

A decorative graphic in the top left corner consists of several overlapping circles of various colors (yellow, orange, red, purple, blue) that are divided into segments, resembling a stylized sun or a cluster of data points.

The Gold Standard for Enterprise Computing

Advantages of a Private Cloud on zEnterprise

Businesses can deliver real value with cloud

Speed

90%

Reduce application deployment from weeks to hours¹

Empowerment

95%

Cut per user cost from \$250K to \$13K²

Economics

35-75%

Reduce workload costs depending on the cloud model used (private, public or hybrid)³

Source: 1. City and County of Honolulu creates a customized cloud; IBM CPO Study 2. IBM Blue Insight Cloud; 3. IDC, *IDC's CloudTrack 2012 Summer Survey, Part 1: Cost Savings in the Cloud*, November 14, 2012

Businesses are choosing a variety of cloud deployment models



Public cloud

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



Hybrid Cloud

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



Private cloud

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



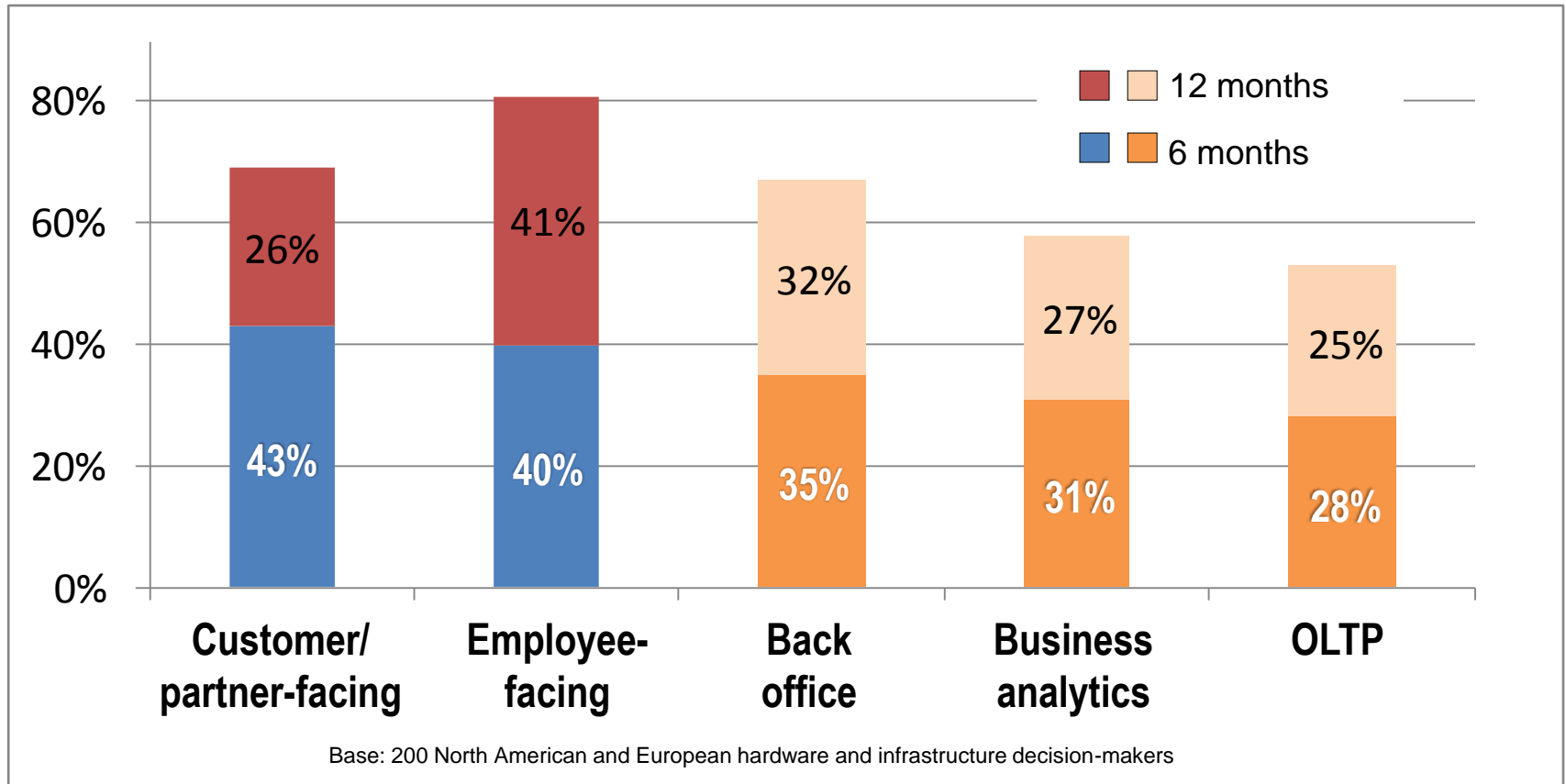
Differences in Security, Availability, Performance

- *Applications and data are publicly exposed*
- *Difficult to access logs and policies*
- *Minimal visibility into day-to-day operations*
- *Minimal customization*

- *Applications and data remain "inside the firewall"*
- *Easy to access logs and policies*
- *Good visibility into day-to-day operations*
- *More customization*

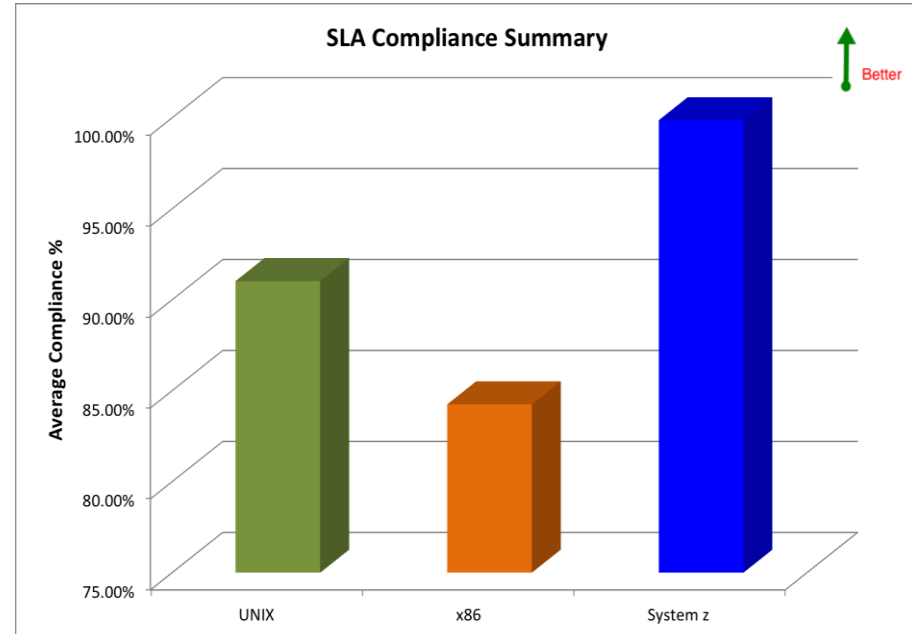
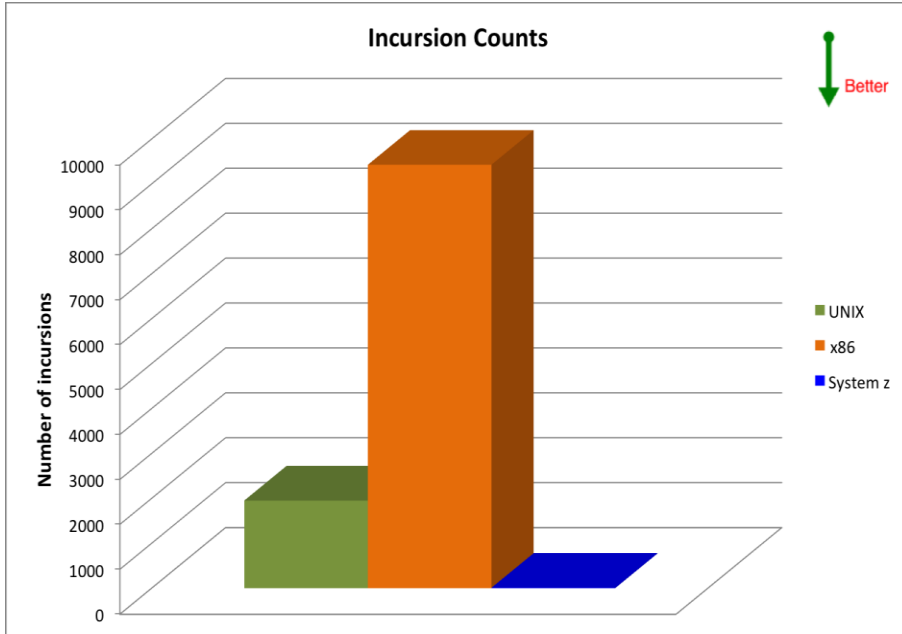
Applicability of the cloud is broadening to include more traditional enterprise workloads

What types of applications do you plan to host on cloud platforms?



Source: A commissioned study conducted by Forrester Consulting on behalf of IBM, October, 2012

zEnterprise excels at supporting enterprise workloads



- Most secure
- Highly available
- Cost-effective
- High performance delivering quality service consistently
- Access to systems of record (z/OS) resident data

Source: "System z and Managed Service Providers," white paper by Solitaire Interglobal, 2013

Why businesses choose private clouds

- Security of data
 - Maintain control
 - Single version of the truth
 - Prevents security breaches

- Compliance
 - With government or industry regulations
 - Many countries prohibit storage of data outside the country

- Workload flexibility
 - Reuse existing capability

- Cost
 - In many cases, a private cloud costs less...



Private cloud

Key steps to deliver a robust private cloud on system z

Virtualization

**IBM zEnterprise
with Linux on z/VM**

- Consolidate and virtualize
- Streamline management

Entry Level Cloud

**IBM SmartCloud
Provisioning**

Advanced Cloud

**IBM SmartCloud
Orchestrator***

Reduce costs and improve agility

*Under development for Linux on System z

Virtualization was pioneered and perfected on IBM System z

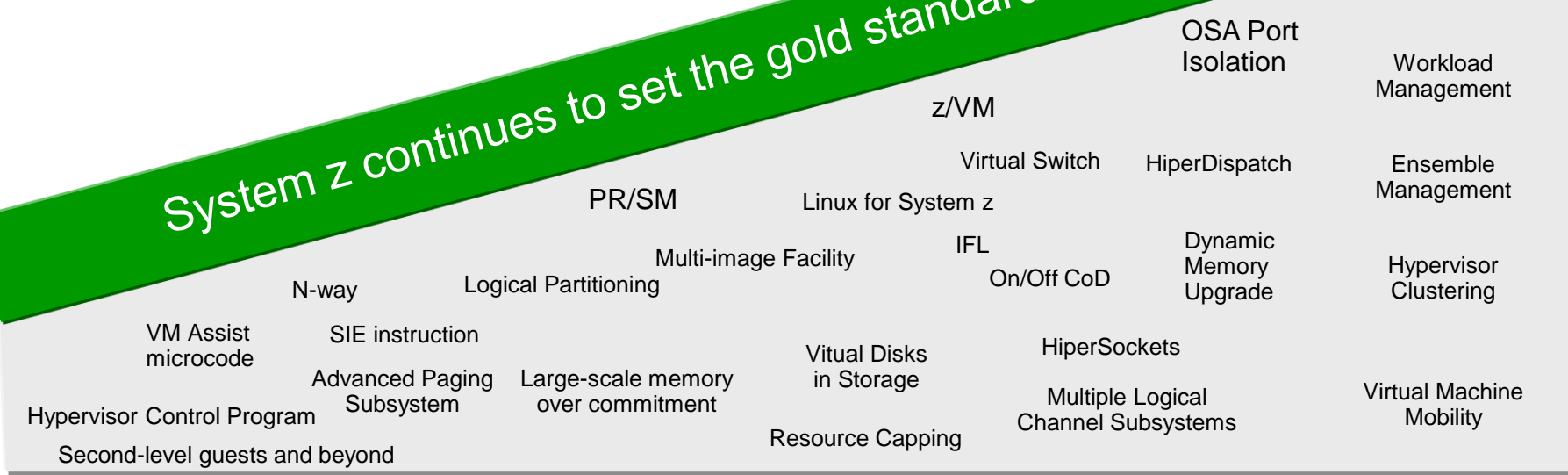
Wisdom

Experience

Intelligence

Innovation

System z continues to set the gold standard in virtualization!




z/VM supports a choice of open standard Linux distributions

- IBM is committed to open standards Linux
- DB2 is optimized to run on the SUSE and Red Hat open standards Linux for System z distributions

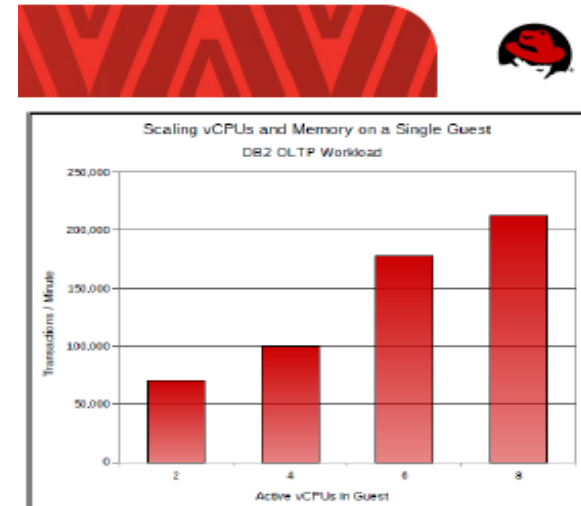
Novell

Press Room
Press Release



Novell and IBM Deliver DB2 Software for SUSE Gallery and SUSE Studio Customers

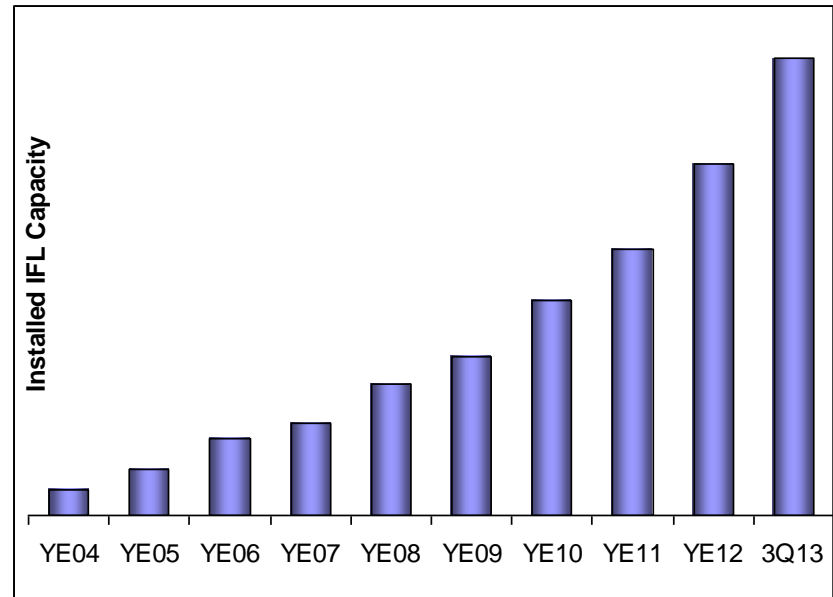
Novell today announced DB2, IBM's highly successful database software, is now available as an easy-to-use online download on [SUSE@ Gallery](#) and as an adaptable template within [SUSE Studio™](#). Today's announcement builds on [Novell's momentum to deliver software appliances across a range of IBM software](#), including WebSphere, Lotus and Smart Business, all powered by SUSE Linux Enterprise.



Linux on zEnterprise continues to grow at a significant rate

- **26%** of total installed MIPS run Linux
- **33%** of all zEnterprise servers have IFLs
- **38%** of zEnterprise Customers have IFL's installed
- **44%** increase in installed IFL MIPS from 3Q12 to 3Q13
- **58%** of new FIE/FIC System z accounts run Linux (FY10-2Q13)

Installed Capacity Over Time

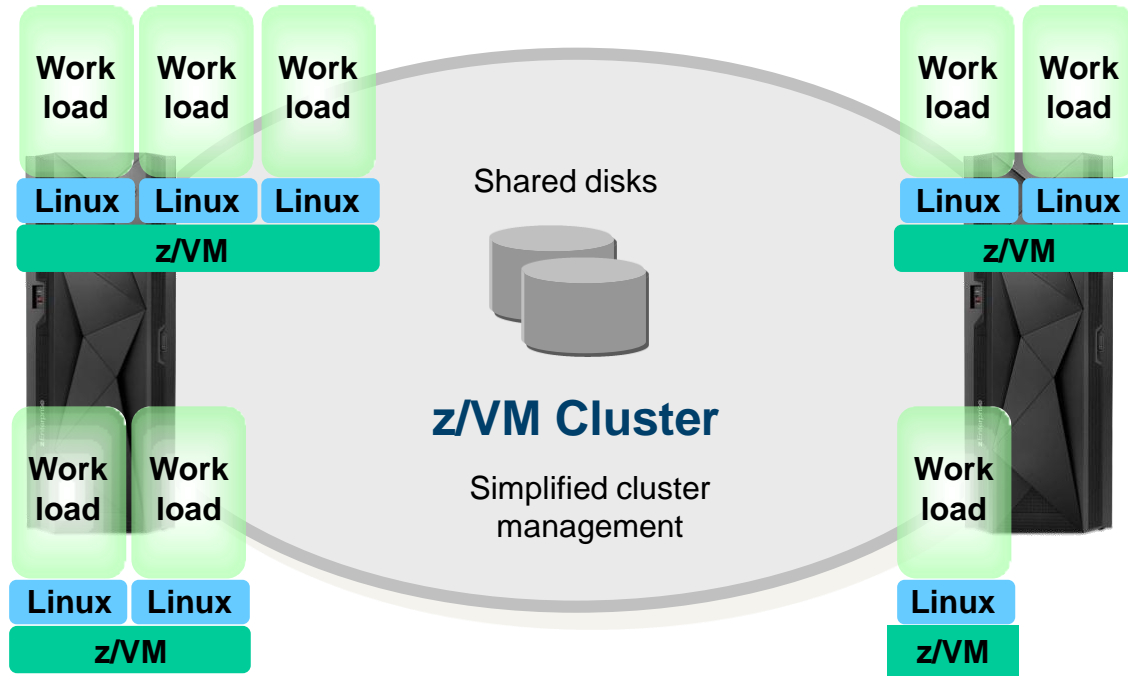


Source: IBM

*CAGR Based on YE 2003 to 3Q 2013

z/VM has multi-system clustering and virtual server mobility

z/VM Clustering – Up to 4 z/VM instances on separate LPARs or other mainframes can be clustered as a single system image



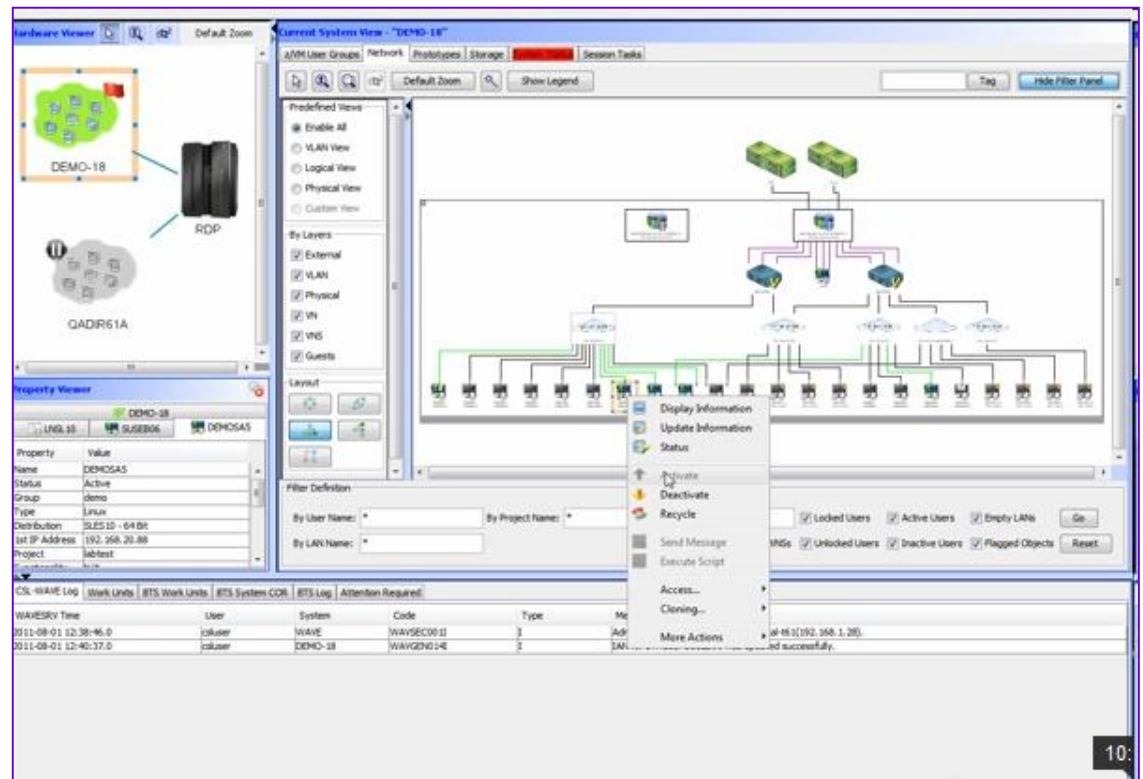
Live Guest Mobility – Move virtual servers non-disruptively to another LPAR on the same or another mainframe server in the single system image

z/VM 6.3 – Now supports 1TB of real memory, 4 times more virtual servers, and offers increased performance for large VMs

Simplified management of the z/VM virtualization layer

CSL-WAVE virtualization management software for z/VM and Linux on zEnterprise environments

- Intuitive graphical workspace with powerful drag-and-drop capability
- Automatically detects all resources in the environment
 - Spans partitions, servers, sites, geographies
 - Supports SSI clustering and Live Guest Mobility
- Simplify and automate management
 - Monitor, provision, manage user accounts
- **Significantly reduces administration requirements and costs**



DEMO: CSL-WAVE and Live Guest Mobility

The screenshot displays the IBM Tivoli Enterprise Console interface. The main window shows a network topology diagram with various nodes and connections. A context menu is open over a node, listing actions such as 'Display Information', 'Update Information', 'Status', 'Locate', 'Deactivate', 'Recycle', 'Send Message', 'Execute Script', 'Access...', 'Cloning...', and 'More Actions'. The 'More Actions' option is selected, showing a sub-menu with 'Ad successfully'.

On the left, the 'Property Viewer' shows details for 'DEMO-18':

Property	Value
Name	DEMOGAS
Status	Active
Group	demo
Type	Linux
Distribution	SLES 10 - 64 bit
Net IP Address	192.168.20.88
Project	Ad-test
...	...

At the bottom, a table shows system logs:

WAVESV Time	User	System	Code	Type	Msg
2011-08-01 12:38:46.0	causer	WAVE	WAVEC0011	I	Ad
2011-08-01 12:40:37.0	causer	DEMO-18	WAVEG014E	I	Ad

10

Many customers are realizing the benefits of consolidating on Linux on z/VM

- Atos Origin
- AutoData Norg AS
- Baldor
- Banco Pastor
- Bank of New Zealand
- Bankia
- BG-Phoenixics
- BSBC Minnesota
- Business Connexion
- City of Honolulu
- Colacem S.p.A.
- Computacentre
- Dundee City
- Efis EDI Finance
- El Corte Ingles
- Embasa
- Endress+Houser
- EuroControl MUAC
- gkd-el
- IBM Blue Insight
- Liberty Mutual
- Marist
- Marsh
- Miami Dade County
- National Registration Dept
- Nationwide
- NWK
- Procempa
- RCBC
- RENFE
- Salt River Project
- Shelter Mutual Insurance
- Shikoku Electric
- Sparda Datenverarbeitung eG
- Svenska Handelsbanken
- University of Bari
- University of Arkansas
- University of NC
- VietinBank

Over 11,000 IFL processors installed worldwide (BC and EC)

Enterprise Linux Server solution provides cost-effective way to get started

- Solution includes:
 - Standalone zEnterprise server (either zBC12 or zEC12) with IFLs, memory, I/O connectivity ... plus z/VM
 - Hardware and software maintenance for 3 or 5 years
 - Linux available from distribution partners
 - SUSE and Red Hat
- For new Linux workload deployment and consolidation
- Designed from the ground up for enterprise-class workloads
- Extremely attractive pricing



**A perfect entry point for businesses
with growing IT needs who are ready to make a commitment to Linux**

Virtually all IBM middleware runs on Linux on System z (Total 244)

IBM Competitive Project Office

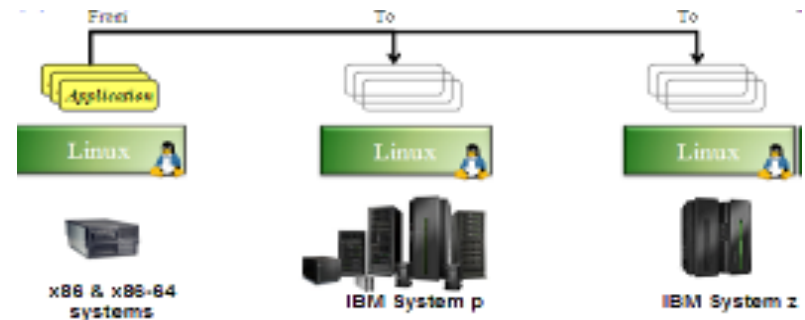


AIM / WebSphere (51)	IM (52)	SCI / Tivoli (57)	Industry Solutions (28)
<p>CICS Transaction Gateway Desktop Edition CICS Transaction Gateway for Multiplatforms Communications Server for Linux HTTP Server for WAS HE Novell SLES IBM Business Monitor IBM Business Process Manager Advanced IBM Business Process Manager Standard IBM Integration Bus IBM Mobile Foundation IBM Runtime Environment, Java Technology IBM Worklight TPF Toolkit WebSphere Adapter for Email WebSphere Adapter for ECM WebSphere Adapter for File Transfer Protocol WebSphere Adapter for Flat Files WebSphere Adapter for IBM i WebSphere Adapter for JDBC WebSphere Adapter for Lotus Domino WebSphere Adapter for Oracle E-Business WebSphere Adapter for PeopleSoft WebSphere Adapter for SAP Software WebSphere Adapter for Siebel Business WebSphere Adapters WebSphere Application Server WebSphere Application Server - Express WebSphere Application Server FP Web 2.0 WebSphere Application Server for Developers WebSphere Application Server Hypervisor WAS HE for Novell SLES on System z (2) WAS HE for Red Hat Enterprise Linux Server WAS HE Intelligent Management Pack WAS HE V7.0 on RHEL for System z (2) WebSphere Application Server Liberty Core WebSphere Application Server ND WebSphere Enterprise Service Bus WebSphere Extended Deployment WebSphere Extended Deployment CG WebSphere eXtreme Scale WebSphere Lombardi Edition WebSphere Message Broker WebSphere MB Connectivity for Healthcare WebSphere MQ, FTE, Low Latency (3) WebSphere Service Registry and Repository WebSphere SSR Advanced Lifecycle Edition WebSphere SSR Client WebSphere Virtual Enterprise</p>	<p>Cúram Social Program Management Database Enterprise Developer Edition DB2 Advanced Enterprise Server Edition DB2 Advanced Workgroup Server Edition DB2 Connect Application Server Advanced DB2 Connect Application Server Edition DB2 Connect Enterprise Edition DB2 Connect Unlimited Advanced z, I (3) DB2 Enterprise Server Edition DB2 for Linux, UNIX and Windows for SAP DB2 Merge Backup for Linux UNIX, Win DB2 Recovery Expert for Linux, UNIX, Win IBM Data Studio IBM InfoSphere Business Info. Exchange IBM InfoSphere Foundation Tools IBM InfoSphere Identity Insight IBM InfoSphere QualityStage Module US Cert IBM Metadata Workbench IBM solidDB Information Server Bus. Glossary Anywhere Informix Client Software Development Kit Informix Connect Runtime Informix Dynamic Server Enterprise Edition InfoSphere Business Glossary InfoSphere Change Data Capture InfoSphere Change Data Delivery InfoSphere Data Replication InfoSphere Federation Server InfoSphere Guardium InfoSphere Information Analyzer InfoSphere Information Server, SAP (2) InfoSphere Master Data Management InfoSphere Master Data Management Server InfoSphere Optim Configuration Manager InfoSphere Optim Performance Manager (2) InfoSphere Optim pureQuery Runtime z/OS InfoSphere Optim Query Capture and Replay InfoSphere Warehouse Advanced Depart. InfoSphere Warehouse Advanced Enterprise InfoSphere Warehouse Departmental Edition InfoSphere Warehouse Developer Edition InfoSphere Warehouse Enterprise Base InfoSphere Warehouse Enterprise Edition InfoSphere Warehouse Optim Data Retention Optim High Performance Unload for DB2 Optim Performance Manager (2) Optim Query Tuner for DB2</p>	<p>IBM License Metric Tool IBM SmartCloud Control Desk IBM SmartCloud Cost Management IBM TRIRIGA Application Builder IBM TRIRIGA Application Platform IBM TRIRIGA Connector Business Apps (2) IBM TRIRIGA Connector for Offline Forms Maximo Adapter for Microsoft Project Maximo Adapter for Primavera Maximo Archiving Adapter for Optim Data Gr. Maximo Asset Configuration Manager Maximo Asset Mgmt, Essentials, Schedule (3) Maximo Calibration Maximo Change and Corrective Action Mgr Maximo Enterprise Adapter, SAP (2) Maximo Everyplace Maximo for Government Maximo for Life Sciences Maximo for Nuclear Power Maximo for Oil and Gas Maximo for Service Providers Maximo for Transportation Maximo for Utilities Maximo Health, Safety and Environment Mgr Maximo Linear Asset Manager Maximo Mobile Asset Manager Maximo Mobile Inventory Manager Maximo Mobile Suite Maximo Mobile Work Manager Maximo Spatial Asset Management Tivoli Application Dependency Discovery Mgr Tivoli Asset Discovery for Distributed Tivoli Business Service Manager Tivoli Monitoring, Energy Mgmt, VE (3) Tivoli Netcool/Impact Tivoli Netcool/OMNibus Tivoli NetView for z/OS Tivoli Network Manager IP Edition Tivoli Provisioning Manager Tivoli Service Automation Manager Tivoli Storage Productivity Center Editions (3) Tivoli System Automation Application Mgr Tivoli System Automation for Multiplatforms Tivoli Usage and Accounting Manager, Ent (2) Tivoli Workload Scheduler, z/OS, Agent (3) TotalStorage SAN Volume Controller</p>	<p>Case Foundation Case Manager Content Analytics Content Foundation Content Integrator Enterprise Edition Content Manager Enterprise Edition Content Manager OnDemand Multiplatforms Cúram Social Program Management Enterprise Records FileNet Business Process Manager FileNet Content Manager IBM WebSphere Multichannel Bank Toolkit Sterling B2B Integrator Sterling Connect:Direct Sterling Connect:Express Sterling Control Center WebSphere Commerce Enterprise WebSphere Multichannel Bank Toolkit WebSphere Transformation Extender WebSphere Transformation Extender SEPA WebSphere Transformation Extender SAP WebSphere Transformation Extender SWIFT WebSphere Transformation Extender EDI WebSphere Transformation Ext. Financial WebSphere Transformation Ext. Healthcare WebSphere Transformation Ext. NACHA</p>
			Rational (19)
<p>ICS / Portal (15) IBM Connections IBM Connections Mail IBM Customer Experience Suite Rich Media IBM Domino IBM Forms Experience Builder IBM Forms Server IBM Mobile Portal Accelerator IBM Web Content Manager, Rich Media (2) IBM Web Experience Factory Lotus Domino WebSphere Dashboard Framework WebSphere Portal Enable, Extend, Server (3)</p>	<p>BA (15) Cognos Business Insight Cognos Business Intelligence & Analysis Cognos Insight Cognos Mobile Cognos Real-time Monitoring IBM SPSS License Authorization Wizard IBM SPSS Modeler Limited SPSS Collaboration and Deployment Services SPSS Decision Management SPSS Modeler & Server (2) SPSS Statistics & Server (2)</p>	<p>Security (7) IBM Security Access Manager for Web IBM Security Identity Manager Tivoli Access Manager for e-business Tivoli Directory Integrator Tivoli Federated Identity Manager Tivoli Federated Identity Mgr Bus. Gateway Tivoli Key Lifecycle Manager</p>	<p>Rational Asset Manager Enterprise Edition Rational Asset Manager Standard Edition Rational Automation Framework Rational Build Forge Rational Build Forge Enterprise Edition Rational Build Forge Enterprise Plus Edition Rational Build Forge Standard Edition Rational ClearCase Rational ClearCase MultiSite Rational Collaborative Lifecycle Management Rational Developer for System z Rational Developer for zEnterprise Rational DOORS Rational Host Access Transformation Service Rational Programming Patterns Rational Programming Patterns for System z Rational Quality Manager Rational Requirements Composer Rational Team Concert</p> <p style="text-align: right;">Source: IBM Clearinghouse Last Updated: 9/11/13</p>

IBM provides free services support to ISVs when moving Linux applications from x86 to zEnterprise

Chiphopper services offering:

- Designed for IBM Business Partners (PartnerWorld members)
- Helps them port their existing Linux applications from competitive platforms onto IBM Power Systems or System z running Linux
 - Enablement and guidance services, plus Linux support
 - Access to IBM hardware and middleware, proof of concept environments and platforms for testing
 - Technical assistance during the port
 - Post-porting issue support
- Free of charge service

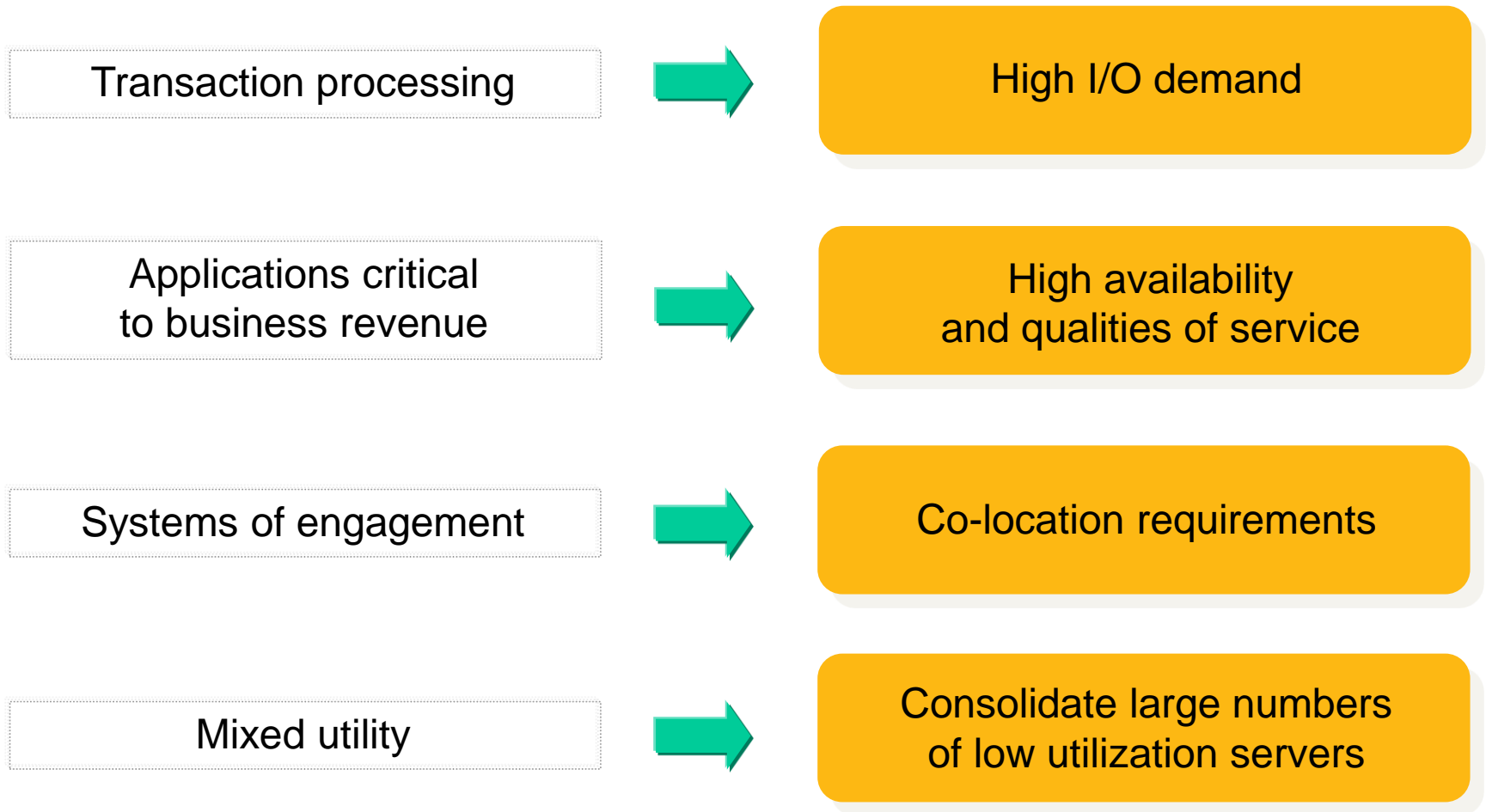


"OpenPro and IBM Chiphopper team are working together to provide a flexible, scalable and fully featured business management ERP solution. This system uses the power of open source technologies with many advanced features that have saved clients millions of dollars in operating efficiencies. OpenPro works with the new IBM DB2 version on the powerful IBM System z or i."

- Jim Clark, CEO of OpenPro

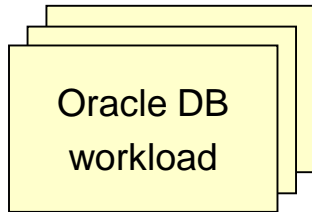
For more information, contact Chiphopper web page: www.ibm.com/isv/go/chiphopper, or send an email to chiphop@us.ibm.com

Examples of workloads best suited to consolidate on a private cloud on Linux on z/VM



Workloads with higher I/O bandwidth requirements benefit from zEnterprise architecture

Which platform provides the lowest TCA over 3 years?



3 Database Workloads
Oracle Enterprise Edition
Oracle Real Application Cluster



3 Oracle RAC clusters
4 server nodes per cluster
12 total Oracle T3-4 servers
(768 cores)

\$28.7M (3 yr. TCA)



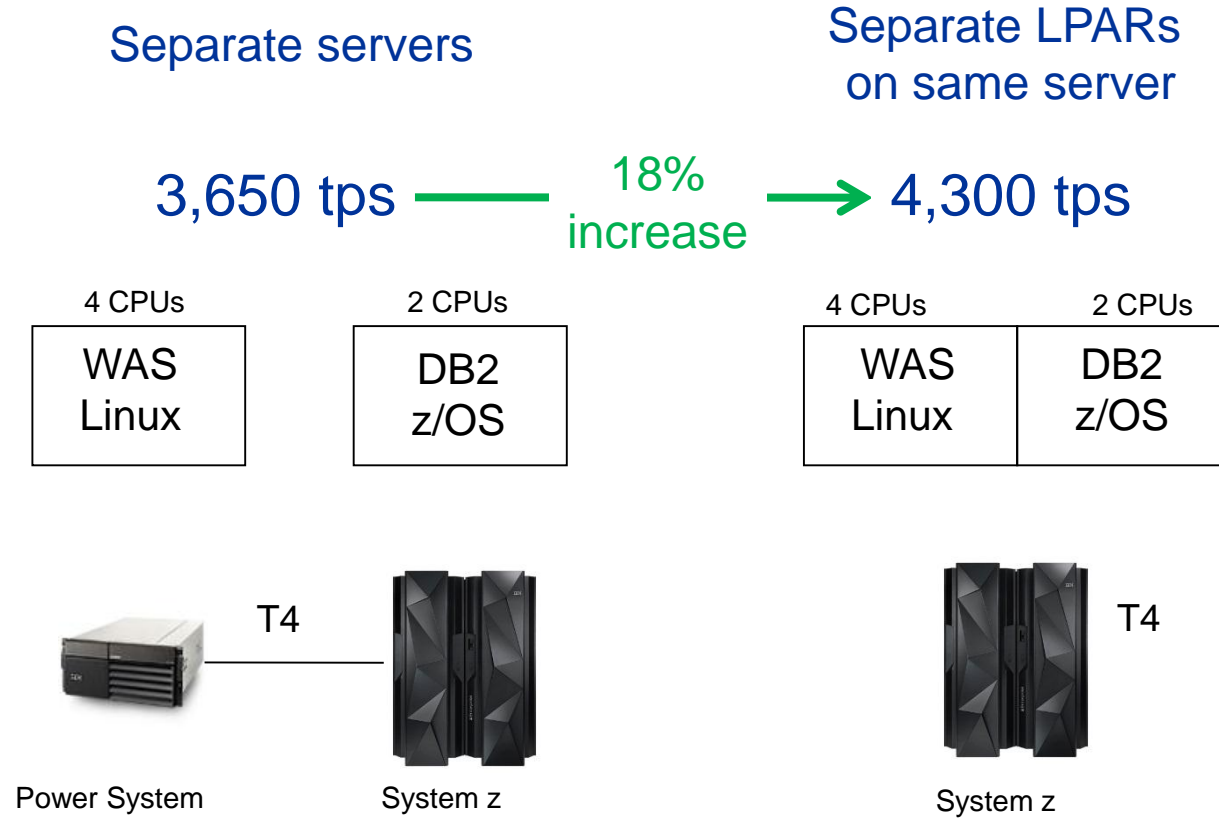
3 Oracle RAC clusters
4 nodes per cluster
Each node is a Linux on z guest
zEC12 with 27 IFLs

\$5.7M (3 yr. TCA)

80% less cost!

TCA includes hardware, software, maintenance, support and subscription. Workload Equivalence derived from a proof-of-concept study conducted at a large Cooperative Bank and projecting to T3-4 servers using published TPC-C Results normalizing them to Relative Performance Units as available from Ideas International

Co-location benefits from zEnterprise architecture



Source: IBM CPO

Consolidation onto System z also yields co-location benefits for SAP applications

Business challenge:

- After acquiring a competitor, inherited 200+ standalone servers
- Faced untenable increases in IT costs from system complexity and incompatibility, maintenance and licensing issues
- Customer service was suffering as a result

Solution:

Consolidated distributed servers *and* migrated its mission-critical SAP and DB2-based applications to an IBM System z running Linux, z/OS and z/VM operating systems

Benefits:

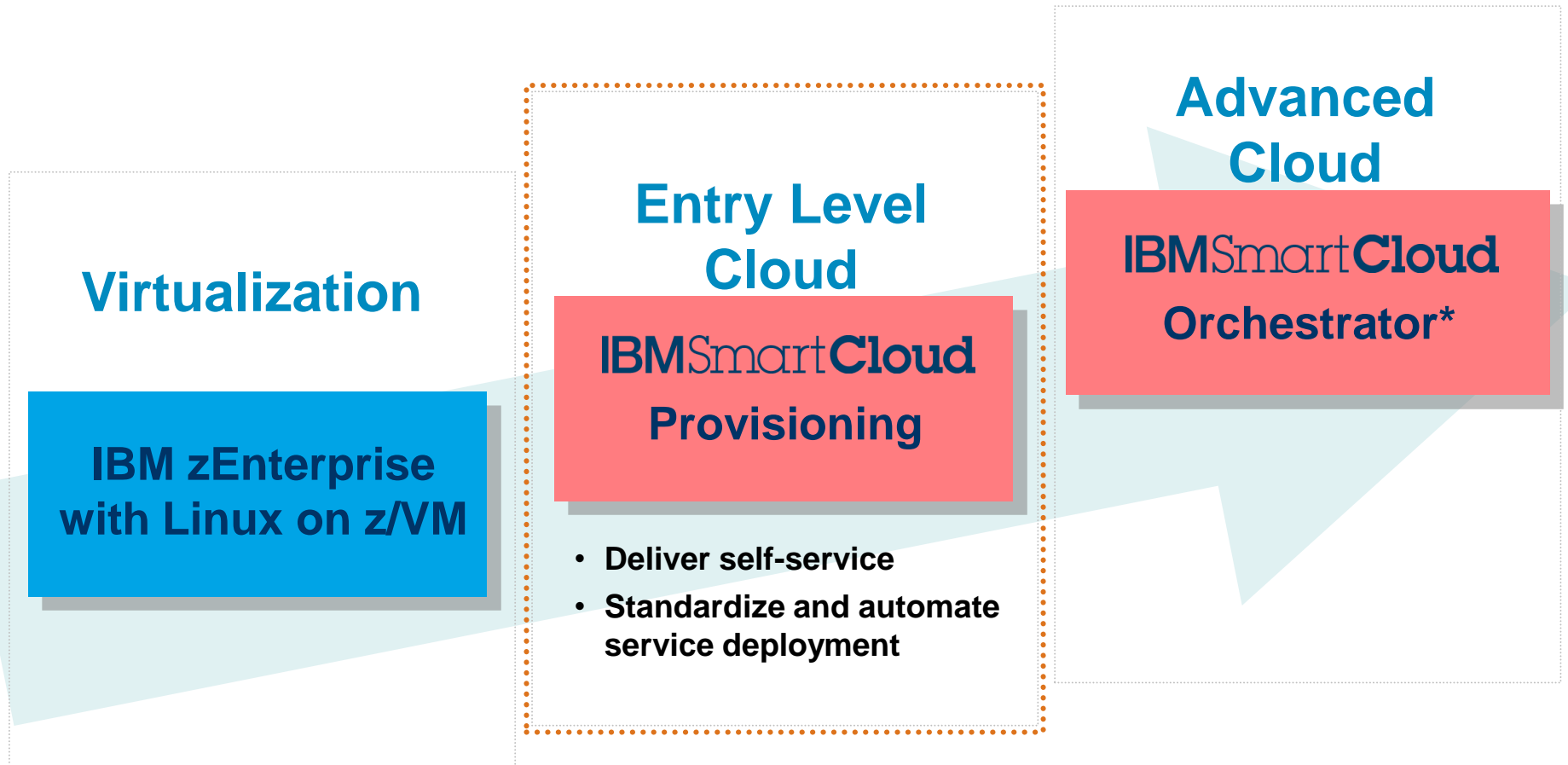
- Reduced IT costs as proportion of sales by **50%**
- Consolidation cuts power by **40%** and reduces data center floor space from 6,000 to 1,000 sq. ft.
- Cut system administration and maintenance costs



SAP	DB2
Linux	z/OS

SAP applications
co-located on System z

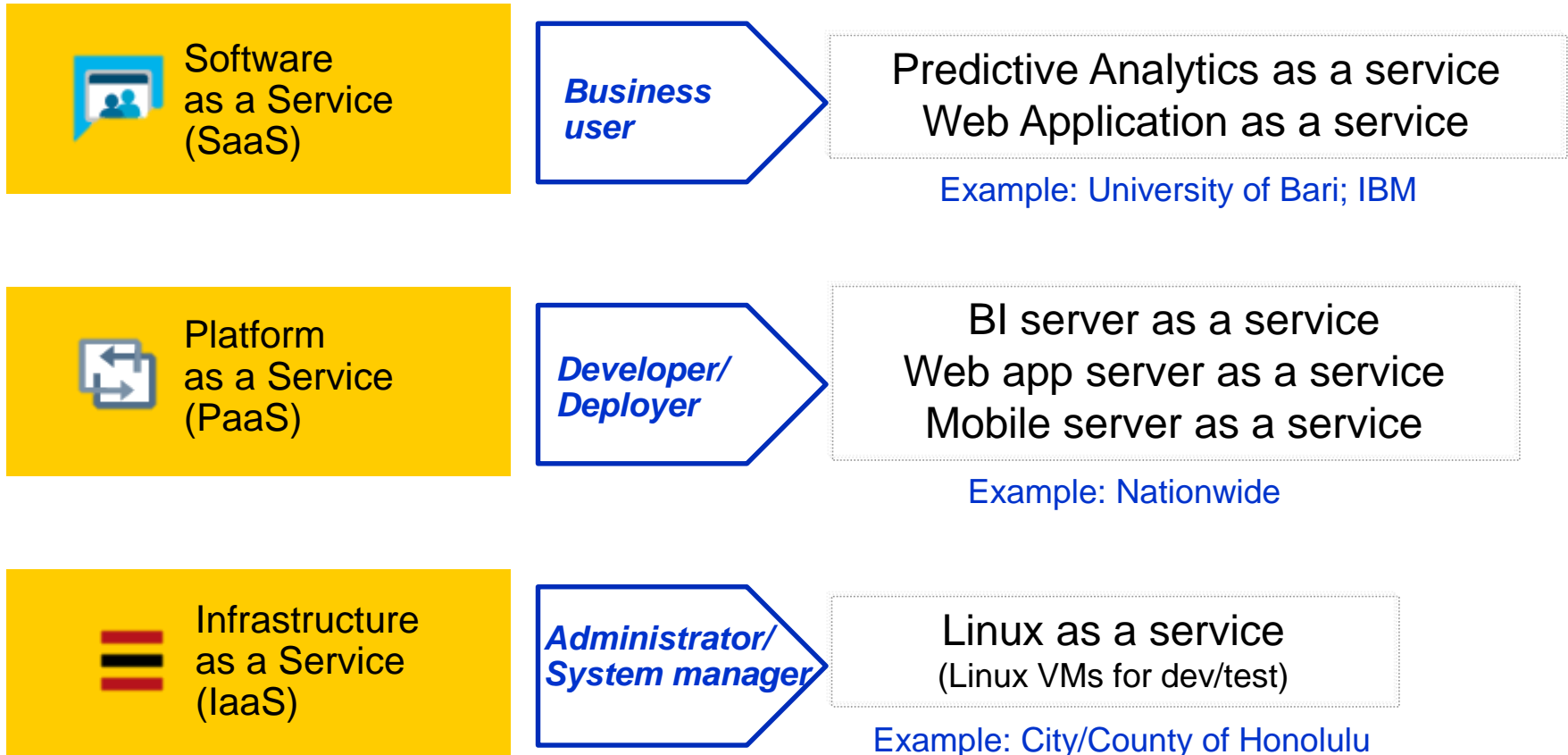
Key steps to deliver a robust private cloud on system z



Reduce costs and improve agility

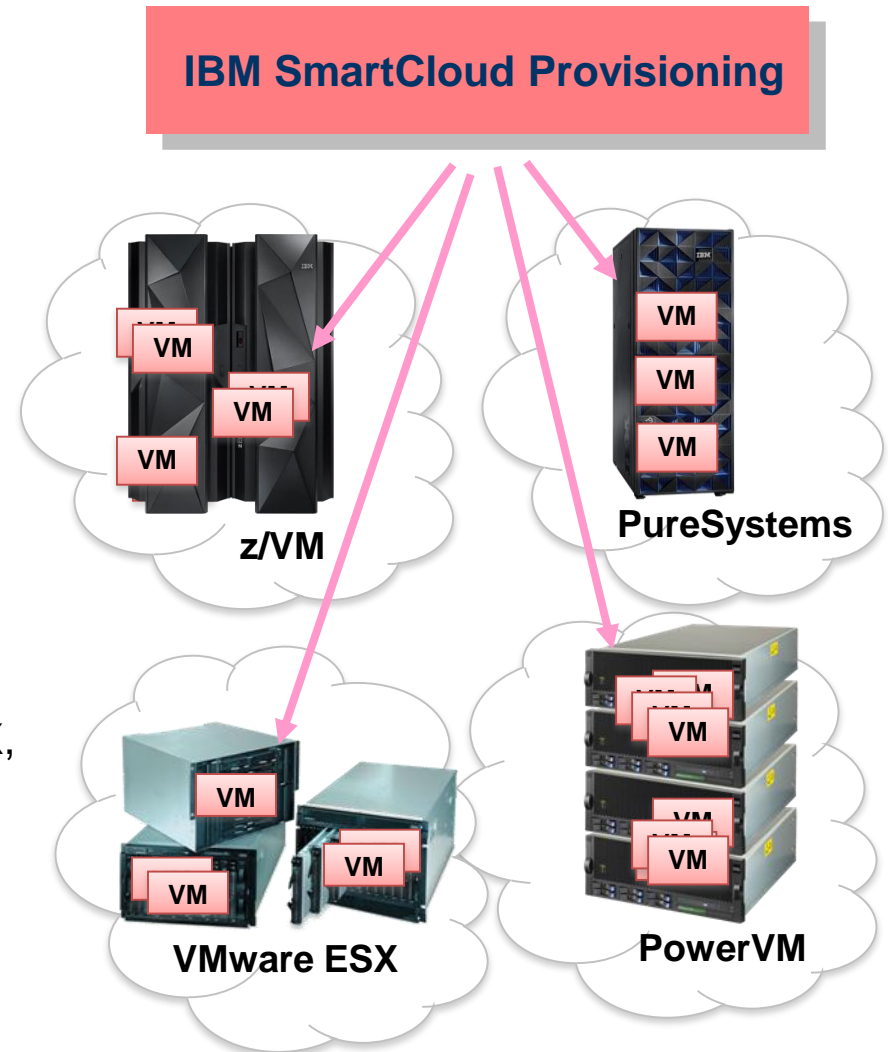
*Under development on Linux on System z

Examples of private cloud services



Automate deployment of cloud services with IBM SmartCloud Provisioning

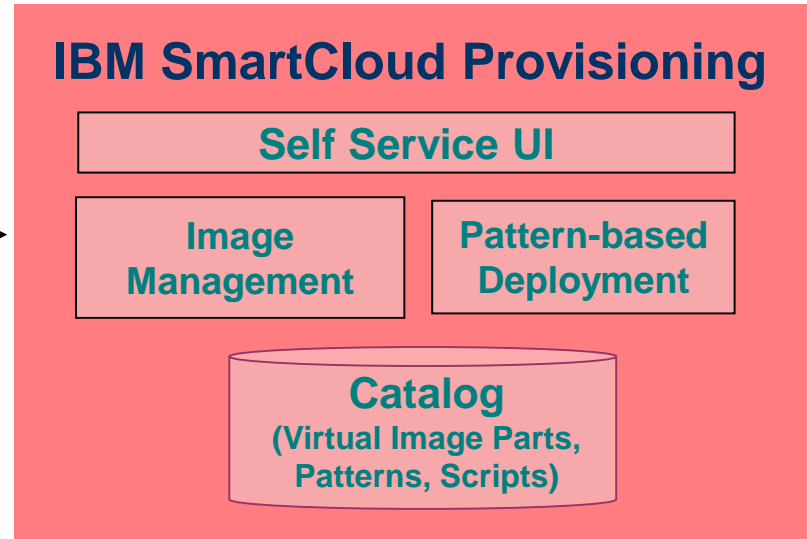
- Self-service automated provisioning of virtual machine images...
 - Images can include OS, middleware and applications
 - Deploy multiple virtual machines in a single operation with patterns
- ...into pools/clouds on virtualized hardware
 - Supports z/VM, PowerVM, VMware ESX, KVM, Xen, Microsoft Hyper-V



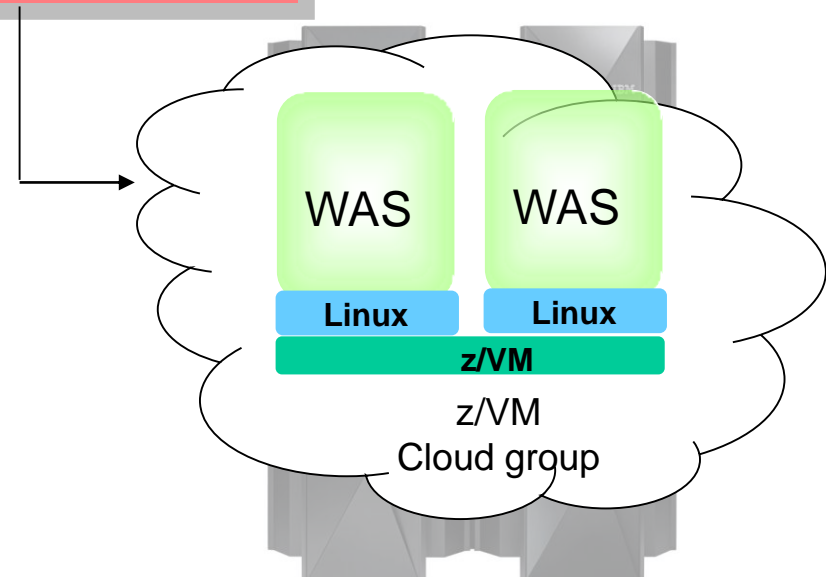
Automation with IBM SmartCloud Provisioning can further reduce costs



User selects and deploys a pattern

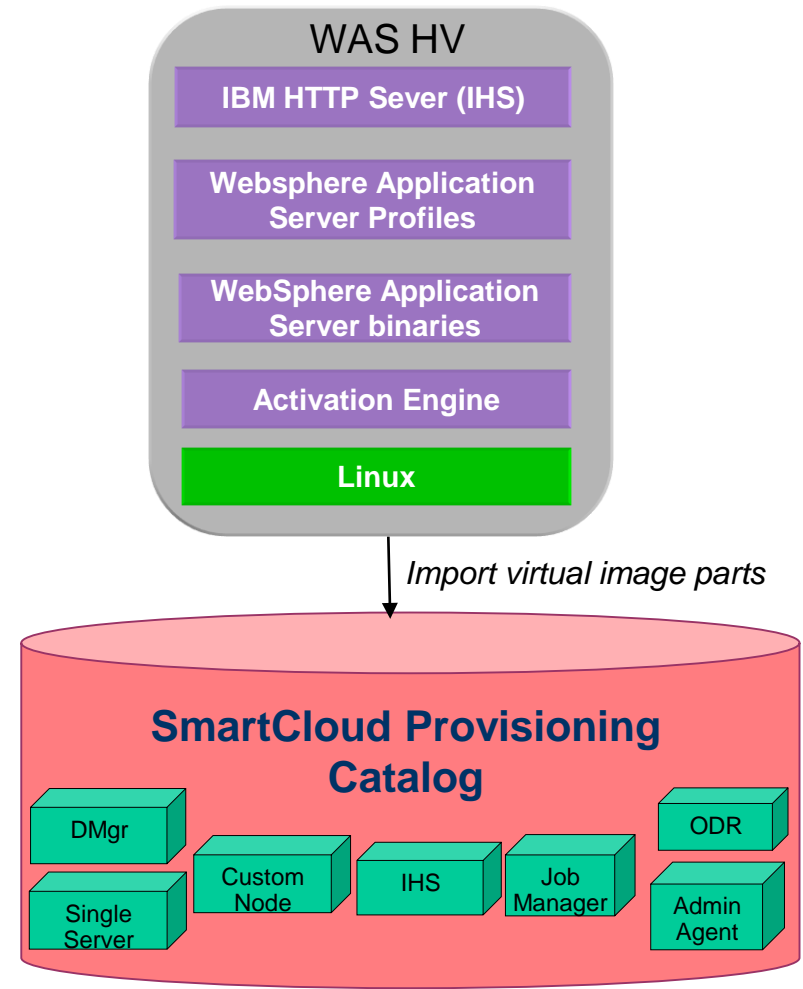


- Self-service console for users
- Virtual images and patterns for quick-starts
- Drag and drop tooling for creating and deploying cloud services using catalog
- Intelligent placement algorithm optimizes resource utilization based on cloud activity



IBM SmartCloud Provisioning makes it easier to get started with virtualized images

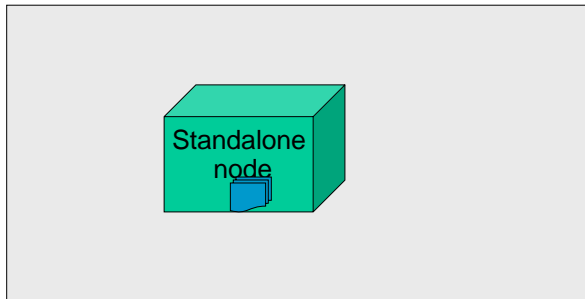
- IBM middleware packaged as Hypervisor Editions (.OVF virtual images), ready to run on a hypervisor
 - Includes pre-installed and pre-configured image, image-specific tuning/configuration and fast deploy-time activation capabilities
- Hypervisor Editions imported into catalog as virtual image parts that represent topology components
 - Example: deployment manager, custom node, etc.
- Virtual image parts can be used to create virtual system patterns



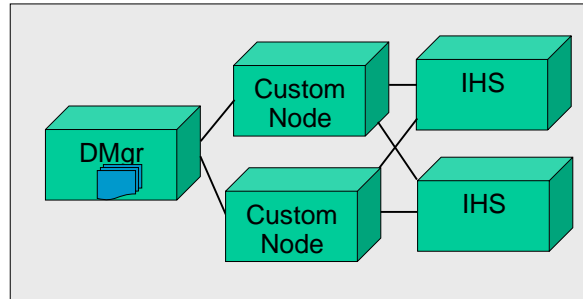
IBM SmartCloud Provisioning deploys standardized virtual system patterns

A Virtual System Pattern is one or more virtual images and script packages to satisfy a certain deployment topology

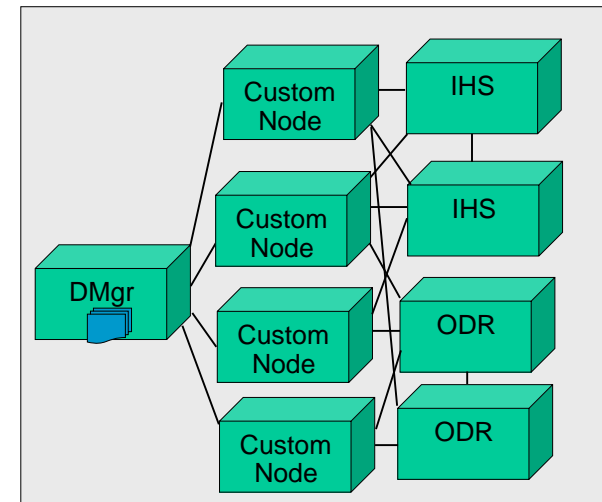
Single Server



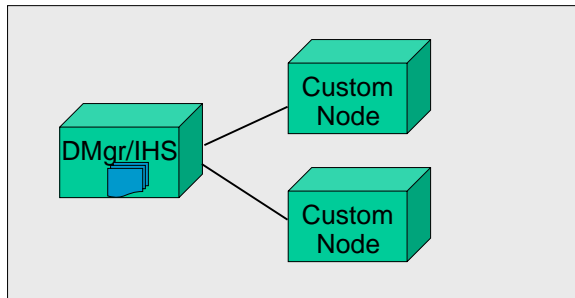
WebSphere cluster



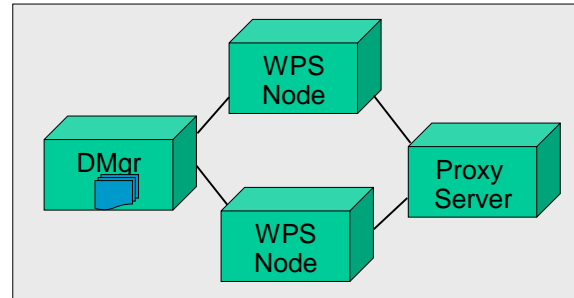
WebSphere Advanced Cluster



WebSphere cluster (dev)

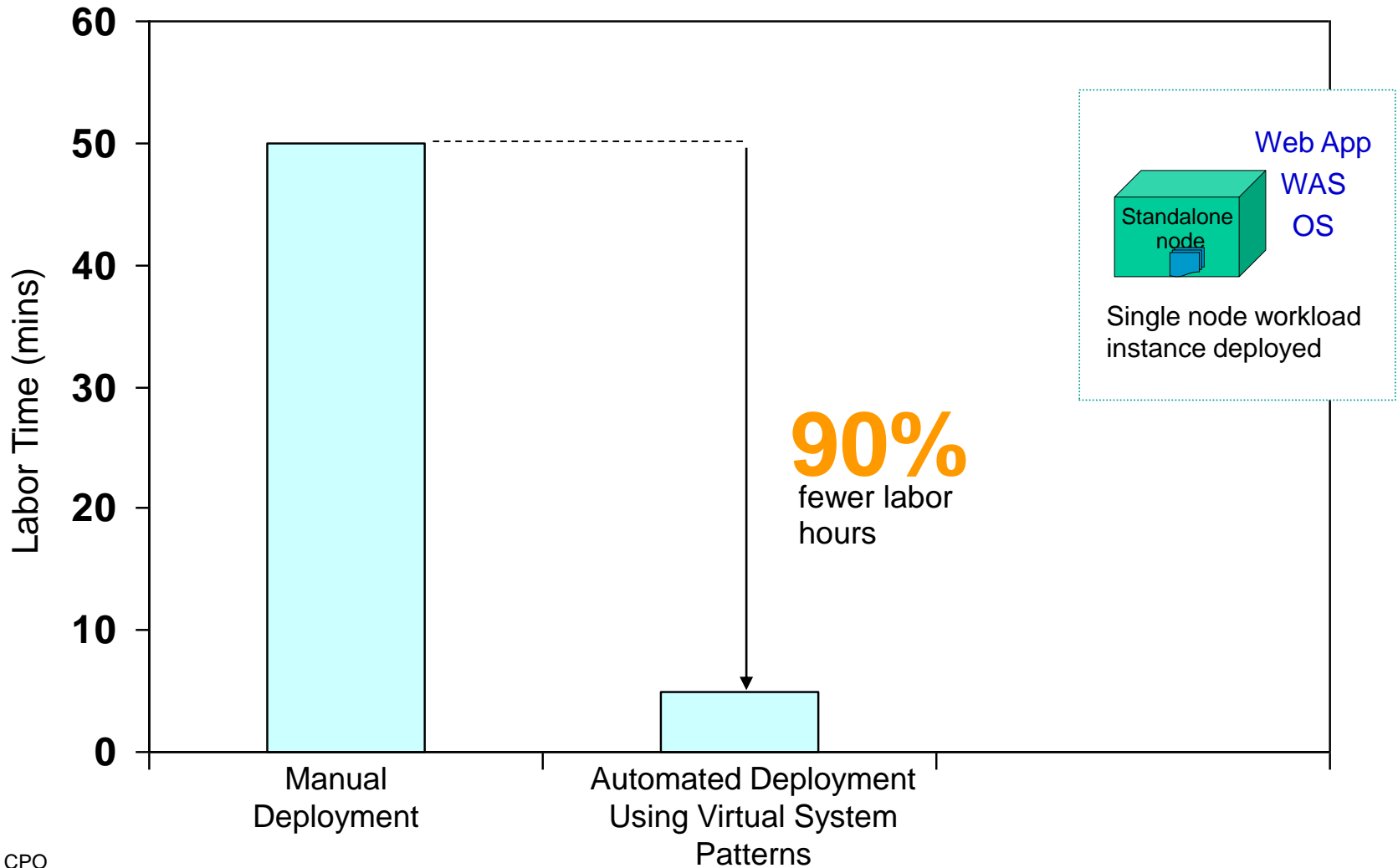


WebSphere Process Server (Scalable)



DMgr = Deployment Manager
 IHS = IBM http Server
 ODR=On Demand Router
 27

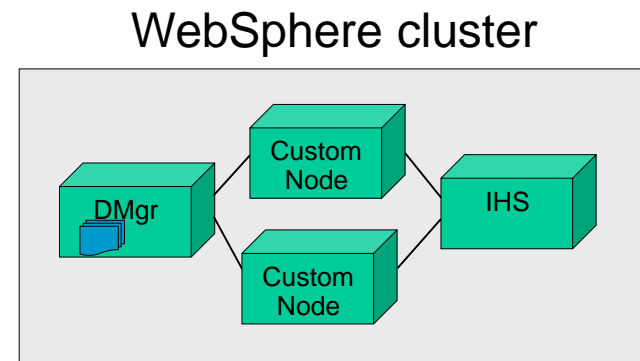
IBM SmartCloud Provisioning automated pattern-based deployment is fast



Source: IBM CPO

Normal deployment steps for WAS high available clustered environment

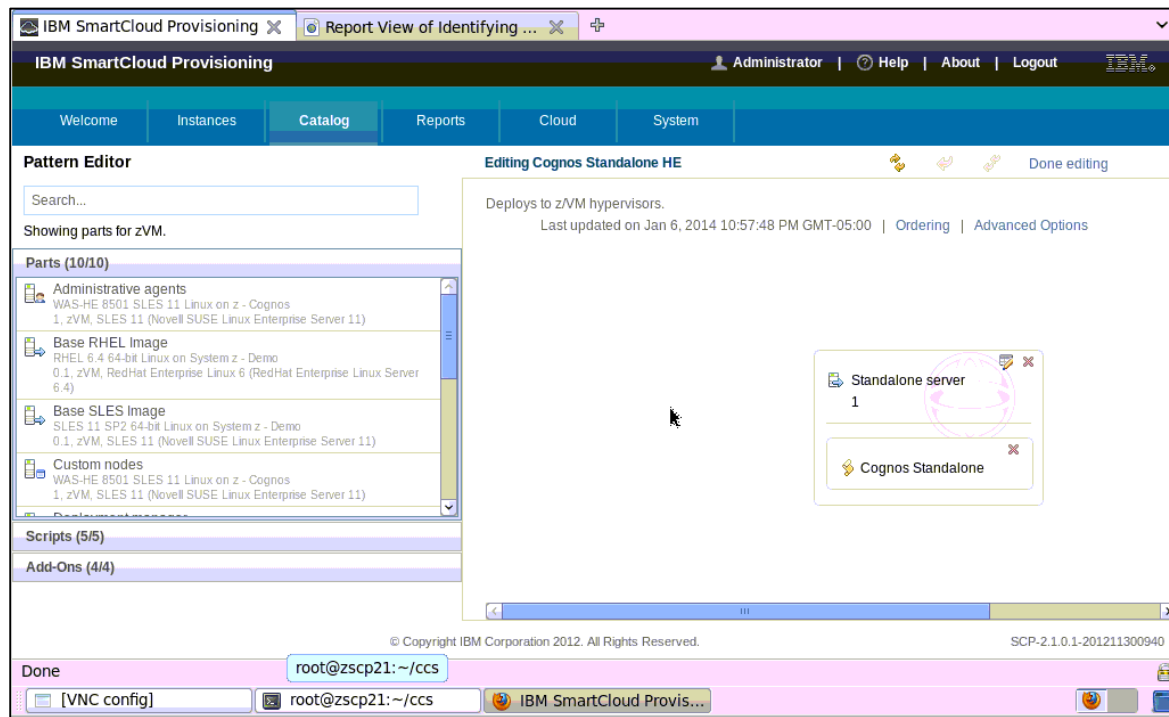
1. Involves creating 4 virtual servers
 - 1 WebSphere deployment manager
 - 2 WebSphere Node
 - 1 IBM HTTP Server
2. Install the WAS Update Installer and install the required iFixs
3. Create WebSphere Cluster with 2 members
4. Configure the HTTP Server
5. Configure Session replication on servers to support Failover
6. Deploy the Application to the WebSphere Cluster



All of these steps are done automatically with IBM SmartCloud Provisioning

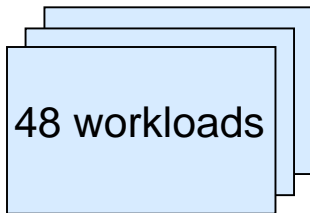
DEMO: Use a private cloud for fast deployment of descriptive analytics

Use SmartCloud Provisioning to extend an existing WebSphere Application Server pattern with Cognos BI services



Which option costs less?

Which platform provides the lowest costs over 3 years?



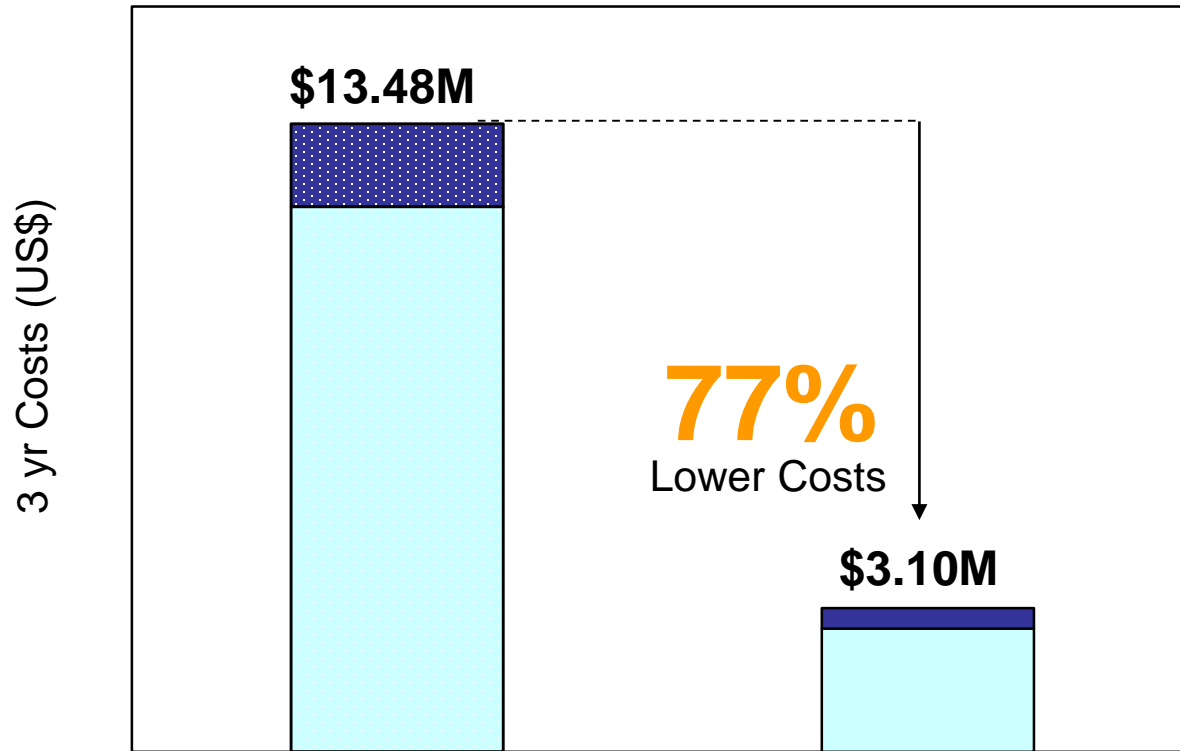
Online banking workloads, each driving **22** transactions per second, with **1 MB I/O per transaction**



1
z/VM on zEC12
32 IFLs

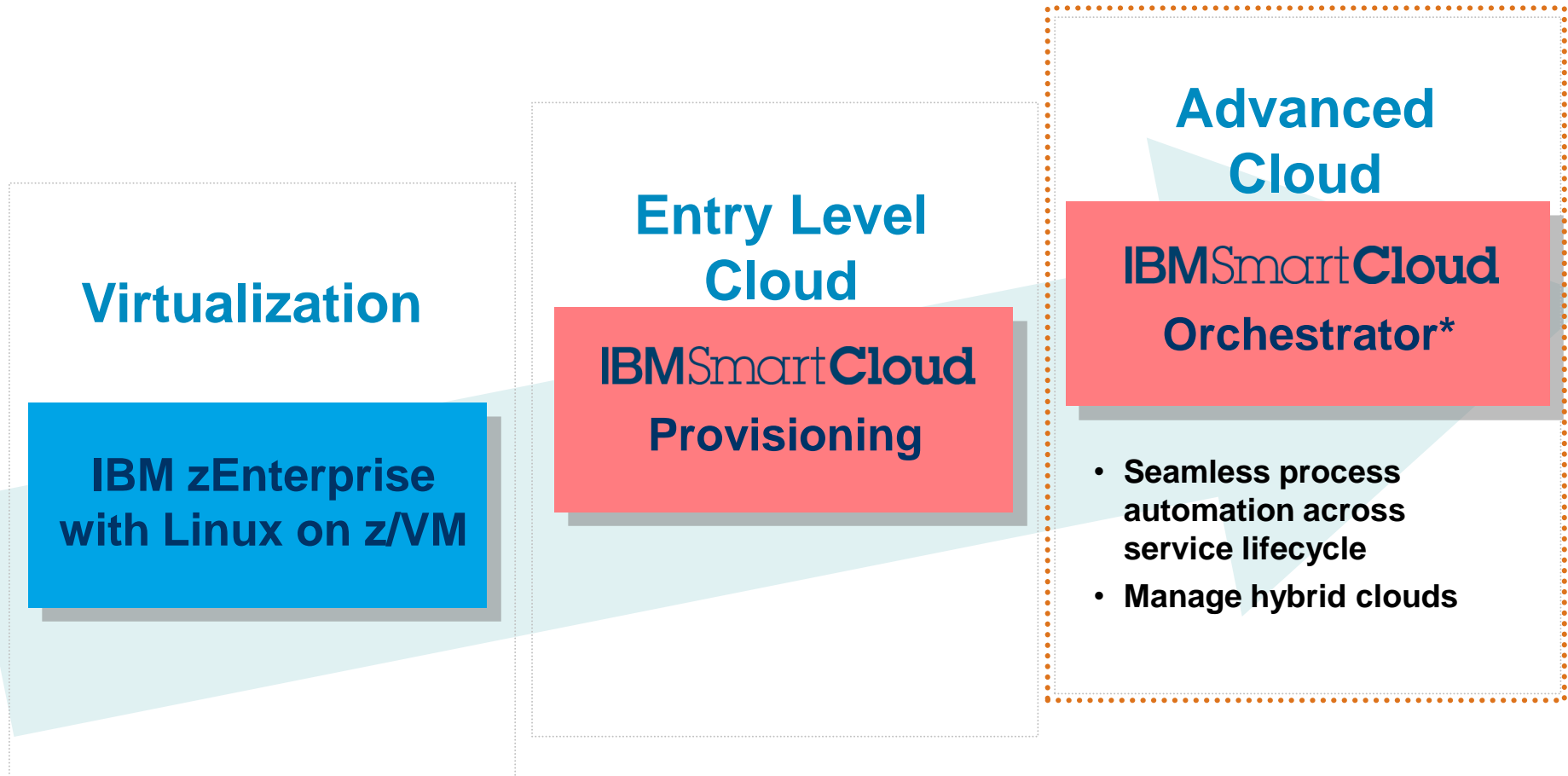
Reduce costs with a System z private cloud

Example With 48 Workloads



Note: 3 year TCO includes hardware acquisition, maintenance, software acquisition, S&S and labor. US pricing - will vary by country.

Key steps to deliver a robust private cloud on system z

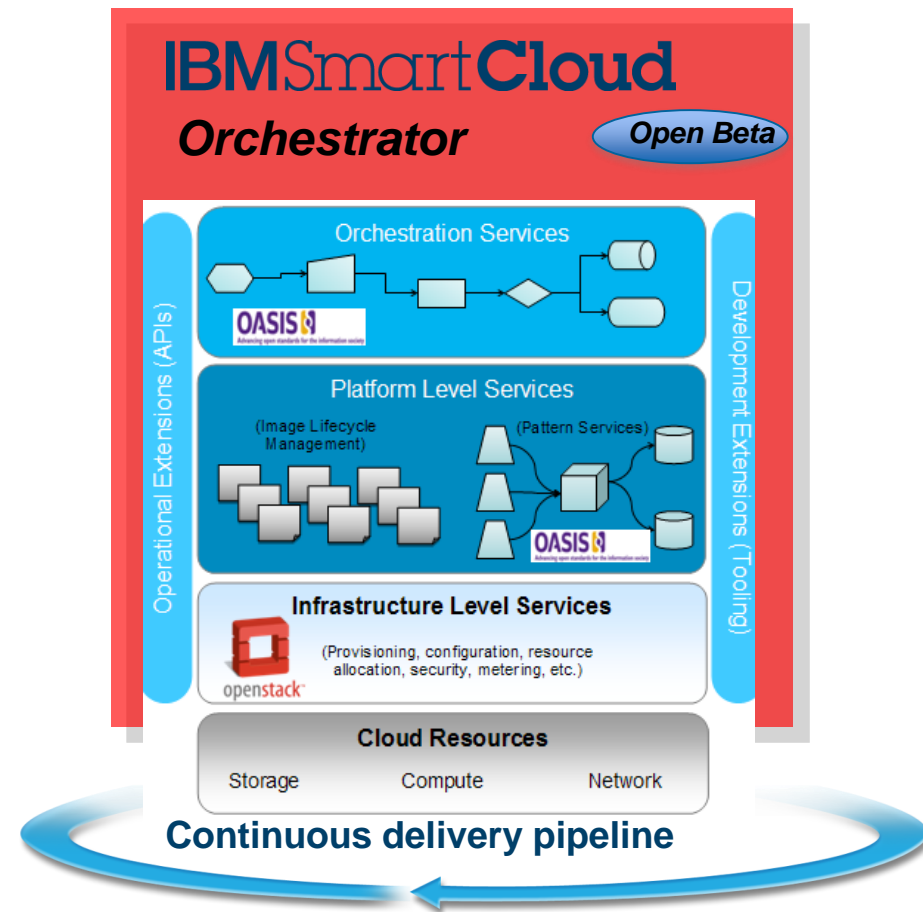


Reduce costs and improve agility

*Under development on Linux on System z

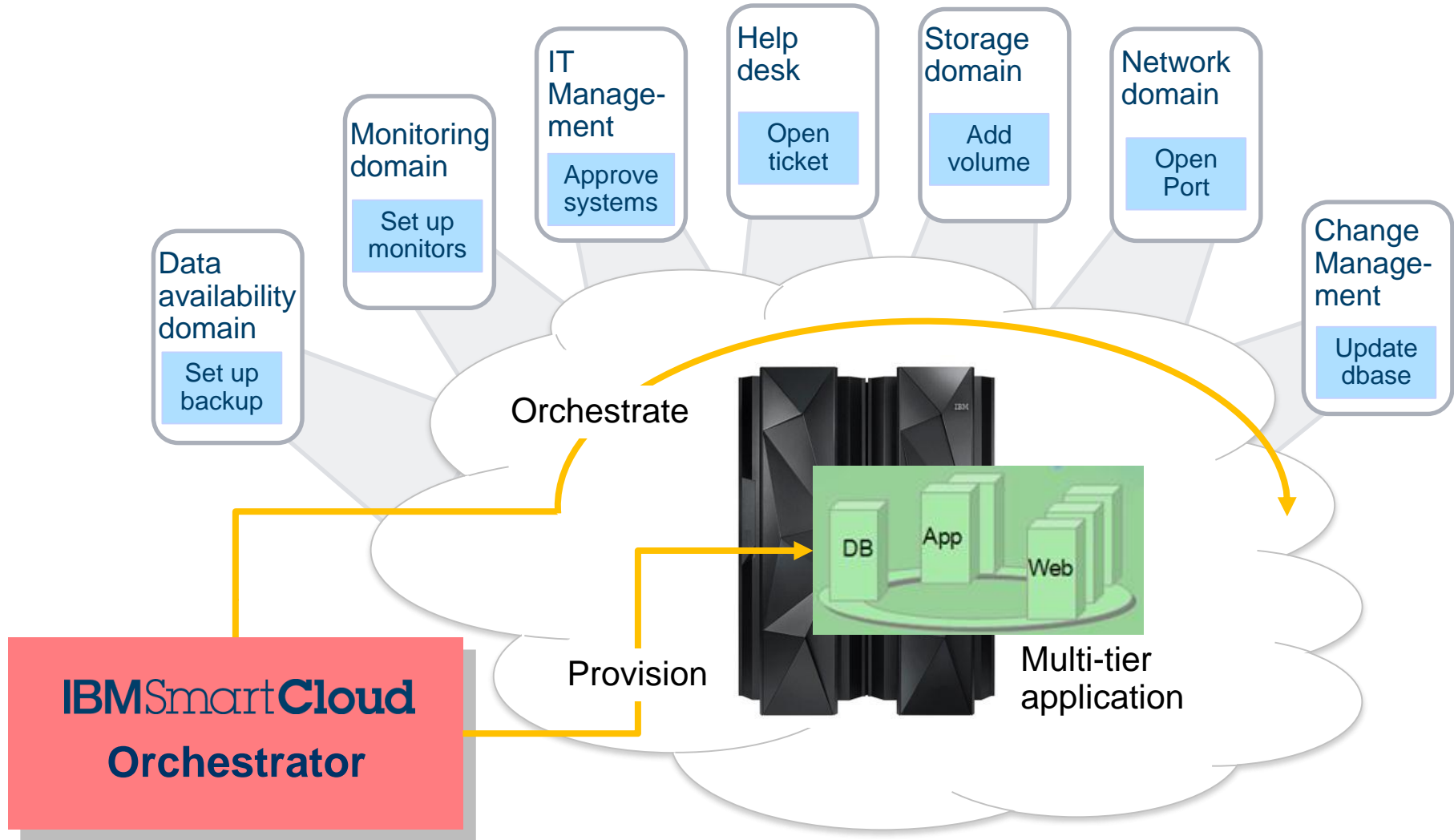
IBM SmartCloud Orchestrator*

- New cloud offering based on open standard OpenStack
- Fully automates end-to-end service deployment across infrastructure and platform layers
- Accelerated deployments with reusable workload patterns and orchestration workflows
- Supports deployment to both private and public clouds
- Comprehensive monitoring and cost management
 - SmartCloud Monitoring
 - SmartCloud Cost Management



*under development on Linux on System z

Managing workloads across the lifecycle



Check out the SmartCloud Orchestrator beta program

Public Community Site:
<http://ibm.co/CPandO>

Additional cloud offerings

- Extreme Cloud Administration Toolkit (xCAT) on z/VM
 - An open sourced tool to manage, provision, and monitor physical and virtual machines
 - Included with z/VM

- Entry cloud configuration for SAP solutions
 - Standardize and automate deployment of IBM DB2 on z/OS for SAP applications

- SmartCloud for System z (hosted services offering)
 - A cloud computing service which provides shared, secure and scalable IBM z/OS mainframe capacity, offered as secured LPARs within a continually refreshed, managed environment

How to get started

- ***Think it***
 - No one-size-fits all
 - zEnterprise is ideal for enterprise workloads requiring high level of security, reliability, scalability, performance

- ***Build it***
 - zEnterprise or Enterprise Linux Server
 - SmartCloud Provisioning/Orchestrator

- ***Tap into it***
 - Strategically mix clouds to deliver business outcome
 - Open standards are important for dynamic hybrid cloud strategy
 - SmartCloud Orchestrator built on open standards