Power Systems Cloud Overview
Solutions for every step in your Cloud Journey

Terri Schlosser, Power Systems Cloud Offering Manager

Pressures like workforce mobility and increasing productivity are placing greater demands on IT systems.

Increased expectations

52%
CAGR growth in self-service channels

Increased demands

10x
growth in digital data from 2007 to 2011.

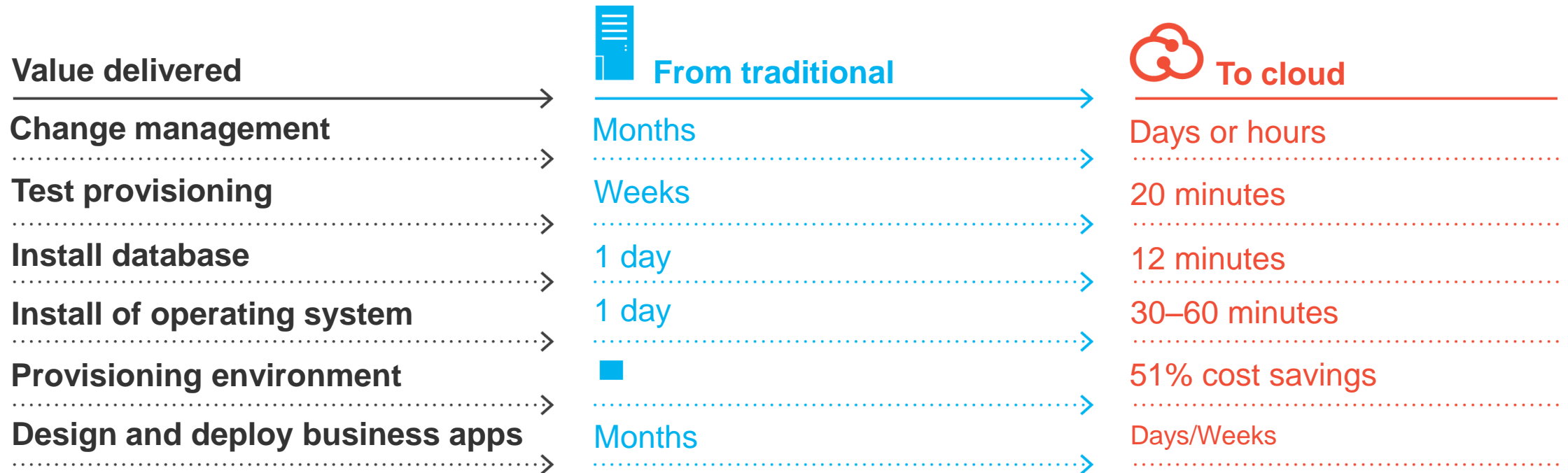**Increased competition**

2/10
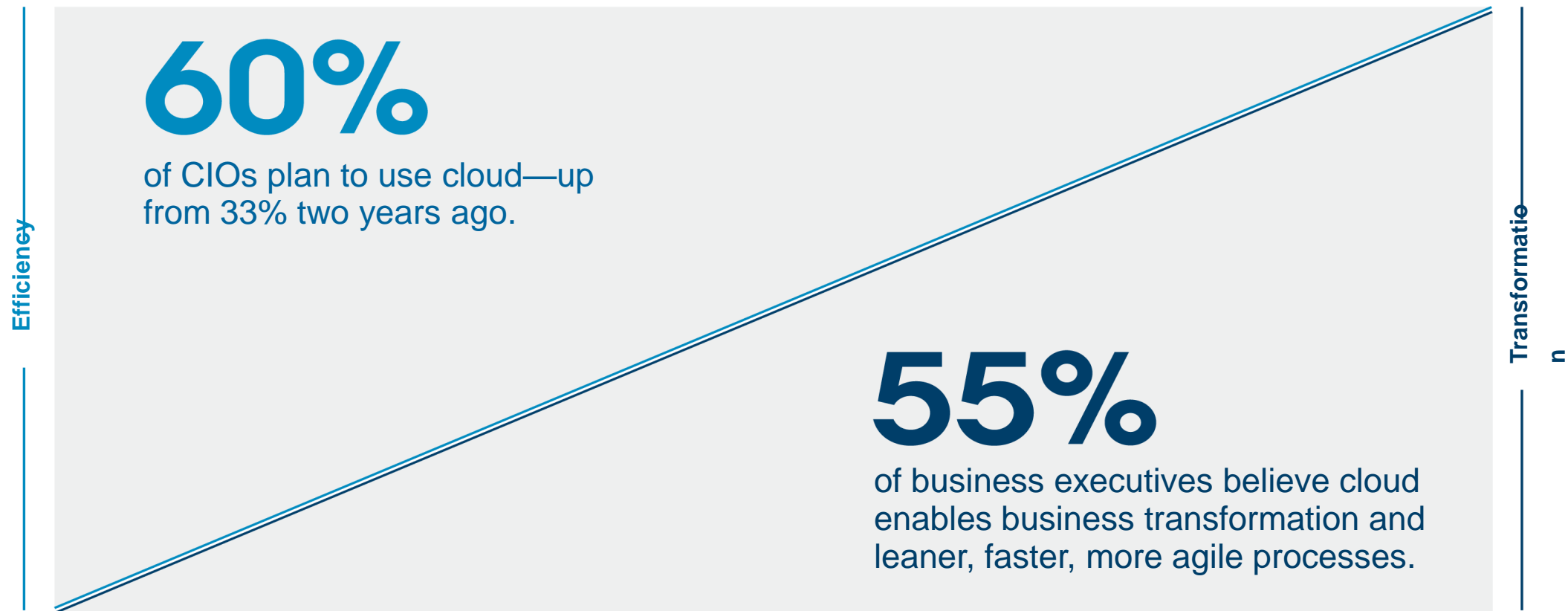of the world's largest companies in 2000 remain on that list today.

54%
of surveyed enterprise IT budgets in 2010 were spent on ongoing operations and maintenance costs.*

*Source: Forrester Research, Inc. "2011 IT Budget Planning Guide," October 7, 2010 by Craig Symons

As a result, cloud is an increasingly attractive means of creating and delivering IT services.

Value delivered	From traditional	To cloud
Change management	Months	Days or hours
Test provisioning	Weeks	20 minutes
Install database	1 day	12 minutes
Install of operating system	1 day	30–60 minutes
Provisioning environment		51% cost savings
Design and deploy business apps	Months	Days/Weeks

IT is drawn to cloud's cost, efficiency and control…

Efficiency

60%

of CIOs plan to use cloud—up from 33% two years ago.

55%

of business executives believe cloud enables business transformation and leaner, faster, more agile processes.

Transformation

…while business users are drawn to cloud's simplified, self-service experience and new service capabilities.

Cloud helps business and IT create and deliver value in fundamentally new ways

Improve speed and dexterity
Speed the delivery of new offerings and services by creating new models of self-service and deployment.

Deliver IT without boundaries
Enable new IT and business processes that break down traditional silos and simplify access to information in order to deliver better business outcomes.
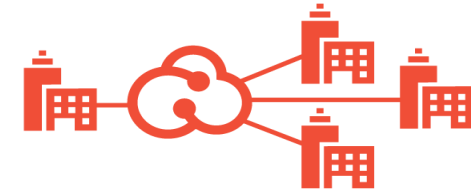
Create new business value
Empower internal and external communities to define and create new offerings and services.

Businesses are choosing a variety of cloud models to meet their unique needs and priorities.

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
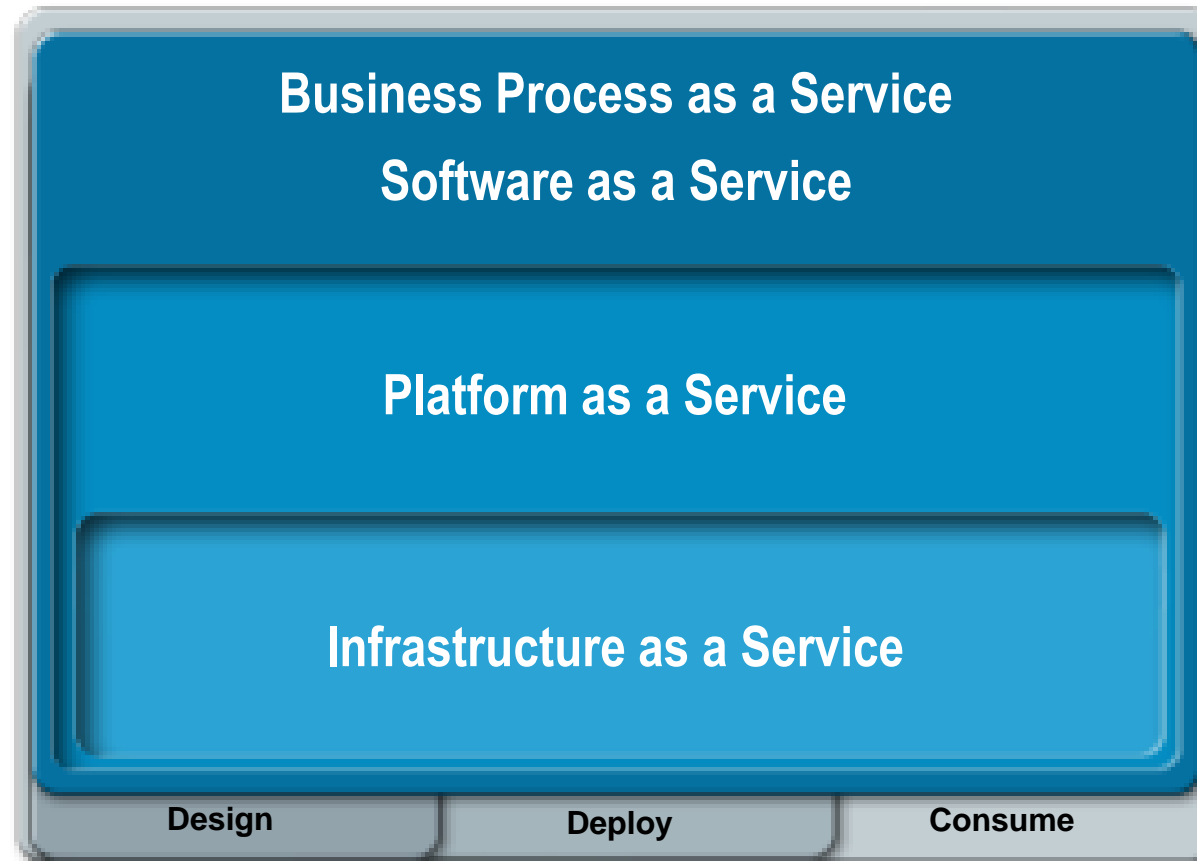
Traditional IT

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

Adoption patterns are emerging for successfully beginning and progressing cloud initiatives

IBMSmart**Cloud**

PaaS: Accelerate time to market with cloud platform services

BPaaS: Innovate business models by becoming a cloud service provider

Business Process as a Service

Software as a Service

Platform as a Service

IaaS: Cut IT expense and complexity through a cloud enabled data center

Infrastructure as a Service

SaaS: Gain immediate access to business solutions on cloud

| Design | Deploy | Consume |

Easily build and rapidly scale private cloud environments with unparalleled time-to-market, integration and management

IBMSmart**Cloud** **Foundation**

Platform as a Service Technologies

Application Lifecycle	Application Resources	Application Environments	Application Management	Integration

Infrastructure as a Service Technologies

Infrastructure Platform	Management and Administration	Availability and Performance	Security and Compliance	Usage and Accounting

❑**Virtualized**　　❑**Standardized**　　❑**Automated**

- Simplified initialization and administration of cloud environments

- Image management to reduce cost and complexity of image sprawl

- Enterprise class rapid image provisioning and scaling across heterogeneous environments improves agility

- Enhanced visibility into performance of cloud infrastructure optimizing quality of service

- Analytics for capacity planning and workload placement improve utilization, lower capex

- Proactive monitoring/protection of cloud resources from attacks and breaches reduces expense, risk

What are customers asking IBM?

Infrastructure Teams

How can I improve my resource utilization, simplify administration and reduce cost ?

Line of Business Teams

How can I accelerate my application release cycle in an optimized , quality fashion?

Infrastructure as a Service Technologies

Infrastructure Platform

Management and Administration

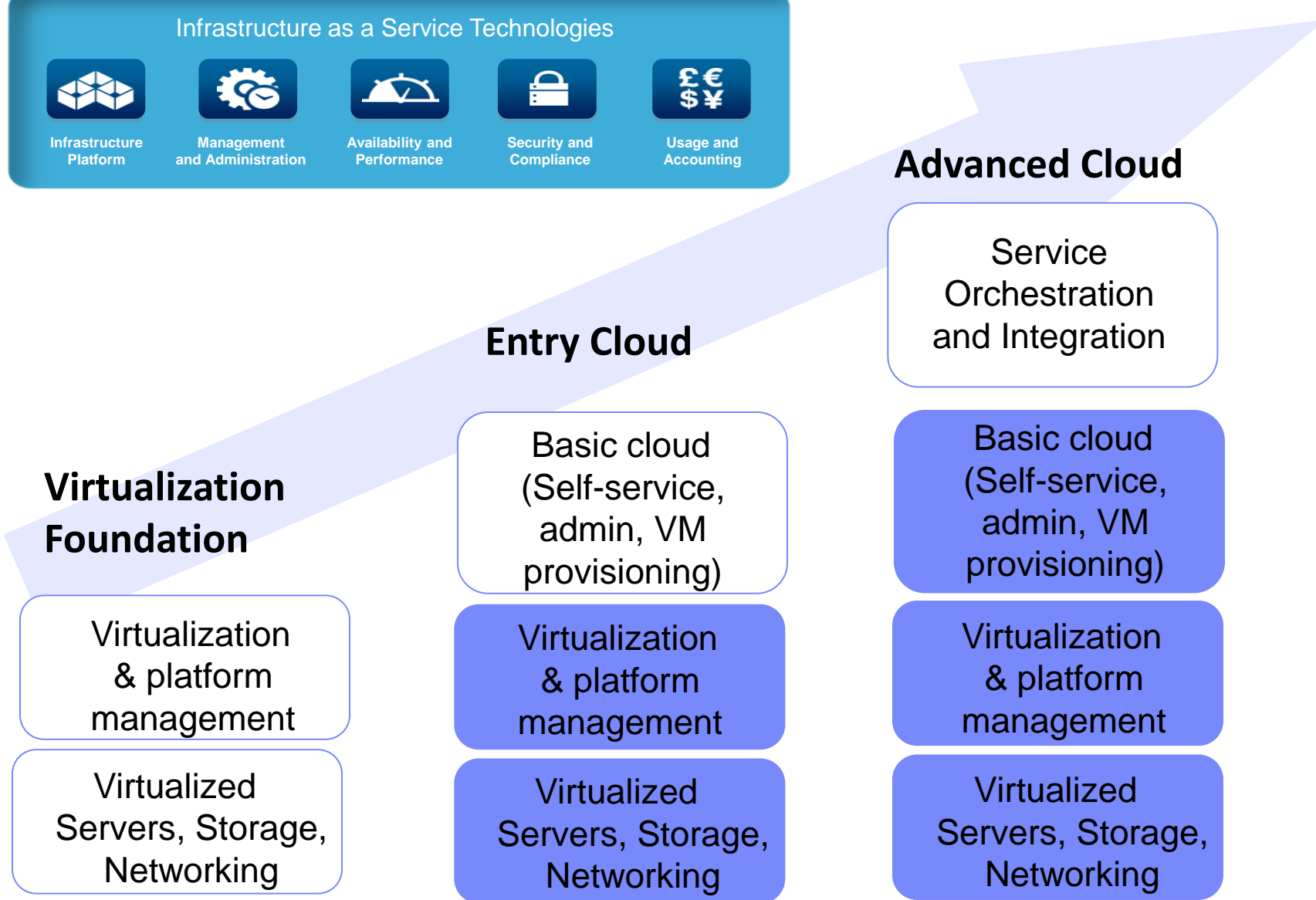**Availability and Performance**

Security and Compliance

Usage and Accounting

Operations Teams

How can I improve responsiveness and drive productivity and efficiency while maintaining stringent qualities of service?

Private clouds can help address these business problems but clients are not sure where to start on the journey

Infrastructure as a Service Technologies

Infrastructure Platform	Management and Administration	Availability and Performance	Security and Compliance	Usage and Accounting

Advanced Cloud

Service Orchestration and Integration

Entry Cloud

Virtualization Foundation

Virtualization Foundation	Entry Cloud	Advanced Cloud
	Basic cloud (Self-service, admin, VM provisioning)	Basic cloud (Self-service, admin, VM provisioning)
Virtualization & platform management	Virtualization & platform management	Virtualization & platform management
Virtualized Servers, Storage, Networking	Virtualized Servers, Storage, Networking	Virtualized Servers, Storage, Networking

- This is not always a linear progression. Some clients begin by optimizing their virtualization foundation for a workload, then gradually move to cloud.

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

- A client may be in all of these stages w/ different workloads across their data center.

Why are Clients moving to Power Systems Cloud Solutions?

Mission critical workloads demand a virtualization solution that can provide Enterprise Quality of Service.

✓ **Enhanced Security** – to ensure the highest level of security

✓ **Performance** – higher performance per core for optimal application performance & lower SW costs

✓ **Availability** – Zero downtime to support those mission critical application workloads

✓ **Scalability** – unlimited elastic scaling to meet changing business demands

Performance for China Telecom means implementing a private cloud to deliver services faster at lower cost

- Operating in a highly competitive market, China Telecom needed to reduce time to market for new products and services to seize greater market share. The high cost of floor space and power in data centers was restricting growth.

- Implemented new Power servers, PowerVM & Systems Director VMControl to create a private cloud and to manage virtual system pools

- Improved hardware utilization, cut hardware costs by over 50 percent, cut energy consumption and CO_2 emissions

- Slashed time to market for new business applications from 3-4 months to 2-3 days

*"Our estimate is that the IBM solution has **improved hardware utilization by over 50 percent**, although this may in fact be higher. Sharing resources through the internal cloud has allowed us to consolidate hardware, translating into **50 percent cost savings in terms of servers and storage**."*

Dr. Lifeng Liu, General Manager Assistant in the Network Development Department, China Telecom

PowerVM

IBM® Systems Director

China Telecom (Case Study)

Source: IBM POP03111-USEN-00

Power Systems Cloud Solutions – Entry points at any level

Deliver IT without Boundaries ↑

Infrastructure as a Service Technologies

Infrastructure Platform	Management and Administration	Availability and Performance	Security and Compliance	Usage and Accounting

Advanced Cloud

Integrated service management platform with automated IT service deployment, full lifecycle management, metering & chargeback

Entry Cloud

Basic cloud functions including simple self service interface and infrastructure with automated provisioning

Virtualization Foundation

Industrial strength virtualization coupled with automated resource balancing and virtual image management

POWER7 systems, PowerVM, PowerSC, Systems Director & VMControl

IBM SmartCloud Entry
by IBM Starter Kit for Cloud

delivered

Cloudburst on Power & IBM Service Delivery Manager

Cloud Capabilities →

PowerVM
Advanced virtualization for a superior foundation

Enterprise QOS virtualization capability with **higher performance**, **more scalability**, and **enterprise security** provides the best foundation for your cloud

- ✓ Consolidate multiple workloads onto fewer systems, **increasing server utilization and reducing costs**

- ✓ **Enterprise security** to help manage risk and maximize availability

- ✓ **Superior flexibility** to optimize IT resource utilization and improve responsiveness

- ✓ **Dynamically optimizing IT resources** such as CPUs, memory and I/O across workloads, systems and entire datacenters to improve service levels

- ✓ **Integrated storage virtualization** for simplified provisioning and management of virtual servers

More information: http://www-03.ibm.com/systems/power/software/virtualization/index.html

PowerVM™

PowerSC
Security and compliance solution ensures a secure foundation

Security and compliance solution designed to **protect data centers** virtualized with PowerVM **enabling higher quality services** and ensuring a **secure foundation** for your cloud

- ✓ **Simplifies management** and measurement of security and compliance with a single pane to see all systems out of compliance

- ✓ **Reduces cost** of security and compliance with compliance automation and reporting only allowing known trusted software to run

- ✓ **Improves detection and reporting** of security exposures with the Trusted Network Connection protocol ensuring that every Virtual System has appropriate security patches and providing notification of any unpatched systems

- ✓ **Improves the audit capability** to satisfy reporting requirements trusted logging and security compliance automation

PowerSC™

More information: http://www-03.ibm.com/systems/power/software/security/

IBM Systems Director with VMControl

Integrated platform management provides core capabilities for virtualization foundation

Automated management, provisioning and optimization of physical
& virtual servers and system pools ensure that your cloud resources
are automatically provisioned for optimal utilization

- ✓ Physical and Virtual Management in a single interface to **reduce complexity**

- ✓ Offers unmatched cross-operating system management, which helps **improve service delivery**

- ✓ Provides **faster time-to-value** and **greater business agility** through simplified virtualization management that allows more effective utilization of virtualized resources

- ✓ Establishes repeatable accuracy and consistency through **automation**

- ✓ **Reduces operational and infrastructure costs** through increased efficiency and resource utilization

More information: http://www.ibm.com/systems/software/director/vmcontrol/index.html

IBM® Systems Director

IBM Systems Director VMControl 2.4
Integrated platform management provides core capabilities for virtualization foundation

Key Features	Customer Benefits	
Unique image management capabilities for virtualized IBM i workloads on Power Systems	Facilitates the creation and maintenance of a secure virtual appliance repository containing 'golden master' standardized IBM i virtualized workloads.	**Improve end-user and operations productivity while accelerating time to value**
Accelerated storage-based provisioning deploys virtualized workloads in record time	Supports the option of storage-based rapid provisioning of virtualized workloads, to increase service levels and minimize wait times.	**Consistent virtualization management experience across multiple platforms**
Appliance-ready design streamlines integration into more sophisticated enterprise virtualization solutions	Designed to integrate into pre-built solutions such as entry clouds, workload-optimized platforms and dedicated appliances, with an external SDK that allows quick and easy external integration.	**Standardize virtualized workloads to manage costs and minimize risk**

IBM SmartCloud Entry delivered by IBM Starter Kit for Cloud
Entry level cloud solution built on top of the virtualization foundation

NEW!

Entry cloud solution that provides affordable, easy-to-install and easy–to-use capabilities to allow clients to **more rapidly move to a cloud model**

- ✓ **Fast time to value** with a solution that is simple to deploy, easy to use and works with existing infrastructure

- ✓ Accelerate infrastructure delivery and speed service deployment to **quickly respond to changing business needs**

- ✓ **Dramatically increase IT efficiency** with standardization and lower operations cost

- ✓ Scale as needed to **improve quality and meet demand** with continuous availability

- ✓ **Enable self service** with a simple interface that provides oversight

- ✓ **Expandable** to advanced Cloud offerings

More information: http://www.ibm.com/systems/power/solutions/cloud/onpower/starterkit.html

Starter Kit for Cloud Capabilities

Create Images

- **Easily create** new golden master images and software "appliances" using corporate standard OS
- **Convert images** from physical systems or between various x86 hypervisors to use cheaper tooling
- **Reliably track** images to ensure compliance and minimize security risks
- **Conserve resources**, reducing both the number of images and the storage required for them

Simplify storage of thousands of images

Deploy VMs

- **Deployment** of application images across compute and storage resources
- **End user self service** for improved responsiveness
- **Ensure security** through resource and VM isolation, project-level user access controls
- **Easy to use** - no need to know all the details of the infrastructure
- **Protect your investment** through full support of your current virtualization environment
- **Optimize performance** on IBM systems with dynamic scaling, expansive capacity and continuous operation

35:1   Slash time to market for new apps from four months to just two or three days

Operate Your Cloud

- **Delegate provisioning** to authorized 'users' to improve productivity
- **Maintain full oversight** to ensure an optimally running and safe Cloud through automated approval / rejection
- **Standardize deployment** and configuration to improve compliance and reduce errors by setting policies, defaults and templates
- **Simplify administration** with an intuitive interface for managing projects, users, workloads, resources, budgeting, approvals & metering

Cut costs with efficient operation

IBM Starter Kit for Cloud solution architecture and components

Starter Kit for Cloud management stack

- Self-service UI
- REST API
- Cloud foundation stack
- VMC API

Customer integration

- Approval policy, project management, users & roles
- Events and auditing
- Metering
- Image library and config

VMControl 2.3.1

IBM Systems Director 6.2

PowerVM

Virtual Servers
(AIX, PowerLinux & IBM I*)

Power HW Reference Configurations
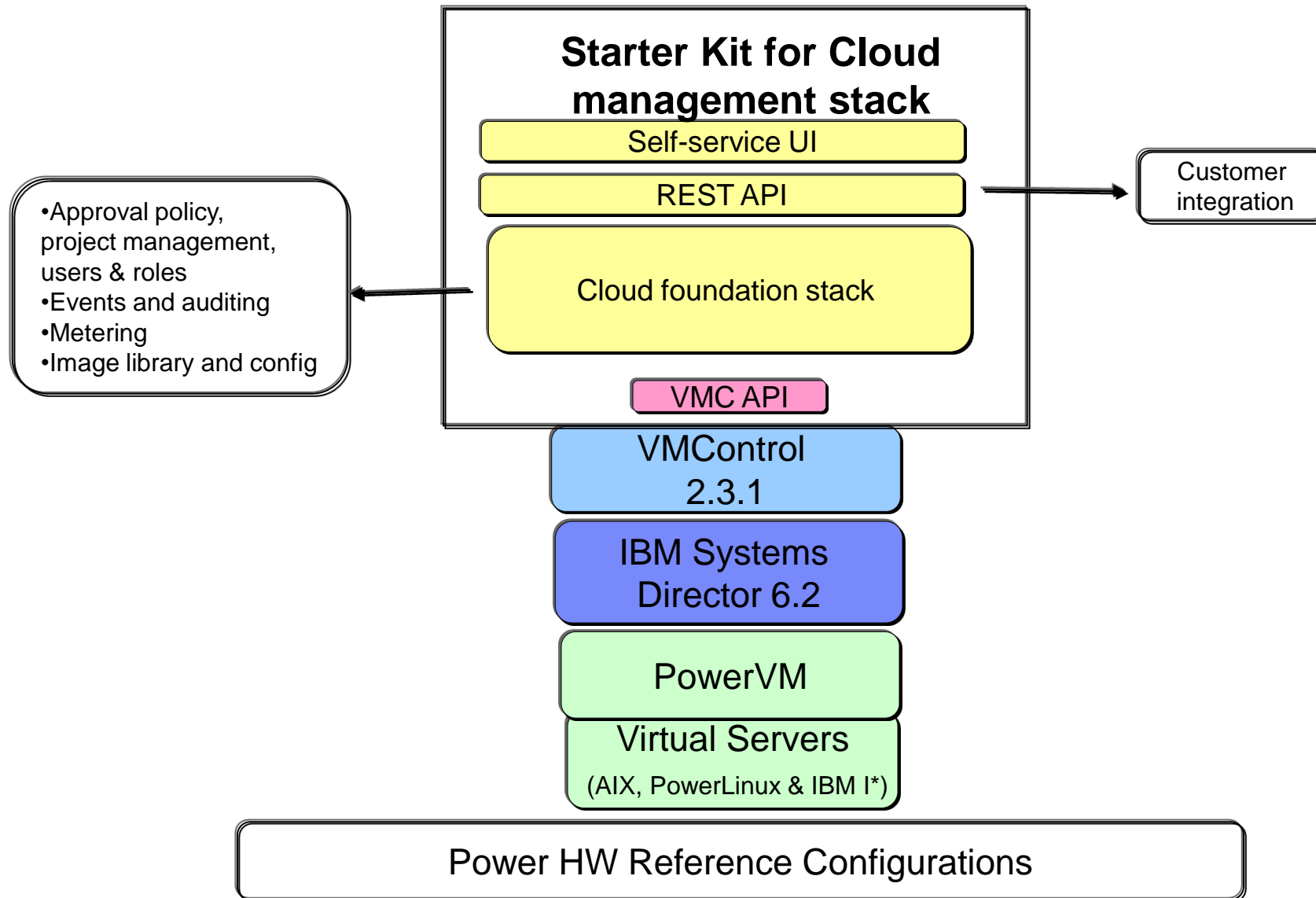
*All statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only. Some features require the purchase of additional software components.

IBM Starter Kit for Cloud Power Reference Configurations

IBM Starter Kit for Cloud **HW Reference Power 740 Rack Based Configuration**	**IBM Starter Kit for Cloud** **HW Reference PS703 BCH Blade Configuration**
p740 Management node, 16 cores, 128GB (8 cores Mgmt, 8 cores Comp) p740,Compute node 16 cores, 128GB (1 core Mgmt, 15 cores comp) Storwize v7000 storage controller with 24 drives - 7TB Min. Infrastructure System x 2 - F/C SAN Switch 40 ports 2 - 1 Gb Ethernet Switch Flat panel with keyboard console and console switch T42 Rack with 4 PDUs SKC / SD / VMC / AIX / Power VM	PS703 Management node, 16 cores, 128GB (8 cores Mgmt 8 cores Comp) PS703 Compute node, 16 cores, 128GB (1 core Mgmt, and 15 cores comp) HS22 x86 infrastructure blade BCH Chassis Storwize v7000 storage controller with 24 drives - 7TB Min Flat panel with keyboard B42 Rack with 4 PDUs SKC / SD / VMC / AIX / Power VM

IBM Service Delivery Manager for Power Systems
Pre-integrated software solution for advanced cloud solutions

Pre-integrated service management software stack that **automates IT service deployment** and provides **resource monitoring, cost management**, and **availability of services** in a cloud environment

- ✓ Self service portal, standardization and automation help to **reduce complexity and simplify use**

- ✓ **Leverage your existing IT investments** by deploying on your existing Power infrastructure and integrating your existing IT assets as part of your cloud environment

- ✓ Software stack delivered as virtual images and pre-integrated to **improve time to value**

- ✓ **Accelerate deployment** with automated image deployment and activation of components

More information: http://www.ibm.com/software/tivoli/products/service-delivery-manager/

Tivoli software

IBM CloudBurst on Power Systems
Completely integrated advanced cloud solution for the fastest time to value

Completely integrated service management platform with network, servers, storage, software and quickstart services that enable the **fastest time to value**

- ✓ **Deliver services faster via a self service portal** by offering a standardized service catalog and automatically provisioning requested resources

- ✓ **Reduce complexity and risk** through standardization and automation which help to reduce human errors

- ✓ **Lower IT costs** by leveraging automation workflows to provision assets based on business approved policies

- ✓ **Decrease capital expenses** by ensuring optimal utilization of all resources

- ✓ **Scales to the enterprise** with the ability to expand the solution to manage additional platforms and workloads

- ✓ **Enterprise quality of service** by leveraging the Power systems hardware, virtualization and software components

More information: http://www.ibm.com/systems/power/solutions/cloud/cloudburst/

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Cloud Capabilities

Power Cloud on the Web

IBM Systems for Cloud Computing

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

Power Systems Cloud Solutions

http://www.ibm.com/systems/power/solutions/cloud/

Power Cloud Customer Case Studies

GHY International

A Canadian customs brokerage services provider migrated to a POWER7 private cloud with AIX, IBM i, and Linux delivering new services faster with superior economics

90 percent reduction in time spent on server management, and **14 percent** reduction in IT budget

China Telecom

Chinese telecommunications provider implemented a POWER7 private cloud to deliver services faster at lower cost

50 percent reduction in hardware costs while slashing time to market for new business applications from **4 months to 2 days**

CIBER Management Services

An application service provider deploys POWER7 cloud IT infrastructure delivering higher quality services for SAP hosting business

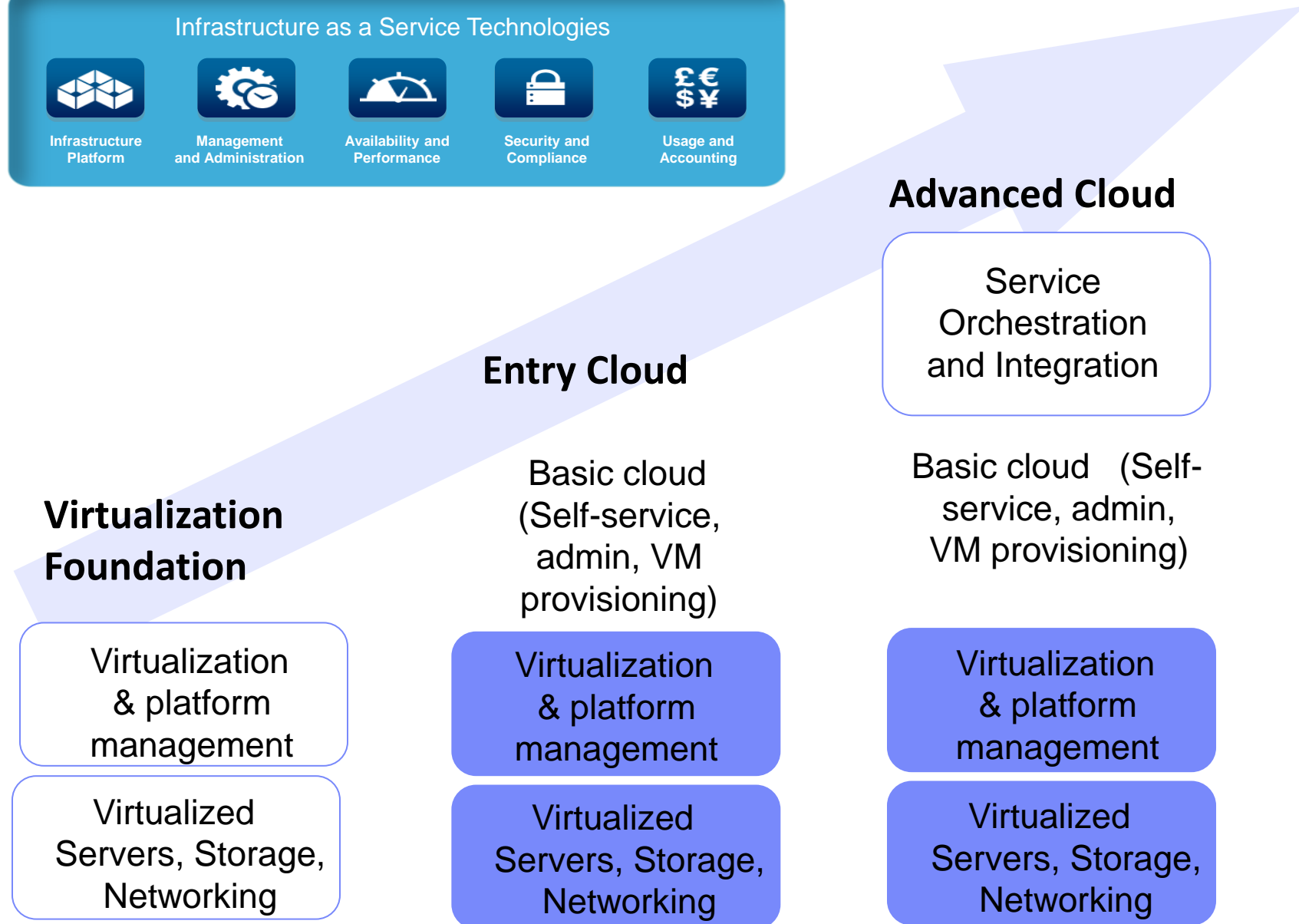driving **170,000 SAPS** and process **12,500 sales orders** per hour

*Click on image to view case study

GRACIAS

IBM

Backup Information

IaaS technologies enable private cloud creation but many clients are not sure where to start on the journey

Infrastructure as a Service Technologies

Infrastructure Platform

Management and Administration

Availability and Performance

Security and Compliance

Usage and Accounting

Advanced Cloud

Service Orchestration and Integration

Basic cloud (Self-service, admin, VM provisioning)

| Virtualization & platform management |
| Virtualized Servers, Storage, Networking |

Entry Cloud

Basic cloud (Self-service, admin, VM provisioning)

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Virtualization Foundation

| Virtualization & platform management |
| Virtualized Servers, Storage, Networking |

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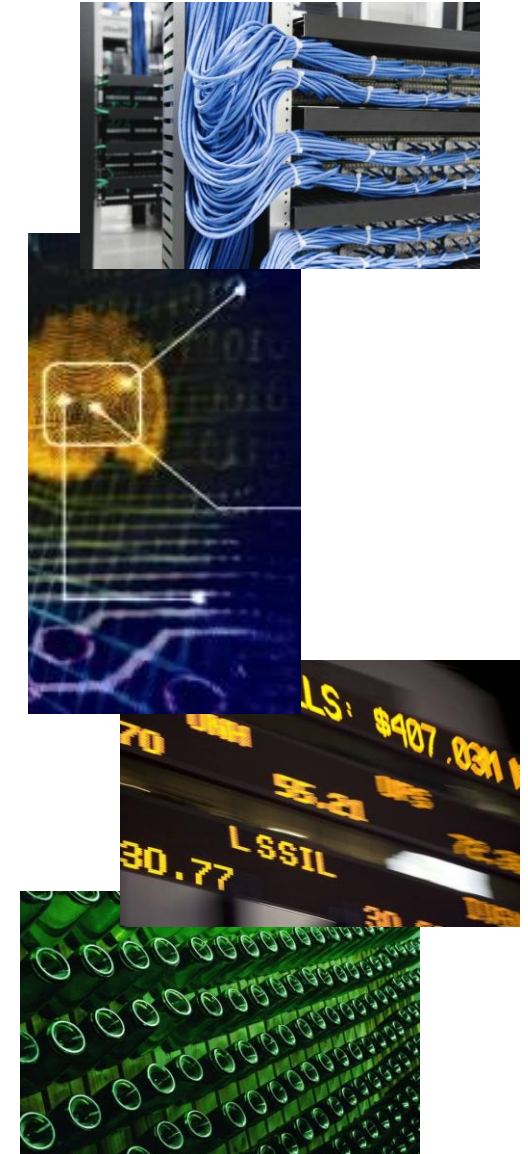
Cloud on Power Systems is …

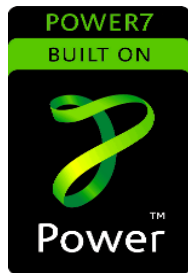**Secure** for isolated multi-tenancy of virtual servers

Scalable for your smallest to largest workloads

Dynamic for automated, optimum resource allocation and superior economics

Reliable for enterprise qualities of service across the cloud

Power is performance redefined

Deliver new services faster, with higher quality, and superior economics

PowerVM delivers superior scalability to maximize consolidation and cut IT costs

Scalability Factors	VMware ESX 4.0 *(in VMware vSphere 4.1)*	VMware ESXi 5 *(in VMware vSphere 5)*	PowerVM
Virtual CPUs per VM	8	32	256
Memory per VM	255 GB	1024 GB	8192 GB
Live VMs per server	320	512	1000
CPU threads per server	160	192	1024
Memory per server	1024 GB	2048 GB	8192 GB

PowerVM™

Source: http://www.vmware.com/files/pdf/products/vsphere/vmware-what-is-new-vsphere5.pdf

PowerVM delivers superior security to help manage risk and maximize availability

Risk Management Factors	VMware ESX 3.5 *(in VMware Infrastructure 3)*	VMware vSphere 4 & 5	PowerVM
Implementation of virtualization technology	Third-party software add-on	Third-party software add-on	Integrated into server firmware
Isolation of I/O drivers from hypervisor	No	No	Yes (using VIOS)
Built-in cross-platform virtualization support	No	No	Yes (using PowerVM Lx86)
Live migration across processor generations	No	Some (with Intel FlexMigration)	Yes (Power6-Power7)

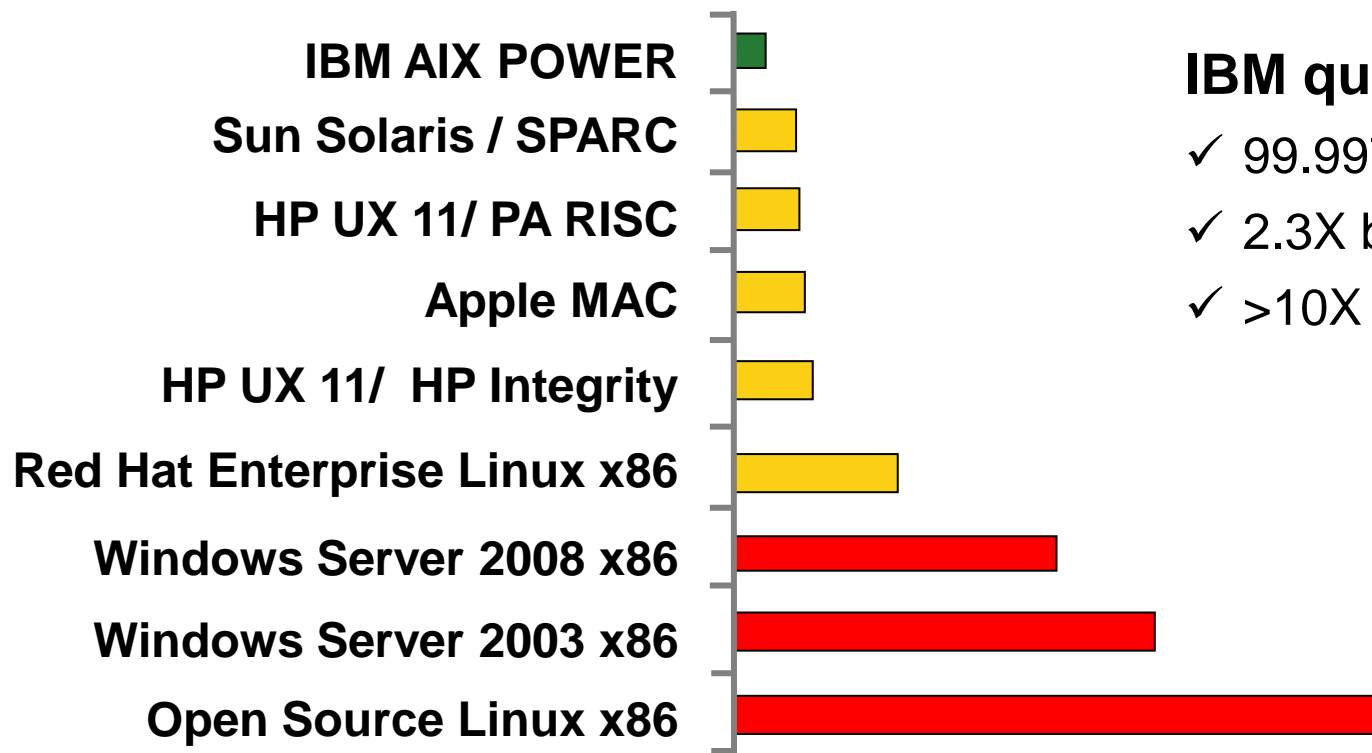**Source:** http://www.vmware.com/files/pdf/products/vsphere/vmware-what-is-new-vsphere5.pdf

Power is the most reliable enterprise platform

54% of IT executives and managers say that they require 99.99% or better availability for their applications

PowerVM™

Downtime (Hours per Year)

IBM AIX POWER
Sun Solaris / SPARC
HP UX 11/ PA RISC
Apple MAC
HP UX 11/ HP Integrity
Red Hat Enterprise Linux x86
Windows Server 2008 x86
Windows Server 2003 x86
Open Source Linux x86

IBM quality of service

✓ 99.997% uptime*

✓ 2.3X better than next UNIX

✓ >10X better than x86-based platforms

POWER7 BUILT ON Power™

Power Systems deliver superior RAS capabilities

PowerVM™

RAS Feature	Power Systems	x86
Application/Partition RAS		
Live Partition Mobility (vMotion)	Yes	Yes
Live Application Mobility	Yes	No
Partition Availability priority	Yes	No
System RAS		
OS independent First Failure Data Capture	Yes	No
Memory Keys (including OS exploitation)	Yes	No
Processor RAS		
Processor Instruction Retry	Yes	No
Alternate Processor Recovery	Yes	No
Dynamic Processor Deallocation	Yes	No
Dynamic Processor Sparing	Yes	No
Memory RAS		
Chipkill™	Yes	Yes
Survive Double Memory Failures	Yes	No
Selective Memory Mirroring	Yes	No
Redundant Memory	Yes	Yes
I/O RAS		
Extended Error Handling	Yes	No
I/O Adapter Isolation (PCI-Bus and TCEs)	Yes	No

See the following URLs for addition details:
http://www-03.ibm.com/systems/migratetoibm/systems/power/availability.html
http://www-03.ibm.com/systems/migratetoibm/systems/power/virtualization.html

PowerVM delivers firmware-based security

- Unlike x86-based products such as VMware, the PowerVM hypervisor is secure by design. IBM is the only vendor that has designed the virtualized environment from 'bare metal' through the hypervisor.

- PowerVM hypervisor is part of the digitally-signed firmware with strong cryptography which makes it impossible to remotely install a modified fileset into the EPROMs of Power Systems.

- There are zero vulnerabilities reported against PowerVM by US CERT or by MITRE Corporation

- PowerVM is certified at a CC Evaluated Assurance Level 4+

Remember, zero is a number too …
a very good number in the Security domain.

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