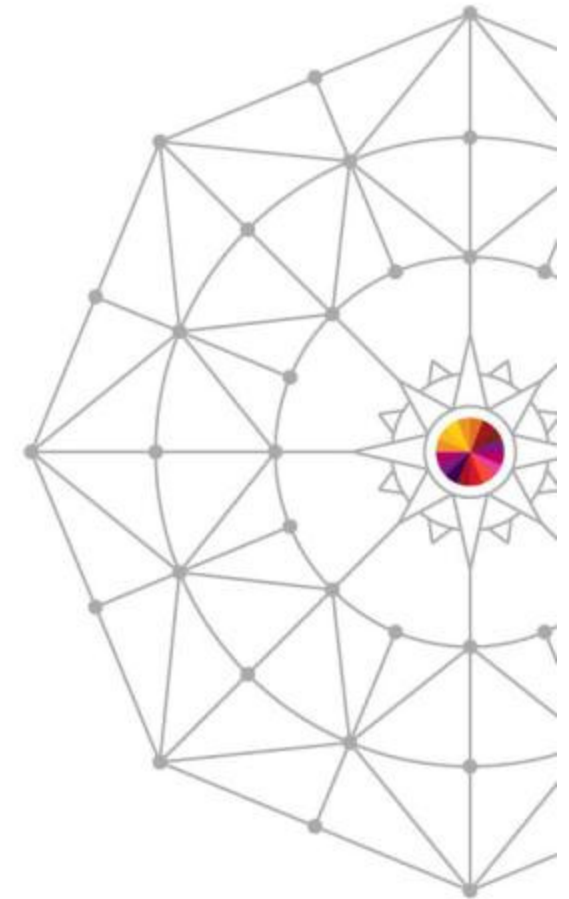# Cloud Computing with IBM System z

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Thursday, March 13th, 2014

Session 14560

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in Anaheim

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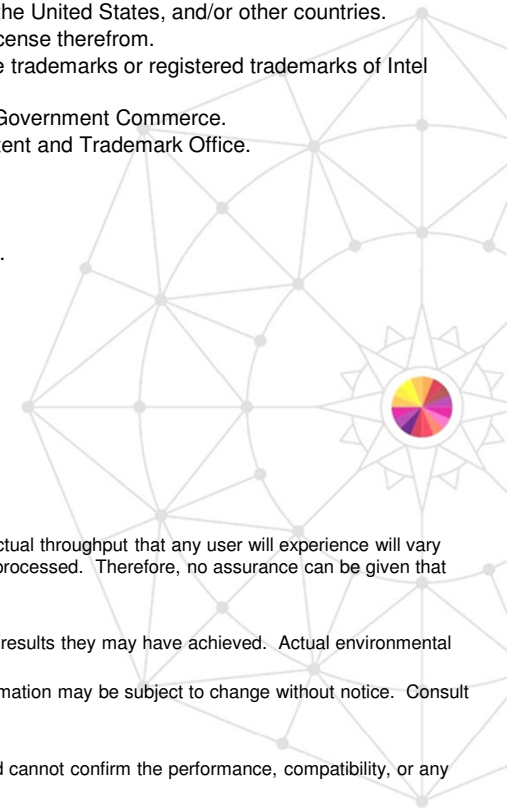
Agenda

- **Trends in the IT Industry and why cloud matters**

- **Cloud Computing Introduction**
  - On it's Way to Become a Standard ... NIST and DMTF
  - An Evolution from Known Technologies It's More than Virtualization

- **IBM System z Cloud Option's/Solution's**
  - Solution Edition for Cloud Computing and Data Cloud
  - SAP Cloud solution
  - CICS Cloud solution
  - Hybrid Cloud solution
  - Mobile solution for System z

- **Summary & Discussion**

Will cloud solve all my problems ?
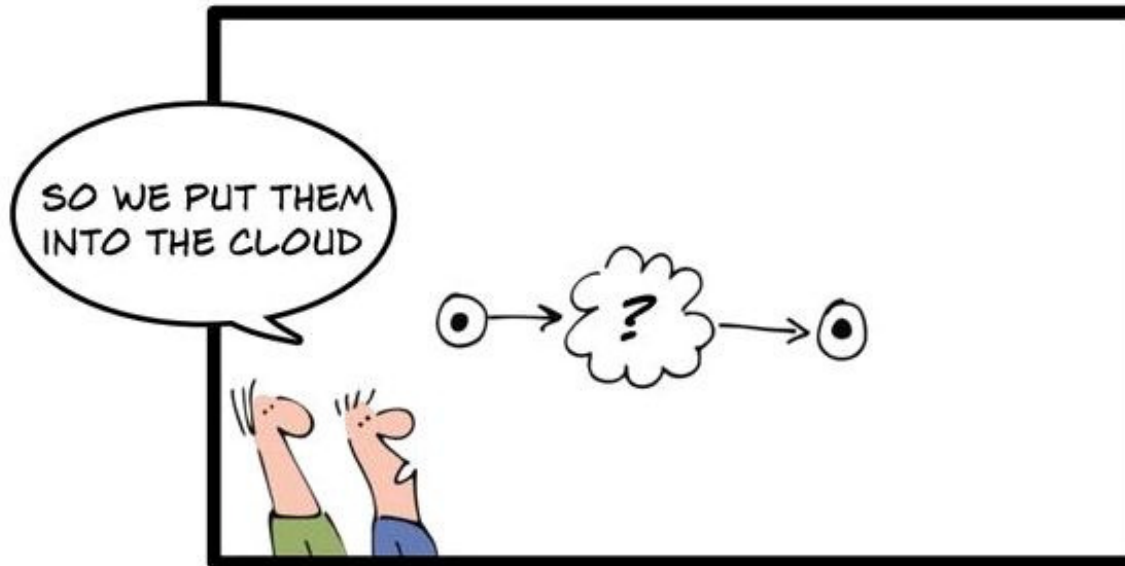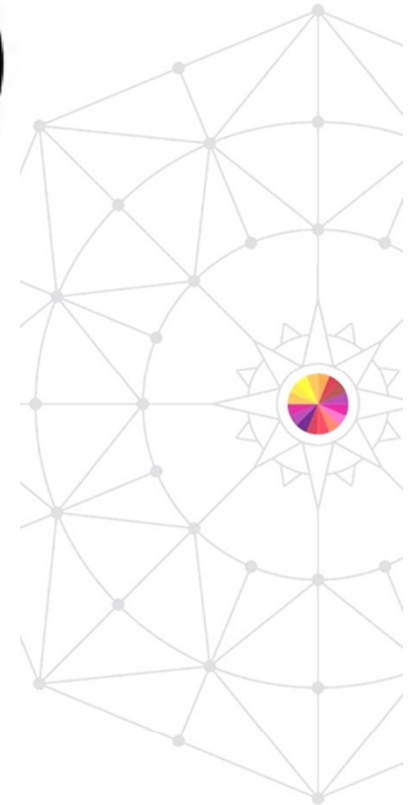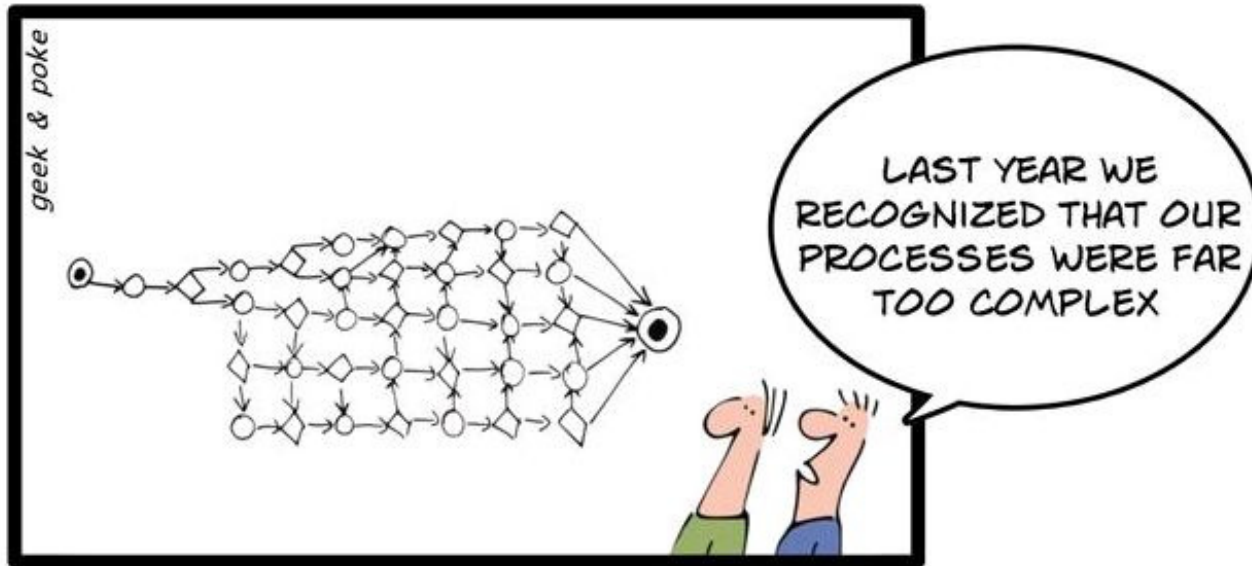
2012 Industry Hot Topics

Soft Budgets

Despite constrained growth in general IT spend, SW remains a key area of spend as a vehicle to improve ROI and do "more with less" in the data center

Business efficiency/flexibility

Focus on agile IT, increasing operational efficiency, reducing complexity, solutions that enable business priorities

Mobile Device Management

Requires many of the same service management capabilities found in the data center: configuration management, security mgmt., asset mgmt., monitoring/logging, scalability
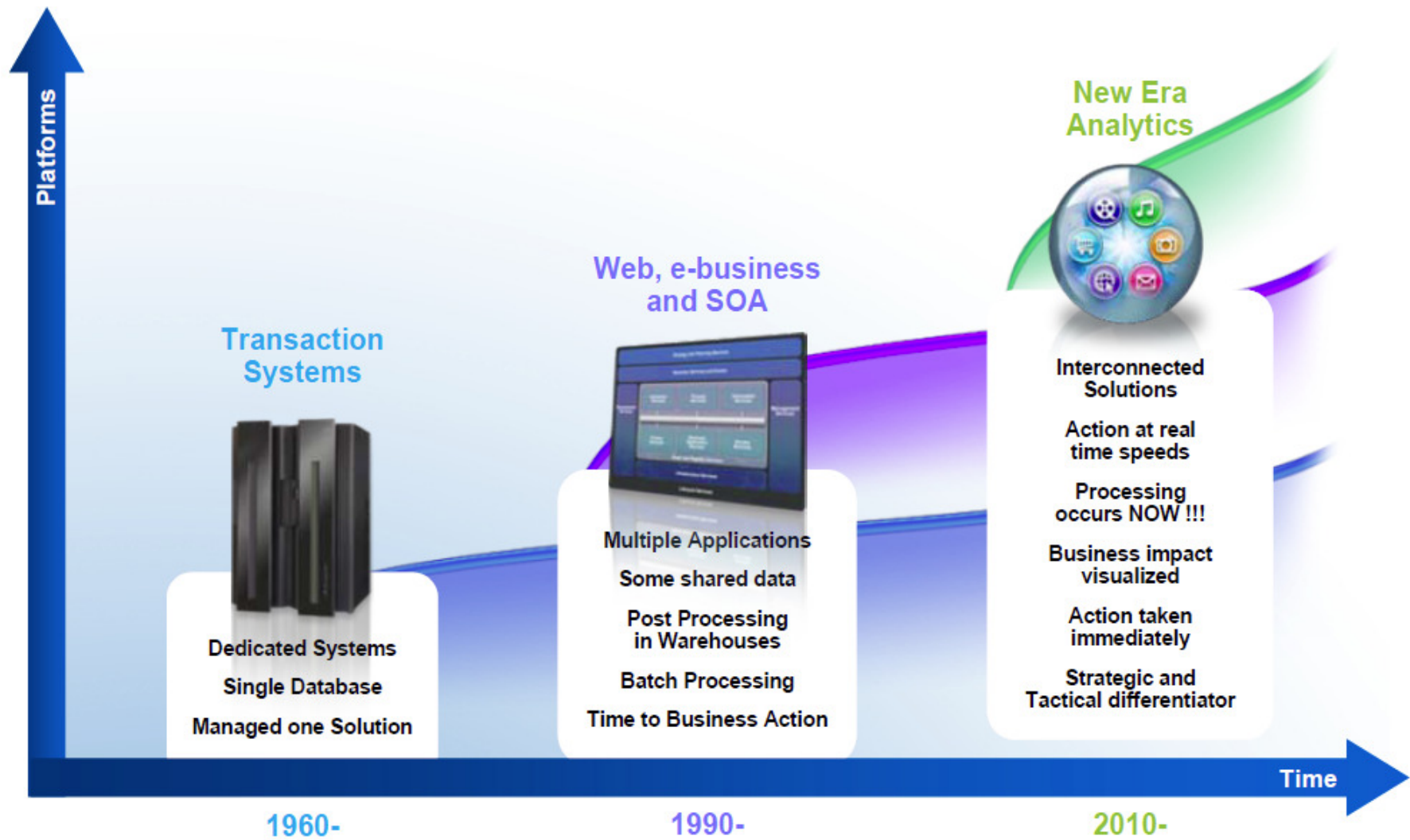
Virtualization

Tops in CIO spending priorities; growing opportunity in virtualization management tools

Cloud

Enterprises looking to build private clouds often lack core service management capabilities essential to successful cloud implementation

© 2012 IBM Corporation
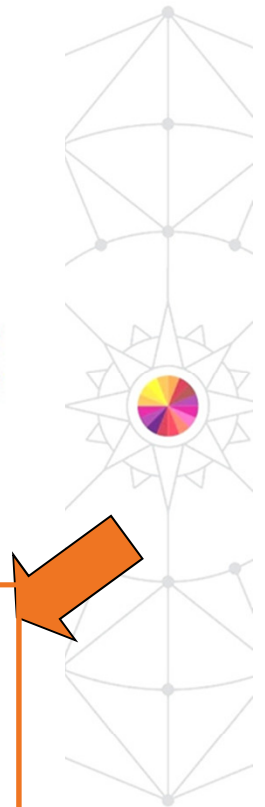
Mobility, big data, analytics, social collaboration and cloud are creating a new wave of business opportunities and IT challenges

Platforms

New Era Analytics

Web, e-business and SOA

Transaction Systems

Interconnected Solutions

Action at real time speeds

Processing occurs NOW !!!

Business impact visualized

Action taken immediately

Strategic and Tactical differentiator

Multiple Applications

Some shared data

Post Processing in Warehouses

Batch Processing

Time to Business Action

Dedicated Systems

Single Database

Managed one Solution

Time

1960-   1990-   2010-

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Shifting Trends in the IT Environment

From monolithic applications	▶	to *dynamic services*
From static infrastructure	▶	to *cloud*
From programmed systems	▶	to *cognitive*
From structured data at rest	▶	to *unstructured data in motion*
From stable well-defined workloads	▶	to unpredictable *workloads*
From standard devices	▶	to a variety of *devices*
From proprietary standards	▶	to *open* innovation
From Corporate owned IT	▶	to *Infrastructure-as-a-Service*

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Emergence of next generation architectures in Smarter Infrastructure will include System z

- Manage workloads and maintain security

- User experience and mobile management

Systems of Record

Social, Mobile, Analytics
Smarter Infrastructure

Systems of Engagement
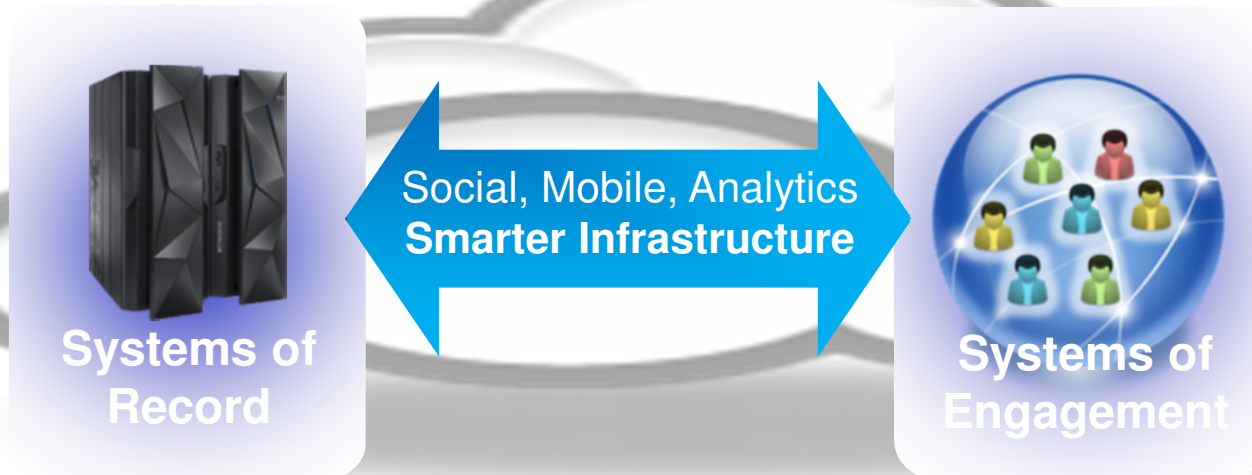
- Transactions
- Command & Control
- Authored content focused on text and graphic docs
- Facts and data mastered in single "source of truth"

- Interactions
- Collaboration
- Community based content primarily with video / audio
- Insight, trends, analytics thru open forums

Both 'Systems of Record' and 'Systems of Engagement' included in cloud

Today's data centers are struggling to stay efficient and profitable while keeping up with needs of business

- Over 60% of Data Center Costs are spent on management labor, followed by costs associated with equipment

- Increasing government and industry regulations focused on security risks and data access

- With growth of virtualization, IT admins now being called to manage both physical and virtual servers with hundreds or thousands of VMs and Network / Storage devices

- 1 hour of downtime costs an organization at least $42K, for large enterprises 12 hours of downtime could cost $10M

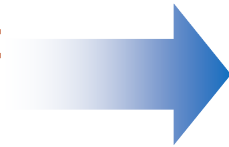- With over 2.7B ZB of digital content, how will this data be analyzed, stored, and protected?

Strategies to Improve Value and Reduce Costs

Optimize the Overall IT Environment

Consolidate Hardware Infrastructure
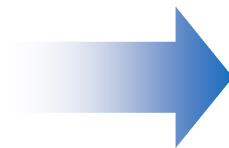
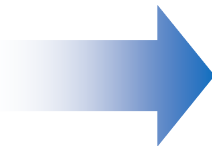**Consolidate Redundant Software and Data**

- SOA
- Compress
- Deduplicate
- Integrate
- Archive

Improve Service Delivery

Integrated Service Management

Visibility   Control   Automation

Cloud Computing

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One Size Does Not Fit All

Defining Cloud Computing ..."Industrialize IT"

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

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

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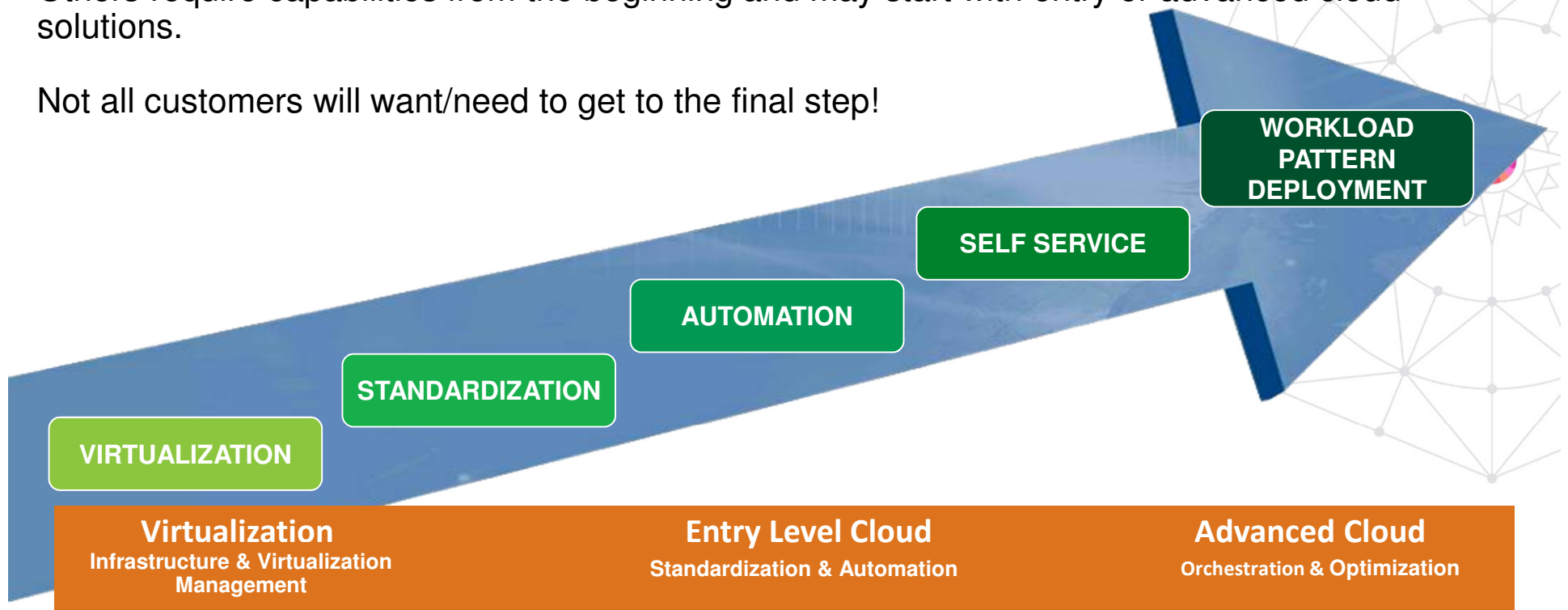# Cloud Computing - Based on Virtualization and Standardization

To position the various technologies in this space, we need to first understand that Cloud computing is a journey beginning with virtualization and consolidation of environments and ending with workload pattern-based deployment of IT services.

This is not always a step-wise progression. Some clients may require advanced cloud capabilities from the start, while others will begin by optimizing their virtualization foundation and then gradually move to cloud.

Others require capabilities from the beginning and may start with entry or advanced cloud solutions.

Not all customers will want/need to get to the final step!

WORKLOAD PATTERN DEPLOYMENT

SELF SERVICE

AUTOMATION

STANDARDIZATION

VIRTUALIZATION

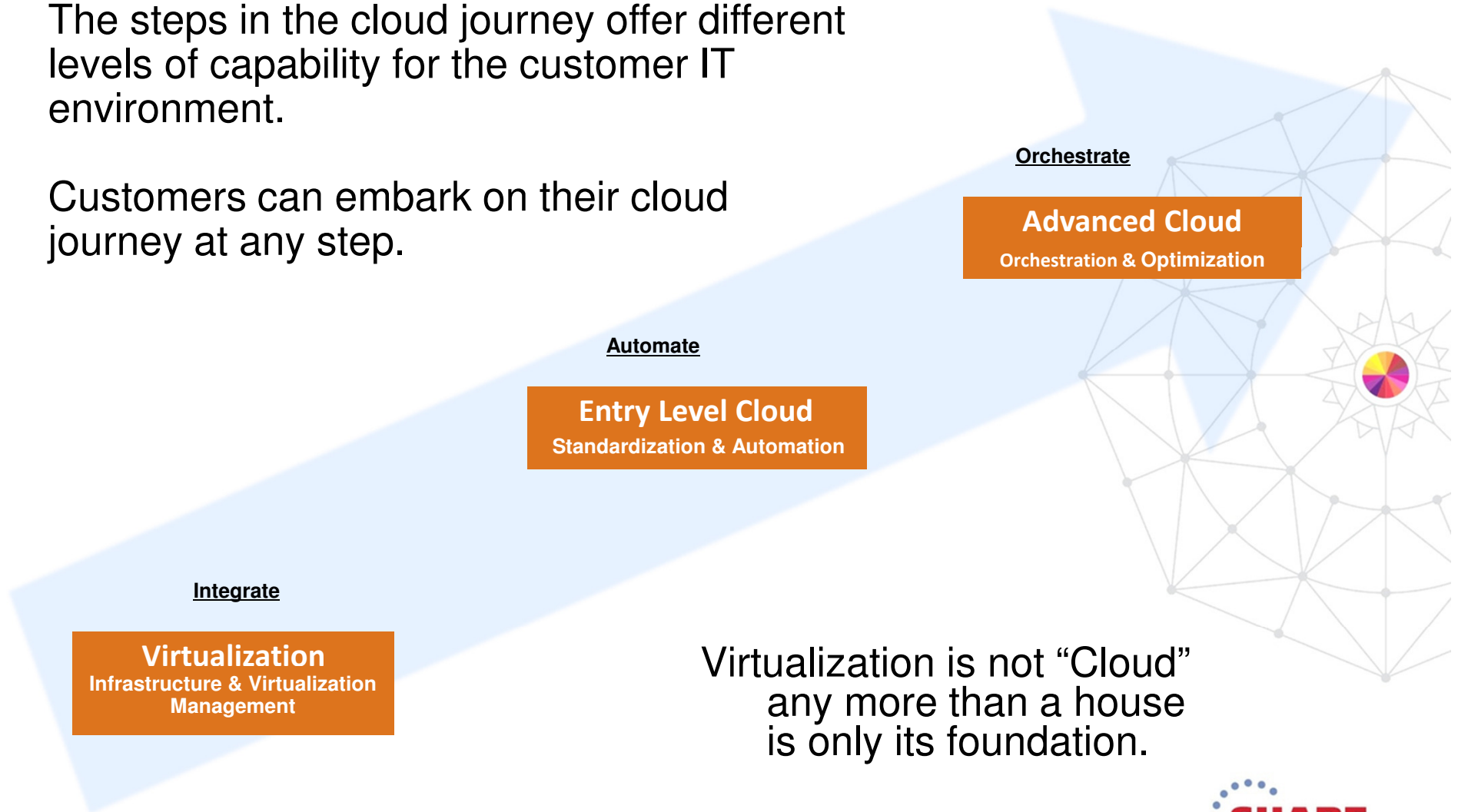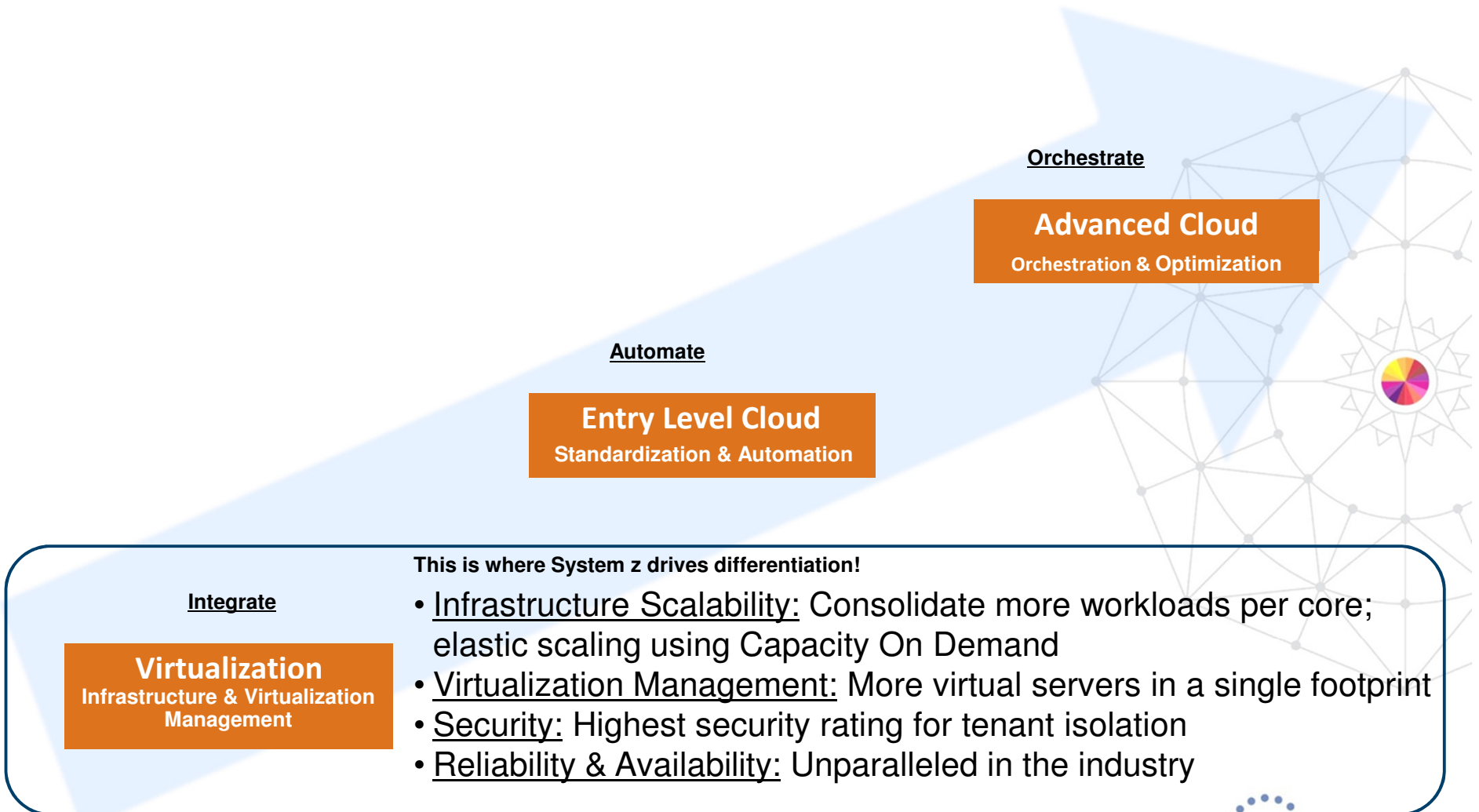| **Virtualization**	**Entry Level Cloud**	**Advanced Cloud**
Infrastructure & Virtualization Management	Standardization & Automation	Orchestration & Optimization

Cloud Computing Journey

The steps in the cloud journey offer different levels of capability for the customer IT environment.

Customers can embark on their cloud journey at any step.

Orchestrate

Advanced Cloud
Orchestration & Optimization

Automate

Entry Level Cloud
Standardization & Automation

Integrate

Virtualization
Infrastructure & Virtualization
Management

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

System z Cloud Blueprint

Orchestrate

Advanced Cloud
Orchestration & Optimization

Automate

Entry Level Cloud
Standardization & Automation

This is where System z drives differentiation!

Integrate

Virtualization
Infrastructure & Virtualization
Management

- <u>Infrastructure Scalability:</u> Consolidate more workloads per core; elastic scaling using Capacity On Demand
- <u>Virtualization Management:</u> More virtual servers in a single footprint
- <u>Security:</u> Highest security rating for tenant isolation
- <u>Reliability & Availability:</u> Unparalleled in the industry

System z Cloud Blueprint

Orchestrate

Advanced Cloud

Orchestration & Optimization

Automate

Entry Level Cloud

Standardization & Automation

- Customers begin to <u>standardize</u> their environments for faster delivery of services.
- <u>Automation</u> is employed to provision and deprovision virtual guest environments using a shared pool of resources.
- Some customers may choose to allow end-user <u>self service</u> provisioning/deprovisioning.

Integrate

Virtualization

Infrastructure & Virtualization Management

This is where System z drives differentiation!

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System z Cloud Blueprint

Orchestrate

Advanced Cloud
Orchestration & Optimization

Finally, some customers will want to evolve and <u>optimize</u> their cloud environment to <u>orchestrate</u> application deployment based on reusable workload patterns in order deliver dynamic cloud services.

Automate

Entry Level Cloud
Standardization & Automation

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System z Cloud Blueprint

Orchestrate

Advanced Cloud
Orchestration & Optimization

Finally, some customers will want to evolve and optimize their cloud environment to orchestrate application deployment based on reusable workload patterns in order deliver dynamic cloud services.

Automate

Entry Level Cloud
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- Reliability & Availability: Unparalleled in the industry

Virtualization is evolving from being a way to reduce costs to being a change agent that enables new and more flexible infrastructures

Cloud Computing
- Elastic scaling
- Shared resources
- Delivered as-a-service
- Private, Hybrid, and Public

Flexible Infrastructure
- Pools of heterogeneous resources
- Policy-based management automation

Availability
- Move running workloads
- Improve maintenance window
- Support old application environments

Test & Server Consolidation
- Better hardware utilization
- Lower power consumption

2007 7%

Not Virtualized

93%

2007->2011 % Workloads Virtualized

2011

39%

Virtualized

61%

•••••• in Anaheim
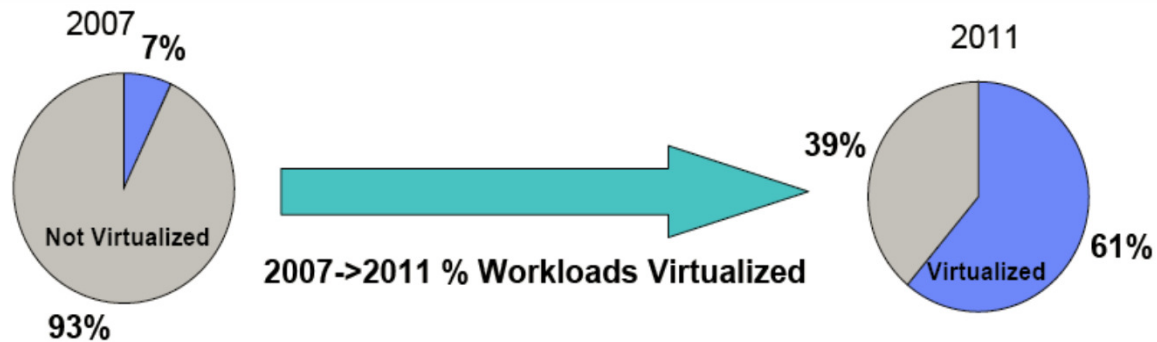
Industry Standardization - DMTF, SNIA, OSGi, OMG,... to Set Industry Cloud Standards

- **DMTF – Distributed Management Task Force**
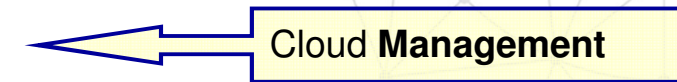 - Open Virtual Format (OVF) ← Infrastructure Virtual **Server**
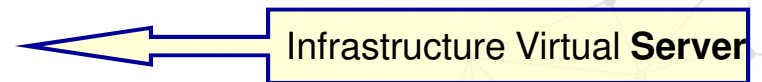
- **SNIA - Storage Networking Industry Association**
  - Cloud Data Management Interface (CDMI) ← Infrastructure **Storage**
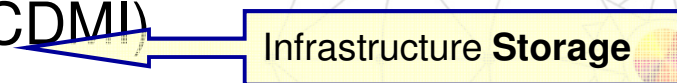
- **OSGi – Open Services Gateway initiative**
  - OSGi framework ← Cloud **Management**

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

Cloud Computing – Deployment, Service, Characteristics

4 - Deployment Models

- Private cloud
- Community cloud
- Public cloud
- Hybrid cloud

3 - Service Models

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

5 - Characteristics

- Rapid elasticity
- Broad network access
- Resource pooling
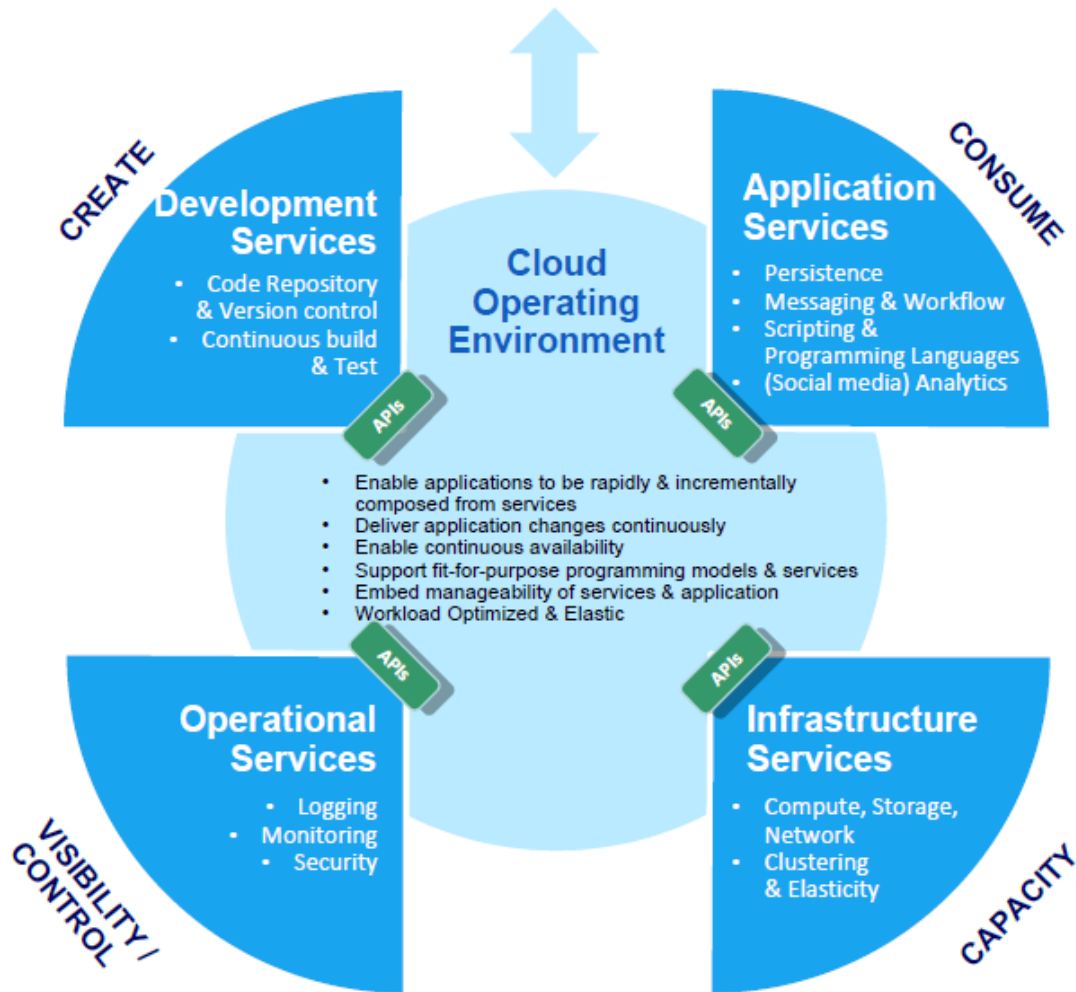- Measured service
- On-demand self-service

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

Cloud Operating Environment

APPLICATIONS / WORKLOADS
(define user experience, services & programming models; composition model; operational model; differentiation)
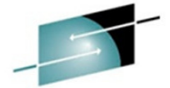
CREATE

Development Services
- Code Repository & Version control
- Continuous build & Test

CONSUME

Application Services
- Persistence
- Messaging & Workflow
- Scripting & Programming Languages
- (Social media) Analytics

Cloud Operating Environment

APIs

APIs

- Enable applications to be rapidly & incrementally composed from services
- Deliver application changes continuously
- Enable continuous availability
- Support fit-for-purpose programming models & services
- Embed manageability of services & application
- Workload Optimized & Elastic

APIs

APIs

Operational Services
- Logging
- Monitoring
- Security

Infrastructure Services
- Compute, Storage, Network
- Clustering & Elasticity

VISIBILITY / CONTROL

CAPACITY

Services will be matured over time with standard interfaces

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Technology · Connections · Results

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What is OpenStack? (http://www.openstack.org/software/)
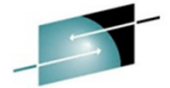
OpenStack is a cloud operating system that controls large pools of compute, storage, and networking resources throughout a datacenter, all managed through a dashboard that gives administrators control while empowering their users to provision resources through a web interface.

The resources managed are:

- Compute – Nova project
- Network – Quantum project
- Storage (Block and Object) – Cinder and Swift projects
- Dashboard (UI) – Horizon project
- Images – Glance project
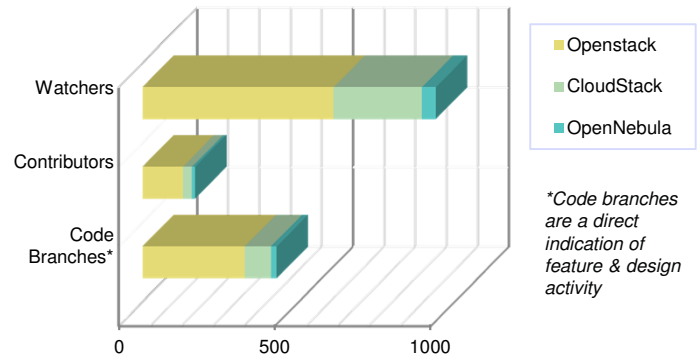- Security – Keystone project
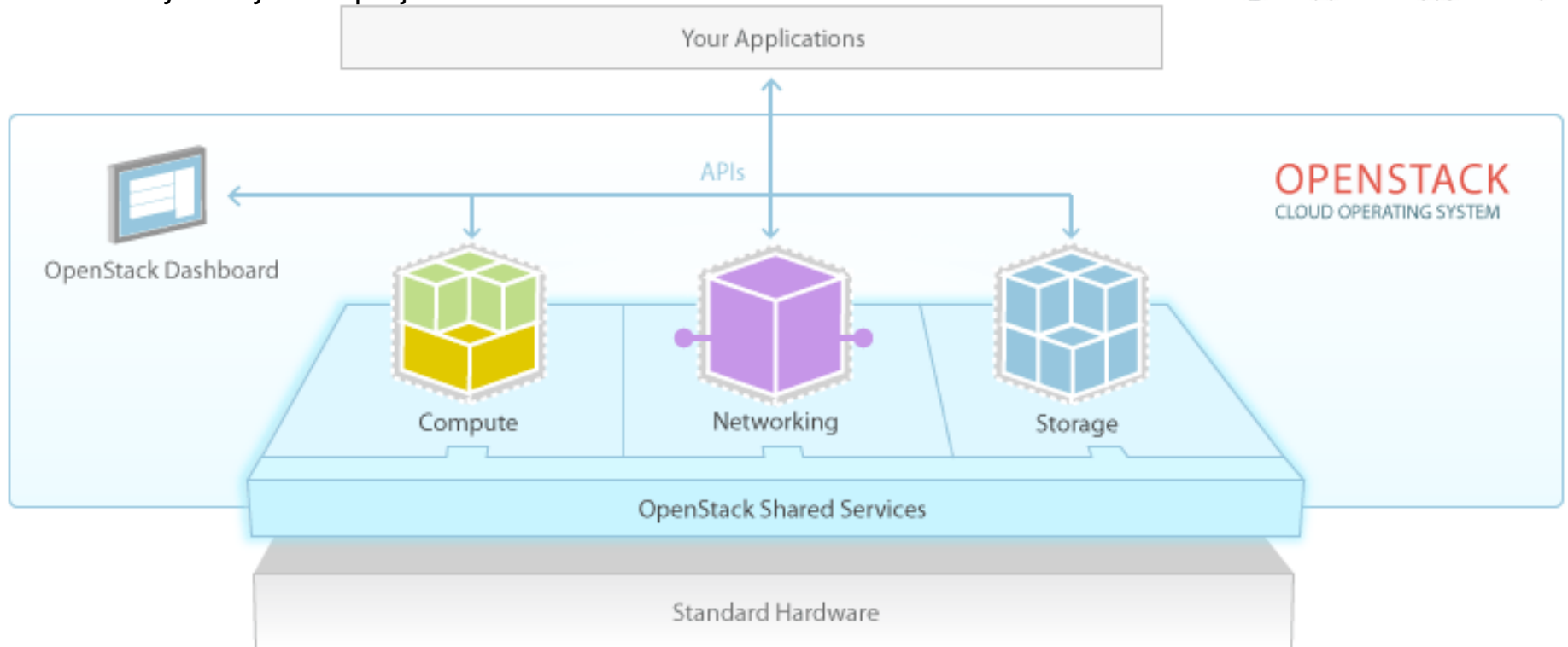
State of the OpenStack ecosystem

Exponential growth in participation

As of APR 2012: **150** Orgs — **850** Orgs As of Jan 2013
2600 Individuals — **6600+** Individuals across **87** countries
30 User groups — **38** User groups

Chart (Watchers, Contributors, Code Branches*) with scale 0, 500, 1000
- Openstack
- CloudStack
- OpenNebula

*Code branches are a direct indication of feature & design activity

One-quarter of Cloudstack & OpenNebula followers also follow OpenStack

OpenStack's social community is roughly 3 times that of its nearest competitor

15,091 followers of OpenStack
4,477 followers of CloudStack
1,602 followers of opennebula

Source: Followerwonk.com

OpenStack ecosystem growth

- OpenStack has the largest active open source, cloud project community (~2,500)
- Individual membership up 286% since April 2012 (2,300 – 6,600+), boasting 47 User Groups in 33 countries
- Social media leader (3x the followers of nearest cloud project community)
- Corporate sponsorship grew 11% (135 - 150) since the OpenStack Foundation announcement
  - Notable additions include VMware & Microsoft
- Fall Design Summit attendance grew 3x, 2011 to 2012
- 2,300 attendees of the Asia Pacific conference in China, across 2 cities (Beijing & Shanghai), in July 2012

IBM & OpenStack

IBM has over 250 employees (internal & external) working on OpenStack

- 73 IBMers have signed the contributor agreement
  - 15 additional pending review & approval, totaling 88
  - 28 IBMers have had code contributions accepted
  - 6 core contributors (of ~30) on 8 projects
  - One fifth of core contributors are IBMers
- IBM is currently 3rd overall in code contributions and reviews behind Rackspace & Redhat.
  - 21% of the design features for the Nova (Compute) project were led by IBM
  - 11% of the design features for the upcoming Grizzly release were led by IBM

OpenStack Infrastructure Management Software

The framework for Software Defined Infrastructure
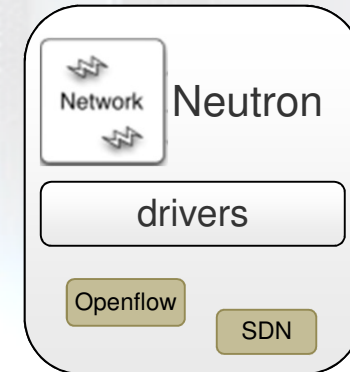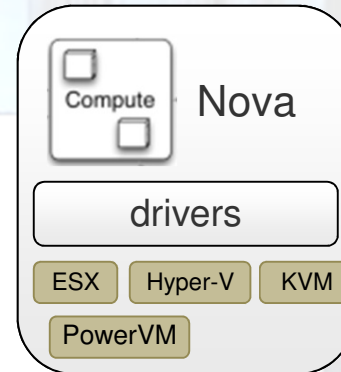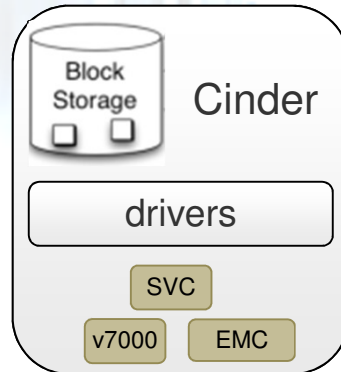
SD Infrastructure APIs
- Services and Resources
- Server, Storage and Network
- Broad Ecosystem Forming

SD Infrastructure Services
- Software Image Services
- Infrastructure Patterns
- VM Placement Intelligence

Vendor Led Scalable Model
- Drivers provided by the vendors
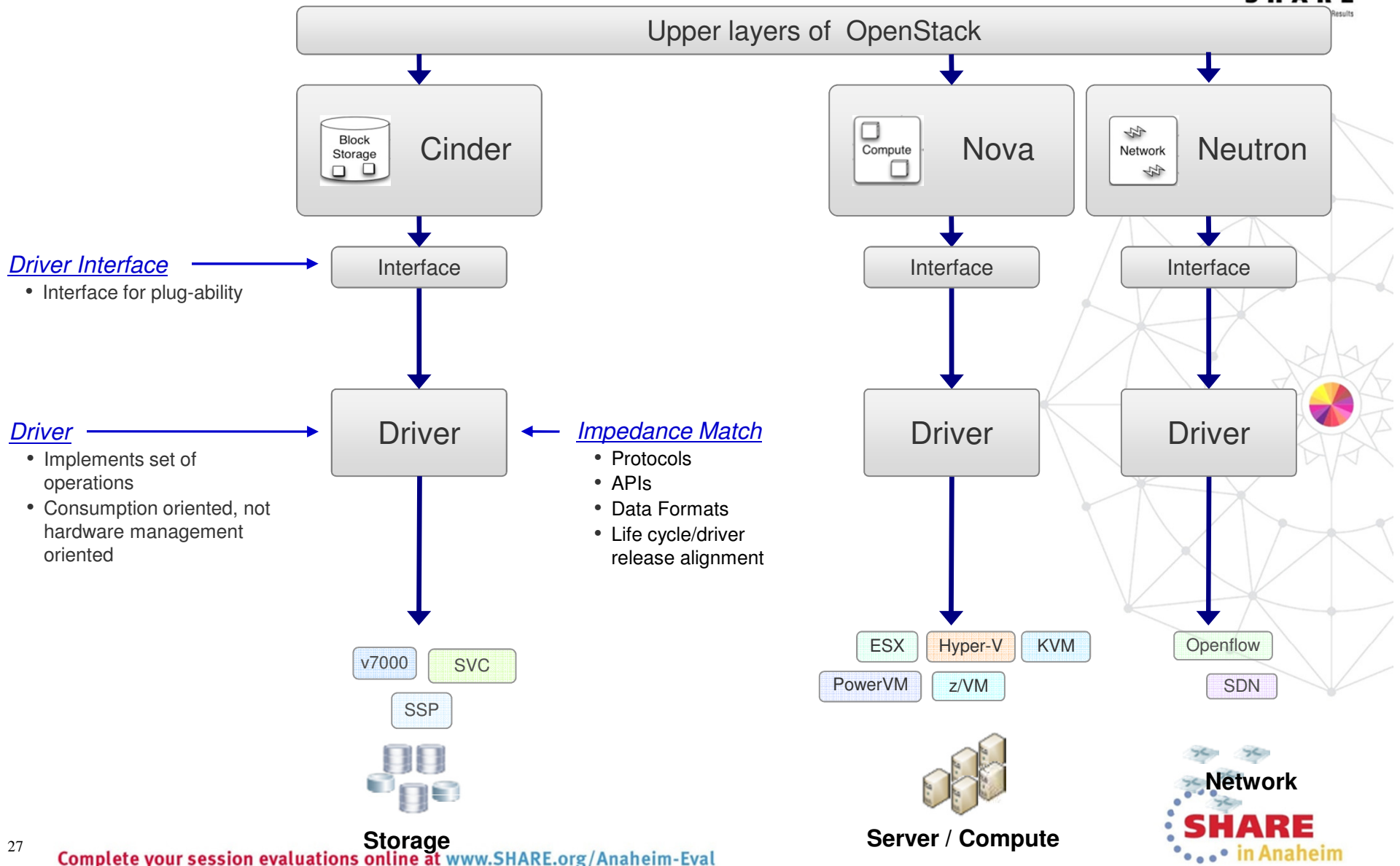- Broad Ecosystem Forming
- Management standardization

OpenStack API

openstack
CLOUD SOFTWARE

IBM Differentiation provided via extensions and value added services

Block Storage **Cinder**

drivers

SVC

v7000   EMC

Compute **Nova**

drivers

ESX   Hyper-V   KVM

PowerVM

Network **Neutron**

drivers

Openflow

SDN

Storage

Server / Compute

Network

Integration of platforms into OpenStack

Upper layers of OpenStack

Cinder (Block Storage)
Nova (Compute)
Neutron (Network)

Driver Interface
- Interface for plug-ability

Interface

Driver
- Implements set of operations
- Consumption oriented, not hardware management oriented

Driver

Impedance Match
- Protocols
- APIs
- Data Formats
- Life cycle/driver release alignment

v7000   SVC
SSP

ESX   Hyper-V   KVM
PowerVM   z/VM

Openflow
SDN

Storage
Server / Compute
Network

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OK – Now How Do I Set-up a Cloud Infrastructure Following All These Standards

- **Make use of existing Cloud Reference Architectures (CCRA)**
  - Sample: NIST Cloud Computing Reference Architecture
- **Sample: IBM Cloud Computing Reference Architecture**

ITIL and cloud series: NIST and IBM Cloud Reference Architecture, what and how to

October 21, 2011 1:46 pm by Claudio Valant

"We know what cloud computing is and we have ITIL that guides us for service management. Do we really need any additional model or framework?"

Yes we do! Indeed we need an architecture that helps us in planning, designing, and building a real cloud computing environment with all the capability and information systems to efficiently run it.

compare IBM CCRA with the **NIST CCRA**[2].

IBM Cloud Computing Reference Architecture[1](CCRA) has already been effectively introduced in a **blog** from Vasfi Gucer. In this blog, I would like to dig a little more and compare IBM CCRA with the **NIST CCRA**[2].

NIST CCRA is an excellent w*hat,* and the IBM CCRA (the complete one) is a very useful h*ow to - they are complementary*

http://thoughtsoncloud.com/index.php/2011/10/itil-and-cloud-series-nist-and-ibm-cloud-reference-architecture-what-and-how-to/

IBM Cloud Computing Reference Architecture (CCRA)

- IBM CCRA represents the aggregate IBM experience from:
  - cloud projects with IBM clients
  - IBM implementation of private/hybrid/public cloud offerings as well as services.

- The architectural overview document might serve as guide to the fundamental cloud building blocks (see graphic)

Publically available RA whitepaper on ibm.com:
http://public.dhe.ibm.com/common/ssi/ecm/en/ciw03078usen/CIW03078USEN.PDF
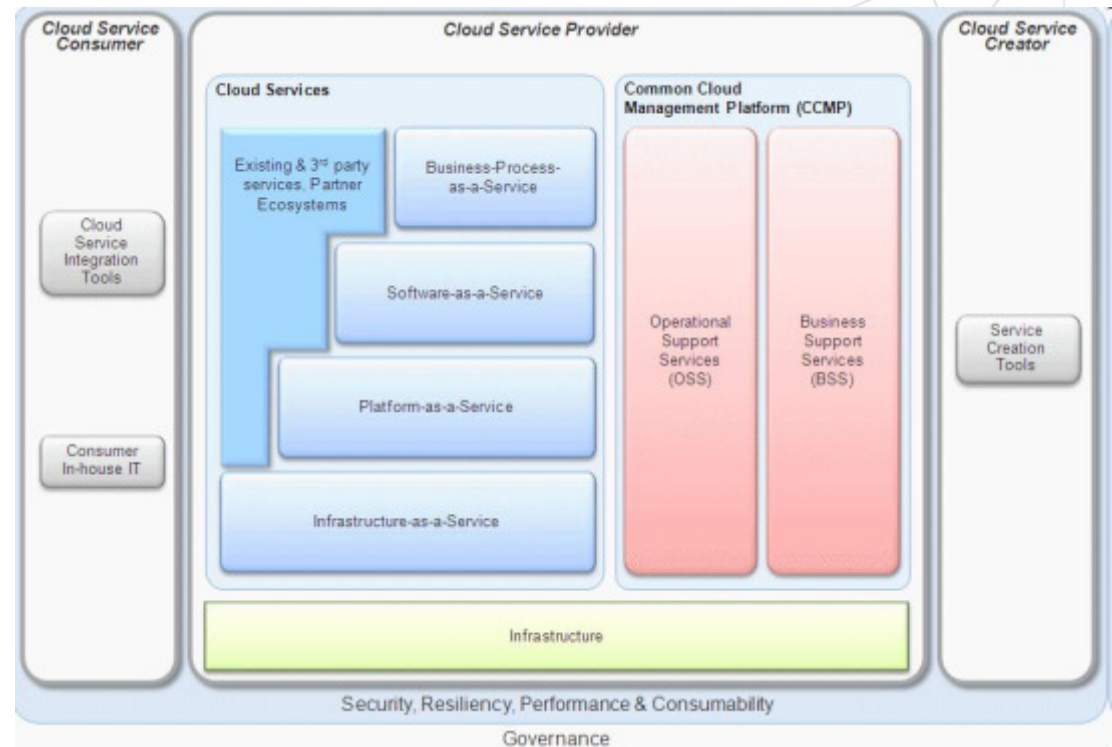
CCRA OpenGroup submission:
http://www.opengroup.org/cloudcomputing/uploads/40/23840/CCRA.IBMSubmission.02282011.doc

Is Security still a Challenge ?? for the Adoption of Cloud Computing

Latest Computerworld article 03/14
Cloud security concerns are overblown, experts say

If cloud providers are vetted properly, most enterprise workloads and data can be safely migrated to cloud environments, according to a panel of practitioners at the recent RSA Security

Security Is Limited By The Weakest Link

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Cloud customers call out security & reliability strengths as highest priorities

Survey Question: How important is it for your cloud platform to have the following reliability characteristics?
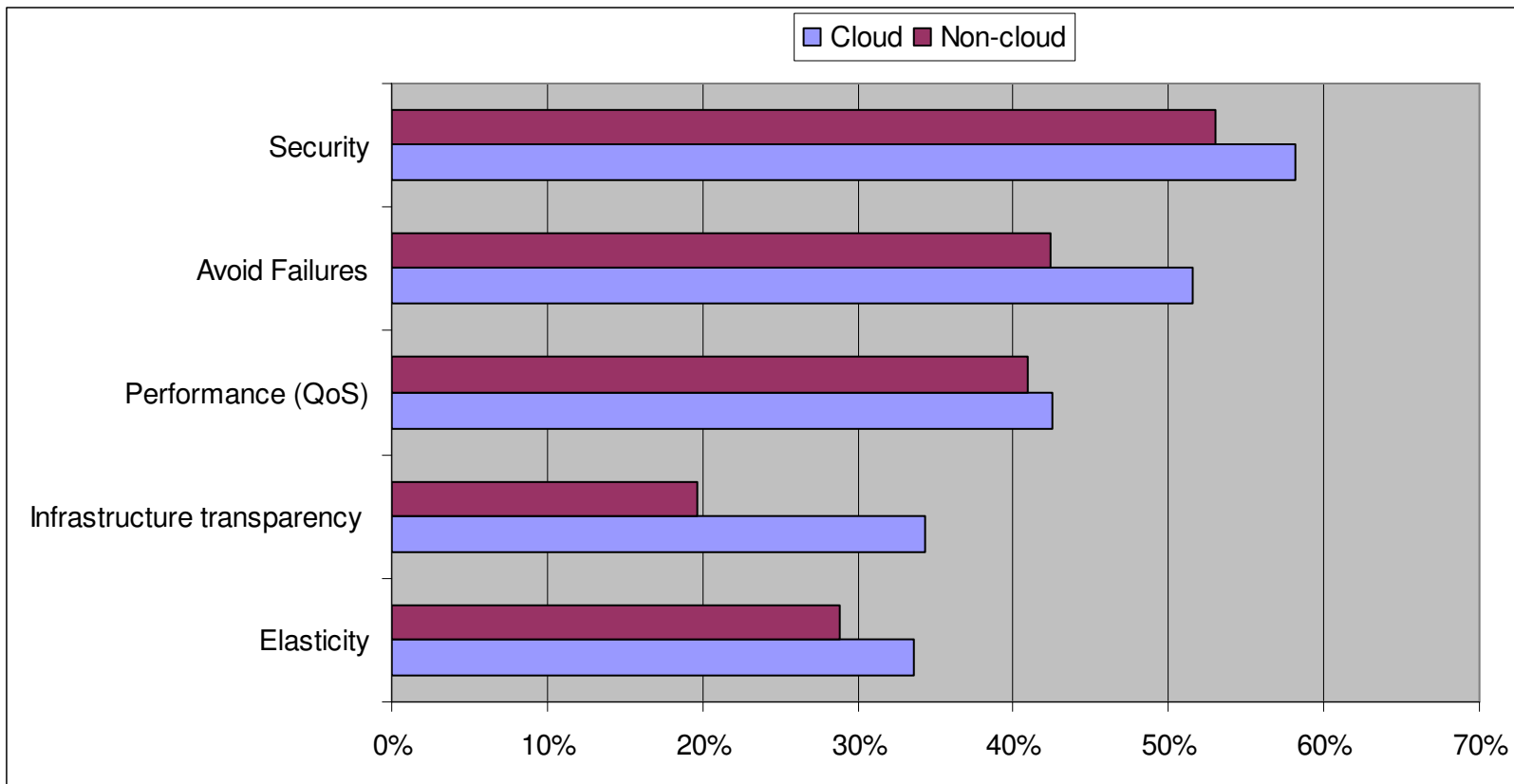
Base: 200 North American and European hardware and infrastructure decision-makers
("Critically important – 5" responses shown)

Cloud Security 101: Simple Example
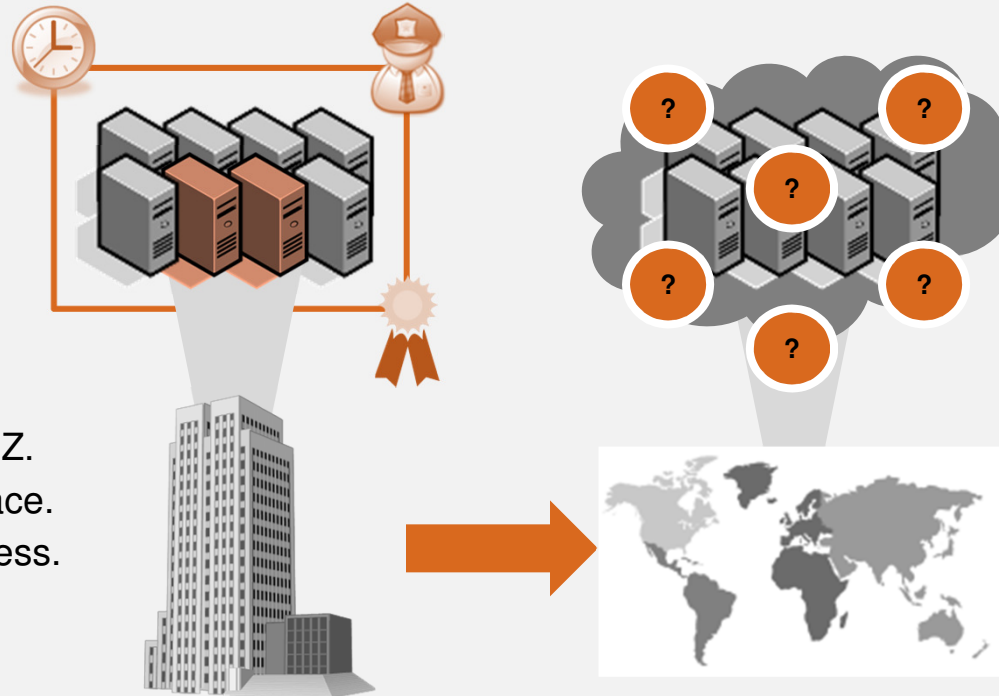
We Have Control

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.

Reliability

High availability will be a key concern. IT departments will worry about a loss of service should outages occur.

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

Compliance

Complying with SOX, HIPAA and other regulations may prohibit the use of clouds for some applications.
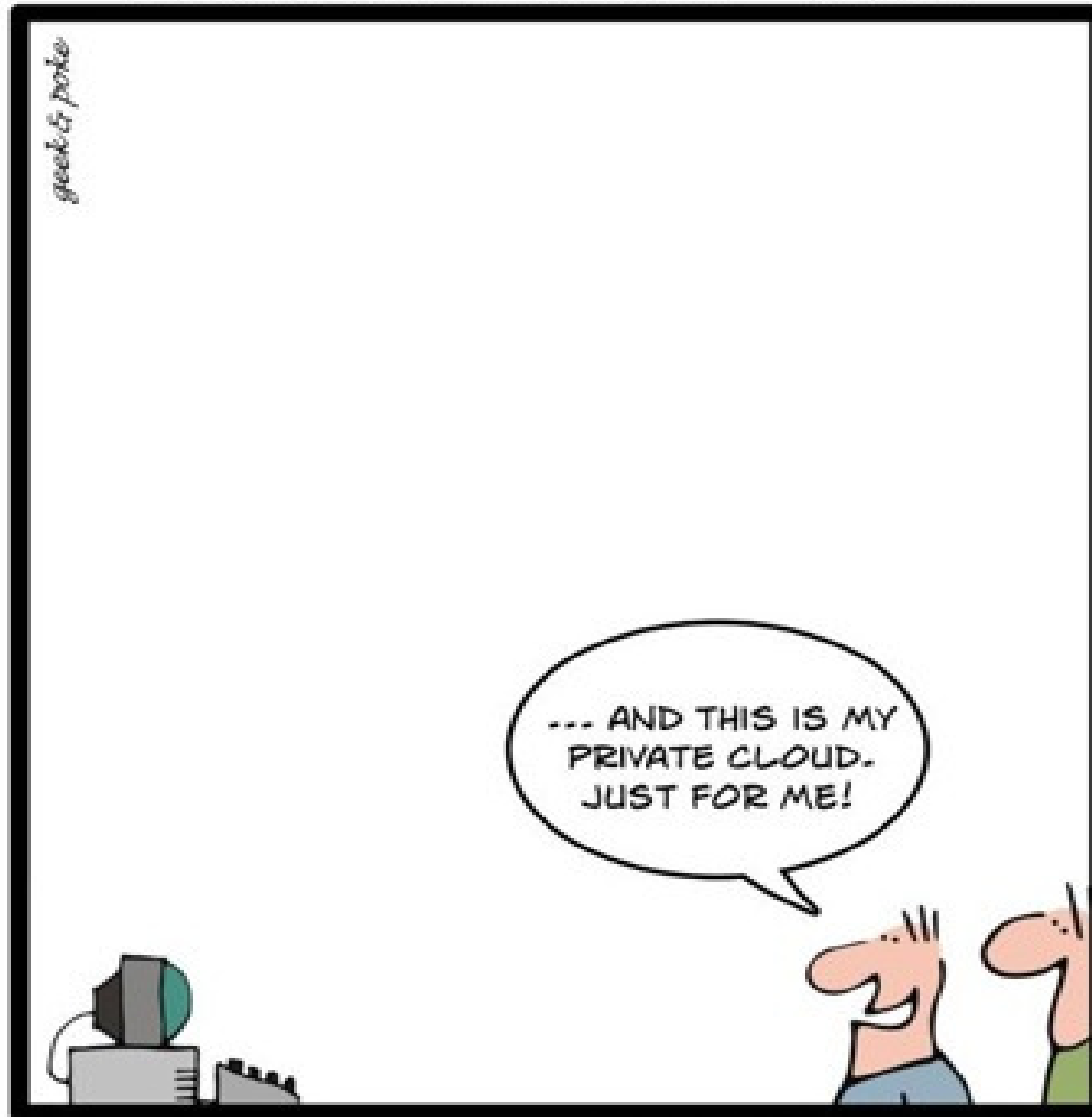
Comprehensive auditing capabilities are essential.
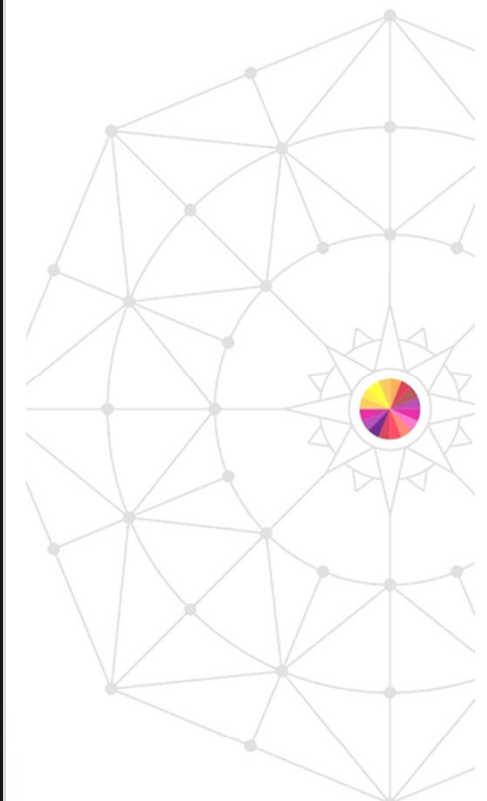
Security Management

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

Providers must supply easy controls to manage security settings for application and runtime environments.
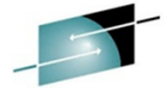
Virtualization and Cloud Portfolio for Linux on System z

Virtualization	Entry Level Cloud	Advanced Cloud
Infrastructure & Virtualization Management	**Standardization & Automation**	**Orchestration & Optimization**

zEnterprise: zEC12, zBC12

- Massively scalable
- Characterized by great economics / efficiencies
- Highly secure / available

z/VM 6.3

- Support more virtual servers than any other platform in a single footprint
- Integrated OpenStack support

Linux on System z

- Distributions available from RedHat and SUSE

IBM Wave for z/VM

- A graphical interface tool that simplifies the management and administration of z/VM and Linux environments

Differentiation

xCAT

- Shipped with z/VM 6.3
- Allows customers to set up a rudimentary cloud environment, without acquiring any additional product
- Based on open source code
- Focused on a different layer and not designed for upward integration to SmartCloud suite

SmartCloud Entry *

- A simple, entry level cloud management stack
- Based on OpenStack
- First tier in the SmartCloud suite of cloud management products

Standardization

Cloud Ready for Linux on System z

- Image-based cloud service delivery with integrated provisioning, monitoring, service catalog & service desk, storage management, and HA

SmartCloud Provisioning

- Builds on functionality of SmartCloud Entry and adds middleware pattern support for workload deployment

SmartCloud Orchestrator *

- Builds on functionality of SmartCloud Provisioning and adds runbook automation

Service Lifecycle Management

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*** System z support currently in development**

System z Cloud Ecosystem

	Integrate	**Automate**	**Orchestrate**
IBM Products & Offerings	• **zEnterprise: zEC12, z196, zBC12, z114** • **z/VM 6.2** • **Linux on System z** • **z/VM 6.3**	• **Tivoli Provisioning Manager** • **CloudReady for Linux on System z** • **SmartCloud Entry** • **SmartCloud Provisioning**	• **Tivoli Service Automation Manager** • **SmartCloud Orchestrator**

openstack
CLOUD SOFTWARE

ISV Solutions

IBM Wave for z/VM
• A graphical interface tool that simplifies the management and administration of z/VM and Linux environments

zPRO
• Provided by **Velocity Software**
• Add-on feature to Velocity's zVPS product that provides performance management
• Provides golden image creation, cloning, and operational controls

APPLogic
• Provided by **Computer Associates**
• Part of the 3Tera acquisition
• GA in 2H2012

MOAB
• Provided by **Adaptive Computing**
• Provides a policy based cloud management based on xCAT

Open Source Options

xCAT
• E**x**treme **C**loud **A**dministration **T**ool
• Now supported on z/VM through services offering (GTS)

OpenStack
• Being enabled for z/VM for delivery in 1H2013
• Being used as a code base for SCE / SCP / SCO

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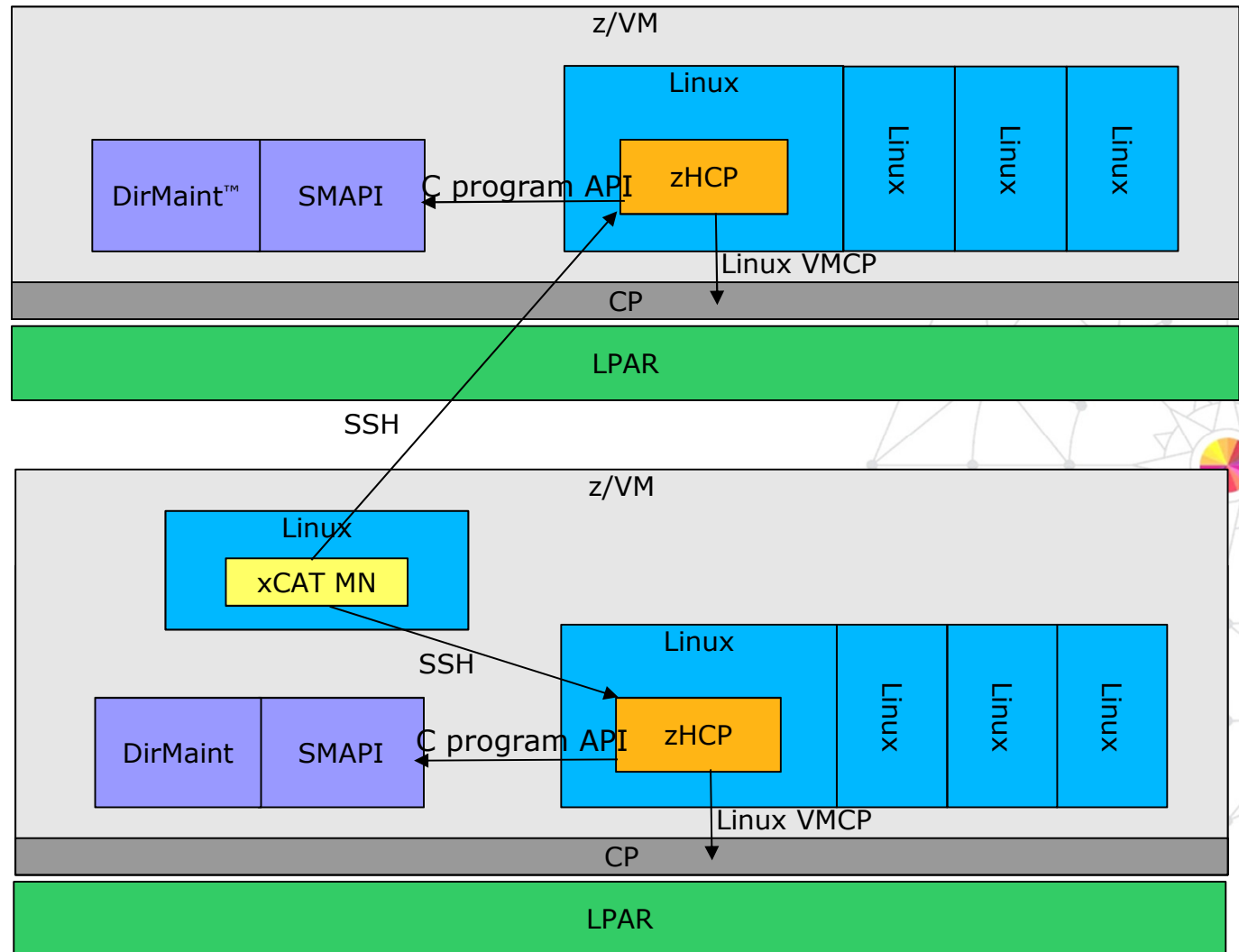# Virtualization and Cloud Portfolio for Linux on System z

Entry Level Cloud
Standardization & Automation

- **xCAT -** E**x**treme **C**loud **A**dministration **T**oolkit
  - Shipped as part of z/VM 6.3
  - Scalable open source toolkit that can be used to set up and administer a rudimentary cloud environment on z/VM only, including
    - Provisioning and de-provisioning of virtual guest environments
    - Monitor physical and virtual resources
    - Provide network, storage and image management
  - Not designed for upward integration to SmartCloud suite

- **SmartCloud Entry**
  - A simple, entry level cloud management stack that can be used as a turn-key solution that cost-effectively delivers basic cloud capabilities across all supported IBM platforms.
  - Based on OpenStack – IBM's strategic code base for all cloud management software and services.
  - System z support not currently available, but IBM announced a Statement of Direction:

    "IBM intends to update IBM SmartCloud Entry to support the System z platform, by providing IBM SmartCloud Entry management software that can be installed on System z and allow SmartCloud Entry to manage heterogeneous cloud resources across System x, Power Systems, System z, PureFlex and Flex System platforms."
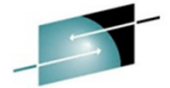
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xCAT Architecture on System z

xCAT MN: Central management server running on normal Linux

zHCP: Runs on privileged VM and manages other VMs via SMAPI and CP

Virtualization and Cloud Portfolio for Linux on System z

- **Cloud Ready for Linux on System z**
  - An image-based deployment solution for cloud service delivery and management leveraging multiple Tivoli products.
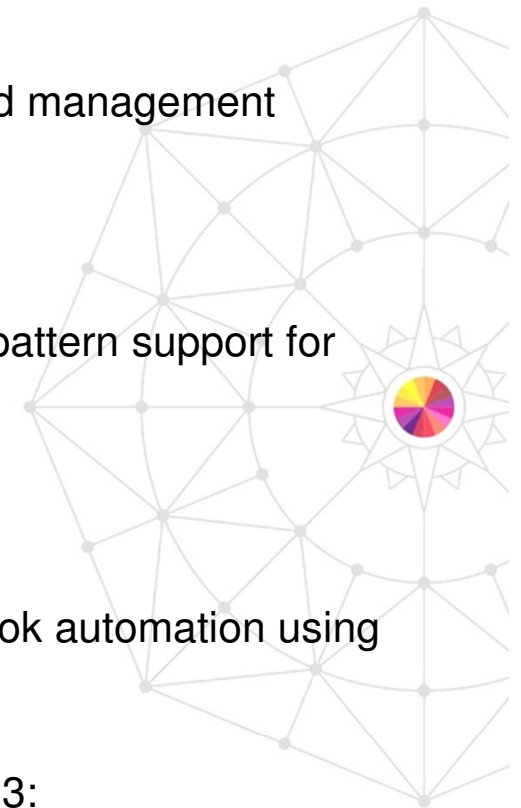 - Based on Tivoli Provisioning Manager (TPM) technology

- **SmartCloud Provisioning**
  - Builds on functionality of SmartCloud Entry and adds middleware pattern support for workload deployment.
  - Being reengineered to be based on OpenStack
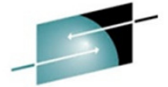 - Provides z/VM support in "manage-to" environment

- **SmartCloud Orchestrator**
  - Builds on functionality of SmartCloud Provisioning and adds runbook automation using WebSphere Business Process Manager (BPM) technology
  - Based on OpenStack
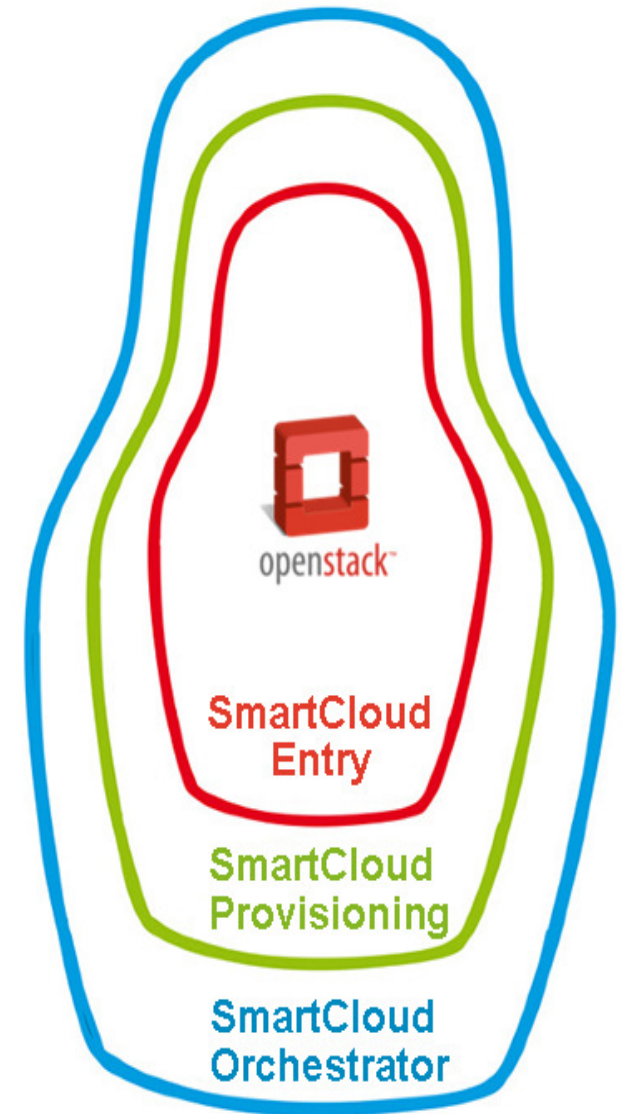 - System z support currently in beta, delivering on SOD from 3Q2013:

    "IBM intends to add additional Linux on System z Cloud support built on z/VM V6.3 and OpenStack, including SmartCloud Orchestrator and SmartCloud Provisioning."
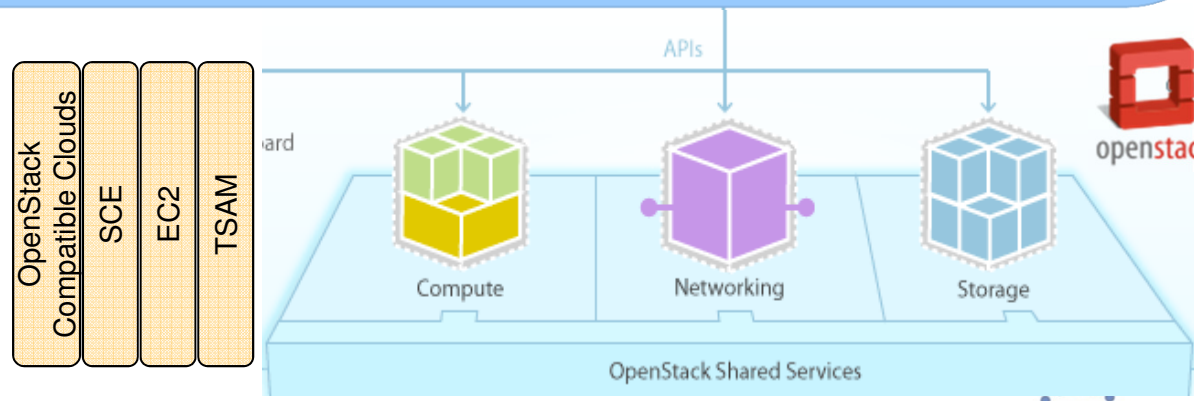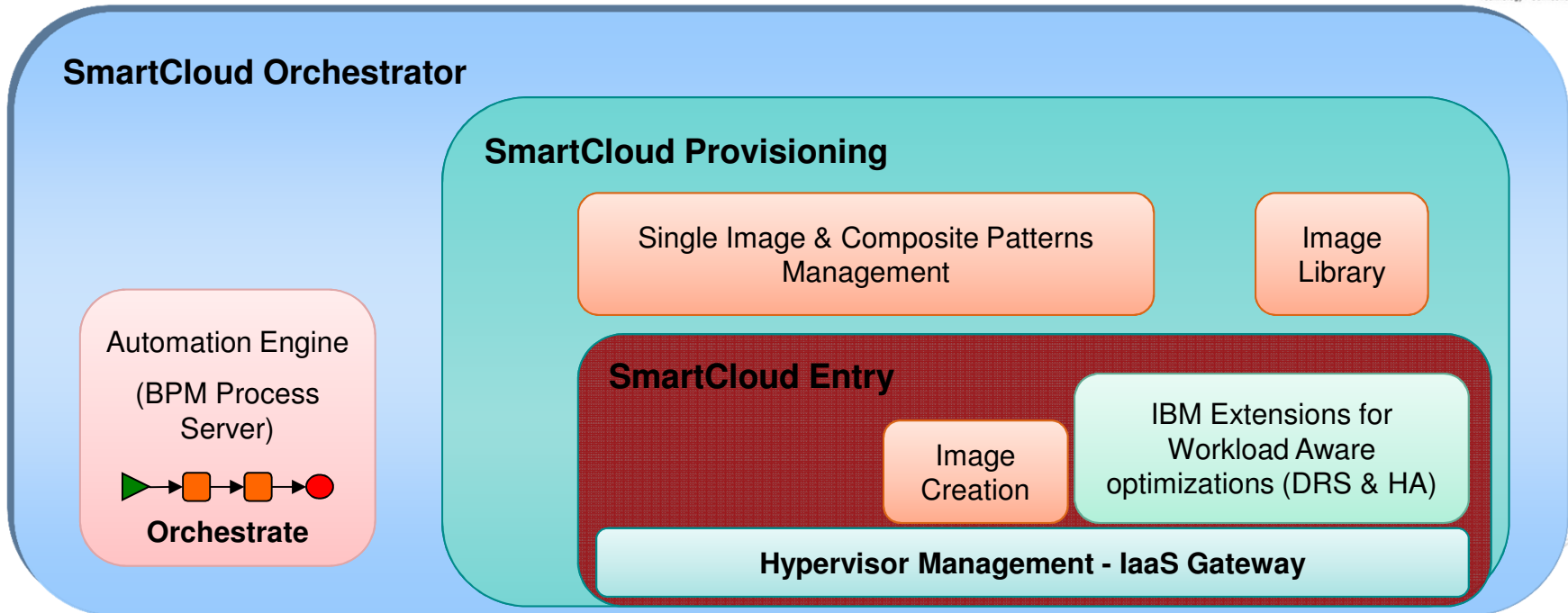
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SmartCloud Suite of Cloud Management Software

- **SmartCloud Entry**

  - A simple, entry level cloud management stack that can be used as a turn-key solution that cost-effectively delivers basic cloud capabilities across all supported IBM platforms.

  - Based on OpenStack – IBM's strategic code base for all cloud management software and services.

- **SmartCloud Provisioning**

  - Builds on functionality of SmartCloud Entry and adds workload pattern support for application deployment.

  - Same pattern technology support as found in IBM Workload Deployer and PureApp Server

- **SmartCloud Orchestrator**

  - Builds on functionality of SmartCloud Provisioning and adds runbook automation using WebSphere Business Process Manager (BPM) technology (aka Lombardi)

  - Support will be provided to allow SmartCloud Orchestrator runbook workflows to invoke legacy TPM workflows for migration and backward compatibility
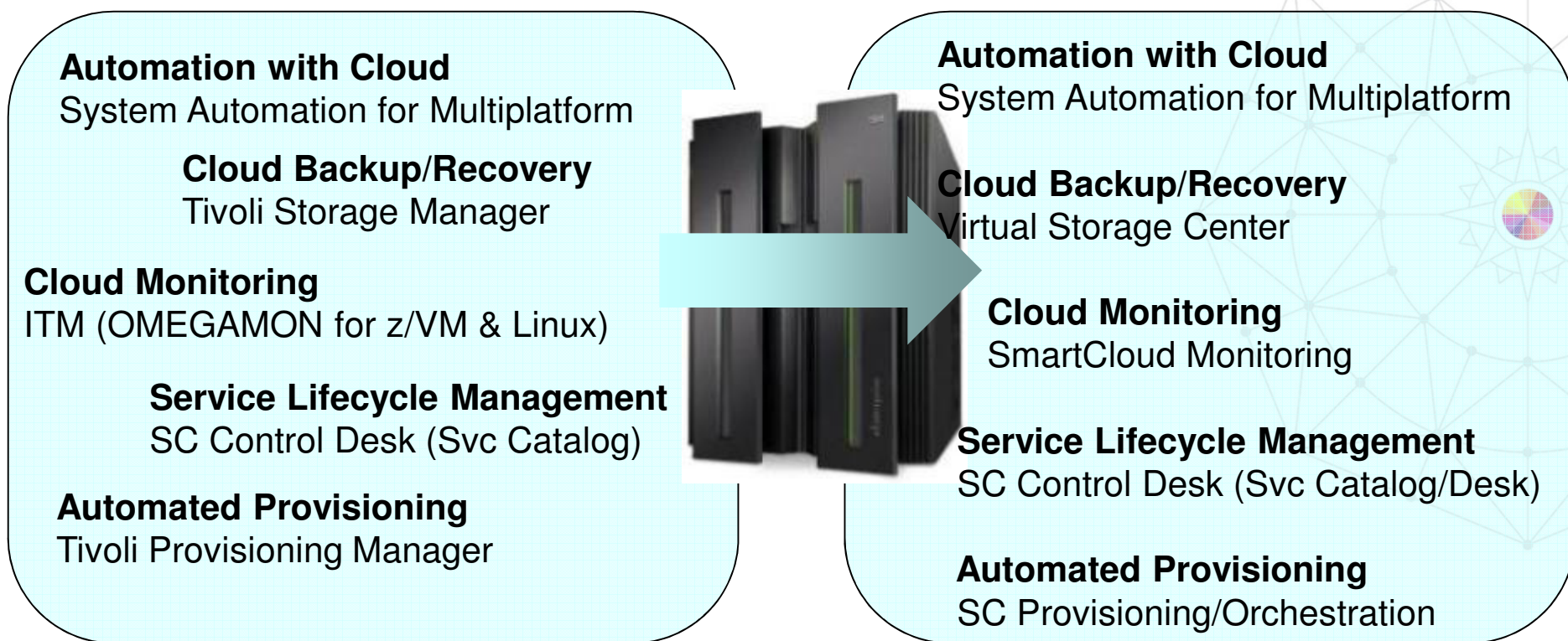

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SmartCloud Entry

SmartCloud Provisioning

SmartCloud Orchestrator

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OpenStack usage by SmartCloud products

SmartCloud Orchestrator

SmartCloud Provisioning

Single Image & Composite Patterns Management

Image Library

Automation Engine

(BPM Process Server)

Orchestrate

SmartCloud Entry

Image Creation

IBM Extensions for Workload Aware optimizations (DRS & HA)

Hypervisor Management - IaaS Gateway

APIs

OpenStack Compatible Clouds

SCE

EC2

TSAM

openstack

Compute

Networking

Storage

OpenStack Shared Services

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Use Cloud Ready to get up and running quickly, and supports moving to SmartCloud as needs grow

Cloud Ready for Linux on System z

Automation with Cloud
System Automation for Multiplatform

Cloud Backup/Recovery
Tivoli Storage Manager

Cloud Monitoring
ITM (OMEGAMON for z/VM & Linux)

Service Lifecycle Management
SC Control Desk (Svc Catalog)

Automated Provisioning
Tivoli Provisioning Manager

SmartCloud Foundation

Automation with Cloud
System Automation for Multiplatform

Cloud Backup/Recovery
Virtual Storage Center

Cloud Monitoring
SmartCloud Monitoring

Service Lifecycle Management
SC Control Desk (Svc Catalog/Desk)

Automated Provisioning
SC Provisioning/Orchestration

Cloud Management for System z provides critical workload provisioning to z

Beta

Hosted Beta Available

Automated Provisioning

Cloud Monitoring

Cloud Backup/Recovery
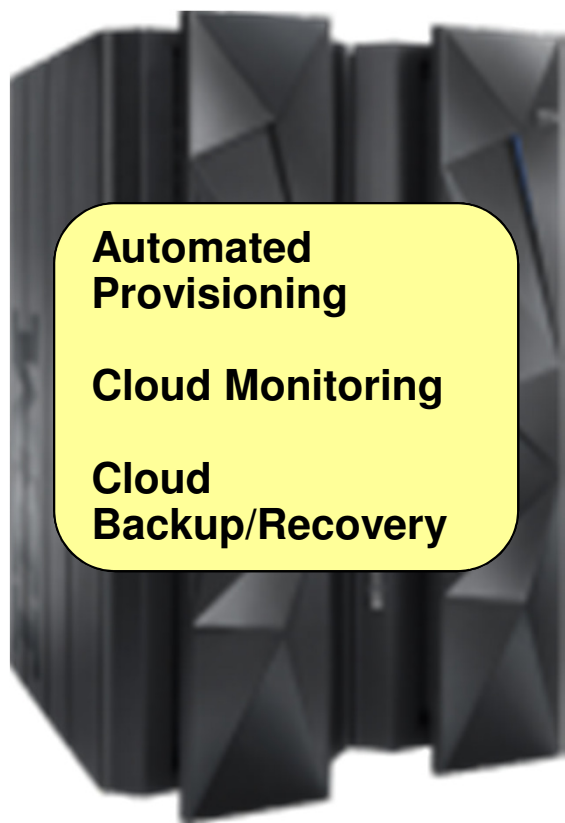
Easily move cloud services to System z with standardized, open orchestration

• Provision workloads to z Linux from SmartCloud Orchestration running on x and p

Fully automate deployment and lifecycle management of cloud services across workloads

Simplify cloud operations and increase productivity with OMEGAMON monitoring of services

Increase availability of cloud data with easy to implement backup/recovery

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Enhanced visibility and management for z/VM and Linux applications and resources saving time and money

Cloud Monitoring

Increased Performance & Availability

- zVM Live Guest Relocation & Single System Image

Cloud Health Visibility and Optimization

- Performance and Availability metrics/analytics

Extensible Cloud Environment

- Business Expansion based on capacity planning

  - Grow without adding hardware

Client Success

- Cloud service provider **consolidates 59 development & test labs into 6**.

- Increased utilization by **increasing VM density by 58%**

Cloud on System z workload backup/recovery with Tivoli Storage Manager Extended Edition

Cloud Backup/Recovery

Performance: High-performance, scalable backups and restores that minimize network traffic .

Disaster recovery: Performs automated, scheduled asynchronous replication of backup data and metadata

Flexibility: Data protection and disaster recovery for more than 500 different disk, tape and virtual tape storage

Scalability and reliability Management of up to four billion data objects on single server architecture built on IBM DB2®

SoftLayer and System z
(Hybrid Cloud Enterprise Architecture)
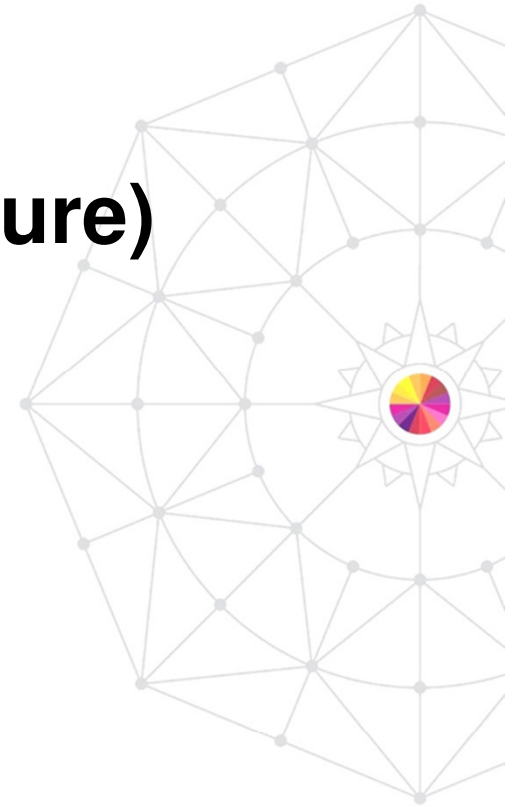
# Hybrid Cloud Enterprise Architecture: Overview

➢ CICS OLTP System on-premise Data Center

   ➢ Provides best-of-breed OLTP system

   ➢ Exploiting security and scalability of GDPS

➢ Application server on SoftLayer Cloud Server

   ➢ Hosts application / presentation tier on dedicated or virtual server

   ➢ Elastically scales compute capacity

   ➢ Reduces costs by paying for capacity

➢ Secure VPN Tunnel

   ➢ Provides secure means to cross public network

   ➢ Presents private network of SoftLayer as extension of on-premise private network
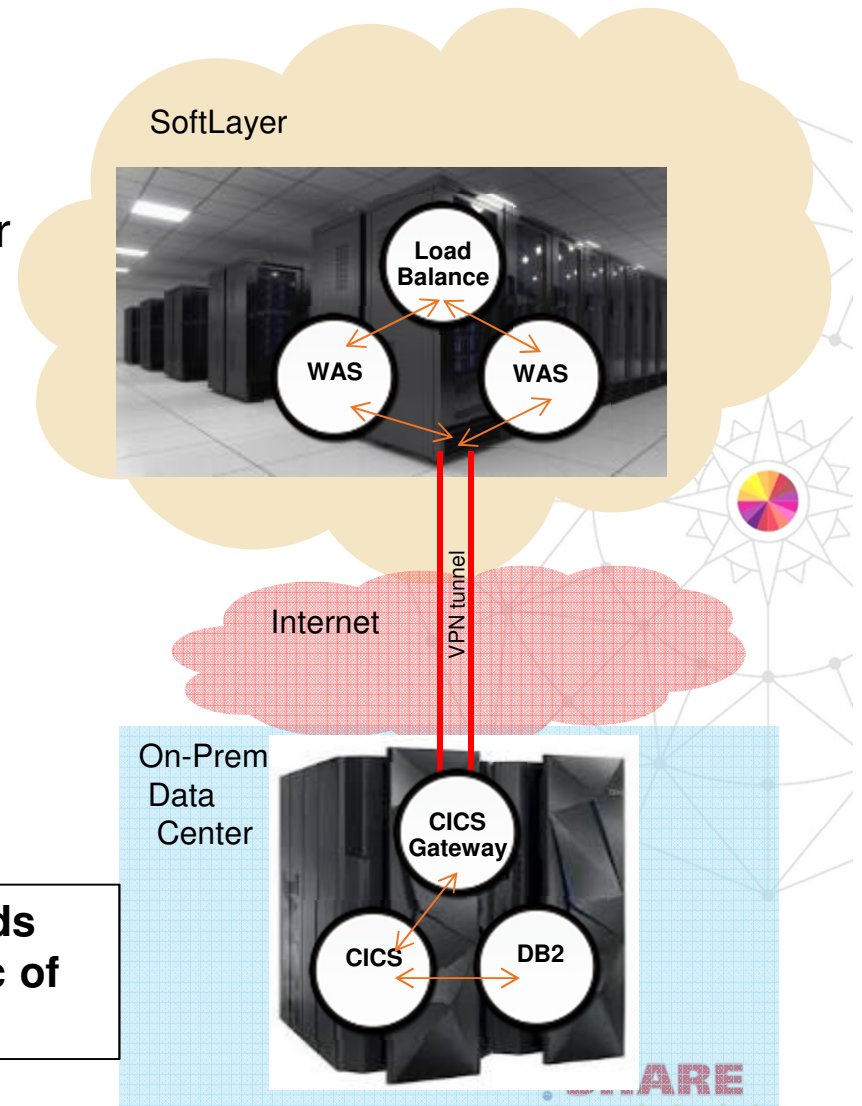
> **Hybrid Architecture provides best of both worlds Secure Transactions combined with the dynamic of Cloud**

On premise and off premise: System z and SoftLayer
System z delivers the performance you need
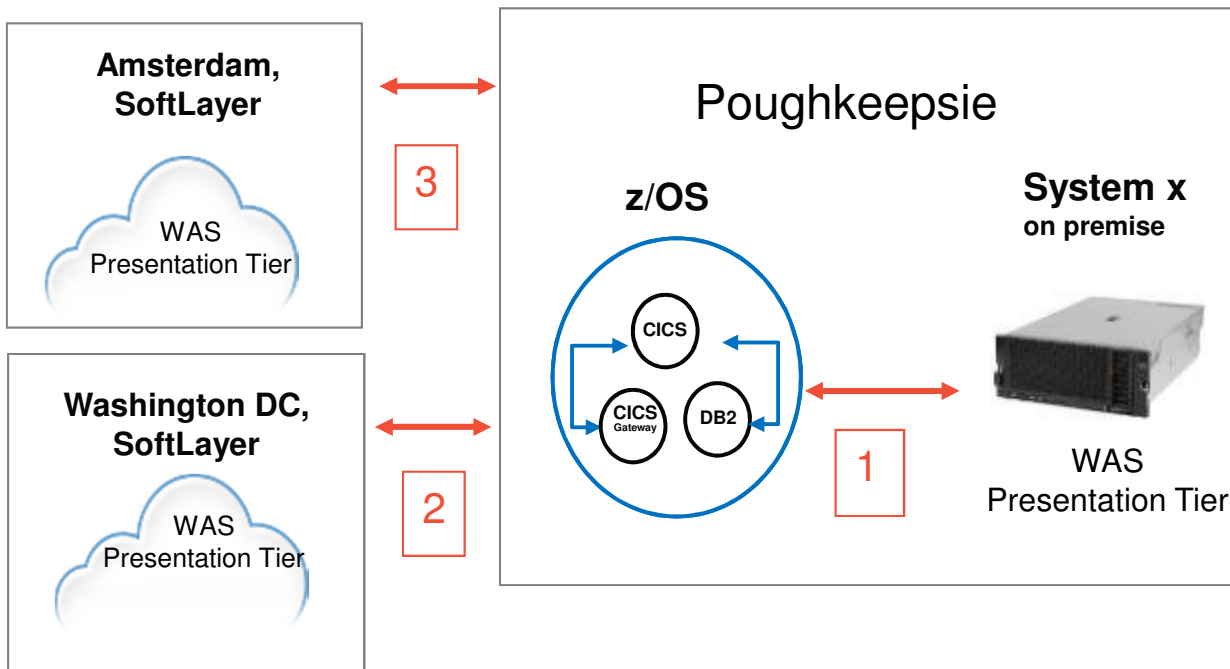
Results

No surprises or issues in implementing the Hybrid architecture
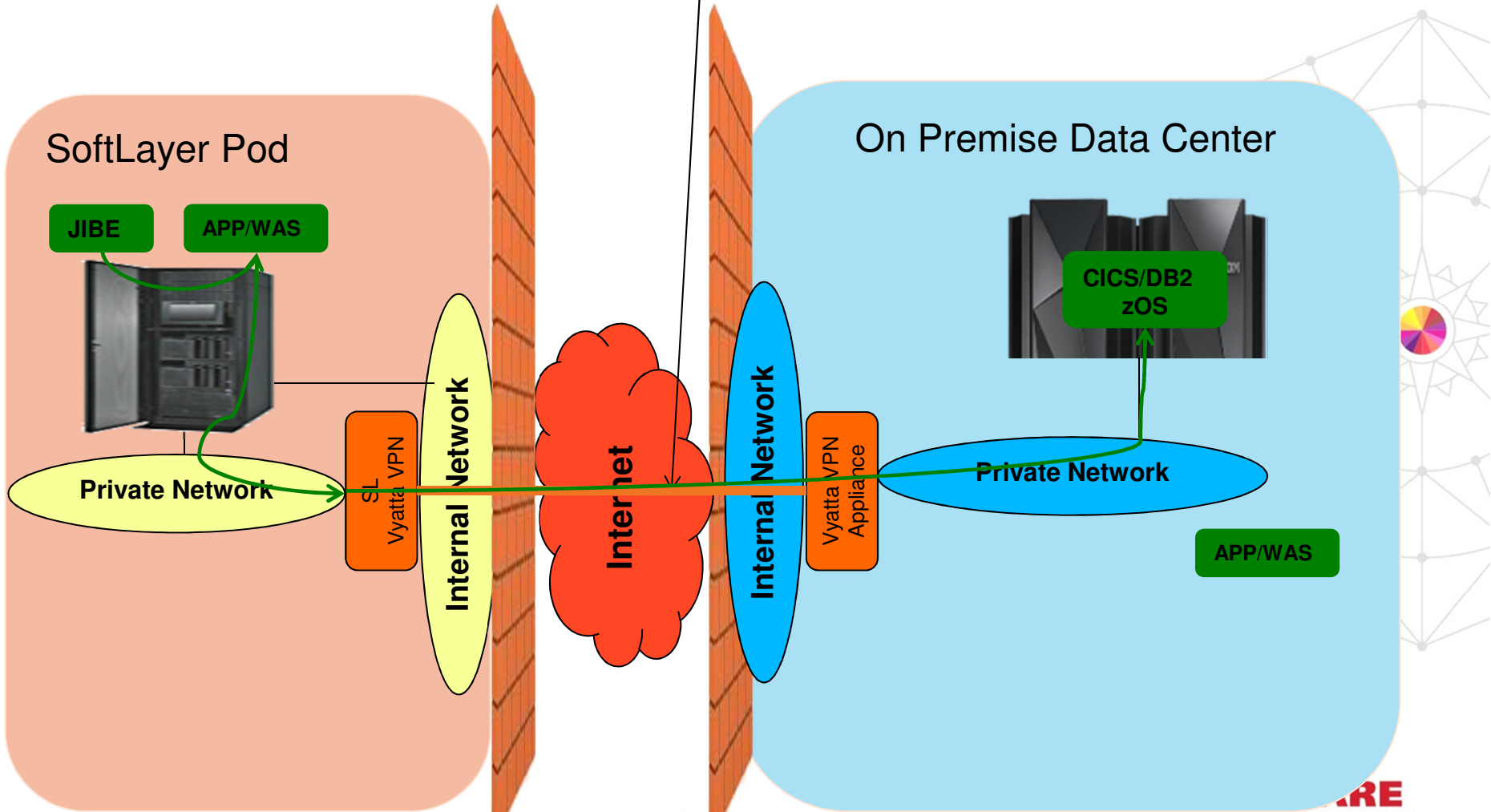
No major performance impacts from added security

Relatively small performance impact accessing z/OS from SoftLayer

----

Washington DC, a 8 ms increase in average client response

No significant change in transaction rate or z/OS load

Hybrid Network Topology : Overview

IPsec VPN tunnel build on Vyatta appliance.
- Secure data connection between Data Centers

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Technology · Connections · Results

SoftLayer Pod

JIBE   APP/WAS

Private Network

SL Vyatta VPN

Internal Network

Internet

Internal Network

Vyatta VPN Appliance

On Premise Data Center

CICS/DB2 zOS

Private Network

APP/WAS

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IBM Entry Cloud Configuration for SAP Solutions on zEnterprise

- A privat cloud enablement offering that combines technology and services to automate, standardize, and speed up day-to-day operations for SAP Solutions
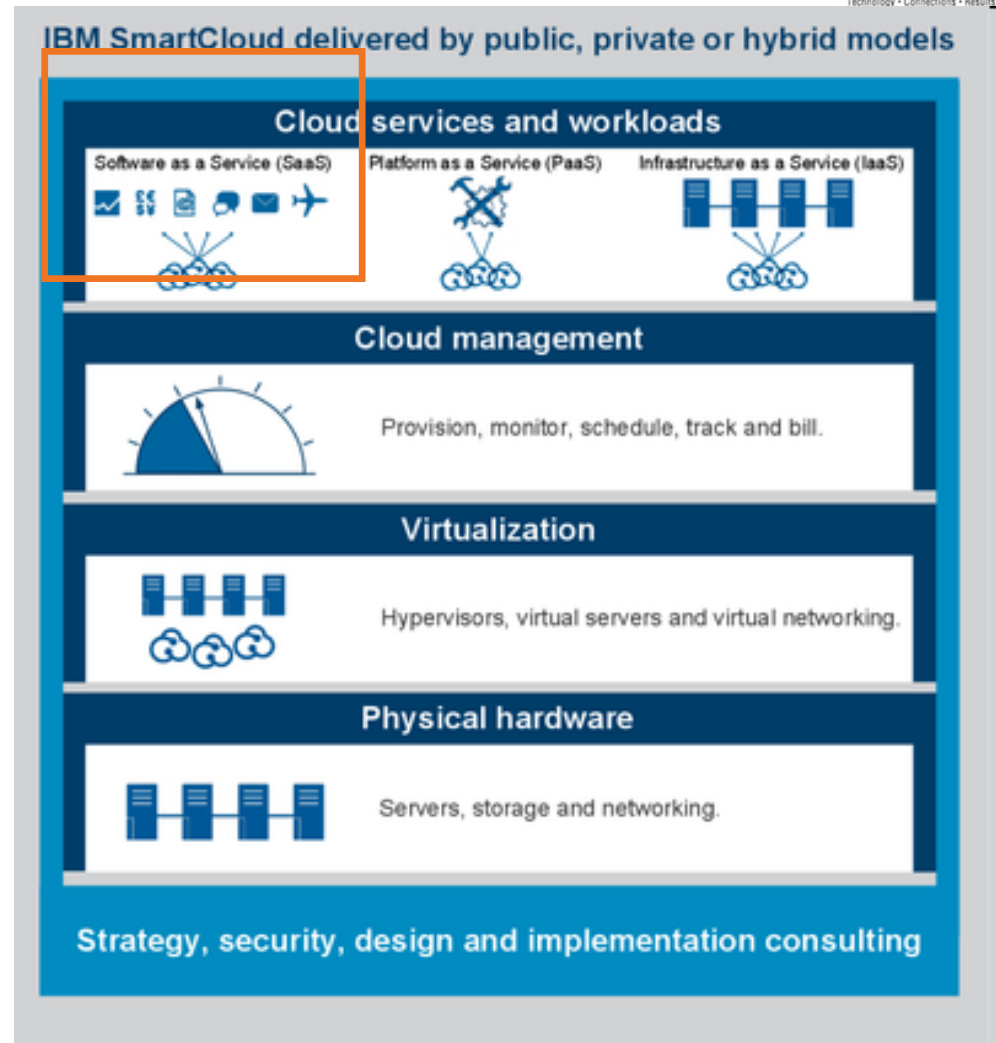
Introducing: IBM Entry Cloud Configuration for SAP Solutions on zEnterprise

A cloud enablement offering that combines technology and services to automate, standardize, and speed up day-to-day operations for SAP Solutions

Solution Summary:

- **SAP Landscape Virturalization Manager (LVM) provides SAP Basis Admin tasks automation for SAP on System z - System Refresh / Copy / Clone**
- **IBM Entry Cloud Configuration SAP Solutions on zEnterprise provides components needed by SAP LVM for SAP database provisioning and cloning**

Offering Components:

- Database provisioning System (DPS) for DB2 on z/OS automation (refresh only in R1)

- IBM Lab Services to deliver and implement the DPS code along with other services

- Optional - IBM DB2 Recovery Expert for z/OS

- Database Provisioning System (DPS) can be used as a Standalone Automation Solution for DB2 on z/OS
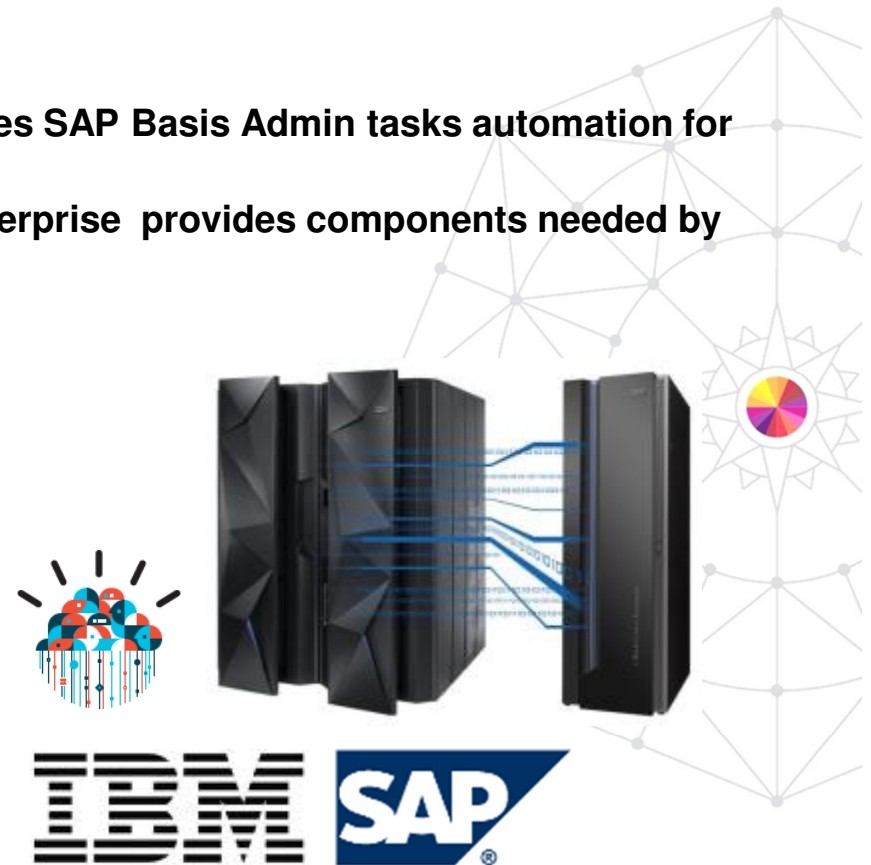
Note: IBM Entry Cloud Configuration for SAP on zEnterprise **is** offered initially as a pilot **with plans to be** followed by a formal offering - Availability dates and attributes may still vary.

IBM Service Automation Cloud for SAP on zEnterprise - Operational Efficiency

Cloud Services:

- SAP System Copy – Create a customized SAP system based on existing system
- SAP System Refresh – Copy DB content from PRD to Non-PRD including post processing
- SAP System Provisioning – Create a fresh SAP system based on existing image
- Additional Dialog instance– Adding additional application server instances, e.g. for monthly closing
- SAP System Clone – Create an identical copy of an existing SAP system

Value Delivered:	From traditional	To cloud
Install DB2	1 day	12 mins
Maintain database libraries	½ day	8 mins
Clone database	2-3 days	20-180 mins
Install operating system	1 day	30-60 mins
Prepare upgrade/provide SAP system	2-3 days	~40-200 mins
Add additional application server	1 day	10 mins

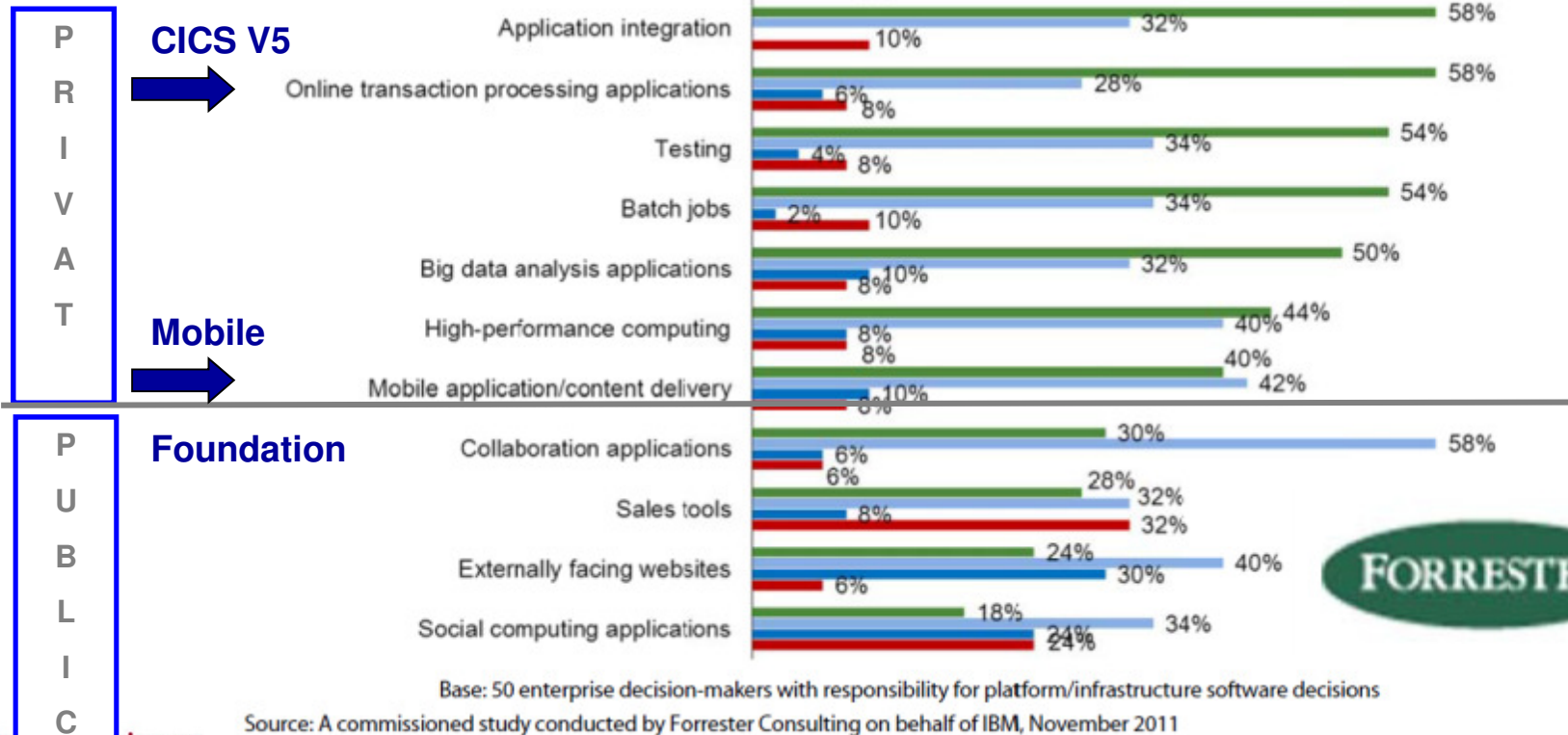# … and There is More to come to hit Market Need - System z goes Mobil - System z CICS TS V1 goes Cloud

Private PaaS By Far Preferred By Respondents

"If your organization could consume, as a managed service, a complete platform to develop, deploy, manage, and integrate applications, including development tools, administration and management tools, and runtime engine(s), which type of hosted scenario, if any, do you feel would be best suited to the following applications/jobs?"

- On-premises, hosted, or self-managed
- Externally hosted, public environment
- Externally hosted, private environment
- Not suited to any hosted scenario

PRIVAT

CICS V5 → Online transaction processing applications

Mobile →

PUBLIC

Foundation

Application	On-premises	Ext. private	Ext. public	Not suited
Intranets (internal only)	64%	26%	2%	8%
Application integration	58%	32%		10%
Online transaction processing applications	58%	28%	6%	8%
Testing	54%	34%	4%	8%
Batch jobs	54%	34%	2%	10%
Big data analysis applications	50%	32%	10%	8%
High-performance computing	44%	40%	8%	8%
Mobile application/content delivery	40%	42%	10%	8%
Collaboration applications	58%	30%	6%	6%
Sales tools	28%	32%	8%	32%
Externally facing websites	24%	30%	40%	6%
Social computing applications	18%	34%	24%	24%

Base: 50 enterprise decision-makers with responsibility for platform/infrastructure software decisions
Source: A commissioned study conducted by Forrester Consulting on behalf of IBM, November 2011

FORRESTER

Source: QMV Cloud 3Q11 at served market

The new CICS Transaction Server V5.1 delivers…

Operational Efficiency

- *Greater capacity* - achieve cost savings through consolidation
- *Managed operations* - *reduce cost and risk through automation*
- *Increased availability* - reduce the need for planned downtime
- *Deeper insight* - *Improve decision making and audit readiness*

Service Agility

- *First-class applications* - create agile services from existing assets
- *First-class platforms* - create agile service delivery platforms
- *Modern interfaces* - build rich web experiences for critical applications
- *Foundational enhancements* - extend core capabilities

100+ requirements satisfied!

… *with Cloud Enablement*

consistent with the IBM Cloud Computing strategy
positions customers for the next transformational era in technology
moves towards a cloud oriented service delivery platform

OSGi – Modularization of Applications

The **OSGi framework** ("Open Services Gateway initiative") implements a complete and dynamic component model above a JVM:

- **Bundles** - are normal jar components with extra manifest headers
- **Services** - connects bundles in a dynamic way
- **Services Registry** - API for management services e.g Service Registration
- **Life-Cycle** - API for life cycle management for install, start, stop, update, and uninstall bundles
- **Modules** - defines encapsulation and declaration of dependencies
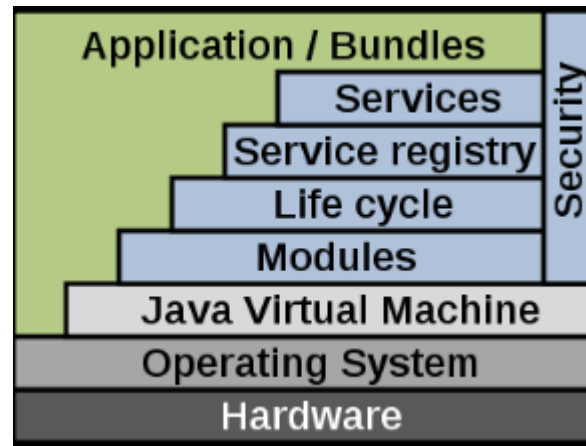
A **bundle** is a group of Java classes and additional resources equipped with a detailed manifest MANIFEST.MF file on all its contents, as well as additional services needed to give the included group of Java classes more sophisticated behaviors
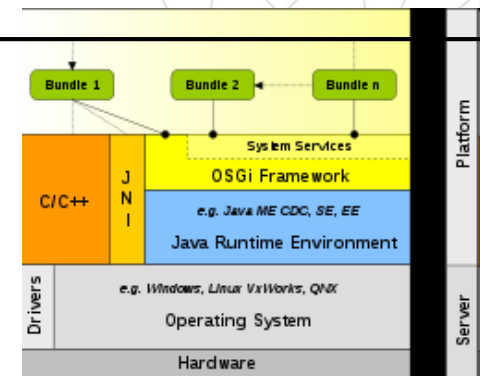
CICS TS V5.1 with cloud enablement

Moving towards a cloud oriented service delivery platform

3 simple steps to cloud enablement…

1. Define your platform encapsulating your existing regions
2. Define your applications, entry points, and dependencies from existing assets
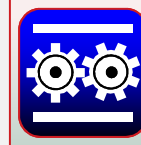3. Deploy your applications onto your platform

With cloud enablement you can…

- Bring the flexibility of cloud deployment to your existing CICS assets
- Easily measure resource usage of your CICS business applications
- Dynamically control your CICS applications and infrastructure at runtime

Application

Create agile services from existing assets

Platform
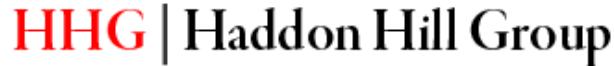
Create agile service delivery platforms

Policy

Control critical resource thresholds with policies

Client Examples

BlueCross BlueShield MN — For the health of all.	"Even without factoring in the maintenance and support costs—which would be considerable for a large estate of physical servers—we found that running a virtualized Linux environment on System z would be somewhere between **30 and 50 percent less expensive** than a distributed architecture." - Ted Mansk, Director of Infrastructure Engineering and Databases at BCBSM
Nationwide® On Your Side℠	Nationwide delivers Cloud Services with Linux on System z and is running hundreds of virtual Linux servers on two IBM System z10 Enterprise Class machines. The company offers a broad set of tested-and-certified Linux images as part of their catalogue of services: WebSphere Application Server, WebSphere Portal Server, Apache Server, DB2 LUW Server. **Virtual server images are deployed in minutes**
HHG | Haddon Hill Group	Haddon Hill is using IBM Workload Deployer to increase efficiencies through simplified tax filing processes. ▪ Projected 7-figure savings for enterprise WebSphere implementations ▪ **13 - 15x faster time to market (3 - 4 days versus 40 - 60 days)**
TRANSZAP	Transzap boosts Software-as-a-Service uptime with IBM System z "We intend to deliver a **99.9% application uptime guarantee** to our customer base, thanks to the availability characteristics of - Peter Flanagan, CEO, Transzap, Inc System z."
IBM	Consolidating 20+ multi-product, departmental BI deployments to Cognos 8 BI on System z Deploying **private cloud self service to support 200,000+ users** across global workforce 56% cost savings per user (grows with volume)

What Workloads are Good targets for Cloud on zEnterprise?

- **Database applications**

- **Transaction-processing systems**

- **ERP workloads**

- **Highly regulated services**

- **Agile Operations (Such as multi-architecture cloud management)**

- **Help Desk**

- **Test/Development (Java™, WAS, Portal, Process Server, Web Hosting)**

- **Cross Architecture solutions (Business Intelligence, Fraud, Analytics)**

zEnterprise Differentiation for Deploying Clouds on System z

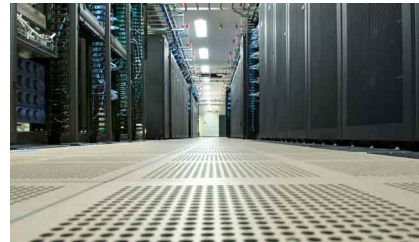| 90%+ utilization **Increased Productivity**	100,000 virtual servers **Higher Utilization**	80% less energy **More Efficient Data Center**	**Greater Reliability, Availability**

Increased Productivity

- Advanced workload management that provisions resources on the fly for 90%+ utilization and maximizes ROI

- Significant software license savings due to zEnterprise power/scale

- 79% less TCA vs. leading public cloud alternatives

Higher Utilization

- Maintain service levels with up to 100% CPU utilization

- "Shared everything" architecture

- Manage up to 100,000 diverse virtual servers

- Unmatched scalability with 24X more scale than x86

More Efficient Data Center

- Up to 80% less energy than existing distributed servers

- Less floor space

- Fewer parts to manage

Greater Reliability, Availability

- Built-in hardware redundancy

- Decades of RAS innovation

- Real time capacity on demand to manage growth and handle workload spikes

- Highest security rating for any commercially available server

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

Cloud implementations that include System z maximize Enterprise flexibility and increase cost savings

Questions?

Complete your session evaluations online at www.SHARE.org/Anaheim-Eval
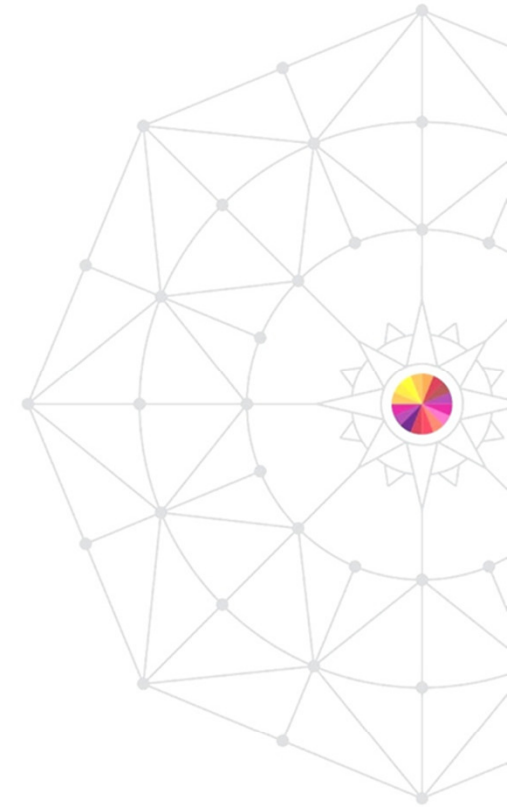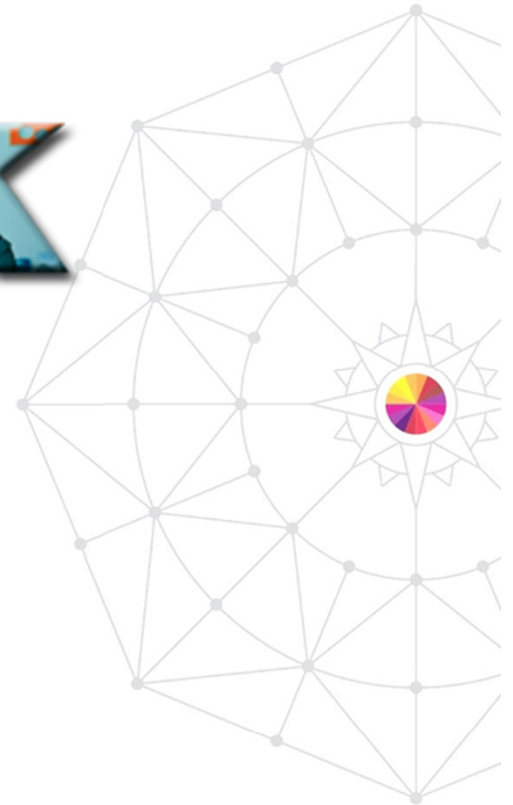
Getting Started with System z Cloud Solutions

- **IBM zEnterprise Starter Edition for Cloud**
  - Tivoli Provisioning Manager
  - *Learn More:* http://public.dhe.**ibm.com**/common/ssi/ecm/en/zsd03028usen/ZSD03028USEN.PDF

- **IBM System z Solution Edition for Cloud Computing**
  - Tivoli Service Automation Manager
  - *Learn More:* http://www.**ibm.com**/systems/z/solutions/editions/cloud/index.html

- **Cloud Ready for System z**
  - Image-based deployment for cloud service delivery and management
    - SmartCloud Control Desk, Tivoli Provisioning Manager, IBM Tivoli Monitoring, System Automation for Multi-Platforms, Tivoli Storage Manager
  - *Learn more:* http://public.dhe.ibm.com/software/tivoli/brochures/Install_Config_cloud_readyLinux_sysz_flyer073112.pdf

- **CICS V5.1 with Cloud Enablement**
  - Moving towards a cloud oriented service delivery platform
  - *Learn More:* http://www.ibm.com/podcasts/software/websphere/middleware/index.rss

- **xCat (Extreme Cloud Administration Toolkit)**
  - Open source solution for creating customized cloud deployments on System z
  - *Learn More:* http://www-03.**ibm.com**/systems/software/xcat/index.html

- ***CSL WAVE***
  - *ISV solution providing complete provisioning and management solution for z/VM environment*
  - *Learn more:* http://www.csl-int.com/