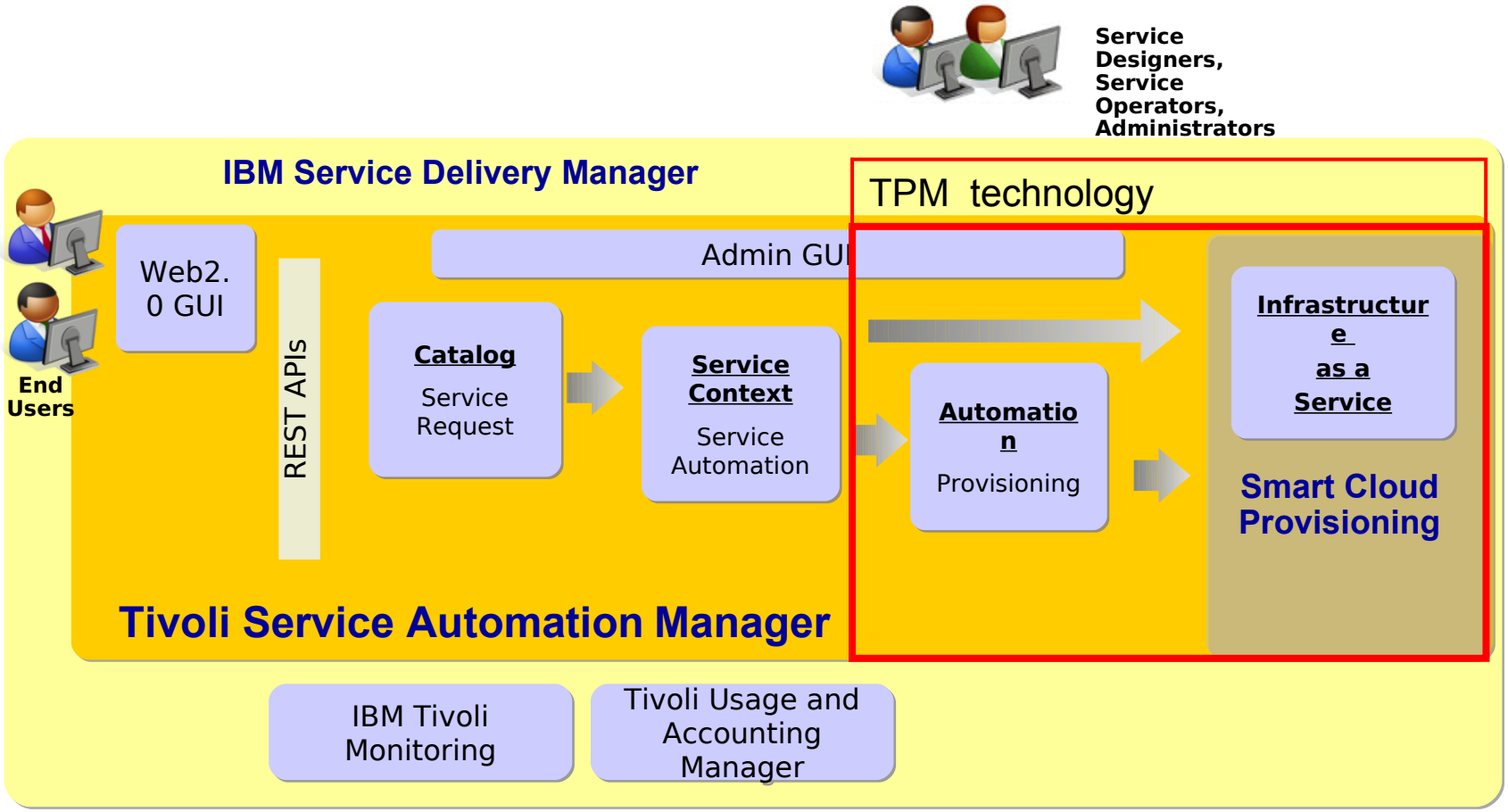
Document version 2.4

Mark Leitch
Andrew Kaye-Cheveldayoff
Bing Yuan
IBM Toronto Laboratory

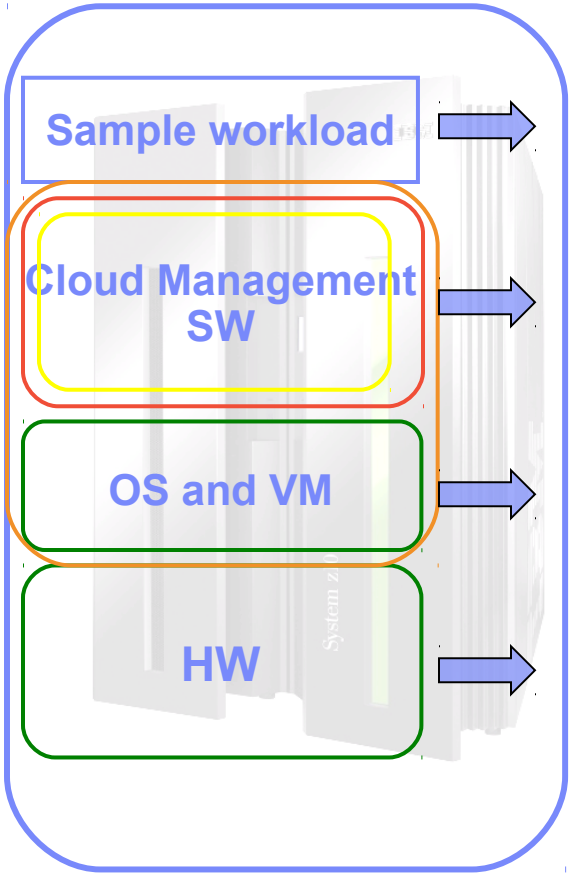
Dr. Juergen Doelle
IBM Boeblingen Laboratory
David Sadler
IBM Poughkeepsie Laboratory

http://public.dhe.ibm.com/software/dw/linux390/perf/TPM-5.1.1.1-64-Bit-z10-Benchmark-Results-v2.4.pdf

IBM zEnterprise Starter Edition for Cloud – Growth Option Towards Tivoli Service Automation Manager (TSAM)



Solution Edition for System z Cloud Computing - Components



Bill of Materials

- eyeOS*, wordpress
- Tivoli Service Automation Manager incl. TPM, TSRM
- IBM Tivoli Monitoring: Omegamon XE
- z/VM®
- Linux
- IBM System z10™ or IFLs
- Memory
- Storage

* procured by customer

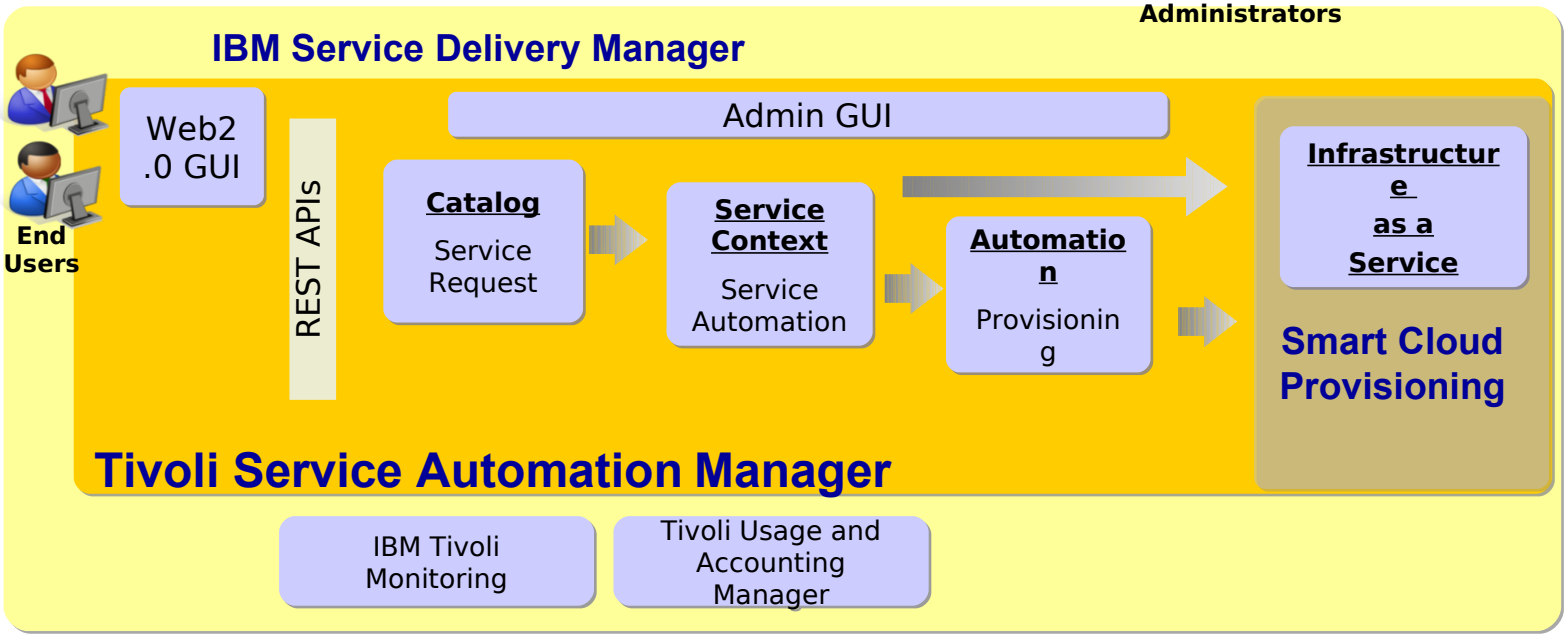
IBM Services

- Planning workshop for cloud environment)
- Install/configure
  - HW system (LPAR creation, security)
  - Base z/VM & Linux
  - Tivoli components
- Develop test scenario for service automation and management via Tivoli Service Automation Manager
- Direct to eyeOS image

STANDARDIZATION | **SELF-SERVE PORTAL** | **VIRTUALIZATION** | **AUTOMATION**

Tivoli Service Automation Manager- Cloud Life Cycle Management

Service Designers, Service Operators, Administrators



Service Catalog → **Service Request Mmgt** → **Service Automation** → **Service Deployment /Termination**

- Interaction with end user
- Access to Service Catalog
- Collect parameters for service requests

- Prepare service request from given input parameters
- Approval and notifications on business level
- Perform reservation of resources

- Topology definition
- Orchestration by management plans
- Management plan definition
- Management plan execution
- Situation governance incl. error handling by admin
- Work assignments on admin level (“inbox”)

- Management plan fulfillment by executing TPM workflows
- ... or native scripts
- ... or Java based actions
- ... or manual tasks

Typical Cloud Management Platform Middleware Stack

Workloads

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

Web, Collaboration and Infrastructure

Technology
Highly Threaded
Throughput-oriented
Scale Out Capable
Lower Quality of Service

Analytics and High Performance Computing

Technology
Compute intensive
High I/O Bandwidth
High Memory Bandwidth
Floating point
Scale out Capable

Transaction Processing and Database

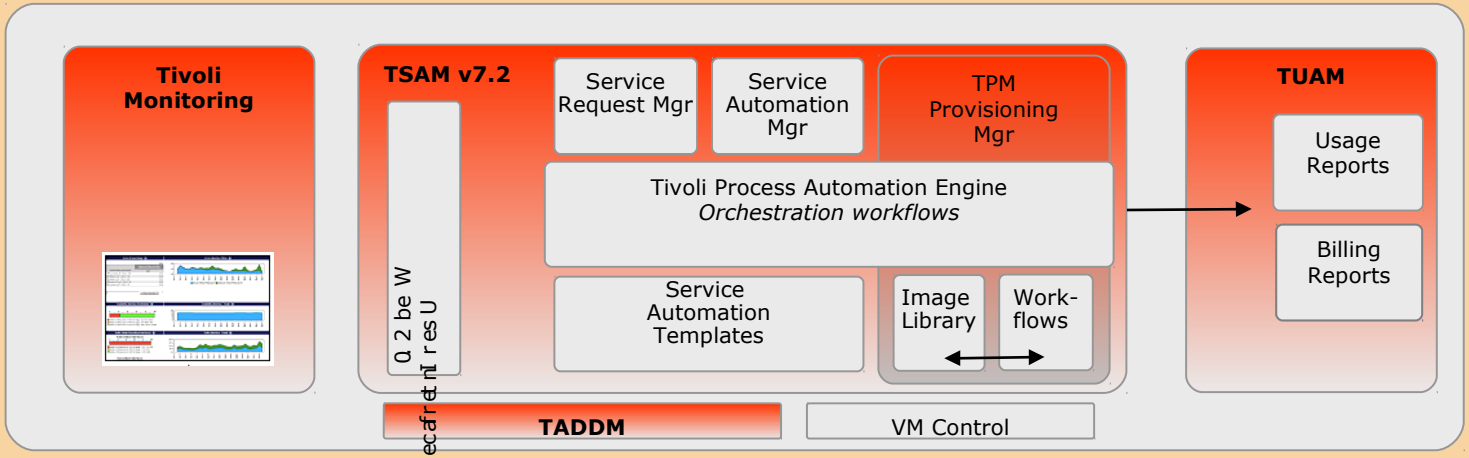
Technology
Scale
High Transaction Rates
High Quality of Service
Handle Peak Workloads
Resiliency and Security

Business Applications

Technology
Scale
High Quality of Service
Large Memory Footprint
Responsive Infrastructure

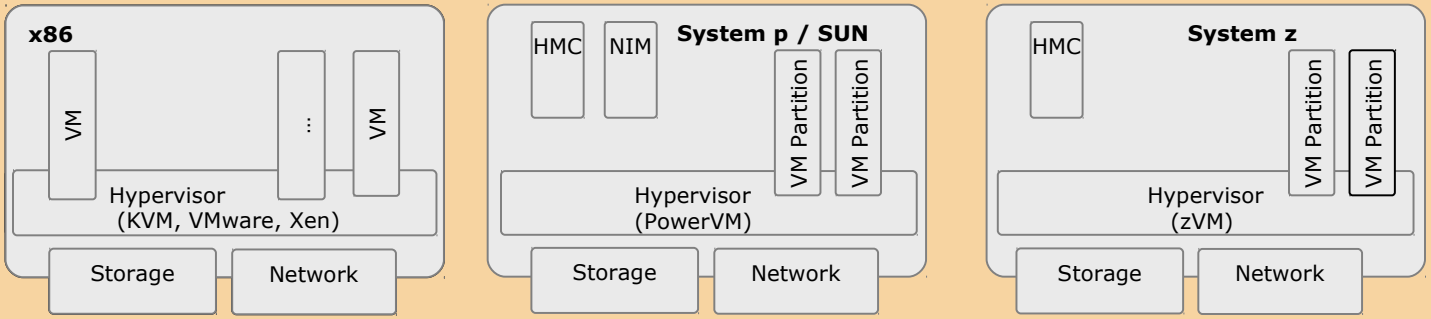
Tivoli Service Automation Layer

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



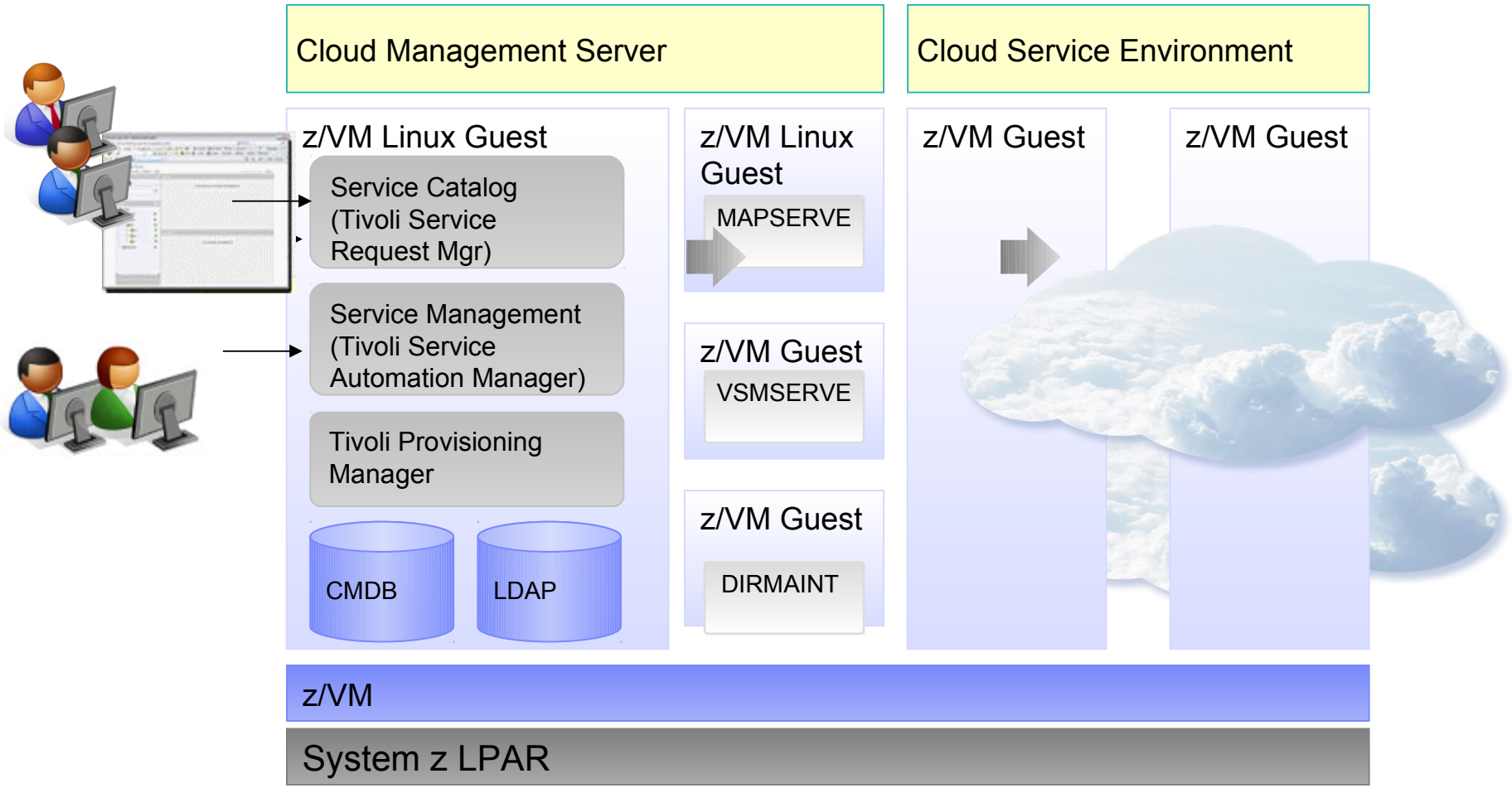
Virtualized Infrastructure Layer

- Virtualized resources
- Virtualized aggregation
- Physical infrastructure



End to End Service Management

Tivoli Service Automation Manager – Implementation under z/VM – Boeblingen Demo System Set-up



IBM System z Cloud Computing Solutions

System z Solution Edition for Cloud Computing

… a cloud computing foundation solution that can be customized by the client for a wide range of cloud workloads.

IBM Smart Analytics Cloud for System z

… a cloud computing solution for the delivery of business intelligence and analytics optimized for the large enterprise client.

Enterprise Linux Server and Solution Edition for Enterprise Linux

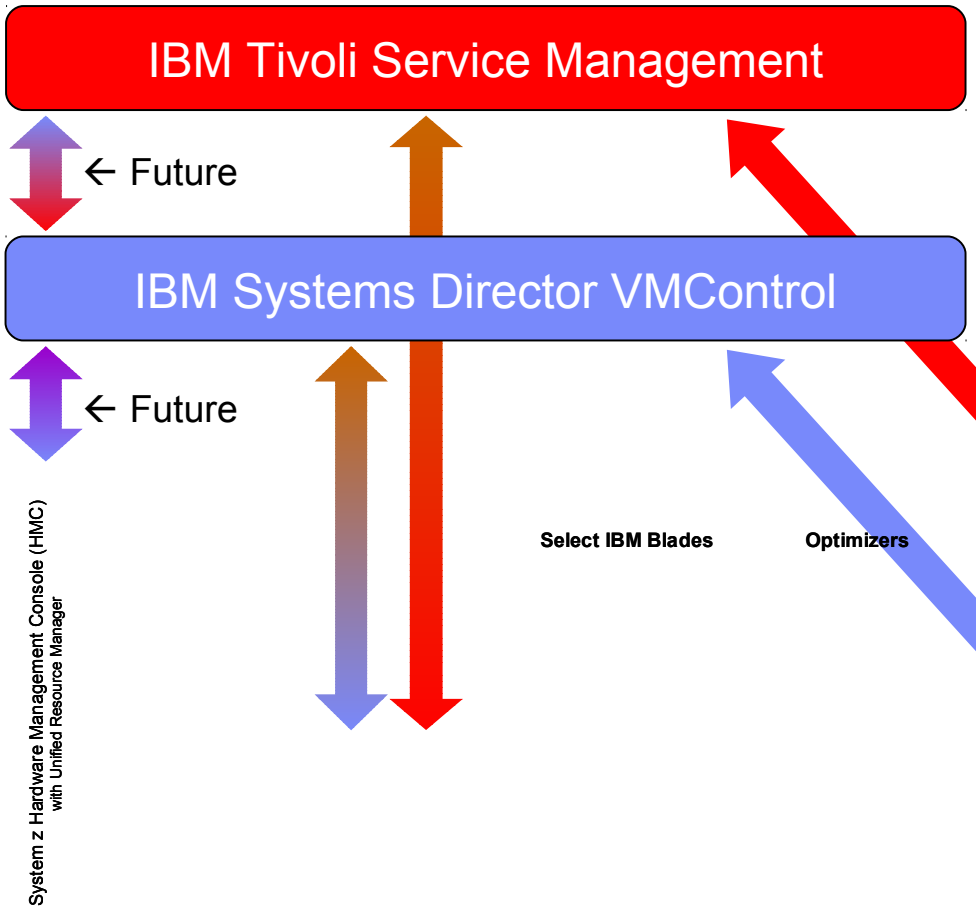
… a system offering that provides a basic level of cloud infrastructure support well suited for deploying a development / test cloud.

IBM WebSphere CloudBurst Appliance for z/VM

… an appliance that creates and dispenses multi-server patterns of virtualized IBM middleware products.

Multi-System Cloud Management on IBM zEnterprise

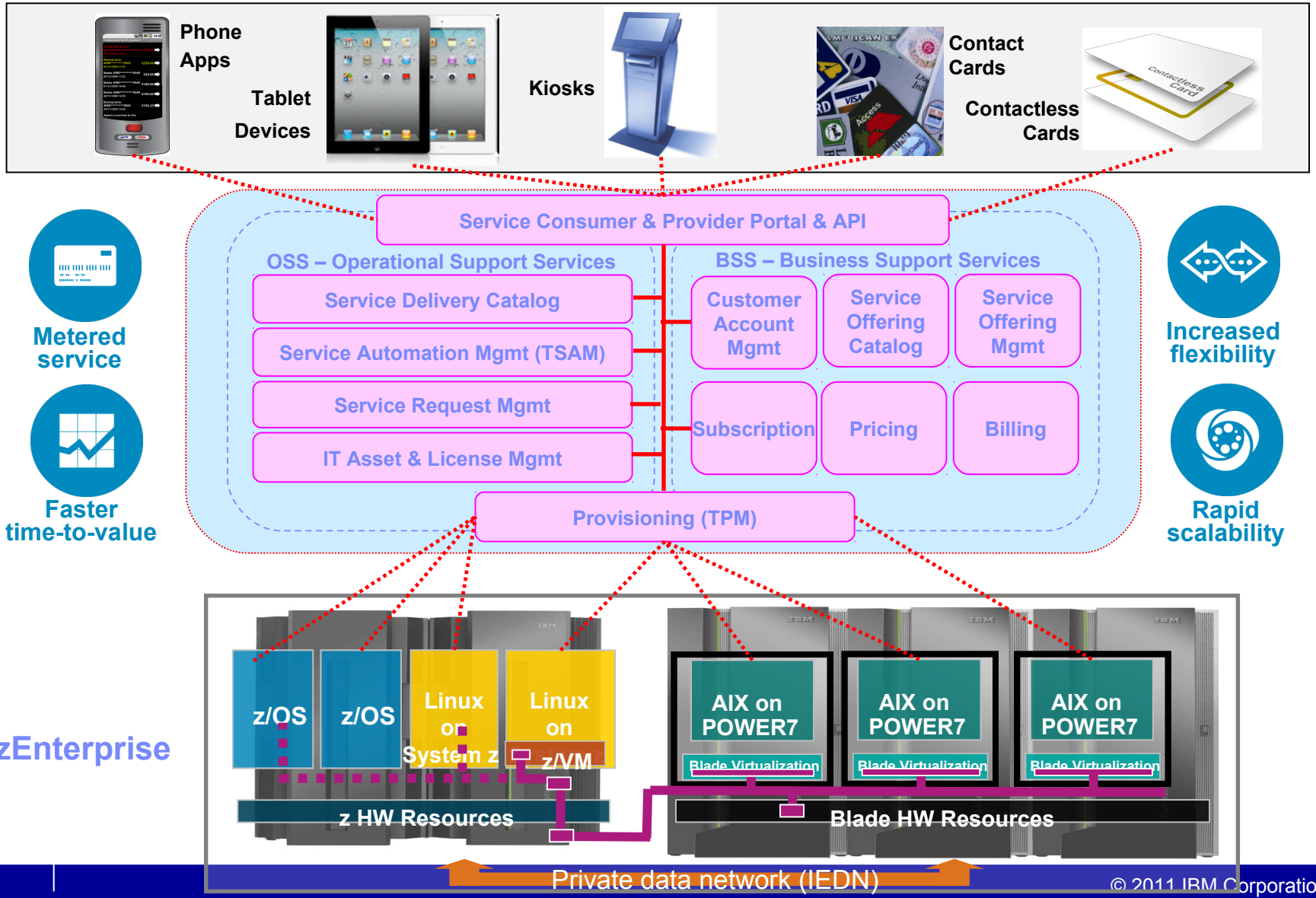
The Big Picture Going Forward



- Enables optimal workload placement in a multi-system cloud infrastructure: spend less *and* deliver higher qualities of service
- Allows clients to manage all the hypervisors in a zEnterprise system with consistency
- Extends same management capabilities to Power and System x servers elsewhere in the enterprise

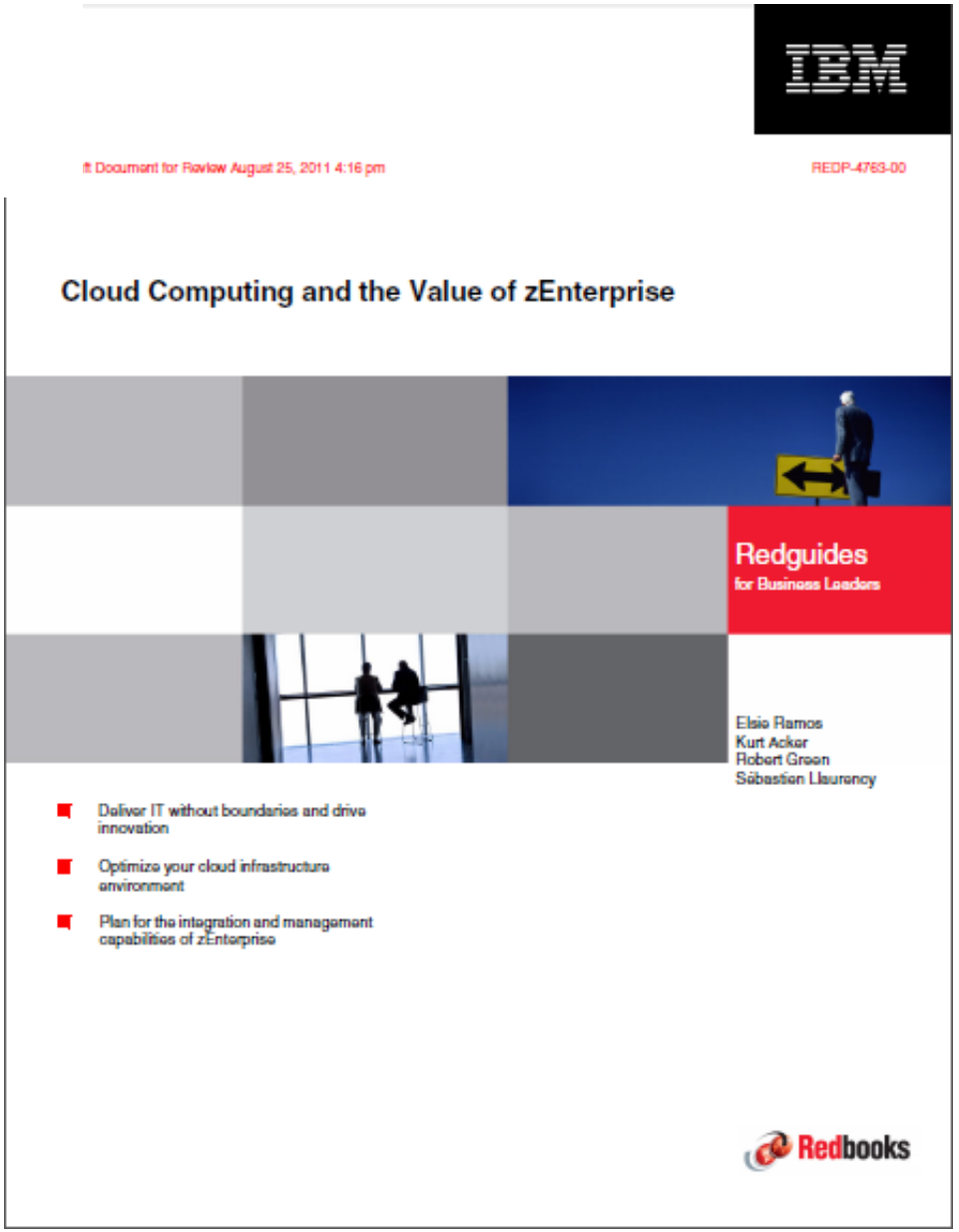
Note: All statements regarding IBM's plans, directions, and intent are subject to change or withdrawal without notice, and represent goals and objectives only.

Mobile Banking Services within a Cloud



Implementation Options on Linux on System z - Cloud Computing and zEnterprise

- Executive overview
  - Challenges of cloud computing
    - Prevalent issues with cloud environments
- Solving cloud computing challenges
- zEnterprise: The value of cloud in a box
- zEnterprise end to end integrated architecture
  - System z environment and distributed systems
  - zEnterprise hardware
  - Hypervisor overview
  - Integrated Software Stack
- How others started the journey
- Summary



http://www.redbooks.ibm.com/redpieces/pdfs/redp4763.pdf

Implementation on Linux on System z

- Provisioning Linux on IBM System z with Tivoli Service Automation Manager
  - Overview
  - Introduction to Tivoli Service Automation Manager
  - Preparing for Linux provisioning on System z with Tivoli Service Automation Manager
  - Verification of provisioning setup environment

http://www.redbooks.ibm.com/redpapers/pdfs/redp4663.pdf

Summary

- Enterprises need to consider cloud deployments as part of their IT roadmaps
- Enterprise adoption is driven by workload considerations and will happen across a spectrum of deployment options
- Governance and architecture are critical for success – introducing cloud computing is transformational
- There will be many clouds and many enterprise deployments will be hybrid
- IBM is investing in enabling deployment choices and offering services ‘on the IBM cloud’
- We would like to stay engaged with you as you develop your cloud strategy

Questions?

Cloud Computing is real -- It's not just another hype

There's real technology available today to build clouds

Thank You

For more information, please visit:

ibm.com/cloud

Or contact me at:

amrehn@de.ibm.com

Additional Resources

- IBM Tivoli Service Automation Manager:
  - http://www-01.ibm.com/software/tivoli/products/tsam-facts.html
- Solution Edition for Cloud Computing:
  - http://www.ibm.com/systems/z/solutions/editions/cloud/index.html
- Provisioning Linux on System z Redpaper:
  - http://www.redbooks.ibm.com/abstracts/redp4663.html?Open
- IBM WebSphere Cloudburst Appliance (WAC):
  - http://www-01.ibm.com/software/webservers/cloudburst/features/?S_CMP=wspace
  - http://www.youtube.com/websphereclouds#p/search/3/yya-gvCMiwQ
- Linux Distributions Supported by each System z Platform:
  - http://www-03.ibm.com/systems/z/os/linux/support_testedplatforms.html
- IBM Software available for Linux on System z:
- http://www-1.ibm.com/servers/eserver/zseries/os/linux/software.html
- Destination z
  - http://www-03.ibm.com/systems/z/destinationz/

TRANSZAP Mainframes for SW As a Service

Leading SaaS provider of ePayable, digital data, and spend analysis solutions

- 44,000+ users
- 4,200 companies
- $80 B in transaction detail, processed

• Available • Secure • Elastic

Traditional Lintel shop

- Challenge to scale, manage, secure
- Complex configurations
- Linear costs for growth

New z9 Business Class shop

- 100% YTY growth-plan to production
- Flexible capacity on demand
- Centrally managed & secured
- Manageable cost of incremental growth

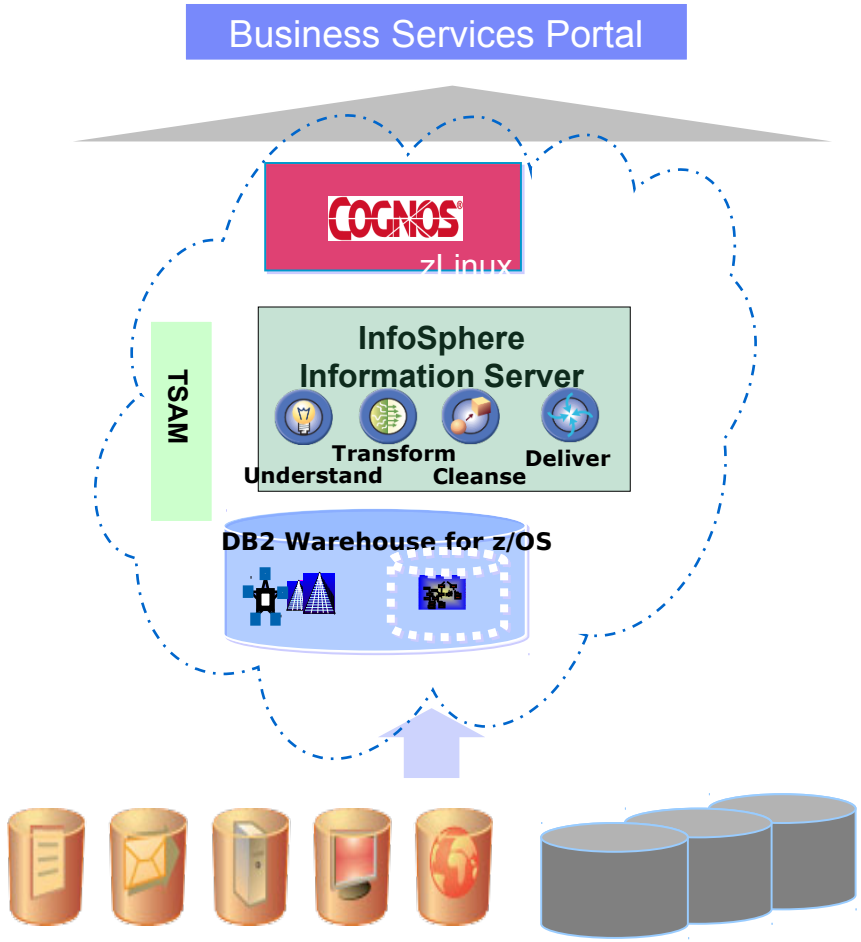
"The IBM z9 provides the stability and scalability needed to accommodate Transzap's triple digit volume growth in a SaaS environment."

– Peter Flanagan, President

System z Data Cloud allows customers to bring BI services with less cost and higher qualities of availability and security.

What is a Data Cloud?

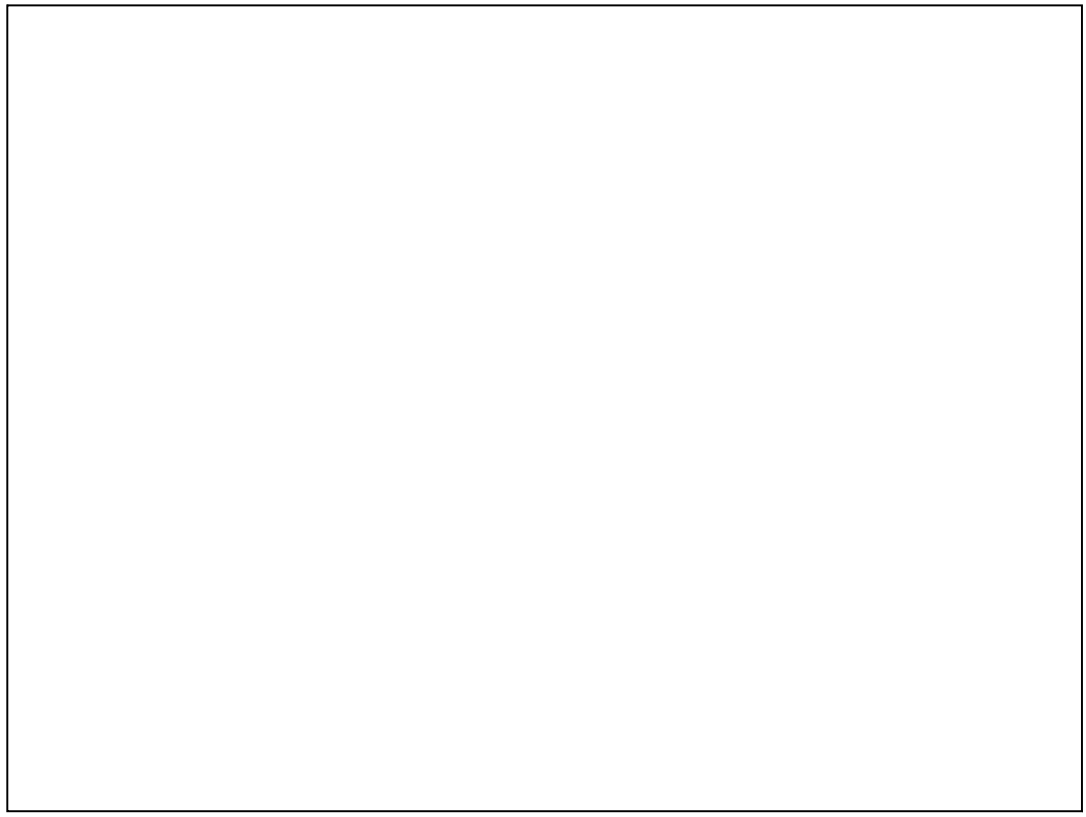
- Centralize BI for optimization using Cognos on z/Linux
- Take Data from anywhere: structured, unstructured, applications, mainframe, or distributed
- Deliver consumer driven services to a broad set of users / lines of business
- Automate delivery of services



Leverage the data centric strengths of z: allows for multi-tenant data support, Sysplex enablement and massive consolidation at the application layer

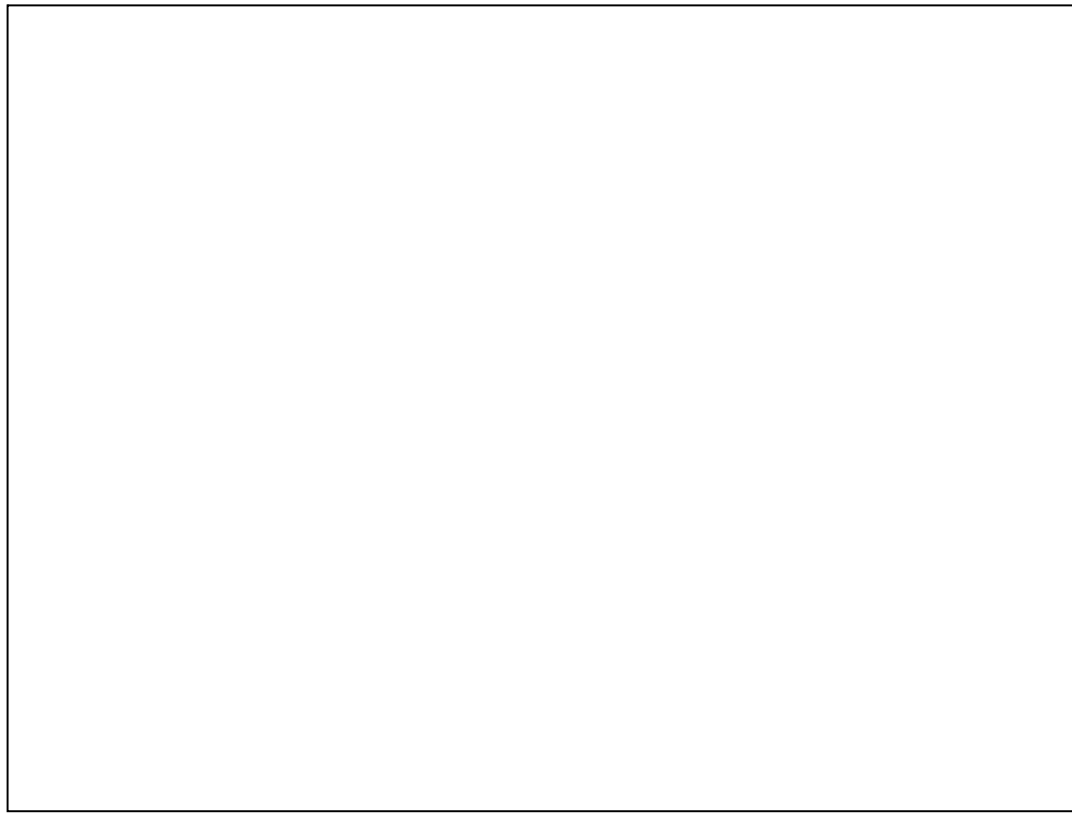
Why z for data clouds?

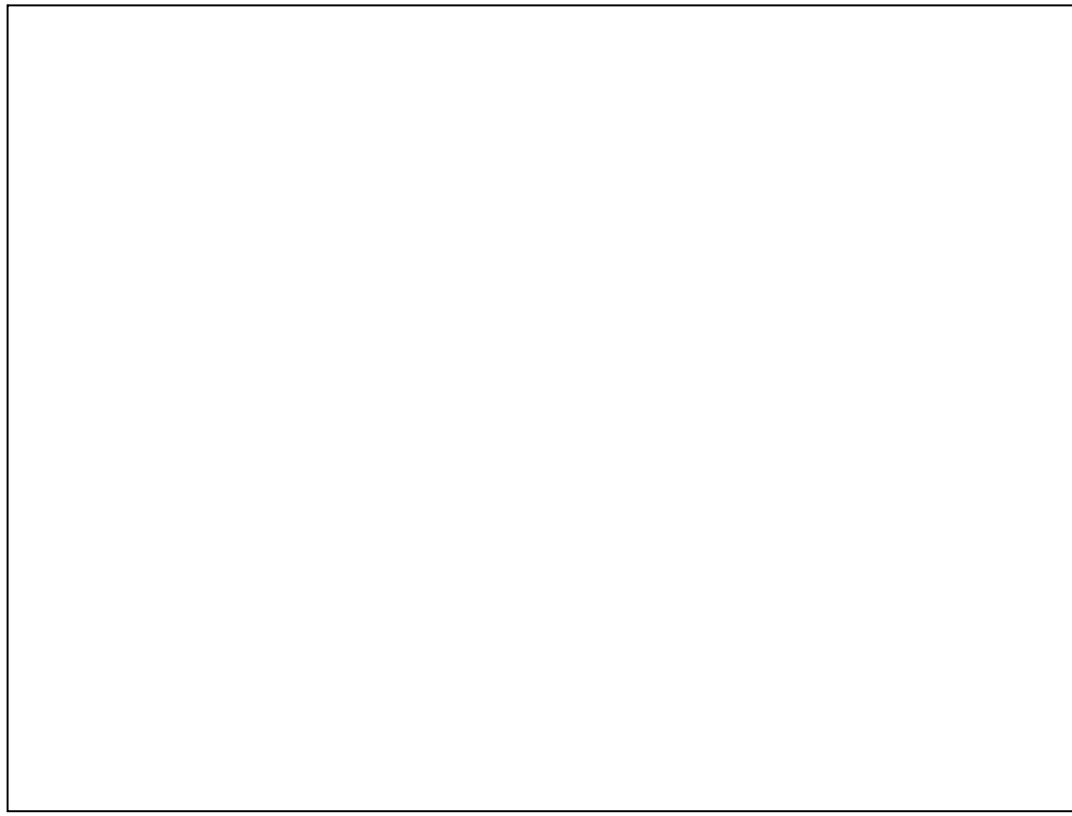
- Save costs with operational efficiencies of z and virtualization
- Deliver qualities of service: availability, security, recoverability
- Allow for elastic growth in tenants and data
- Prevent unforeseen operations costs that occurs with a patchwork IT investment pattern

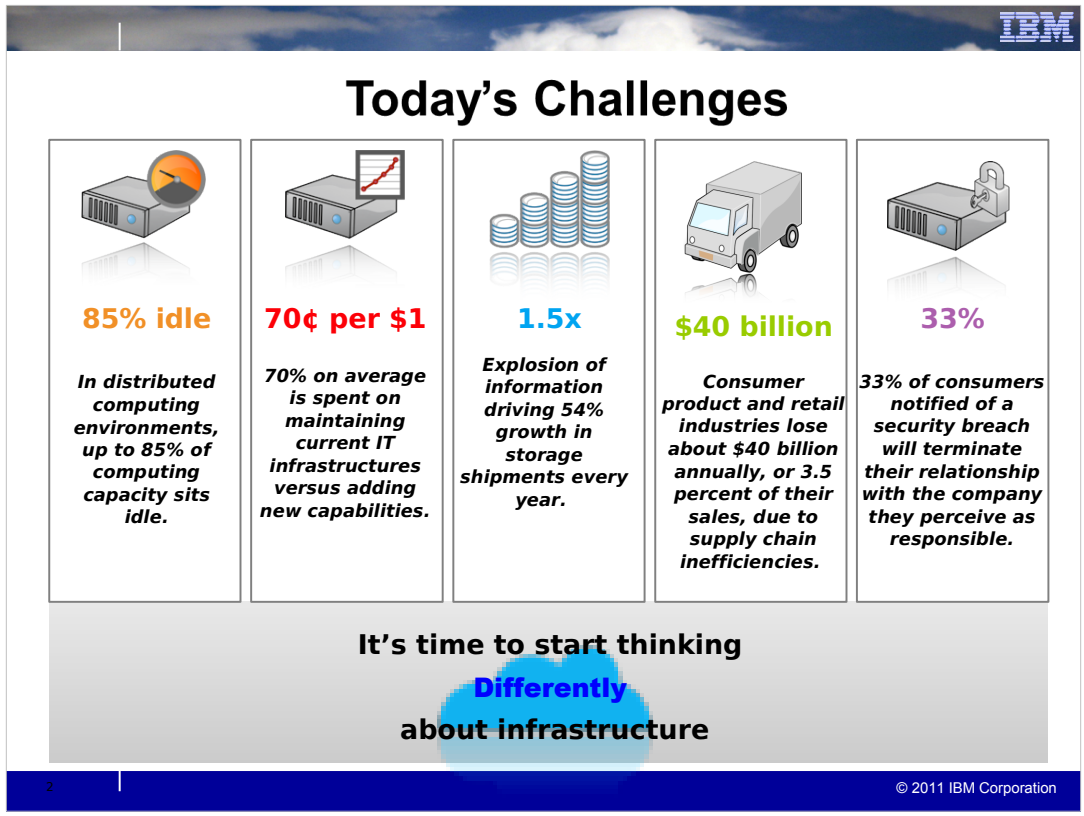


Download:

https://w3-03.sso.ibm.com/sales/support/ShowDoc.wss?docid=I396866I35854T12&infotype=SK&infosubtype=M0&node=doctype,M0|doctype,PSC|brands,B5000|brands,B5T00|businesstopic,T3100&appname=CC_CFSS







The World is getting more complicated, data is exploding and organizations are competing on an unprecedented level. Organizations need to think differently on how they address these challenges and the cloud offers the ability to see new efficiencies


CLOUD CAFE
COFFEE
SANDWICHES
SODA
ICE CREAM
CHIPS
BEER

Defining Cloud Computing …

Cloud computing is a new **consumption and delivery model** inspired by consumer Internet services. Cloud computing exhibits the following 5 key characteristics:

- On-demand self-service
- Ubiquitous network access
- Location independent resource pooling
- Rapid elasticity
- Pay per use

Multiple Types of Cloud Exist

- Private, Public & Hybrid

7

What is clear is that it has evolved with the consumer market place and hence many of the attributes are ascribed to clouds are related to the requirements of running internet based web 2.0 type user applications, the type of apps you would access from Facebook or you iPhone.

Features such as rapid elasticity and Pay per use suit web 2.0 applications which overnight can become the latest sensation. When users and workload can escalate over night due to viral marketing and the number servers required can go from 1 to 100 in hours or days. Similarly they can equally fall out of favour and return back to 5 or 10. To miss the peak could result in significant lost revenue, to resource for a peak that never comes will put you out of business.

Animoto

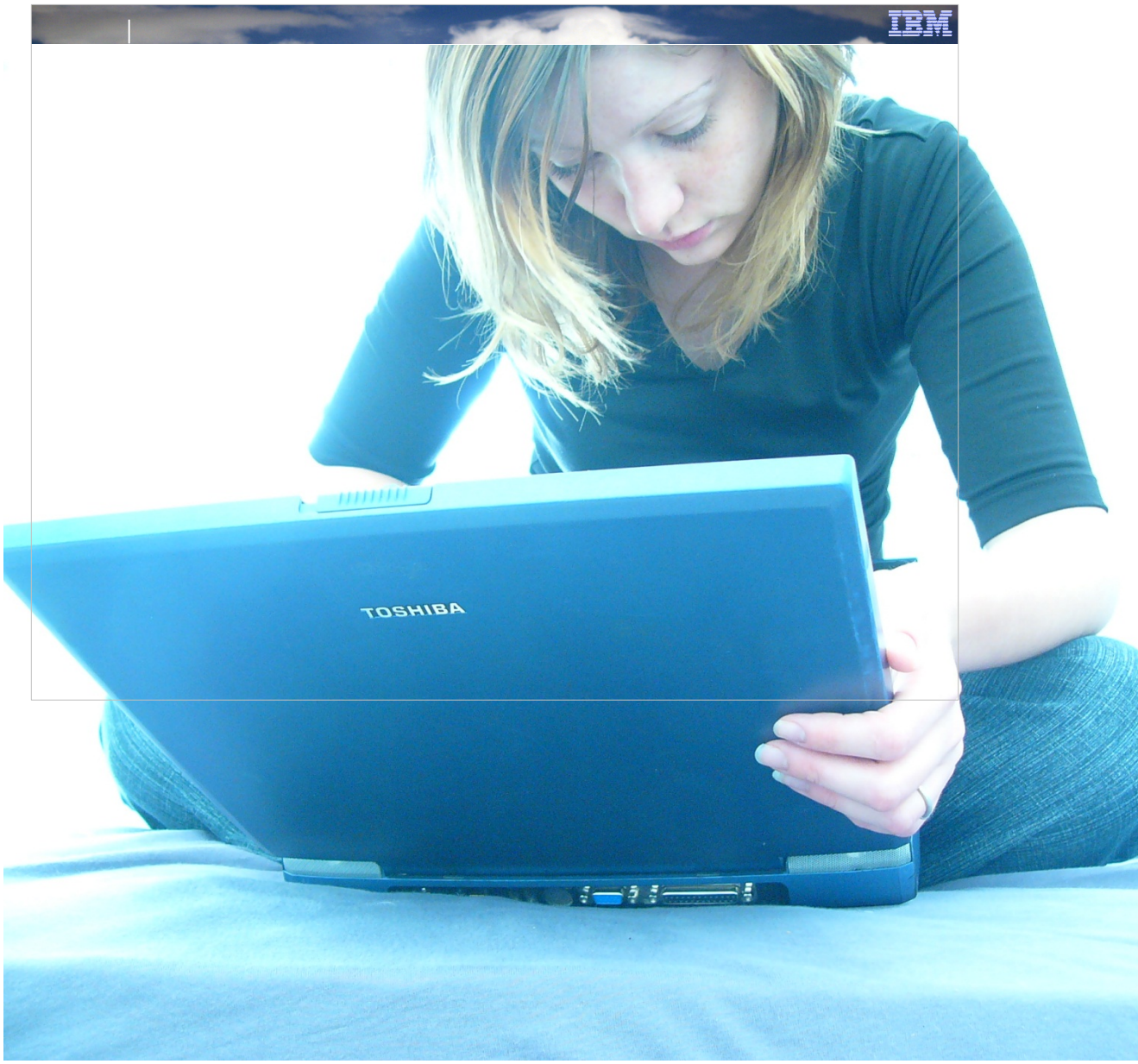
25K to 750K users

70 to 8500 servers

Peak of 25K per hour

Usually 50 over night.

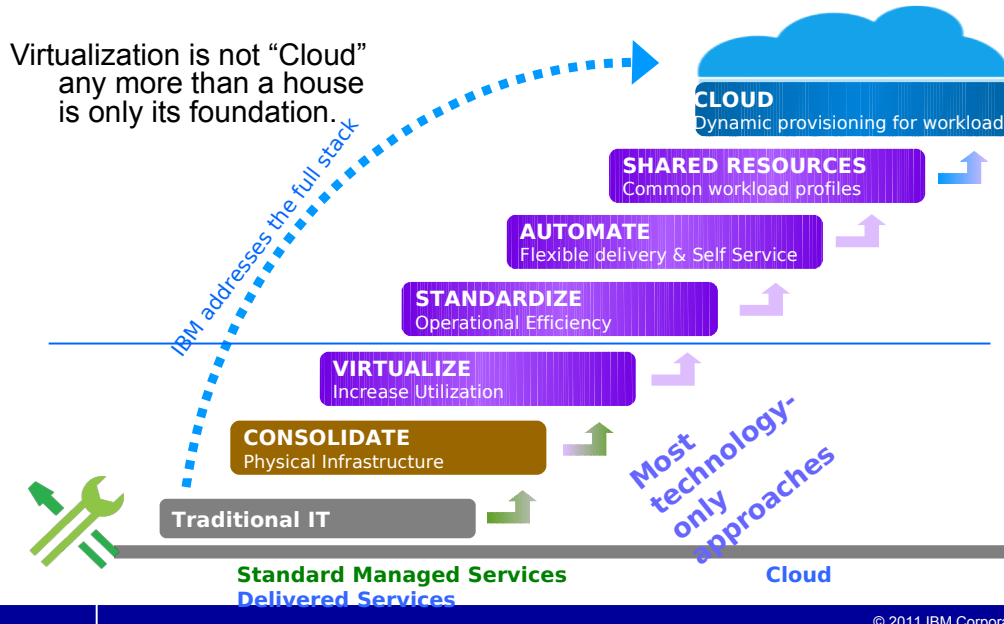
Though one of the frequent comments when described to veteran IT hacks is that there is nothing new in cloud computing and we have done it before. Lots of different views, recycled, nothing new.

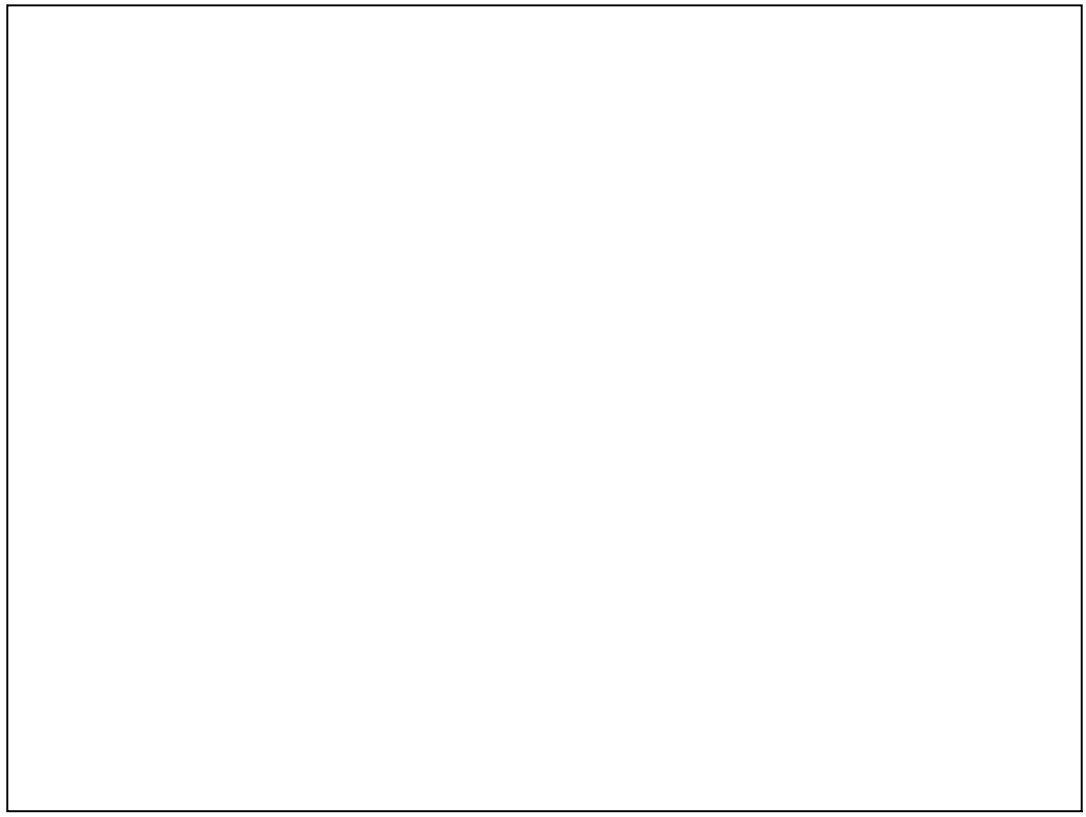

IBM
TOSHIBA

A Deployment Model

Business Model

This is a Natural Progression





IBM Premise: Cloud Computing Must Have

Common Attribute	Details
Flexible pricing	*Utility pricing, variable payments, pay-by-consumption and subscription models make pricing of IT services more flexible*
Elastic scaling	*Resources scale up and down by large factors as the demand changes*
Rapid provisioning	*IT and network capacity and capabilities are – ideally automatically – rapidly provisioned using Internet standards without transferring ownership of resources*
Advanced virtualization	*IT resources from servers to storage, network and applications are pooled and virtualized to provide an implementation independent, efficient infrastructure*
Standardized offerings	*Uniform offerings readily available from a services catalog on a metered basis*

The Harsh Reality of Cloud Computing

Lines of business are leveraging public clouds today

"Submarine Projects" are currently underway in your business

IT has been here before

Remember when those pesky Windows based Web Servers did this?

Users views IT as a commodity.

Users think Cloud can do Everything.

Who needs traditional IT?

Lines of business are focusing on short term cost.

Enterprises desire the benefits of cloud – but are not willing to compromise on their requirements

Availability and performance tuned to workloads

Technology platform choices built on standards

Flexible payment and billing options

Varying degrees of Security and Isolation

From self service to fully managed environments

44%

are concerned with the lack of or limited ability for customization of public clouds

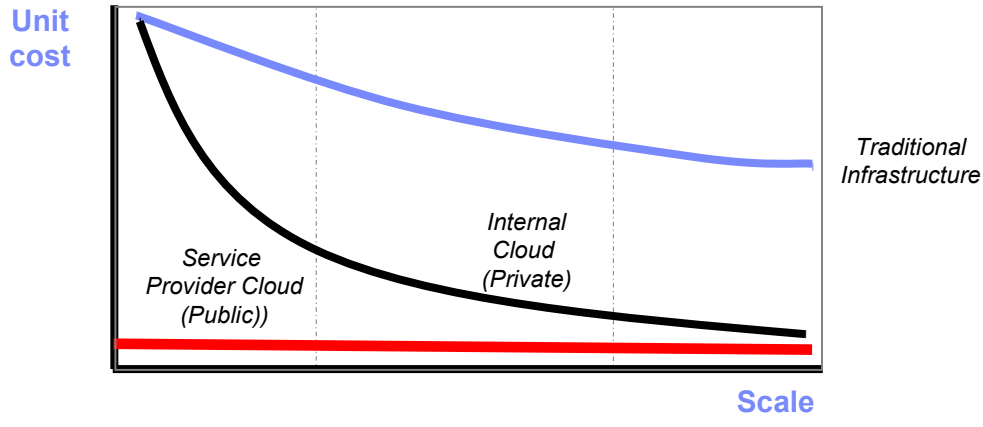
50%

concerned about the loss of control over IT activities/ business processes

56%

believe that service level agreements are not detailed enough

Standardisation and optimisation by workload enables economies of scale …

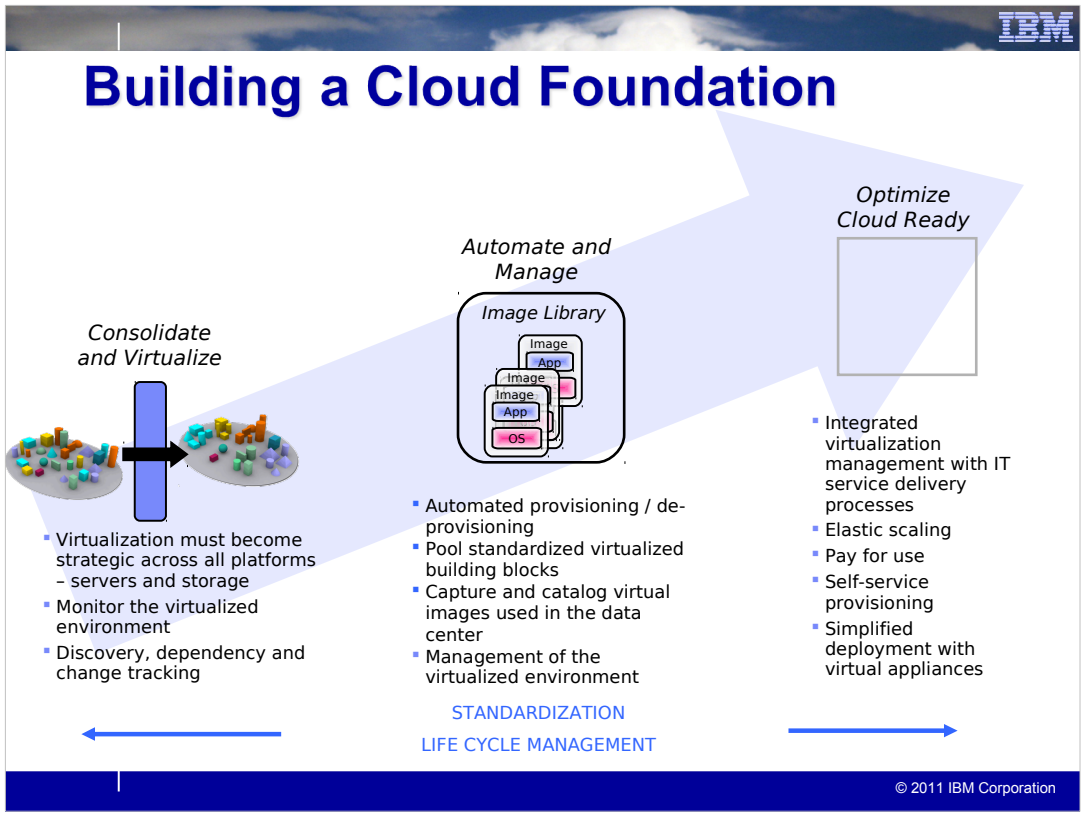


Large enterprises can significantly reduce costs for some workloads compared with traditional IT.

One option for businesses is to go for a public cloud, cheap but attendant risks with concerns about security and compliance, vendor lock in etc.

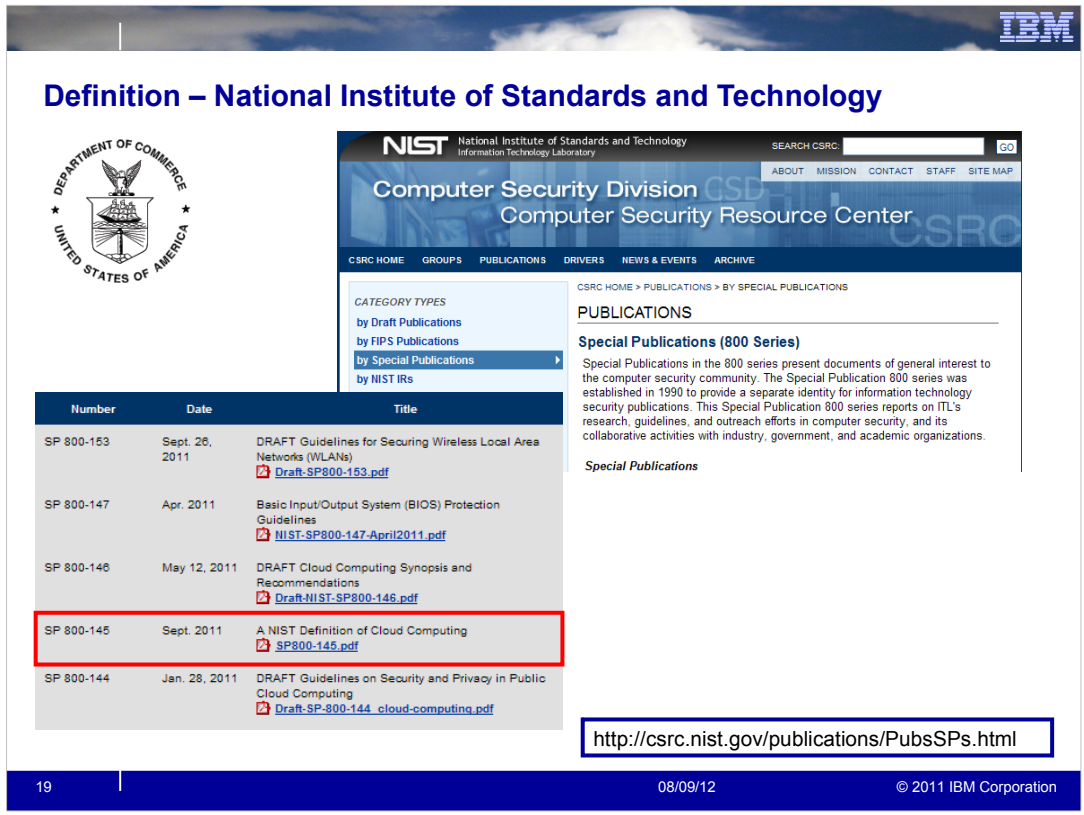
If you built your own cloud from scratch from all IBM provides then initial costs will be high. It will take a long time and a steep learning curve and can cost a lot.

CloudBurst provides a preintegrated package which is already cost optimised. However it's a fairly fixed package. IBM provides several options and in June these were announced as Smart Business services and systems.



Key points:
•There is a stepwise approach
•You can start with a private cloud
•IBM provides the tools and services to help you at every stage

Speaker Notes
• In most data centers today there is a plethora of systems with varying degrees of standardization and best practices. In order to simplify the management and create a repeatable, predictable infrastructure, you need to create standard building blocks. The Rolling Thunder offering will guide you through the process to ensure success.
• IBM will be providing ready-made ensembles, but you can also start this process by applying best practice patterns to the systems that you already have. These patterns define the best practice virtualization configurations depending on the systems and the way you want to use them.
• The next step is to capture and catalog the images (operating systems, middleware, and software) used in the datacenter and standardize on those building blocks as well thru virtual appliance definition. This will result in simplified deployments and image management.
• The third step involves pooling your standardized virtual configurations into ensembles where you can manage many systems as if they were one.
• This logically flows into workload management according to the service level agreements defined by the data center. Service Management offerings, such as Tivoli Service Automation Management (TSAM) will help you define and manage those services in tight integration with Systems Director and Ensembles.



NIST

http://csrc.nist.gov/publications/nistpubs/800-145/SP800-145.pdf

http://csrc.nist.gov/groups/SNS/cloud-computing/

January 2011:

- http://csrc.nist.gov/publications/PubsDrafts.html
- http://csrc.nist.gov/publications/drafts/800-145/Draft-SP-800-145_cloud-definition.pdf

DMTF White Paper – 11-2009- Interoperable Clouds

http://www.dmtf.org/about/cloud-incubator/DSP_IS0101_1.0.0.pdf

White Paper – Old paper- Cloud Computing Use Cases

http://cloud-computing-use-cases.googlegroups.com/web/Cloud_Computing_Use_Cases_Whitepaper-2_0.pdf?gda=yWeixF8AAAAPGXgkJ5fi30lYg4awQpoEtNcuGSkF6ywGfwpMc3ay0fRsmgvNFNvJoZZD7r3PzEf2eHjnTEKAfBvfYgf3pCOmkEgpbUZZ3G5ARZSq1vi2gJxzIUqf6s0oL53Wkz8h1XQ

DMTF's OVF Becomes National Standard

DMTF's Open Virtualization Format (OVF) has been adopted by the American National Standards Institute (ANSI), paving the way for adoption as an international standard by the International Standards Organization/International Electrotechnical Commission (ISO/IEC).

OVF is intended to simplify interoperability, security and machine lifecycle management in virtual environments.

Learn More About OVF

OVF = Open Virtual Format

ANSI American National Standards Institute

http://www.dmtf.org/

Cloud Management

DMTF's Cloud Management Working Group is developing a set of standards to improve cloud management interoperability between service providers and their consumers and developers.

Conformance Programs

DMTF conformance programs allow vendors to test products for conformance to DMTF specifications. Both DASH and CDM conformance programs are currently available. Conformant products are listed in the DMTF Certification Registry.

Management Standards & Technology

DMTF provides standard management tools supported by numerous hardware, software and services vendors.

Standards-based management allows you to select the best products for today without worrying about propietary hassles in the future.

Search for Standards

Narrow by Standard | Search

DMTF Standards & Initiatives

Alert Standard Format	ASF
...non Diagnostic Model	CDM
...non Information Model	CIM
...l Management	CLOUD
...guration Management Database Federation	CMDBf
...top and Mobile Architecture for System Hardware	DASH

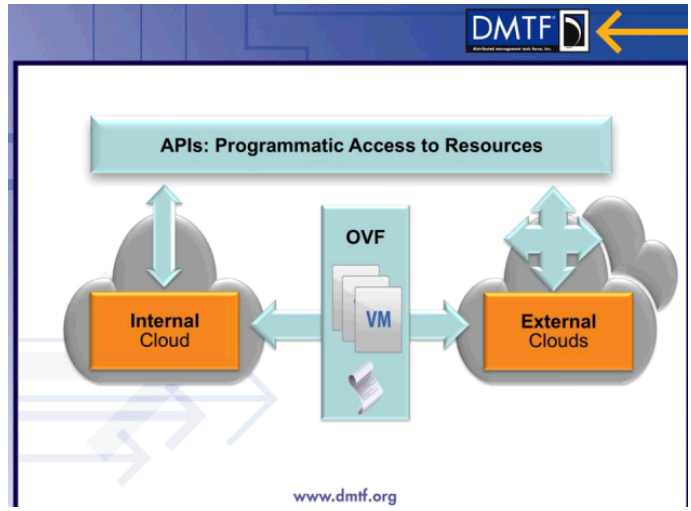
DMTF News & Updates

DMTF's Open Virtualization Format Achieves ANSI Adoption — Aug 31

PORT organi develc (OVF) Interna marks virtual

PORTLAND, Ore. – August 31, 2010 – Distributed Management Task Force, Inc. (DMTF), the organization bringing the IT industry together to collaborate on systems management standards development, validation, promotion and adoption, today announced that its Open Virtualization Format (OVF) standard version 1.1 has been adopted as an American National Standards Institute (ANSI) International Committee for Information Technology Standards (INCITS) standard. This achievement marks a major milestone in DMTF's efforts to enable interoperable, platform-independent cloud and virtual management solutions.

Distributed Management Task Force (DMTF) –



Source: Webtalk May 2010 at http://www.brighttalk.com/webcast/20535

DMFT – Distributed Management Task Force

Cloud Computing –Standardization DMTF, SNIA, OGF, OMG,...
Cloud is not a Hype anymore

- **DMTF – Distributed Management Task Force**
  Open Virtual Format (OVF)
  ← Infrastructure Virtual Server

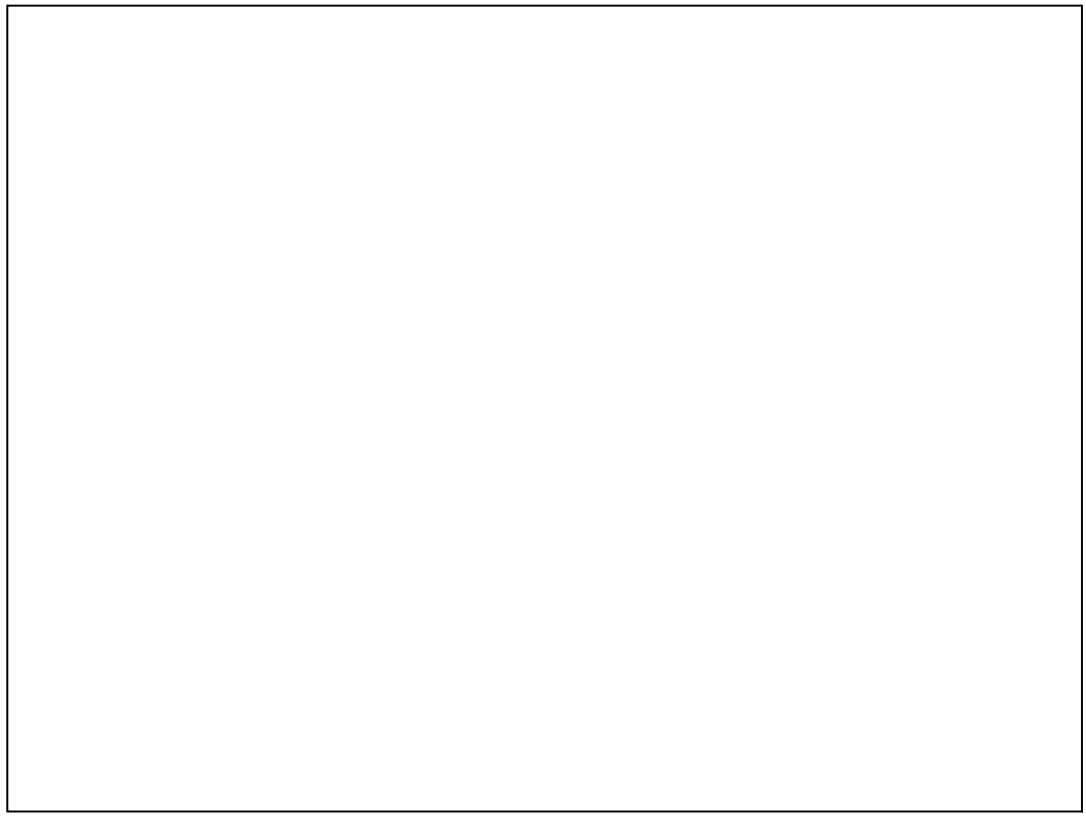
- **SNIA - Storage Networking Industry Association**
  Cloud Data Management Interface (CDMI)
  ← Infrastructure Storage

- **OGF – Open Grid Forum**
  Open Cloud Computing Interface (OCCI)
  ← Cloud Management

- **OMG**
  Unified Modeling Language (UML)
  ← Application

Webtalk May 2010 at
http://www.brighttalk.com/webcast/20535

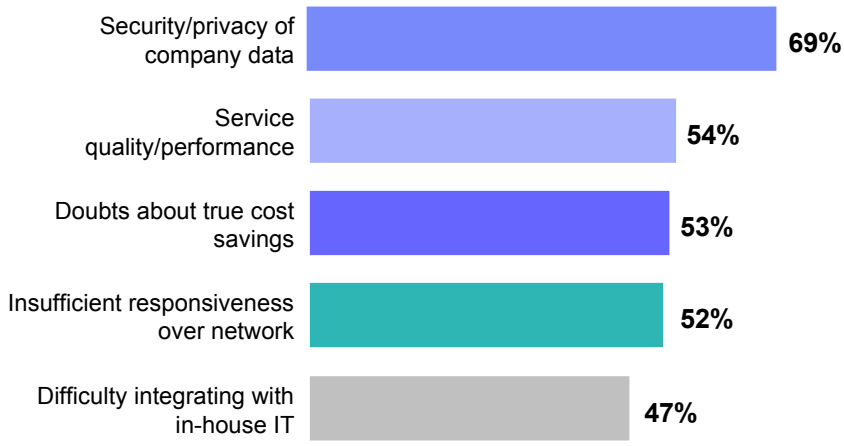
Security –
Grand Challenge for the Adoption of Cloud Computing



Why does a senior manager of security groups talk about virtualization?
Sometimes he gets bored ☺

Concerns about data security and privacy are the primary barriers to public cloud adoption

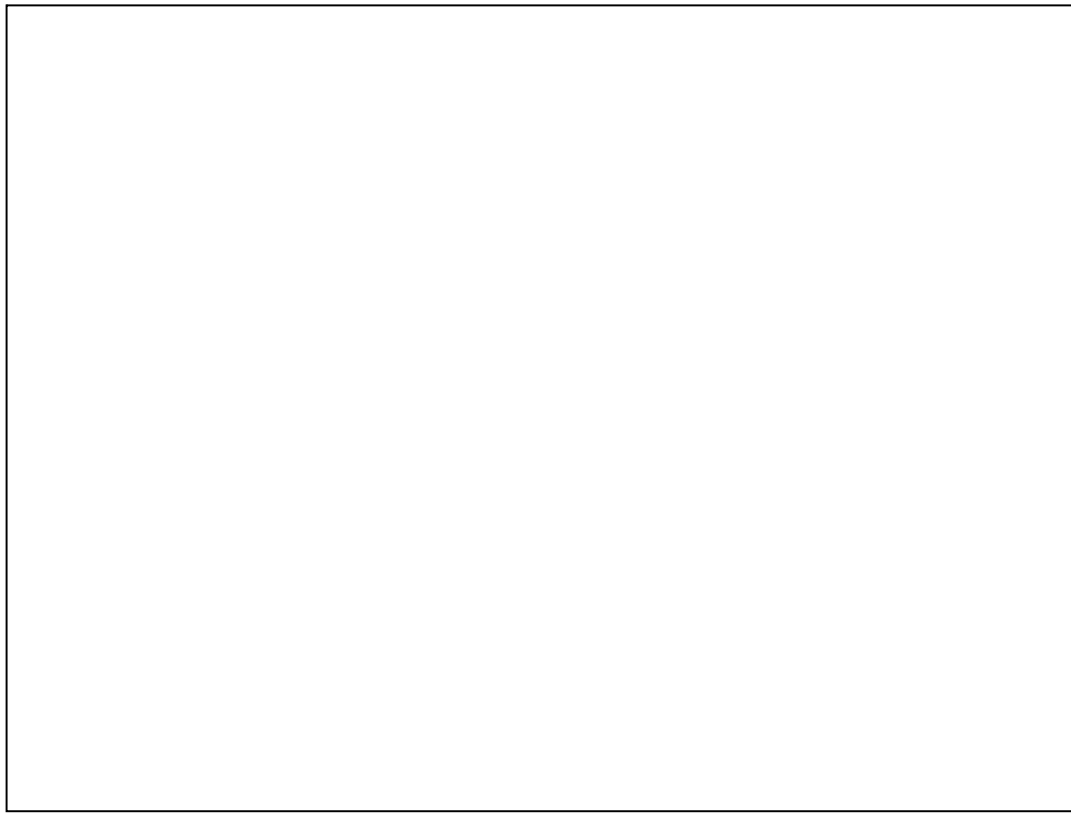
What, if anything, do you perceive as actual or potential barriers to acquiring public cloud services?



Percent rating the factor as a significant barrier (4 or 5)

Respondents could select multiple items

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



Cloud Data Integrity is Critical

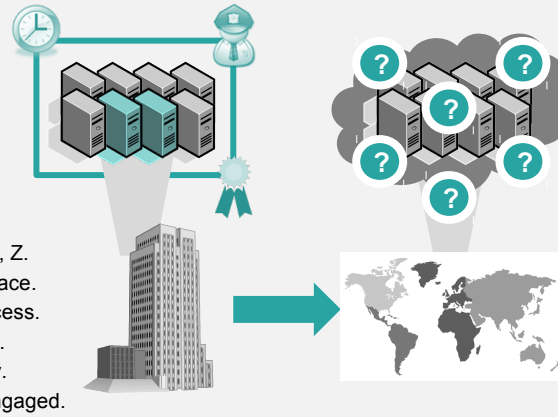
October 11, 2009: Microsoft Cloud Loses T-Mobile customer data

October 2nd, 2007: Amazon EC2 Outage Wipes Out Data

Piecing together islands of data from multiple locations involves synchronization and is not simply a data restore

Cloud Security 101: Simple Example

TODAY	TOMORROW

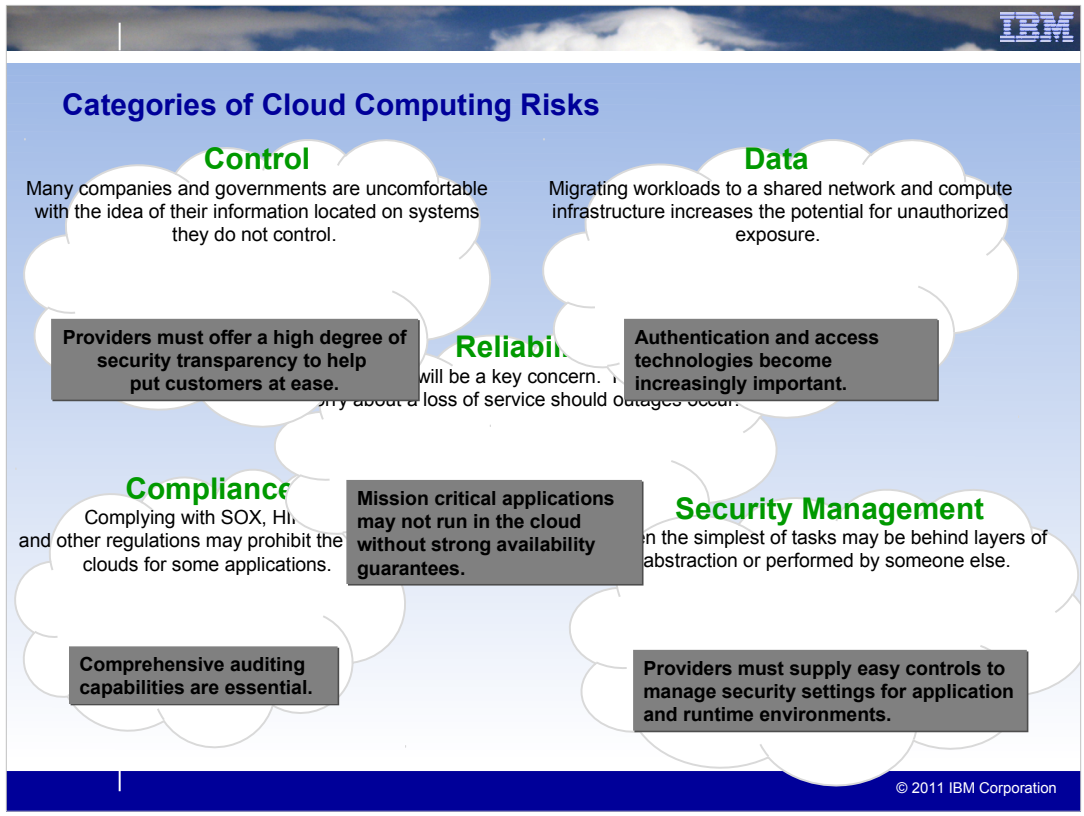


We Have Control
It's located at X.
It's stored in server's Y, Z.
We have backups in place.
Our admins control access.
Our uptime is sufficient.
The auditors are happy.
Our security team is engaged.

Who Has Control?
Where is it located?
Where is it stored?
Who backs it up?
Who has access?
How resilient is it?
How do auditors observe?
How does our security team engage?

What is Cloud Security?

Confidentiality, integrity, availability of business-critical IT assets
Stored or processed on a cloud computing platform



Key point: Some concerns are more relevant to the cloud than others, these are the most frequently discussed.

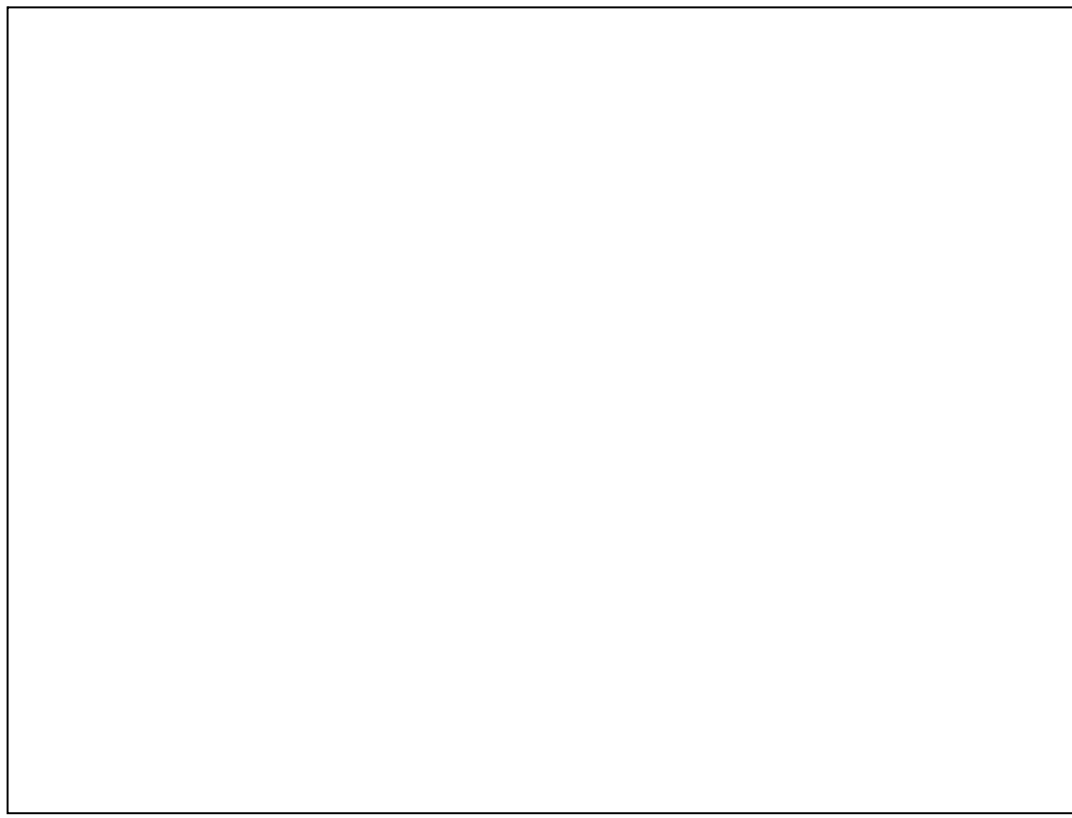
Less control: Uncomfortable with the idea of their information on systems they do not own in-house.

Data Security: A shared, multi-tenant infrastructure increases potential for unauthorized exposure. Especially in the case of public-facing clouds.

Reliability: They are worried about service disruptions affecting the business.

Compliance: Regulations may prohibit the use of clouds for certain workloads and data.

Security Management: How will today's enterprise security controls be represented in the cloud?



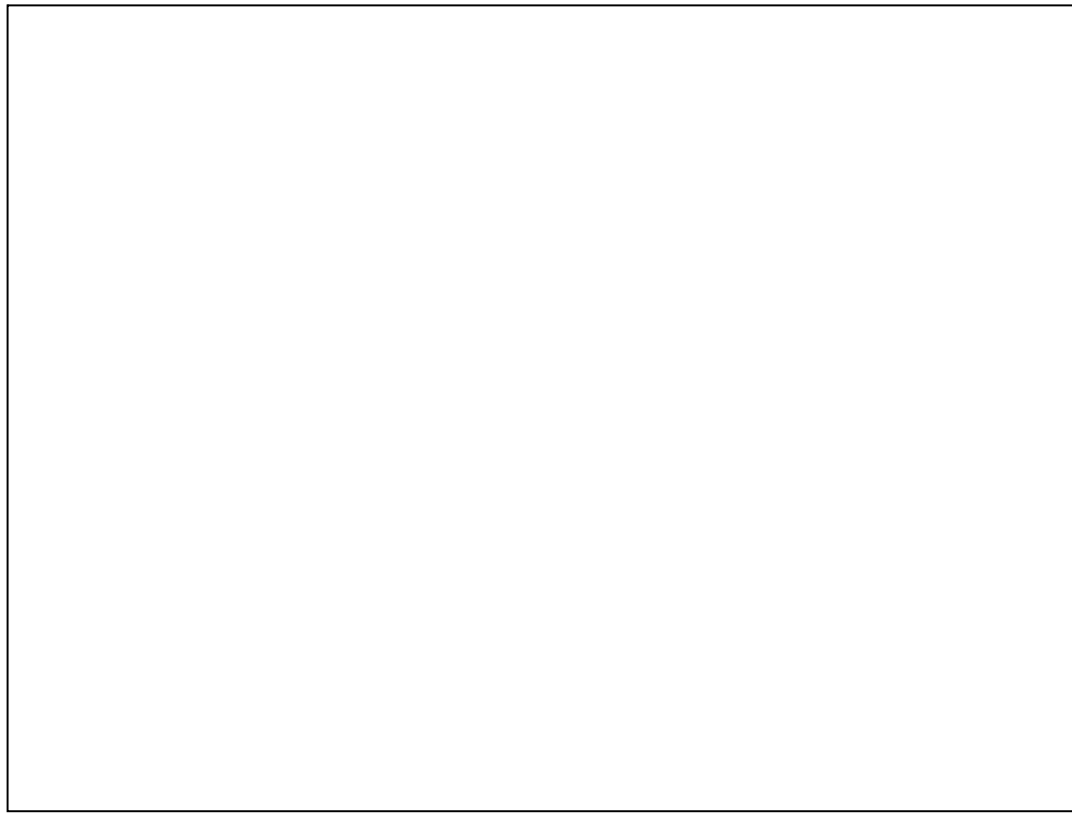
When thinking about "Cloud", think about workloads

- Workload characteristics will drive the rate and degree of standardization of IT and business services.
- Complex transaction and information management processes, for example, will likely present challenges and risks of migration to standardized services. Other workloads will move faster, presenting rapid return-on-investment and productivity gains.
- For most enterprises, the best opportunities will be clear.

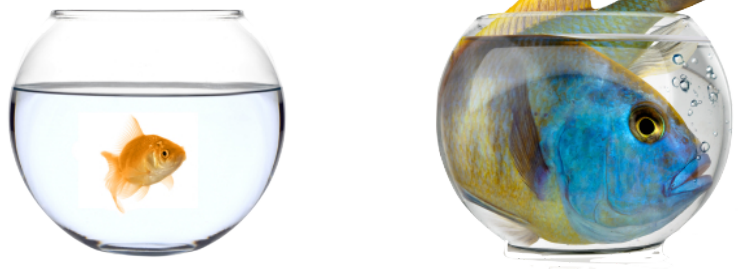
Analytics	Collaboration	Development and Test	Desktop & Devices	Infrastructure	Business Services





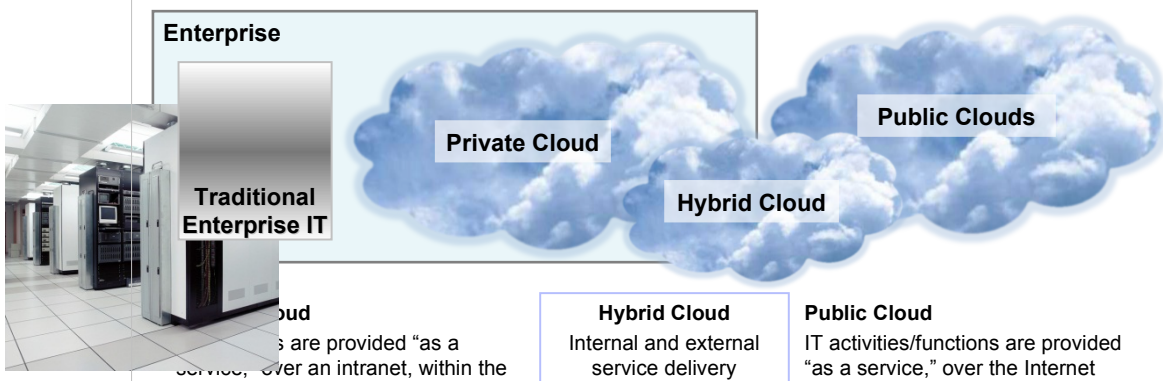


One Size Does Not Fit All



The IBM Model is focused not on providing a single solution that solves all customer concerns, but on providing appropriate levels of security for specific cloud needs. What does this mean well the needs of developers are very different than those using collaborative clouds. Organizations need to focus on security.

Today there are three primary delivery models that companies are implementing for cloud …



oud

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

- Key features include:
  - Scalability
  - Automatic/rapid provisioning
  - Widespread virtualization
  - Chargeback ability

Hybrid Cloud

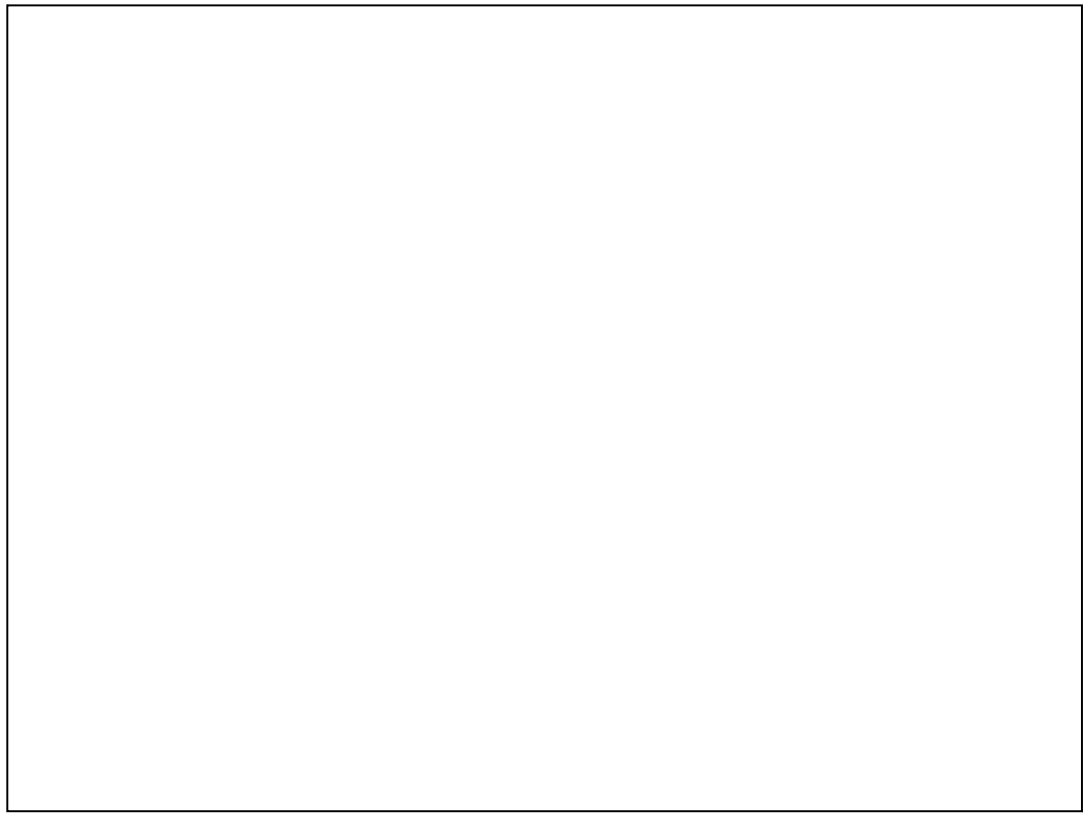
Internal and external service delivery methods are integrated, with activities/functions allocated to based on security requirements, criticality, architecture and other established policies.

Public Cloud

IT activities/functions are provided "as a service," over the Internet

- Key features:
  - Scalability
  - Automatic/rapid provisioning
  - Standardized offerings
  - Consumption-based pricing
  - Multi-tenancy

Source: IBM Market Insights, *Cloud Computing Research*, July 2009.



•Leveraging IBM STG to deliver industry leading compute platforms like IBM system x, p, z and i coupled with virtualization and storage technologies.

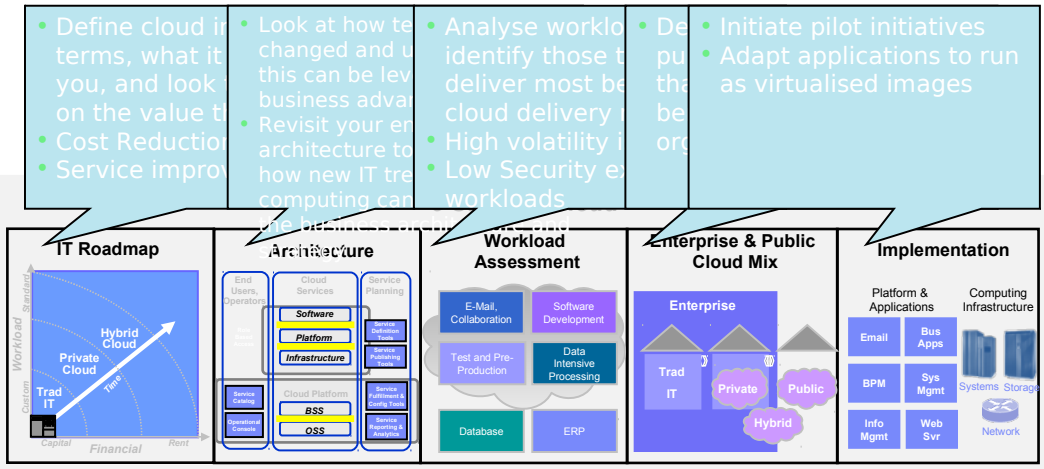
•Leveraging IBM software group to deliver service automation platforms through Tivoli, Web sphere, Lotus, Information Management and Rational.

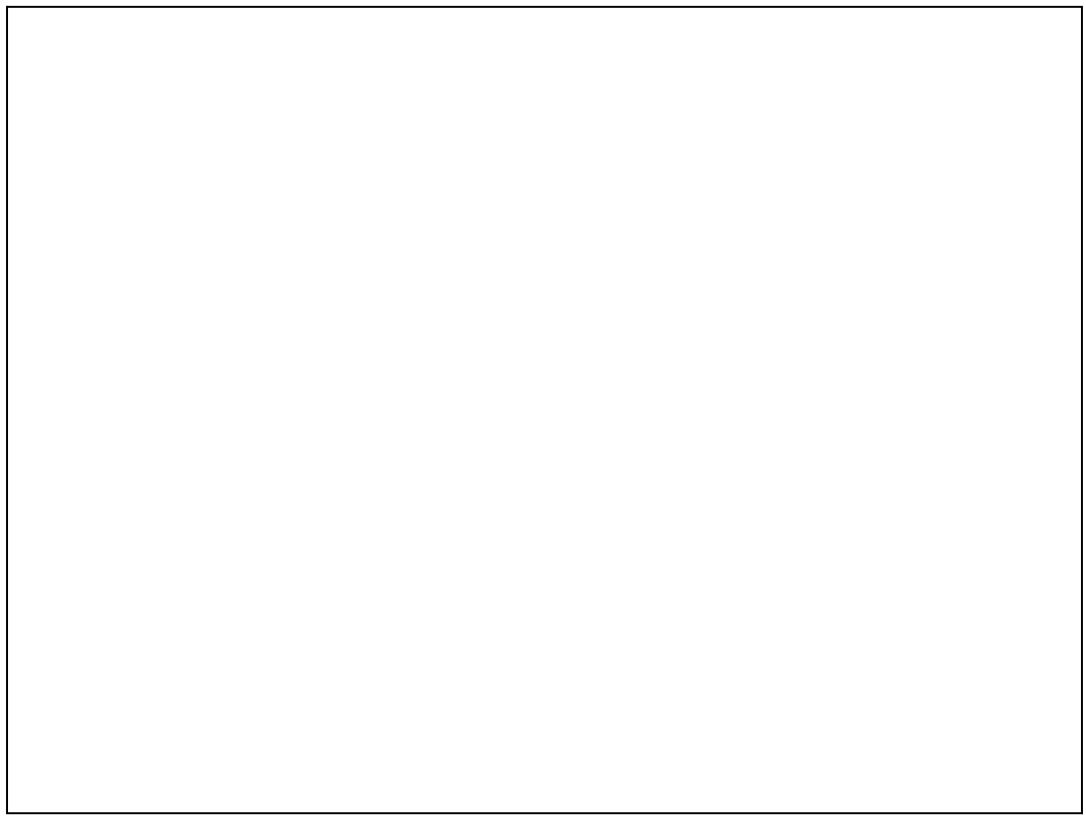
•Leveraging GTS to package and deliver via the web a customer friendly world class interface to deliver an end-to-end collaborative application lifecycle management solutions with a set of ready-to use services for development and test scenarios optimized for the IBM Cloud

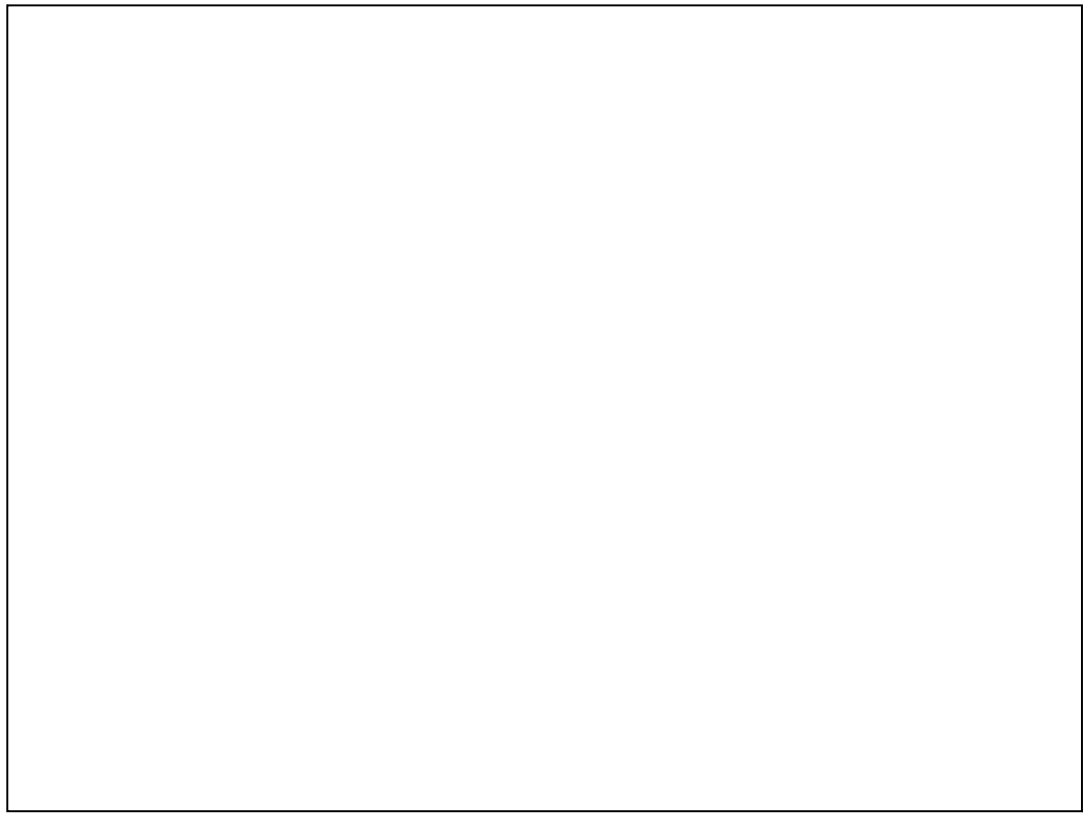
With the IBM Cloud being built out we can differentiate ourselves in the enterprise market

Enterprise Attributes	***IBM Differentiation***
Financial Attractiveness (time-to-market / dev. cost)	Service Composition
Access to External Capabilities[1]	Hybrid Cloud Support, Open APIs, Trusted Partner
Speed of Deployment & Expertise	Service Automation, Implementation Services
Security (e.g. identity mgmt)	Security Offerings
Performance and Mainframe Services	Power Systems
Reliability / Availability	Higher-Value Managed Services
Integration w/ Existing Systems	Federated Management
Consumability Maturity Model	Service Catalog, Consumability

Developing the Cloud strategy and implementation plan is key

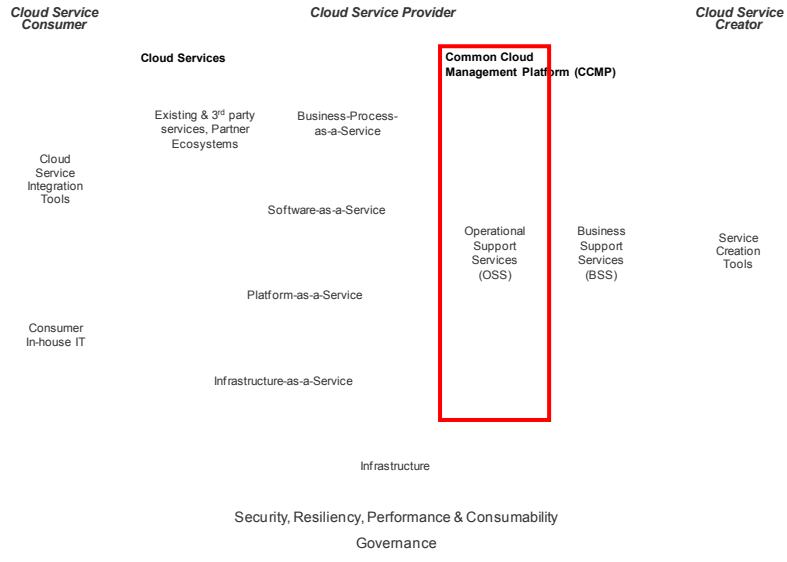




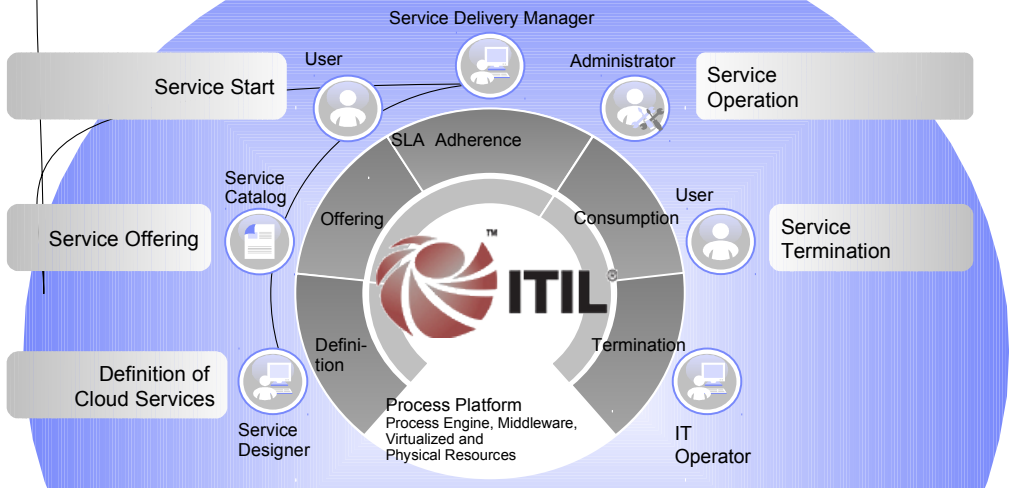


IBM Cloud Computing Reference Architecture – Best Practices Cloud Life Cycle Management

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



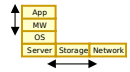
Cloud Life Cycle Management - Delivery & Consumption of IT Resources as Cloud Service



Based on IT Service Management ITIL Best Practices

12 steps towards creating a cloud service

1. Specify cloud service description

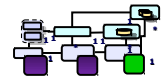


Describe function, price , SLA of cloud service, incl. management scope

2. Implement runtime functionality

Examples: Select off-the-shelf hypervisor (VMaaS), implement custom app (e.g. LotusLive)

3. Define unit of delivery & rating



Examples: VM, file system, distributed app, virtual IP address, queue, web conference, RDBMS, 3-tier business app, etc.

4. Implement self-service delivery & management functionality

Examples: "Create VM, add more nodes to WAS cluster, change max # of seats for LotusLive web conf

5. Implement monitoring metrics & event correlation rules

Select existing agent / implement new agent for monitoring JVM heapsize, hypervisor swap file size, # of processes, etc.

6. Implement incident, problem and asset mgmt processes

Incident, problem & asset mgmt process is specific to cloud service → customization needed

7. Implement resiliency SLA

Examples: HA for management system, delivered WAS cluster must be highly available

8. Implement backup approach

Examples: Backup all VMs, backup DB of LotusLive application

9. Implement security functions

Implement authentication, auditing, data protection, governance & audit

10. Implement cloud service specific billing metrics

Examples: CPU/hour, # of DB transactions, GB/month, # of users/webconf/hour, etc.

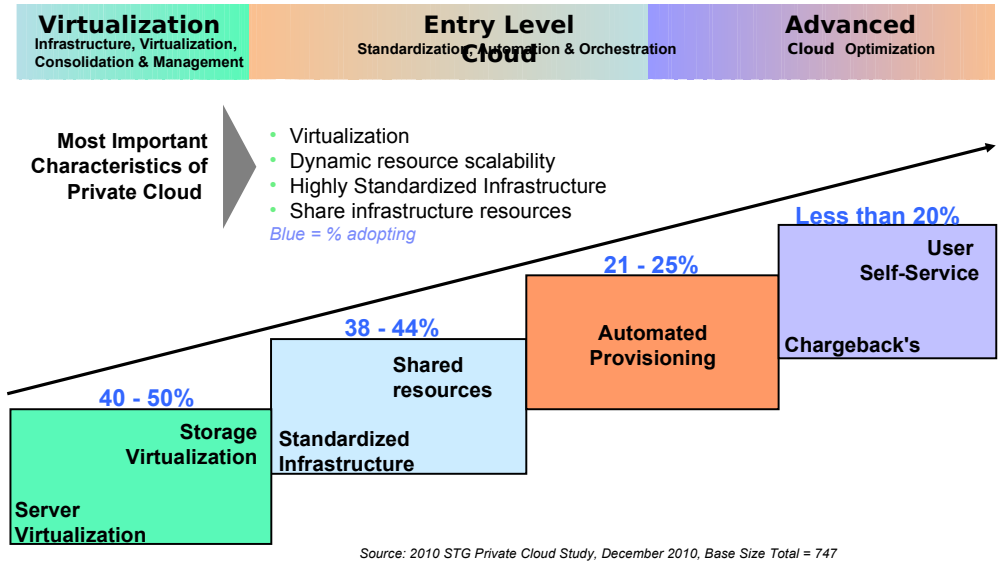
11. Implement rates for charging cloud service consumption

Examples: $0.11/VMhour; $0.19/MBsTransferred; $0.02/webconference; $0.05/fraudAnalysis

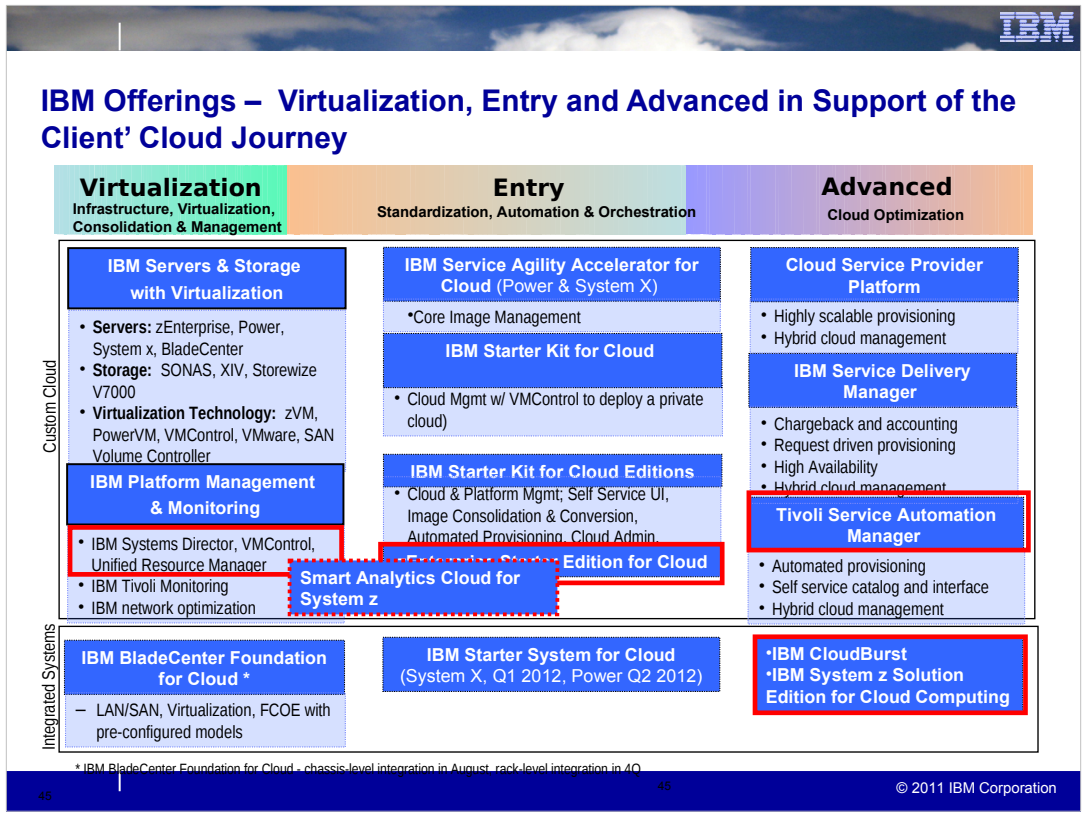
12. Register cloud service to service catalog

A cloud service must be registered to the service catalog to be externally accessible, entitlements need to be configured,

Market View - Clients Approach Cloud as a Journey
Most are in the early stages of adoption



Source: 2010 STG Private Cloud Study, December 2010, Base Size Total = 747



zEnterprise Starter Edition for cloud

Significant Adoption

Simple integrated management for Server, Storage and Networking

Standardized Infrastructure

Storage Virtualization

Server Virtualization

Near term sweet spot

Entry Image Management

Automated Provisioning

High Scale Provisioning

Security

Dynamic Scalability

Integrated physical / virtual management of Server, Storage and Networking

LEADING adopters

User self-service

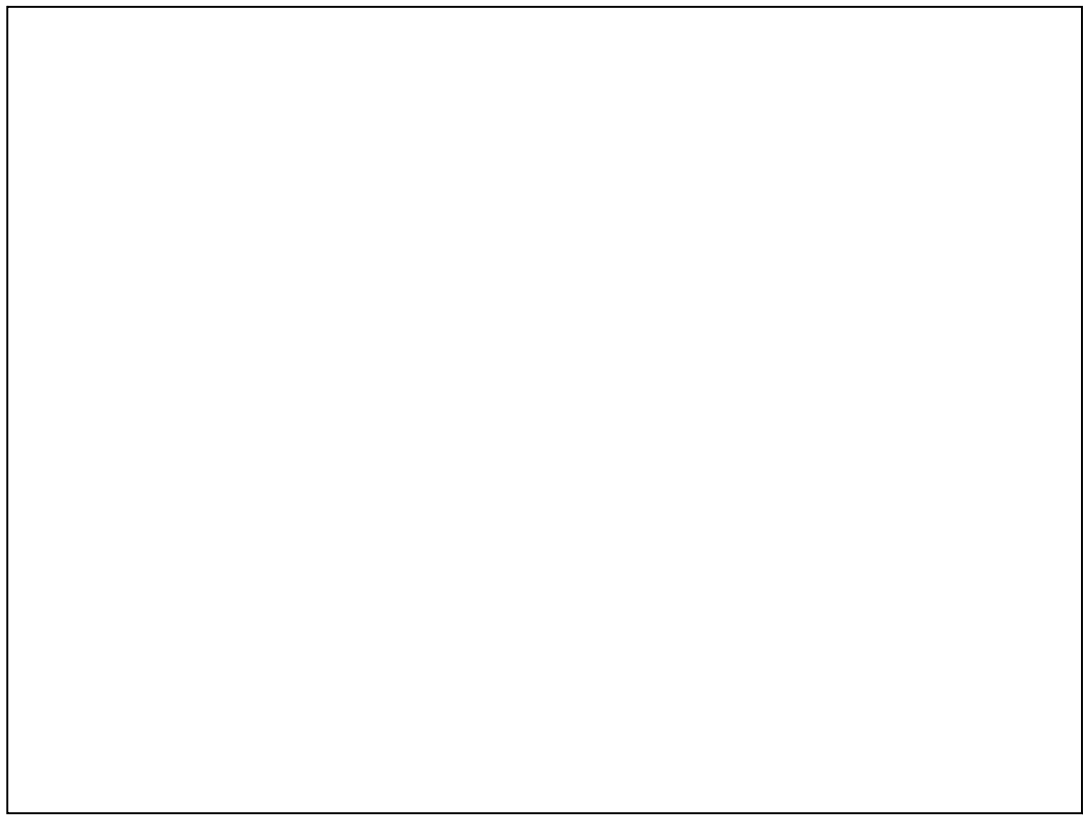
Charge back

Manage heterogeneous environments

Service Catalog

Service Orchestration

Multi-tenancy



Key points:
•There is a stepwise approach
•You can start with a private cloud
•IBM provides the tools and services to help you at every stage

What is IBM Systems Director VMControl?

VMControl encompasses virtual server lifecycle management, image management and resource pool management as an extension to IBM Systems Director.

IBM System x

Power Systems

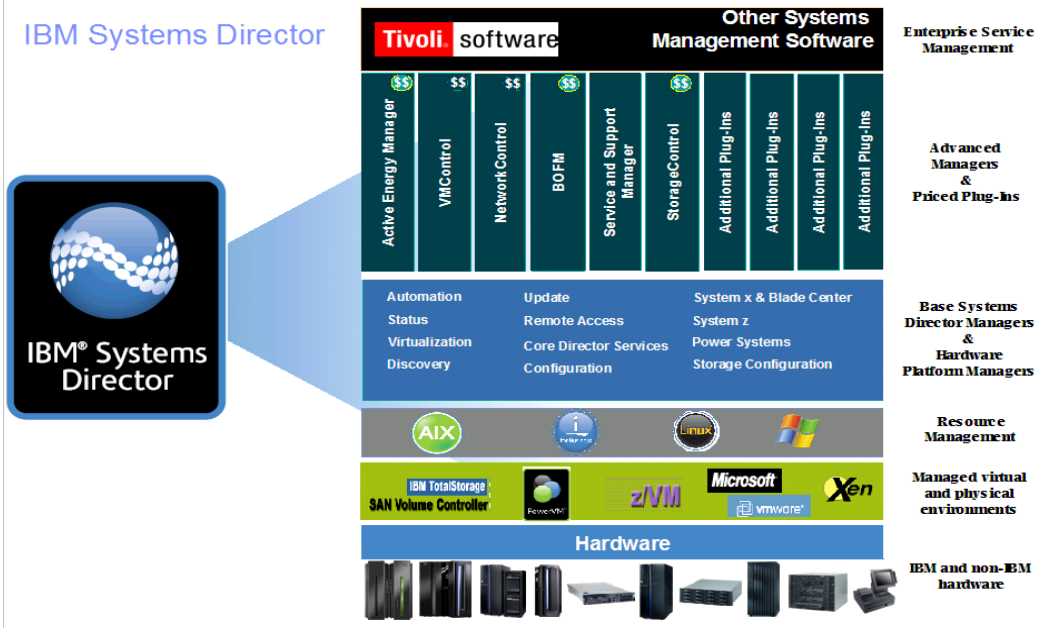
System z

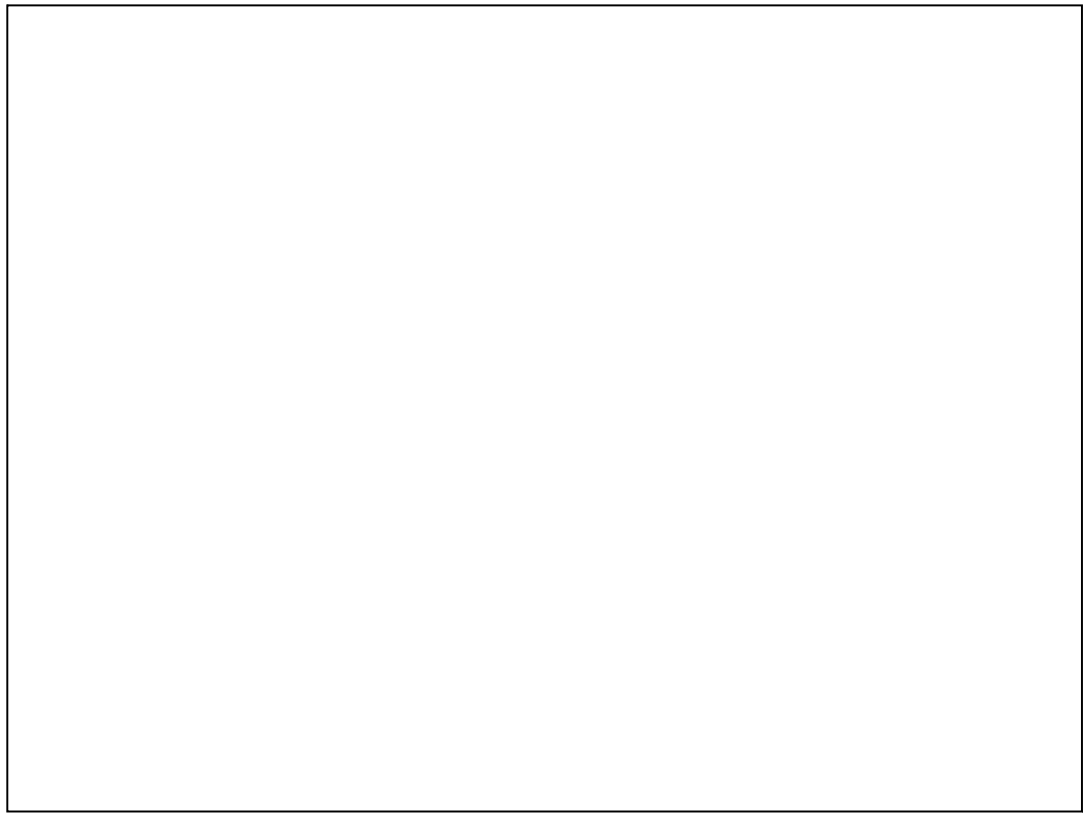
VMControl features:

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

Using VMControl as an extension of IBM Systems Director it is possible to combine management of physical and virtual resources in one management tool

IBM Systems Director

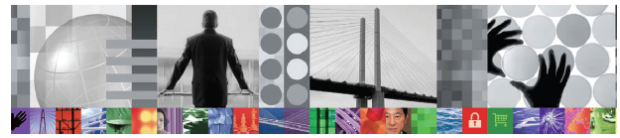




Set-up on Linux on System z
Benchmark for TPM on zLinu

November 2009

Tivoli software



64 Bit Benchmark Results

The benchmark results will be broken down into the following result sets.

- CPU scaling for DB2.
- CPU scaling for TPM.
- Network utilization.
- Transaction and page response times.

Tivoli Provisioning Manager 5.1.1.1:
64 Bit System z10 Benchmark Results

Document version 2.4

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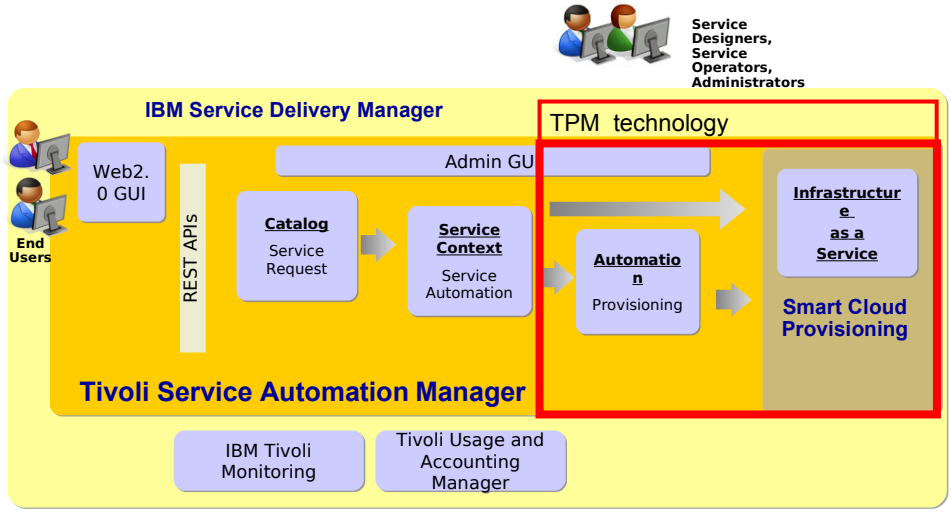
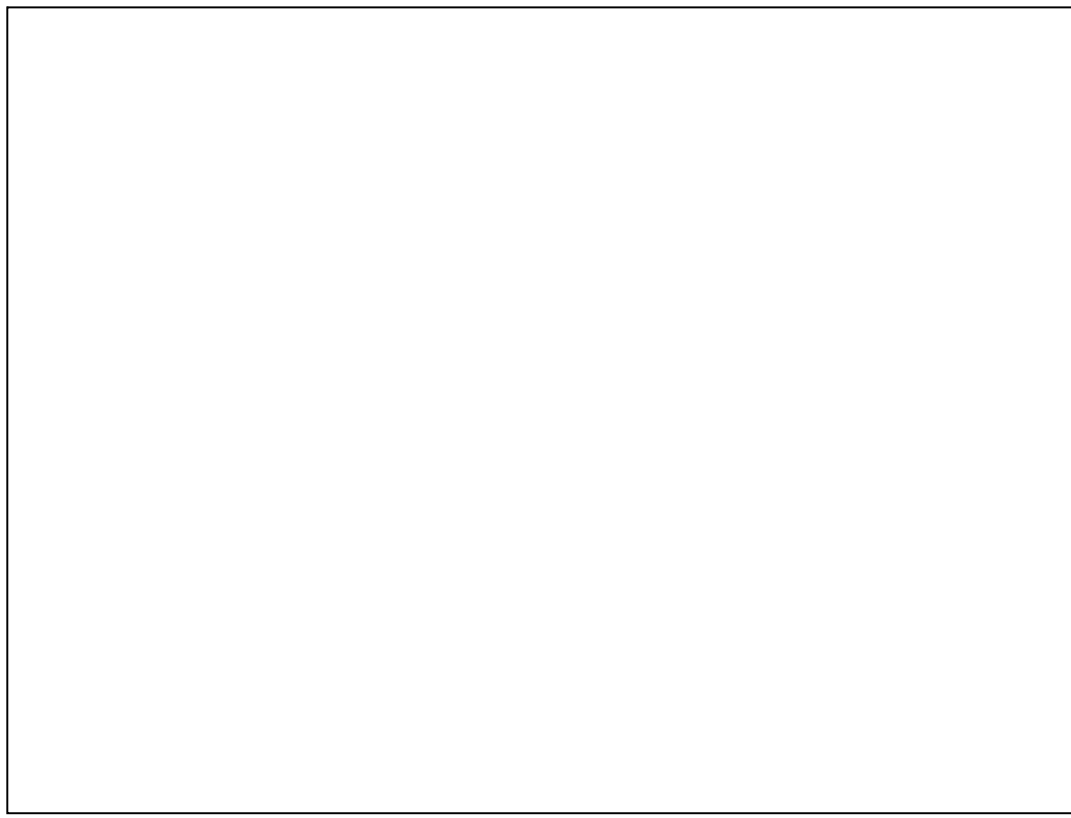
http://public.dhe.ibm.com/software/dw/linux390/perf/TPM-5.1.1.1-64-Bit-z10-Benchmark-Results-v2.4.pdf

IBM zEnterprise Starter Edition for Cloud – Growth Option Towards Tivoli Service Automation Manager (TSAM)





Mapping of Solution Edition Components to Cloud Computing Characteristics:

- Standardization - Orange

  - Enterprise-internal standards: Pre-defined templates and management plans delivered with Tivoli Service Automation Manager will help to standardize OS, applications and process flows across an enterprise

  - Industry standards for cloud API' are in work – e.g. Nationale Institut of Standards and Technology http://csrc.nist.gov/groups/SNS/cloud-computing/

  - Standardized images with Open Virtual Format (OVF) images used via integration into VM Control

- Self Service – Yellow

  - Tivoli Service Automation Manager delivers Web 2.0 self service portal and service catalog. A Service Request Manager routes the request finally to Tivoli Provisioning Manager for service fulfillment

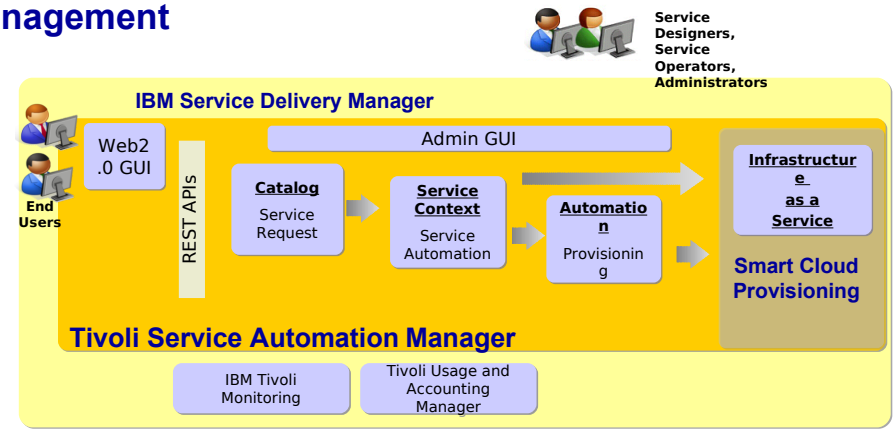
- Automation – Red

  - Tivoli Service Automation Manager includes Tivoli Provisioning Manager with the deployment engine to initiate service fulfillment. Pre-packaged automation packages provide customizable work flows to conditionally automate a sequence of tasks

- Virtualisation – Green

  - System z LPAR and hypervisors z/VM, kvm

Tivoli Service Automation Manager- Cloud Life Cycle Management



Service Catalog

- Interaction with end user
- Access to Service Catalog
- Collect parameters for service requests

Service Request Mmgt

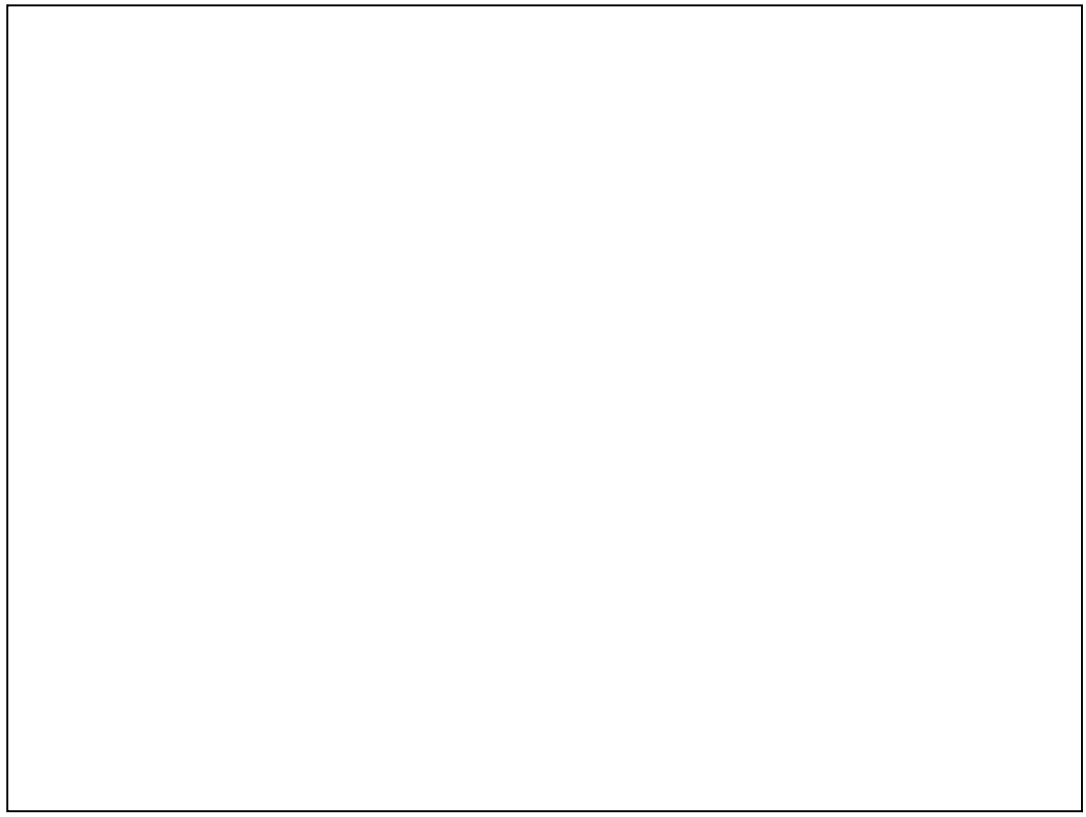
- Prepare service request from given input parameters
- Approval and notifications on business level
- Perform reservation of resources

Service Automation

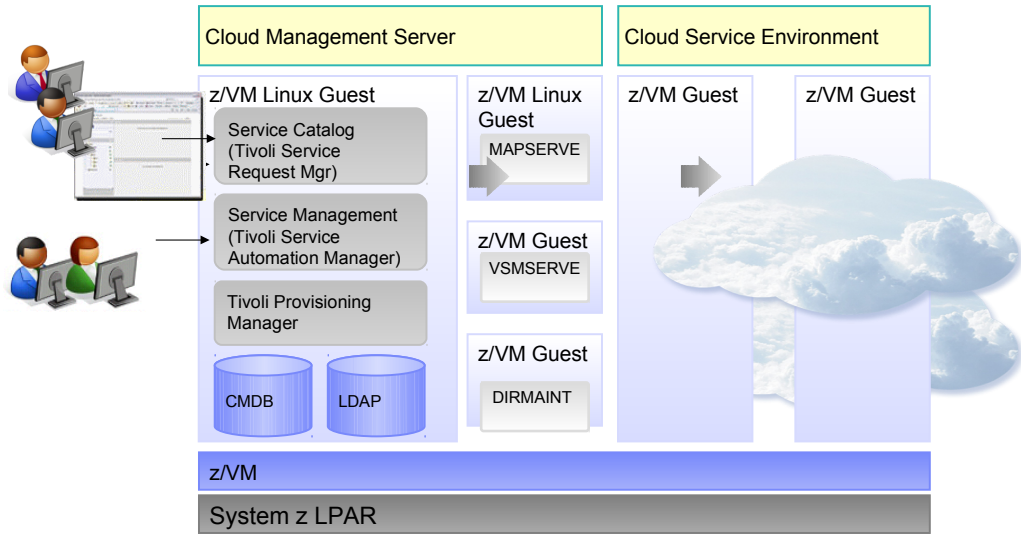
- Topology definition
- Orchestration by management plans
- Management plan definition
- Management plan execution
- Situation governance incl. error handling by admin
- Work assignments on admin level (“inbox”)

Service Deployment /Termination

- Management plan fulfillment by executing TPM workflows
- ... or native scripts
- ... or Java based actions
- ... or manual tasks



Tivoli Service Automation Manager – Implementation under z/VM – Boeblingen Demo System Set-up



IBM System z Cloud Computing Solutions

System z Solution Edition for Cloud Computing

… a cloud computing foundation solution that can be customized by the client for a wide range of cloud workloads.

IBM Smart Analytics Cloud for System z

… a cloud computing solution for the delivery of business intelligence and analytics optimized for the large enterprise client.

Enterprise Linux Server and Solution Edition for Enterprise Linux

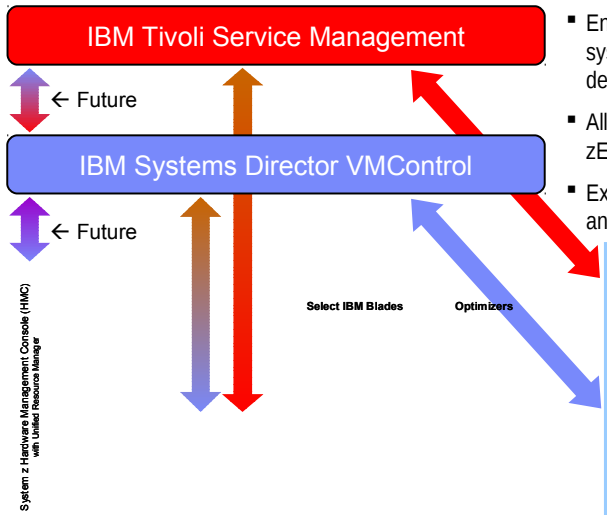
… a system offering that provides a basic level of cloud infrastructure support well suited for deploying a development / test cloud.

IBM WebSphere CloudBurst Appliance for z/VM

… an appliance that creates and dispenses multi-server patterns of virtualized IBM middleware products.

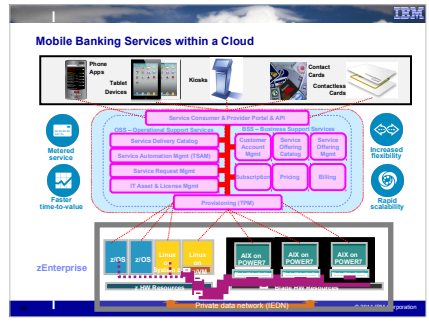
Multi-System Cloud Management on IBM zEnterprise

The Big Picture Going Forward



- Enables optimal workload placement in a multi-system cloud infrastructure: spend less *and* deliver higher qualities of service
- Allows clients to manage all the hypervisors in a zEnterprise system with consistency
- Extends same management capabilities to Power and System x servers elsewhere in the enterprise

Note: All statements regarding IBM's plans, directions, and intent are subject to change or withdrawal without notice, and represent goals and objectives only.



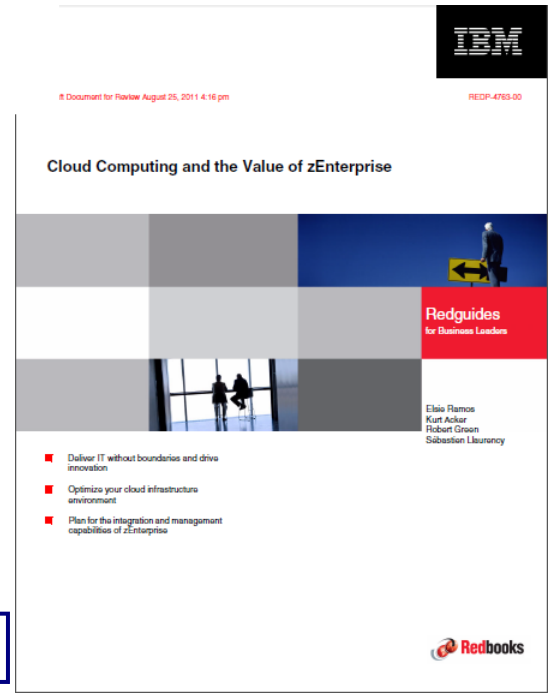
Mobile Banking is made up of multiple services, offered across a range of devices. By providing a common consumer (user) and provider (Admin) portal, subscriptions and services are offered to Clients from a catalog that is role based, so Retail Banking Private clients would be offered services such as payments, txn management, alerts, loyalty schemes, etc. Corporate clients would be offered business dashboards/reports, ledger services. Or even, Financial Market clients could be offered trading info.

The automation, provision and management of the services are managed within the Cloud services. These services and the transactions themselves can be provisioned dynamically upon a number of zEnterprise hybrid locations, including z/OS (for example, Websphere Business Events), Linux on z (TSAM), Power orLinux/Wintel (when available) on zBX. Benefitting from the superior Qualities of Services (Availability, Security, Scalability, etc..) of the zEnterprise platform.

Implementation Options on Linux on System z - Cloud Computing and zEnterprise

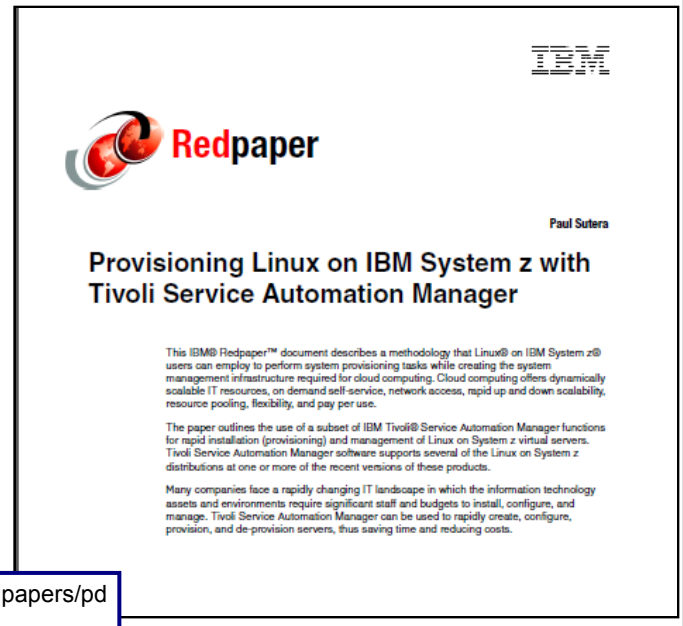
- Executive overview
  - Challenges of cloud computing
    - Prevalent issues with cloud environments
  - Solving cloud computing challenges
  - zEnterprise: The value of cloud in a box
  - zEnterprise end to end integrated architecture
    - System z environment and distributed systems
    - zEnterprise hardware
    - Hypervisor overview
    - Integrated Software Stack
  - How others started the journey
  - Summary

http://www.redbooks.ibm.com/redpieces/pdfs/redp4763.pdf



Implementation on Linux on System z

- Provisioning Linux on IBM System z with Tivoli Service Automation Manager
  - Overview
  - Introduction to Tivoli Service Automation Manager
  - Preparing for Linux provisioning on System z with Tivoli Service Automation Manager
  - Verification of provisioning setup environment



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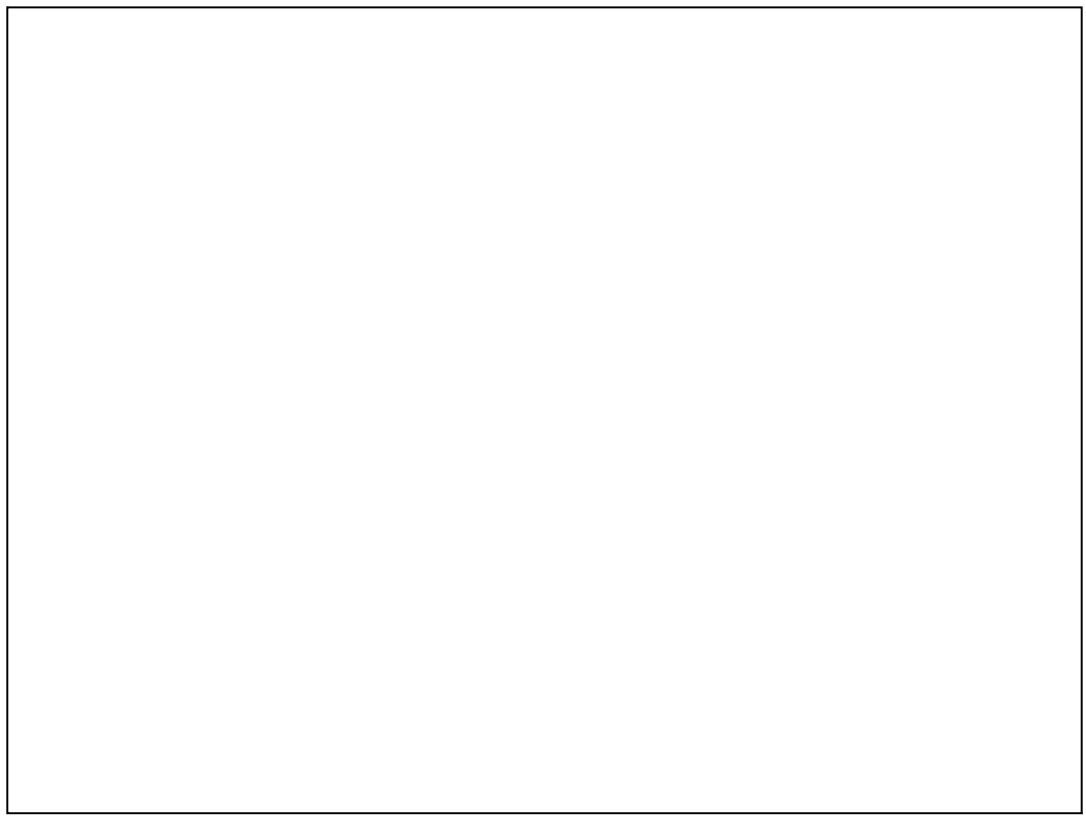
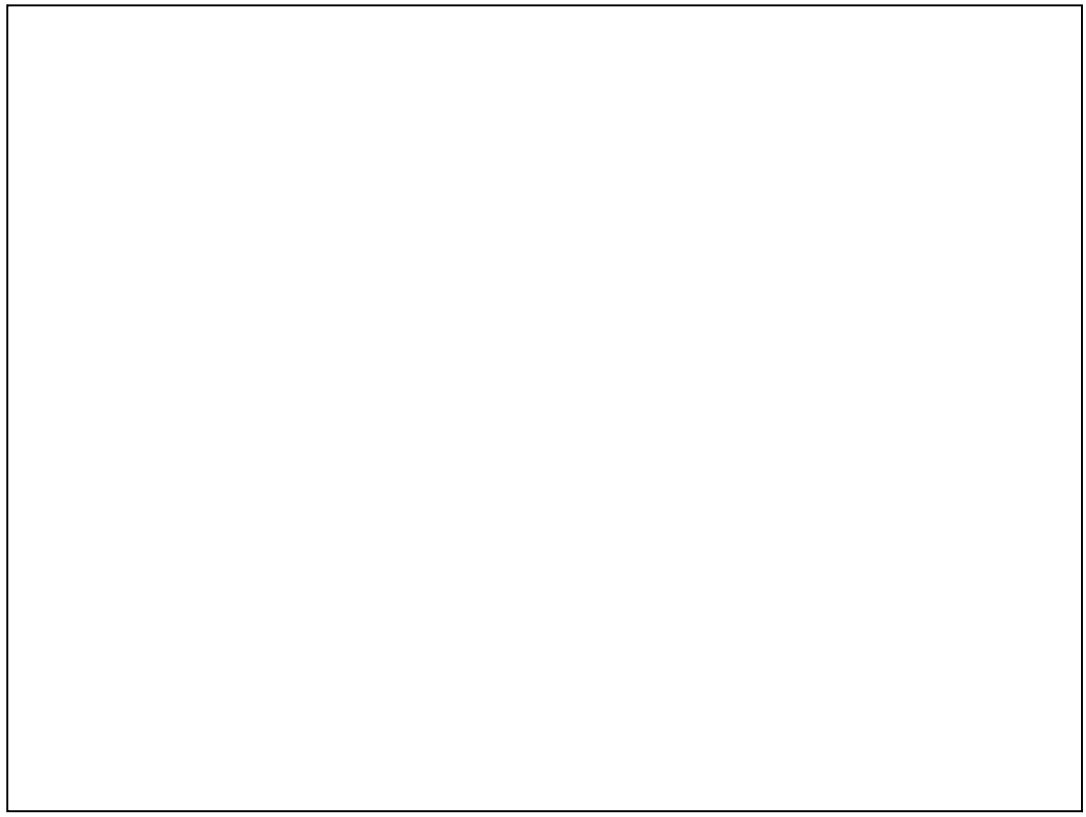
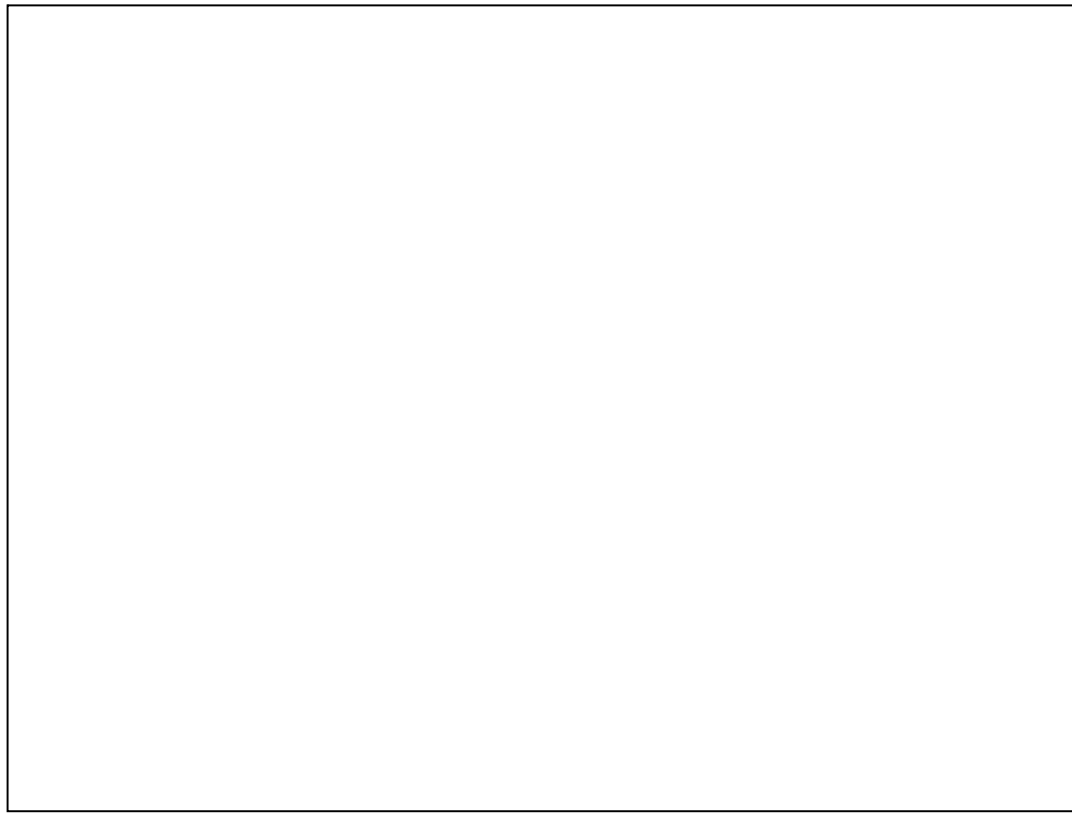
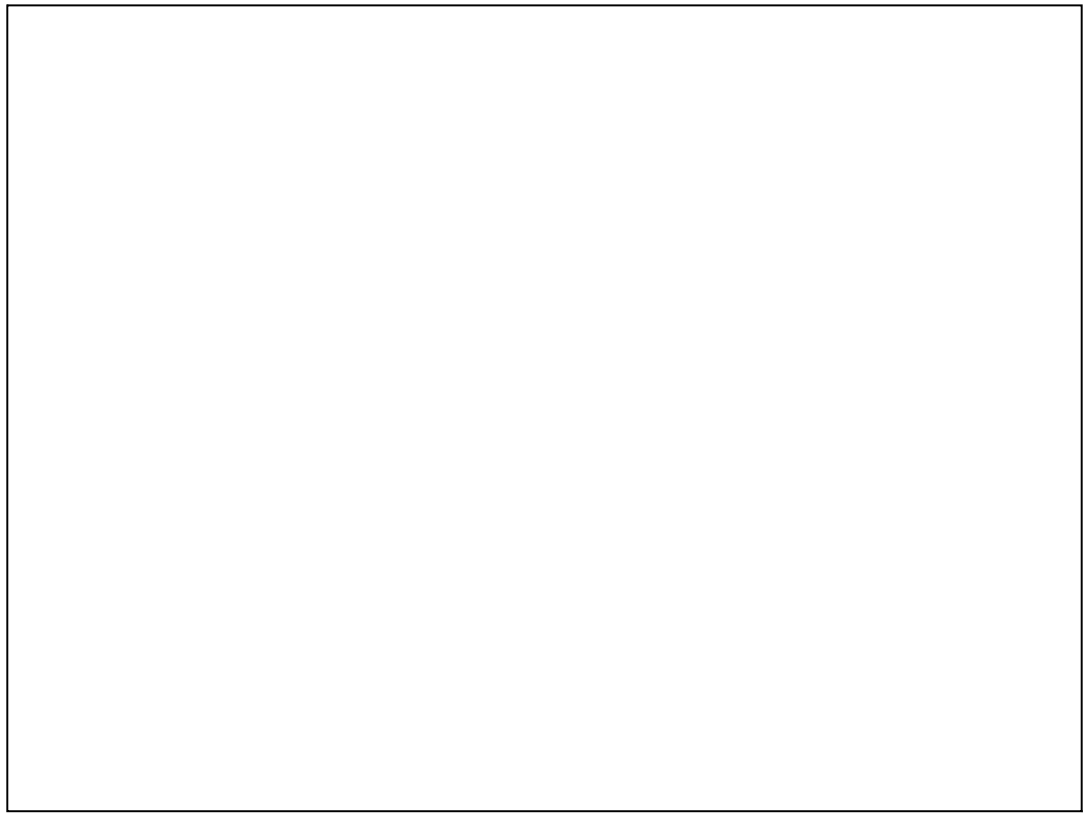
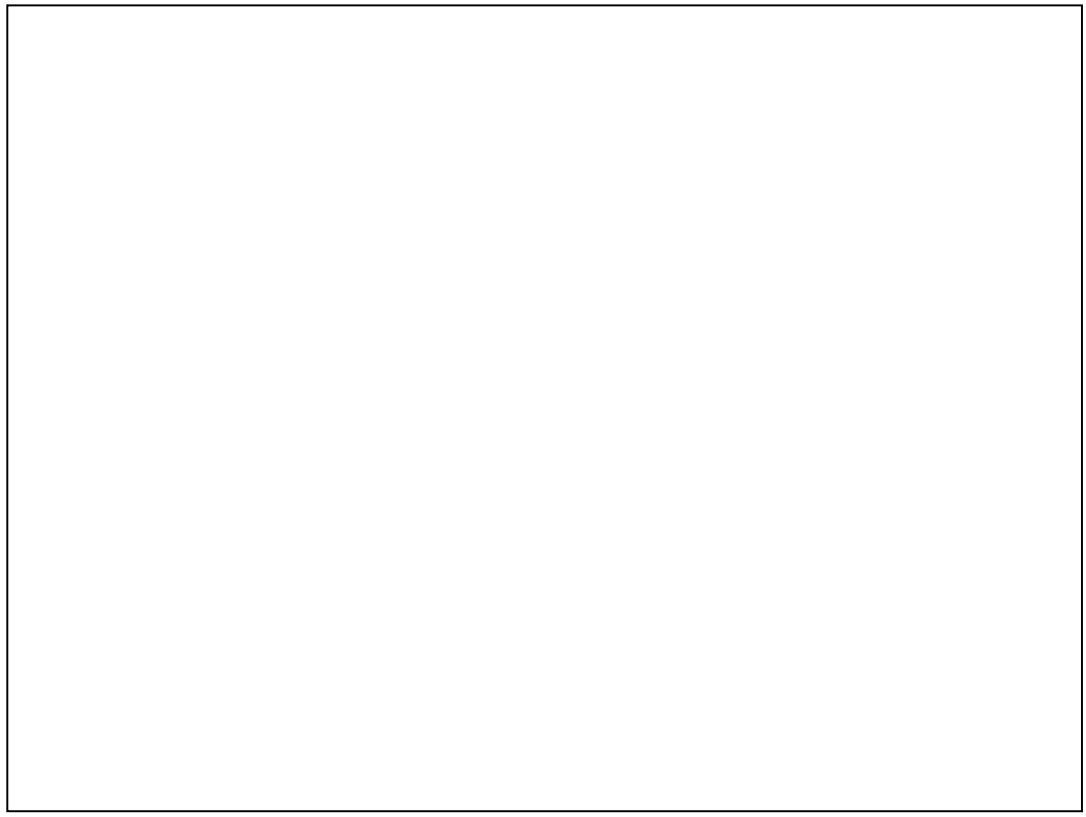


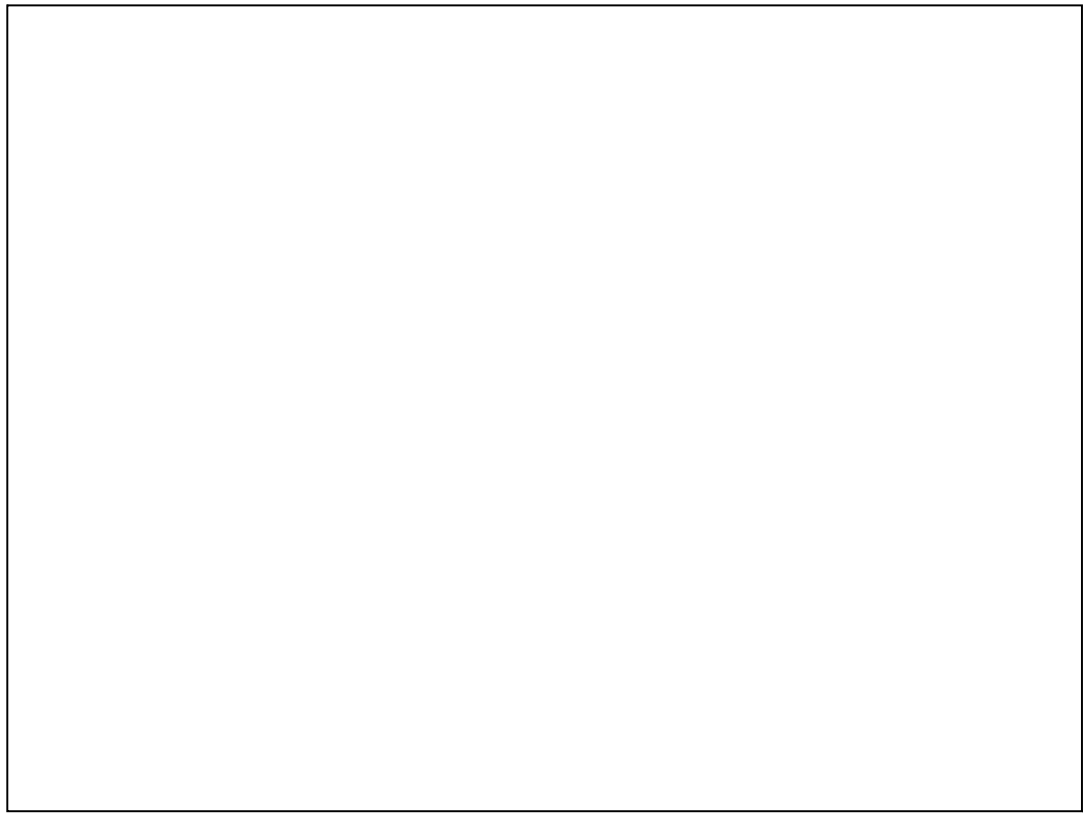








Oildex the leading provider of e-payable



Central repository for data .. For multi-users/ line of businesses

Cloud of analytical applications that can be provisioned dynamically as users and new users are identified and authorized