SmarterComputing

Cloud on System z is the “real deal”

Jim Elliott
Consulting Sales Specialist – System z; zChampion; Linux Ambassador
IBM Canada Ltd.

Journey to the cloud consists of simple steps to adopt key capabilities supporting transforming IT infrastructure

1 Integrate

Build an efficient IT infrastructure

- Consolidate and virtualize servers, storage, and networking
- Streamline systems management

Doing more with less

2 Automate

Improve speed and dexterity

- Deliver self-service provisioning
- Automate IT service deployment
- Simplify administration

Higher quality services

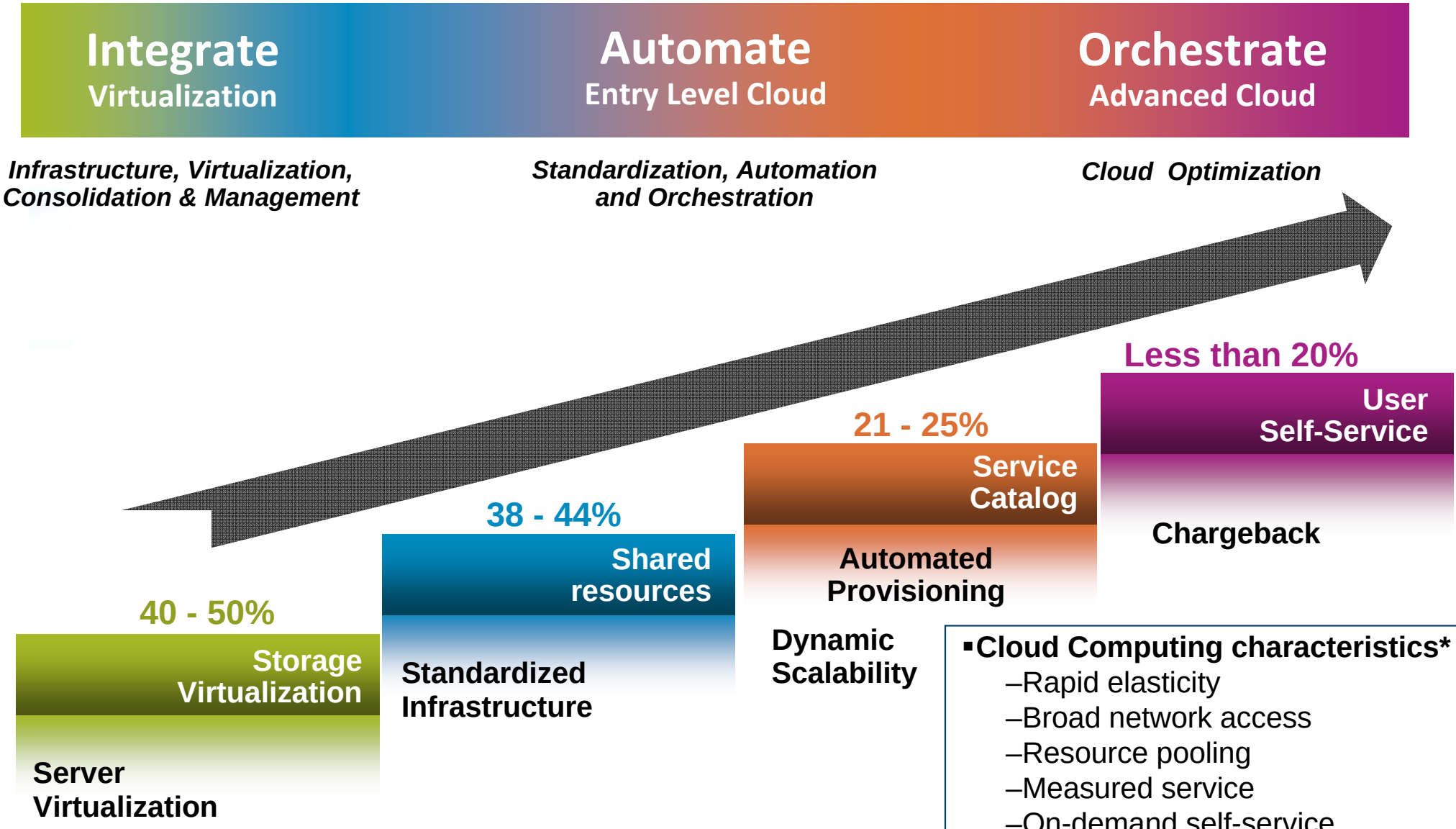
3 Orchestrate

Deliver IT without boundaries

- Increase agility by managing multi-tenant environments
- Speed innovation through seamless orchestration

Breakthrough agility and reducing risk

Cloud implementation stages



- **Cloud Computing characteristics***
  - –Rapid elasticity
  - –Broad network access
  - –Resource pooling
  - –Measured service
  - –On-demand self-service

Source: 2010 STG Private Cloud Study, December 2010, Base Size Total = 747
Percentages are number of clients who stated intention to execute this level of cloud implementation in the future.
* Source: National Institute of Standards and Technology (NIST) http://csrc.nist.gov/publications/nistpubs/800-145/SP800-145.pdf

Deliver results and address IT infrastructure challenges

Automation Standardization Virtualization

IT attributes	From	To
Server/storage utilization	10-20%	70-90%
Test provisioning	Weeks	Minutes
Change management	Months	Days/hours
Release management	Weeks	Minutes
Metering and billing	Fixed cost	Variable cost
Service catalog ordering	Months	Days/hours
Service access	Administered	Self service
Payback period for new services	Years	Months

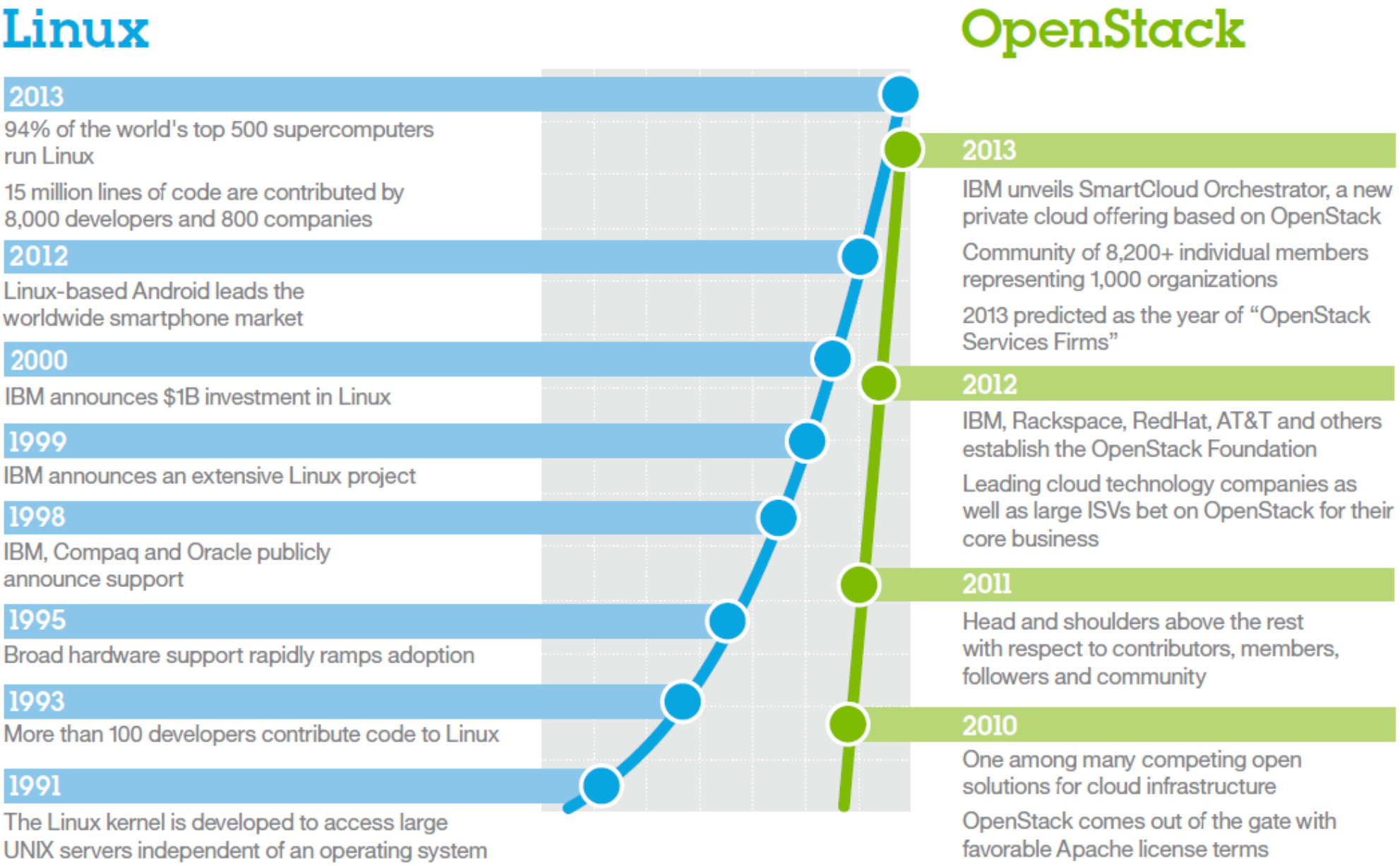
Journey to cloud

SOURCE: Based on IBM and client experience

IBM is a leader in Cloud open standards

- **Cloud open standards are the key to achieving true interoperability and eliminating vendor lock-in across the industry.**
- **IBM builds its cloud offerings on open standards to ensure interoperability and accelerate clients' success with cloud.**
  - IBM helped found the Cloud Standards Customer Council to provide a space for customer-led recommendations for cloud standards.
  - As a Platinum member of the OpenStack Foundation, IBM actively encourages the adoption of standards in the open source community.
  - Based on real-world cloud implementations, IBM contributed the Cloud Computing Reference Architecture to The Open Group as the basis of an industry-wide cloud architecture.

Linux, OpenStack and SmartCloud Orchestrator



Multiple adoption patterns for clients to leverage cloud services

Cloud Enabled Data Center

- Create a Cloud strategy and roadmap
- Consolidate and virtualize IT infrastructure
- Implement Cloud service security

Cloud Platform Services

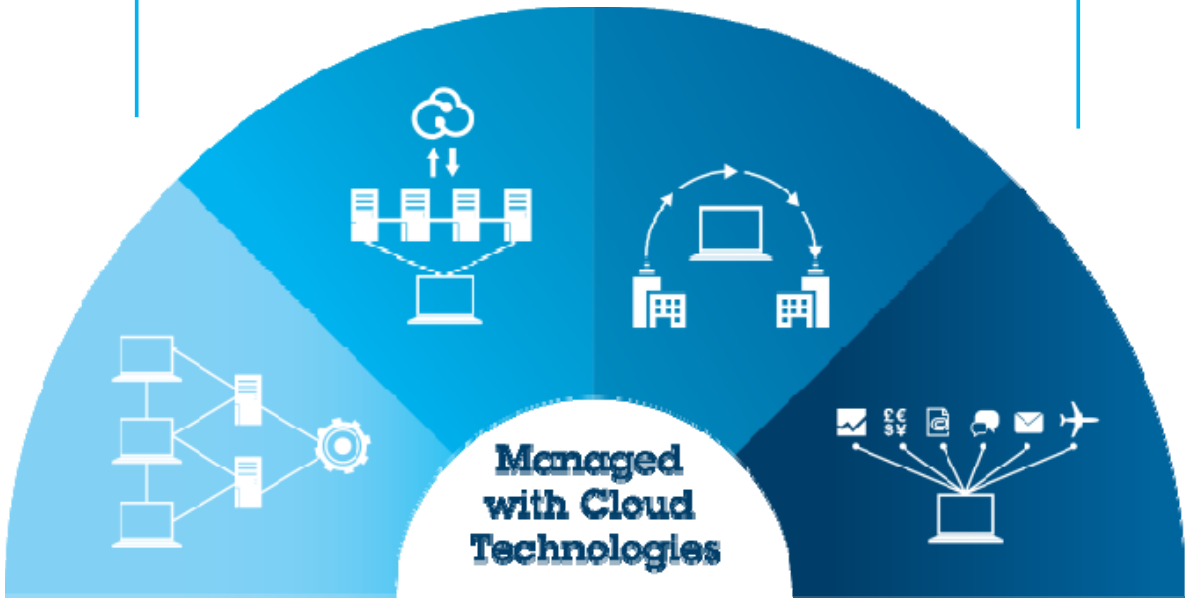
- Deploy and manage application infrastructure
- Deploy an integrated Cloud solution
- Deliver Development and Test Environment
- Deploy Planning and Automation
- Integrate and manage a hybrid cloud

Cloud Services Provider

- Re-design business processes
- Consume business services through a cloud

Business Solutions on Cloud

- Build the cloud infrastructure
- Enable applications in the Cloud
- Extend applications in the Cloud



Coexistence is key – There is no one-size fits all!

Private cloud

On or off premises cloud infrastructure operated solely for an organization and managed by the organization or a third party

Public cloud

Available to the general public or a large industry group and owned by an organization selling cloud services

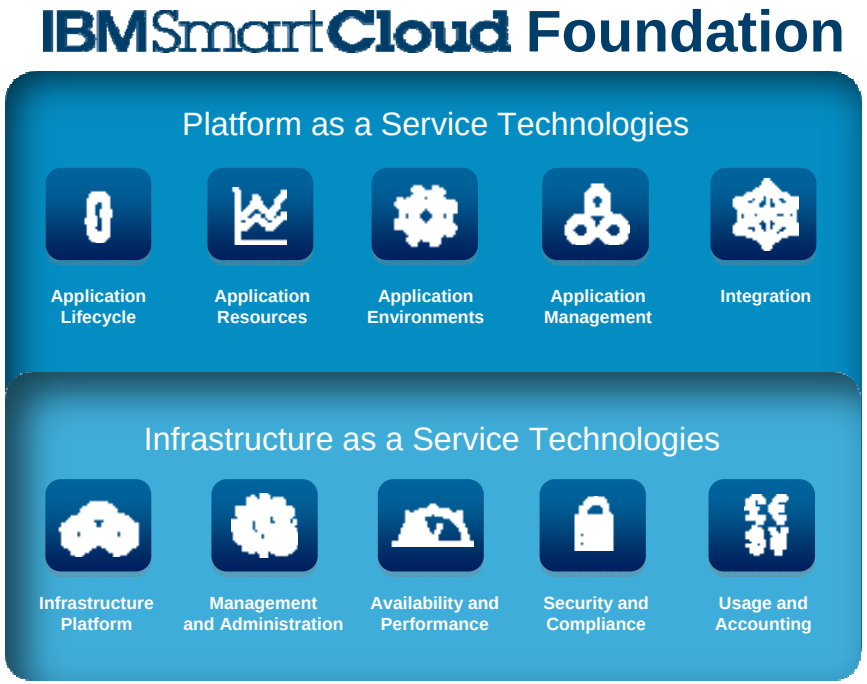
Hybrid IT

Traditional IT and clouds (public and/or private) that remain separate but are bound together by technology that enables data and application portability

Traditional IT

Appliances, pre-integrated systems and standard hardware, software and networking

SmartCloud – IBM's vision for cloud computing



- **System z is a logical choice for cloud computing:**
  - Leading virtualization capabilities
  - Massively scalable
  - Offers a superior user experience
  - Characterized by great economics / efficiencies
  - Highly secure / available

VISIBILITY

CONTROL

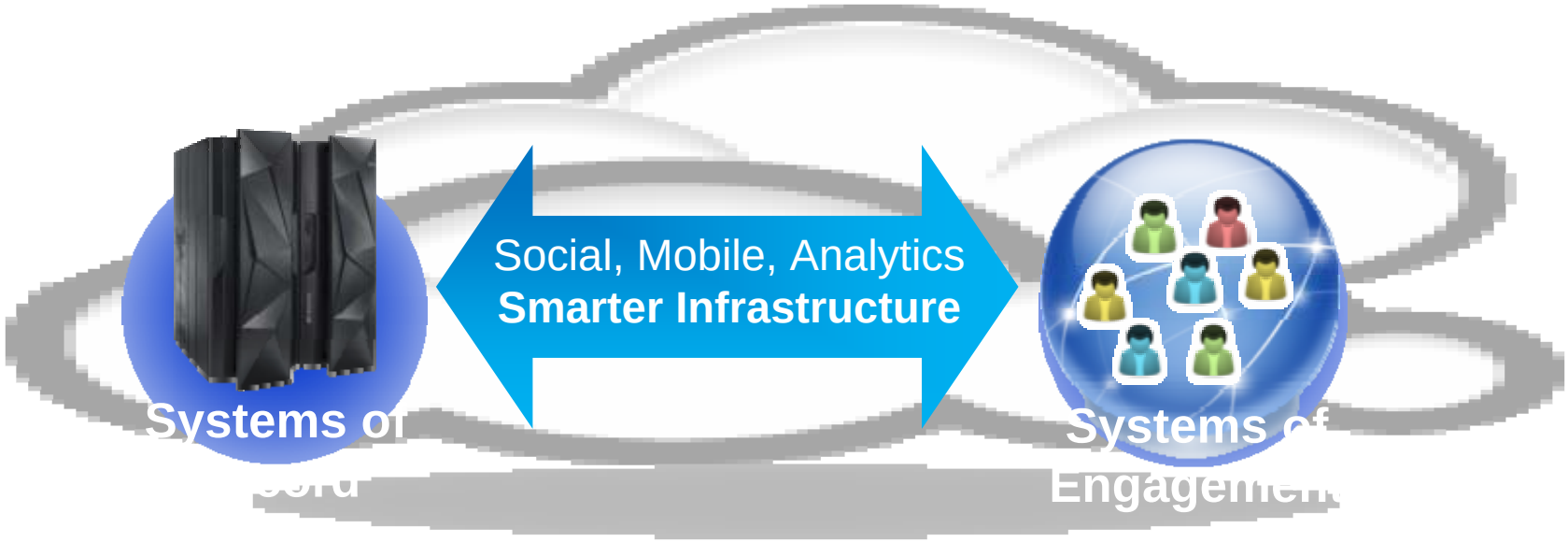
AUTOMATION

IBM Tivoli offers integrated service management capabilities for cloud

System z Cloud blueprint

Integrate	Automate	Orchestrate
"Take out cost" *Consolidate and Virtualize*	*"Simplify"* *Automate and Manage Better*	*"Orchestrate"* *Service Lifecycle Management*
Differentiation	*Standardization*	*Service Management*
▪ Rapid deployment of Linux virtual servers for less than $1 a day ▪ Industry leading "gold standard" security for tenant isolation ▪ Elastic scaling achieved by dynamically adjustable capacity at sustained performance ▪ Multisystem virtualization simplifies management by clustering shared resources	▪ Automated provisioning and de-provisioning ▪ Pool standardized virtualized building blocks ▪ Plug-and-play capacity across hardware generations ▪ Capture and catalog virtual images in the data center ▪ Automated methods for faster delivery of services with higher levels of control	▪ Integrated virtualization management with IT service delivery processes ▪ Self-service provisioning ▪ Automated service lifecycle management including dynamic instantiation of cloud services ▪ Pay for use ▪ Optimize IT resources to reinvent business processes
▪ z/VM ▪ Linux on System z	▪ Tivoli Provisioning Manager ▪ SmartCloud Provisioning ▪ SmartCloud Entry	▪ Tivoli Service Automation Manager ▪ SmartCloud Control Desk ▪ SmartCloud Orchestrator (soon)

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



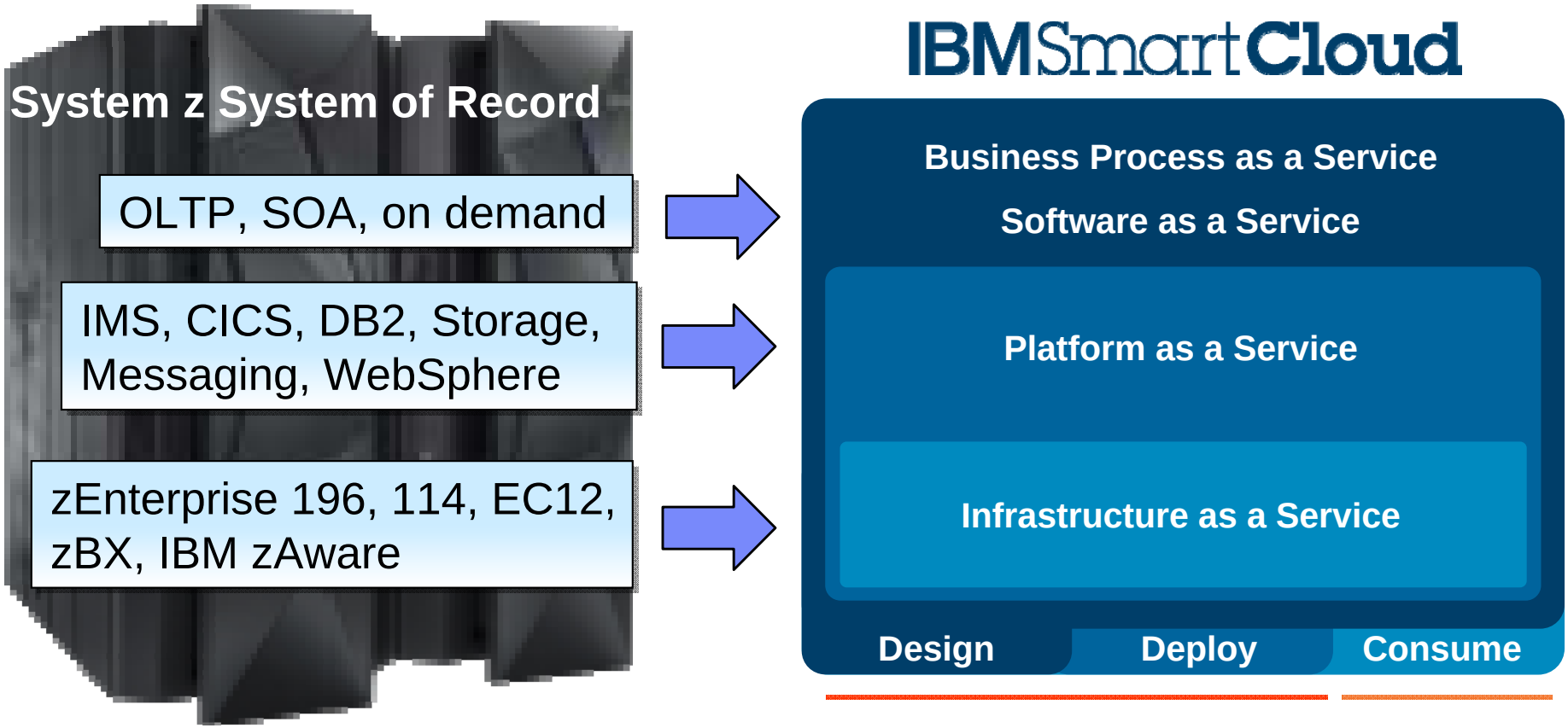
- Transactions
- Command and control
- Authored content focused on text and graphic docs
- Facts and data mastered in single "source of truth"

- 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

System z 'Systems of Record' provides key resources supporting SmartCloud 'Systems of Engagement'

zEnterprise provides value for Cloud workloads, including virtualization, database, security, high availability and high utilization



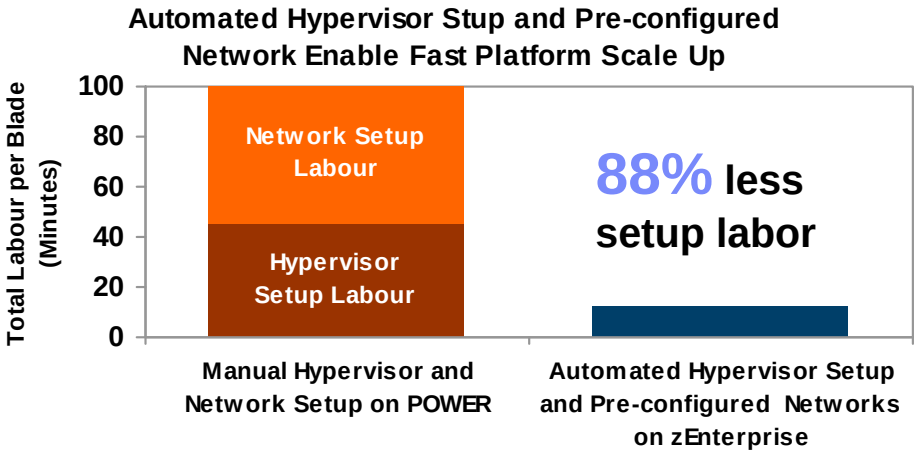
Advantages to customers of deploying Cloud on System z

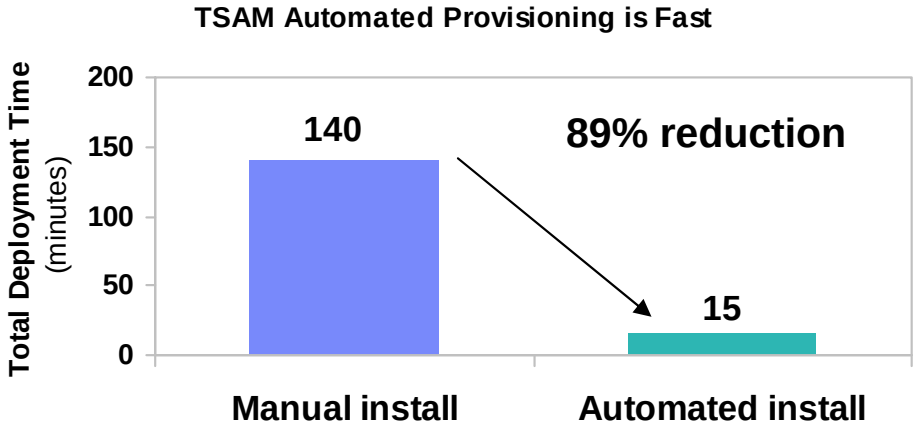
- **Increased Productivity**
  - Advanced workload management provisioning drives 90%+ utilization
  - U.S. Bank reduced provisioning time from 45 days to 20 minutes
  - 79% less TCA vs. leading public cloud
- **Higher Utilization**
  - Up to 100% CPU utilization
  - "Shared everything" architecture
  - Manage up to 100,000 virtual servers
- **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
  - Capacity on Demand and Capacity Backup

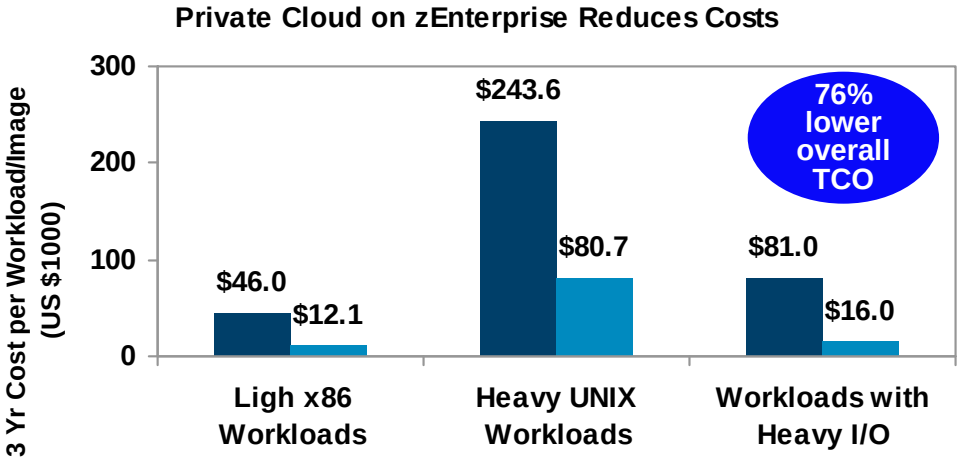
"…the System z, particularly the IBM zEnterprise and IBM zEnterprise BladeCenter Extension, are ideal for private clouds…"

Alan Radding, DancingDinosaur

Designed to fit your business, the way you run your business







- Automated hypervisor setup and pre-configured networks on IBM zEnterprise use 88% less setup labor than manual
- Automated provisioning using Tivoli Service Automation Manager running on System z 89% faster than manual provisioning
- TCO 76% less when deploying a private cloud on zEnterprise vs. leading public cloud

Targets for Cloud on zEnterprise

- **What are good targets for 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
- **What to avoid:**
  - Some traditional IT services come with significant migration costs and risks
  - Existing resources may be sufficient to meet customer requirements
  - Don’t try to fit cloud into all solutions

Why System z for cloud workloads

Key differentiators for clients dependant on systems to provide flexible, secure, 24x7 uptime for improved QoS and drive innovation

- **Resilient and Secure**
  - System z is trusted for its' ability to consistently deliver higher workload availability, and higher security than x86 platforms, especially those running Microsoft Windows
  - System z hypervisor and virtualization technologies provide higher security levels with fewer vulnerabilities reported than VMware on x86 providing EAL5+/EAL4+ security
  - Because IBM owns the server design, manufactures and tests components, and provides warranty and maintenance service for the systems (including processors, memory buffers, I/O hub controllers, service processors, firmware, etc.), IBM system architects have a broad view of how to build a reliable server
  - Predictive Failure Analysis and dynamic system adaptation, the IBM availability team has helped to create a unique processor that unleashes significant value to the client.
  - Superior availability versus competition: 80% more downtime for Windows/x86 and 35% more downtime for Linux/x86

Source: Does Your OS Matter? Selecting a Strategic Operating System; Solitaire Interglobal Ltd (All rights reserved); October 2011.

Why System z for cloud workloads

Key differentiators for clients dependant on systems to provide flexible, secure, 24x7 uptime for improved QoS and drive innovation

- **Optimized**
  - Unlike x86 systems that feature components from multiple vendors, IBM can optimize performance across the full software and hardware on System z
  - IBM has specifically optimized Tivoli to leverage the System z software stack
  - More than 5x the throughput and 2x the efficiency over VMware/x86
  - IBM provides a complete system stack optimized across hardware, firmware, hypervisor, operating system, middleware and applications to deliver maximum efficiency
  - Higher utilization of larger shared resource pools adapt better to peak demand
  - System utilization driven at over 80% sustained average

Source: The Edison Group, A Comparison of PowerVM and VMware vSphere (4.1 & 5.0) Virtualization Performance
https://www14.software.ibm.com/webapp/iwm/web/signup.do?source=stg-web&S_PKG=us-en-po-ar-edison&S_CMP=web-ibm-po-_-ws-powervm

Why System z for cloud workloads

Key differentiators for clients dependant on systems to provide flexible, secure, 24x7 uptime for improved QoS and drive innovation

- **Scalable**
  - In addition to scale out deployments common on x86 servers, System z can scale up and scale within providing near linear performance scalability
  - Unlike x86 systems with VMware, System z has highly efficient hypervisor technologies with dynamic workload resource balancing that maximize system utilization
  - Autonomous system resources management improves response time, lowers cost and improves performance
  - Greater flexibility to meet peak workload requirements of individual workloads
  - Fewer systems required for equivalent workloads due to higher VM density and leading per-core performance

System z Cloud portfolio roadmap

Integrate	Automate	Orchestrate
"Take out cost" *Consolidate and Virtualize*	*"Simplify"* *Automate and Manage Better*	*"Orchestrate"* *Service Lifecycle Management*

- **zEnterprise: zEC12, z196, z114**
- **z/VM 6.2**
- **Linux on System z** *(Enterprise Linux Server* or *Solution Edition for Enterprise Linux)*

- **Tivoli Provisioning Manager** *(zEnterprise Starter Edition for Cloud)*

- **Tivoli Service Automation Manager** *(System z Solution Edition for Cloud Computing)*

TPM 7.2.1 IFix 3
z/VM 6.2
Exploitation

TSAM 7.2.4
z/VM 6.2
Compatibility

Cloud Ready
TPM-based Solution

SCE 2.3 for System z
(GCG STG Lab-based Asset)
(Manage to)

SCP 2.x FP2.1
z/VM 6.2
Compatibility
(Manage to)

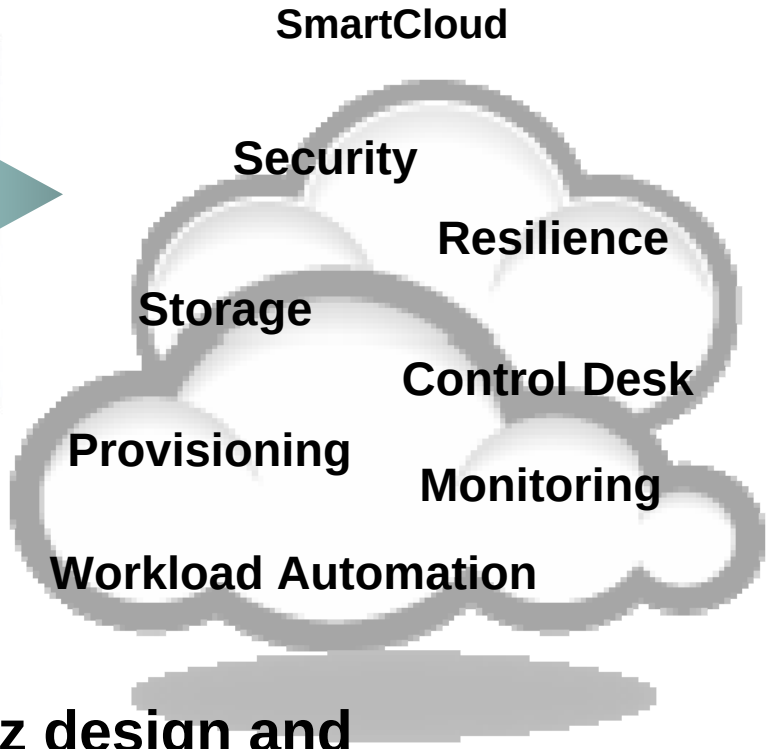
Coming in 2013 **z/VM 6.3** **SCE 3.0** **SCP 3.0** **SCO 3.0**

SCE: SmartCloud Entry; SCP: SmartCloud Provisioning; SCO: SmartCloud Orchestrator

Assume "manage-from" unless otherwise noted

Use Cloud Ready for Linux on System z to get up and running quickly, and supports moving to SmartCloud as needs grow

- **Automation with Cloud**
  - Tivoli System Automation
- **Cloud Backup/Recovery**
  - Tivoli Storage Manager
- **Cloud Monitoring**
  - OMEGAMON for z/VM & Linux
- **Service Lifecycle Management**
  - SmartCloud Control Desk
- **Automated Provisioning**
  - Tivoli Provisioning Manager



- **Services for all stages of Cloud on System z design and implementation**
- **Knowledge transfer and on-going support, as needed**

Cloud Ready for Linux on System z

Installation and configuration services

- **Challenges**
  - –Cut IT costs while addressing new business requirements
  - –Decrease business risks by taking advantage of Cloud
  - –Need to move current workload to mainframe cloud environment
  - –Tap security and reliability of mainframe for Cloud Computing
  - –Develop new business applications for little incremental cost
  - –Support growing storage requirements with reduces funding
  - –Improve operations productivity with increasing workloads
  - –Address business requirement to implement cloud quickly
- **Benefits**
  - –Gain performance insights of cloud applications
  - –Move to cloud environment on System z faster
  - –Improve usage of mainframe assets, including storage
  - –Exploit System z availability, security and reliability
  - –Provide ability to run, change, create and remove virtual servers from mainframe with automation
  - –Create virtual servers from configurable Linux Master using service catalog.
  - –Savings of up to 60% over stand alone servers by consolidating workloads to Linux on System z
- **Deliverables**
  - –Installation and configuration of:
    - Tivoli Provisioning Manager
    - IBM Tivoli Monitoring
    - System Automation for Multiplatforms
    - Tivoli Storage Manager
  - –Services for each stage of Cloud on System z design, implementation and ongoing support fit to individual requirements
  - –Knowledge Transfer and on-going support as needed.
  - –Typical Project Duration: 5 days.
  - –Can scale based on customer requirements
  - –SmartCloud Control Desk Media included for Service Desk Administration

ftp://public.dhe.ibm.com/software/tivoli/brochures/Install_Config_cloud_readyLinux_sysz_flyer073112.pdf

IBM zEnterprise Starter Edition for Cloud

Extends Linux on System z into a highly available and secure private cloud

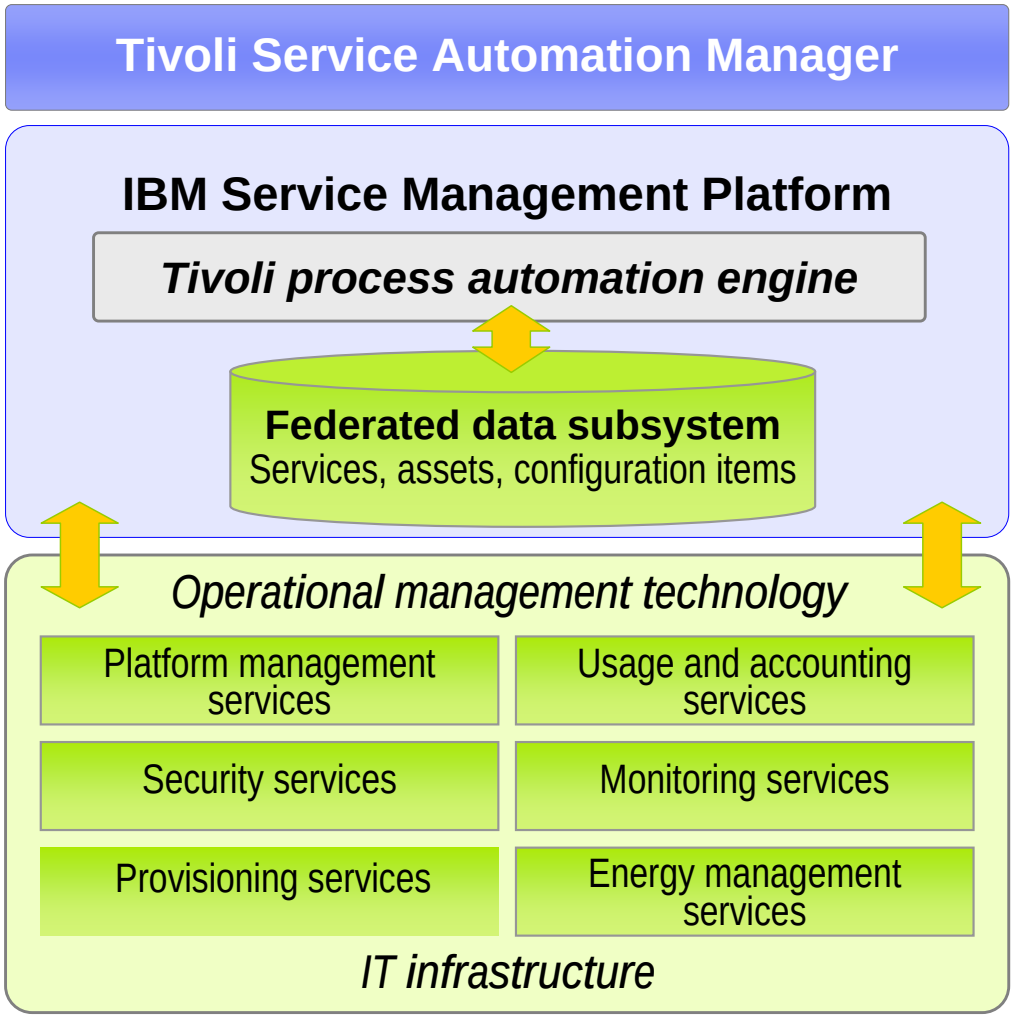
- **Our understanding of your goals**
  - Enterprises of all sizes are looking for new levels of efficiency in their datacenters to deliver a better return on investment (ROI)
  - Lower total cost over the effective life of the computing platform
  - Virtualization and cloud technology can help achieve these goals
  - Perceptions exist that creating a private cloud infrastructure is expensive, time-consuming, and complicated
- **Our approach to meeting your goals**
  - IBM zEnterprise Starter Edition for Cloud is an entry private cloud offering that works current Linux on System z environments
  - Provides easy entry into the benefits of cloud technology without significant investment
  - Helps reduce capital and administration expenses
  - Quickly deploy self-service provisioning of virtualized workloads with a simple interface

IBM zEnterprise Starter Edition for Cloud

- **Features:**
  - Basic server image management and service level monitoring
  - Deployment of standardized server images specific to a business's need
  - Provides an easy-to-deploy, highly scalable, highly secure, highly resilient offering for rapidly deploying an IaaS Cloud on the System z platform
- **Benefits:**
  - Provides an easy-to-deploy, highly scalable, highly secure, highly resilient offering for rapidly deploying an IaaS Cloud on the System z platform
  - Ensure success in deploying an automated solution for provisioning Linux on System z under z/VM
- **Why IBM?**
  - Get the benefits of our private cloud implementation methods and best practices gained from our experience with the IBM internal cloud network, which serves more than 100,000 professionals
  - We have already helped numerous clients plan, develop, test and optimize their IT environments for successful cloud computing deployments

Create a seamless environment with System z Solution Edition for Cloud to maximize business value

- **Supports service lifecycle management of Cloud workloads on IBM zEnterprise**
- **Builds on IBM Service Management Platform to manage life cycle of virtual images**
- **Reduces complexity by orchestrating technology, processes, people and data**
- **Provides rapid provisioning / deprovisioning of virtual resources into a highly secured z/VM environment**
- **Aggregates capabilities for managing total cloud environment**



The City and County of Honolulu creates a customized cloud to improve information and service delivery

- **Before:**
  - The City and County of Honolulu wanted to increase government transparency and provide more information, such as the city's financial data, to its citizens
  - Honolulu also wanted to increase community involvement and improve the efficiency of its work order system
- **Transformation:**
  - Honolulu deployed an Integrated Facility for Linux (IFL) engine running Linux on the city's IBM System z10 mainframe
  - This provided the necessary platform to provide the city's data to citizens, and it enabled the city to create a custom cloud environment to deploy applications
- **After:**
  - Reduced time to deploy applications from 1 week to only hours
  - Lowered database licensing costs by 68 percent
  - Supported a new property tax appraisal system that helped to increase tax revenue by USD1.4 million in three months

"Working with us to take an innovative approach. Instead of following the long processes of other governments or even the private sector, we were able to get things up and running quickly."

Gordon J. Bruce, director and CIO of the Department of Information Technology, City and County of Honolulu

- **Solution components:**
  - IBM System z10 with IFL engine running Linux
  - IBM XIV Storage System and IBM tape and virtual tape storage
  - IBM Maximo Asset Management and IBM Tivoli software

http://www.youtube.com/watch?v=KBSMVvIahu0
http://www.youtube.com/watch?v=hCXLYhaeEwU

Cloud Computing with Linux on System z at Nationwide

- **Consolidated distributed server landscape to Linux virtual servers running on IBM zEnterprise**
- **Created multi-platform private cloud optimized for all workloads**
- **Reduced power, cooling and floor space requirements by 80 percent.**
- **Reversed expenditure on distributed server landscape, saving an estimated $15 million over the first three years.**
- **Application development reduced from months to hours**

http://www.youtube.com/watch?v=ZygaG7noaDE

"The Java hosting environment that we created internally, is really our first instantiation of an internal Private Cloud."

Jim Tussing, Chief Technology Officer, Infrastructure

Cloud Computing on z/OS

- **With z/OS, we need to think about cloud just a bit differently**
  - Today in cloud environments on distributed servers, or even with Linux on System z, customers would provision a virtual machine with an instance of an operating system to run a single workload.
    - To deploy another workload would mean another virtual machine with another instance of the operating system.
  - However, in the context of z/OS, this methodology goes against everything we have come to know and expect about z/OS.
    - On z/OS, you have the ability to run multiple disparate workloads with different service levels for those hosted workloads with isolation or multi-tenancy.
  - Hence our approach for cloud on z/OS is not focusing on the provisioning of operating system instances, but rather the ability to provision multiple workloads in a single z/OS instance.

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
- **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

CICS Transaction Server 5.1 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

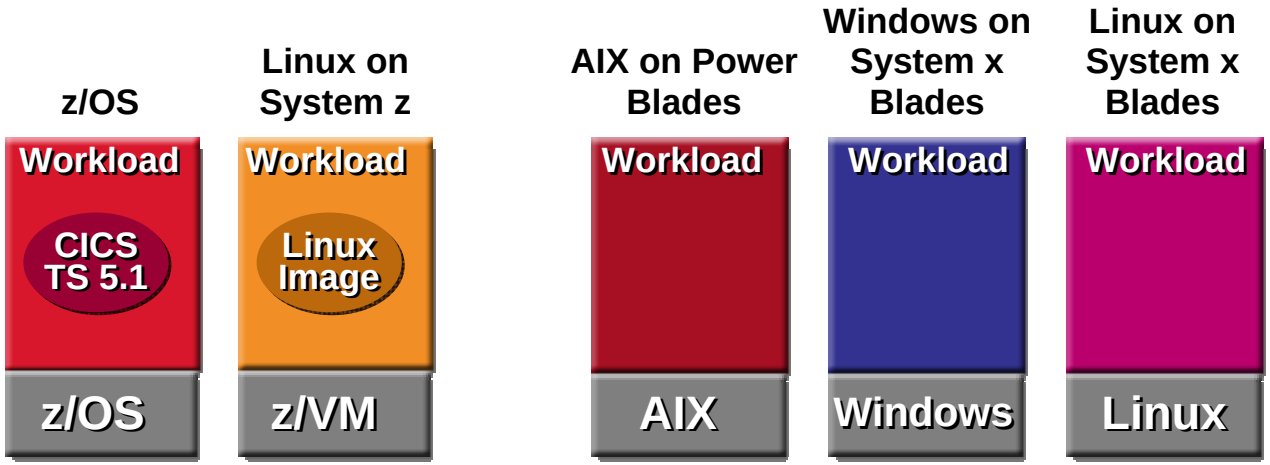
Policy

Control critical resource thresholds with policies

zEnterprise Cloud – the broadest architectural support for private cloud

- **Integrated Service Management**
  - Visibility
  - Control
  - Automation

- **Fit-for-Purpose strategy extended to the cloud**
  - Cloud management for multiple environments
  - End-to-end Visibility, Integrated Control and Automation
  - Flexibility to adapt to changes in workload requirements



zEnterprise EC12, z114, z196

zEnterprise BladeCenter Extension (zBX)

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

1. IBM SmartCloud open cross-platform architecture includes System z within a fit-for-purpose framework
2. System z in Cloud optimizes critical business workloads requiring high availability and performance
3. Implement Cloud on System z quickly with Cloud Ready, and easily migrate to SmartCloud over time

Thanks!

J. L. (Jim) Elliott
Consulting Sales Specialist – System z
zChampion & Linux Ambassador
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