Audit My OpenStack Cloud!!

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Abstract

- Organizations are moving towards cloud technologies for scalability, cost reduction, and new service offerings. Tackling all security and compliance issues that come up in this environment seems daunting due to varied proprietary cloud technologies in the market. OpenStack cloud technologies developed as a global collaboration effort across several service providers and developers benefit the consumers with open standards and quick adoption addressing security compliance better. A potent combination of factors, including the growth of IT, widespread media attention, and even geopolitical tensions, have spurred governments to push for more legal requirements, stricter regulations, and increased enforcement. Business data must be archived in accordance with very strict regulatory rules, and data is often required to be stored in unalterable form for the life of the product and beyond

- This session brings real life examples of the customers that are using open stack cloud technology to their advantage where IBM has been instrumental in providing a compliant cloud using private cloud based on OpenStack. This compliant cloud provides integrated document management, quality management, training management , Incident Problem & Change Management and automated testing tools. Come and learn how this is creating an excitement in the market that was struggling with its stringent demands and expensive support infrastructure.

Why do we write this?

Motivation -

- Enterprises are adopting cloud and open standards at rapid pace to realize benefits of flexibility, pay as you go, faster time to market and elastic growth

- Moving workloads to cloud involves moving on-premise data and workloads with clearly defined security controls to where the cloud service provider hosts the environment

- Regulatory Controls in specific industries such as Life Sciences strictly address where workloads and data reside, document and validate how it gets created/used and ready to provide proof on who accesses it

- Failure to address these control points upfront will result in non compliance, huge penalties and exposure
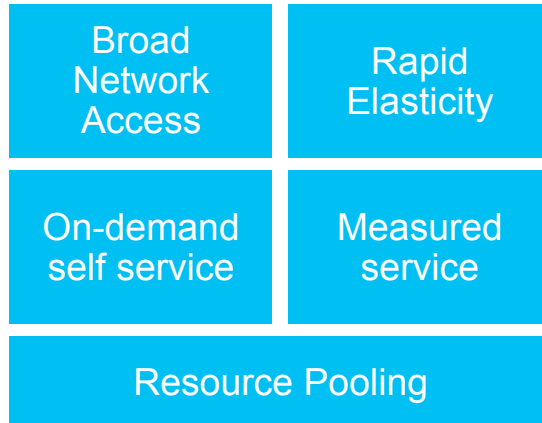
How Failure can happen

1. **Not able to track what application is running where**. Cloud infrastructure is supposed to be data center agnostic, but this is a strict NO for regulated workloads!! Audit compliance looks for data on what is running where

2. **Not able to predict how cloud behaves**. Cloud agility is to "autoscale" and move things around based on workload performance. That's a red flag to regulators!!

3. **Not able to manage adhering to documented controls**. Managing run time per documented controls can not always happen in cloud due to new features added every day
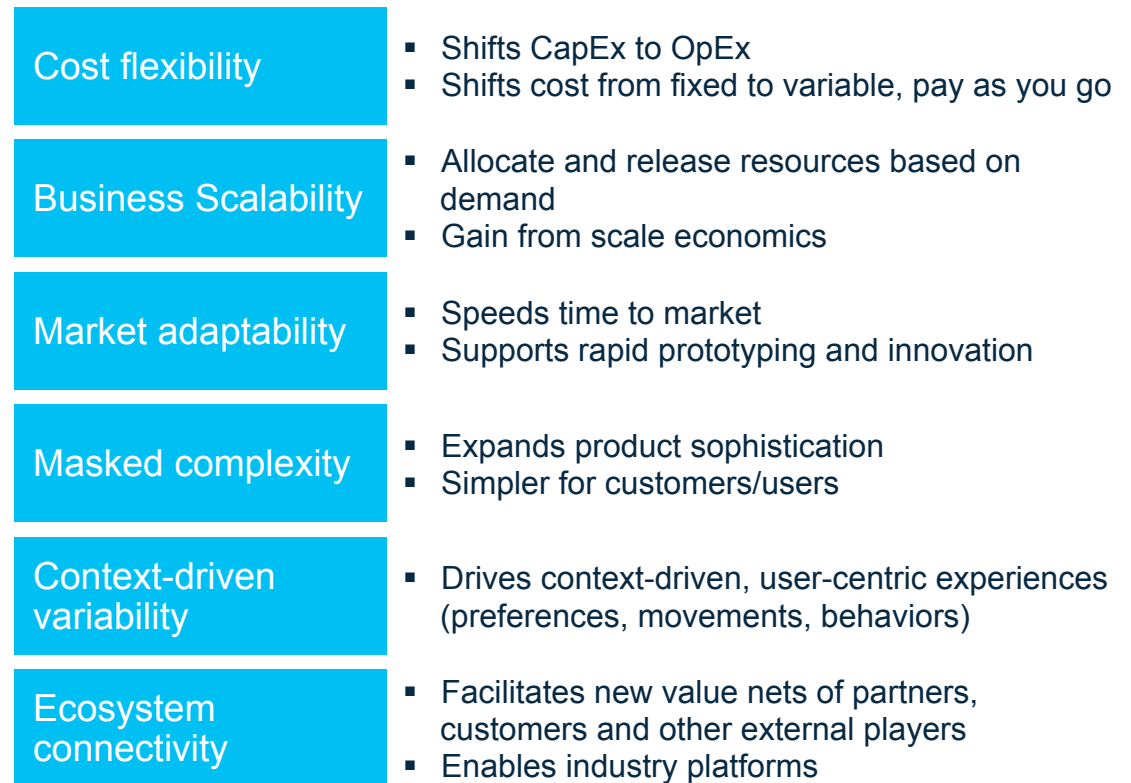
Cloud Computing Drivers

Cloud computing is a pay-per-use consumption and delivery model that enables real-time delivery of configurable computing resources (for example, networks, servers, storage, applications, services).

Cloud's essential characteristics

Broad Network Access	Rapid Elasticity
On-demand self service	Measured service
Resource Pooling	

Cloud empowers six potentially "game changing" business enablers

Cost flexibility	▪ Shifts CapEx to OpEx ▪ Shifts cost from fixed to variable, pay as you go
Business Scalability	▪ Allocate and release resources based on demand ▪ Gain from scale economics
Market adaptability	▪ Speeds time to market ▪ Supports rapid prototyping and innovation
Masked complexity	▪ Expands product sophistication ▪ Simpler for customers/users
Context-driven variability	▪ Drives context-driven, user-centric experiences (preferences, movements, behaviors)
Ecosystem connectivity	▪ Facilitates new value nets of partners, customers and other external players ▪ Enables industry platforms

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Cloud Compliance for SoftLayer Cloud

- SoftLayer is compliant with major industry and regulatory standards

SoftLayer Manages To:

US NIST SP800-53 standard

SAFEHARBOR
US DEPARTMENT OF COMMERCE

SoftLayer Compliance Demonstrated Through (~):

AICPA SOC

PCI DSS COMPLIANT

ISO 27001 Certified

PCI DSS v3.0 AOC for Physical Security

Supported Workloads Include

PCI Security Standards Council

HIPAA

FFIEC

FDA

European Commission

GxP

EU Data Privacy

Targeted for 2015

FISMA

FedRAMP (*)

What is OpenStack

- OpenStack is a non-profit Cloud Computing organization
- OpenStack develops Infrastructure as a Service (IaaS) software
- The software is open source (released under the Apache license)
- The software is primarily developed on Linux
- The software is portable to other operating systems
- OpenStack technology is a series of interrelated projects for
  - Compute (Processing)
  - Storage
  - Networking
  - Web-Based Management Interface , Others
- OpenStack is managed via the OpenStack Foundation

Why Open Standards for Cloud

A 2012 report by Booz & Company, *Standardizing the Cloud: A Call to Action*, noted that the adoption and effectiveness of cloud computing is being limited by a number of challenges, **chief among them being a lack of standards.**

- Today's solutions are inconsistent, incompatible, everything's a one-off!

- Cloud is in its initial ascent .. a transformational technology like …
  - Mainframe, Client/Server, .com, now Cloud!

- No one has taken leadership yet, it's not first to market that wins
  - Early Browser – Netscape Navigator
  - Early Word Processor – Wang, Wordstar
  - Early Spreadsheet – Lotus 123, VisiCalc
  - Early Video Playback Format – VHS, Betamax

4 key Benefits of Open Standards to Customers

1. Flexibility to port workloads freely across many delivery models in a modular fashion
2. Quality of Open source products developed, well tested and released by broad community. Further enables quick bug fixes and faster release cycles
3. No vendor lock in significantly reducing acquisition costs
4. Community based collaboration across developers from many enterprises producing innovative features and functions

One big challenge for enterprises is support and integration of the Open products by skilled personnel
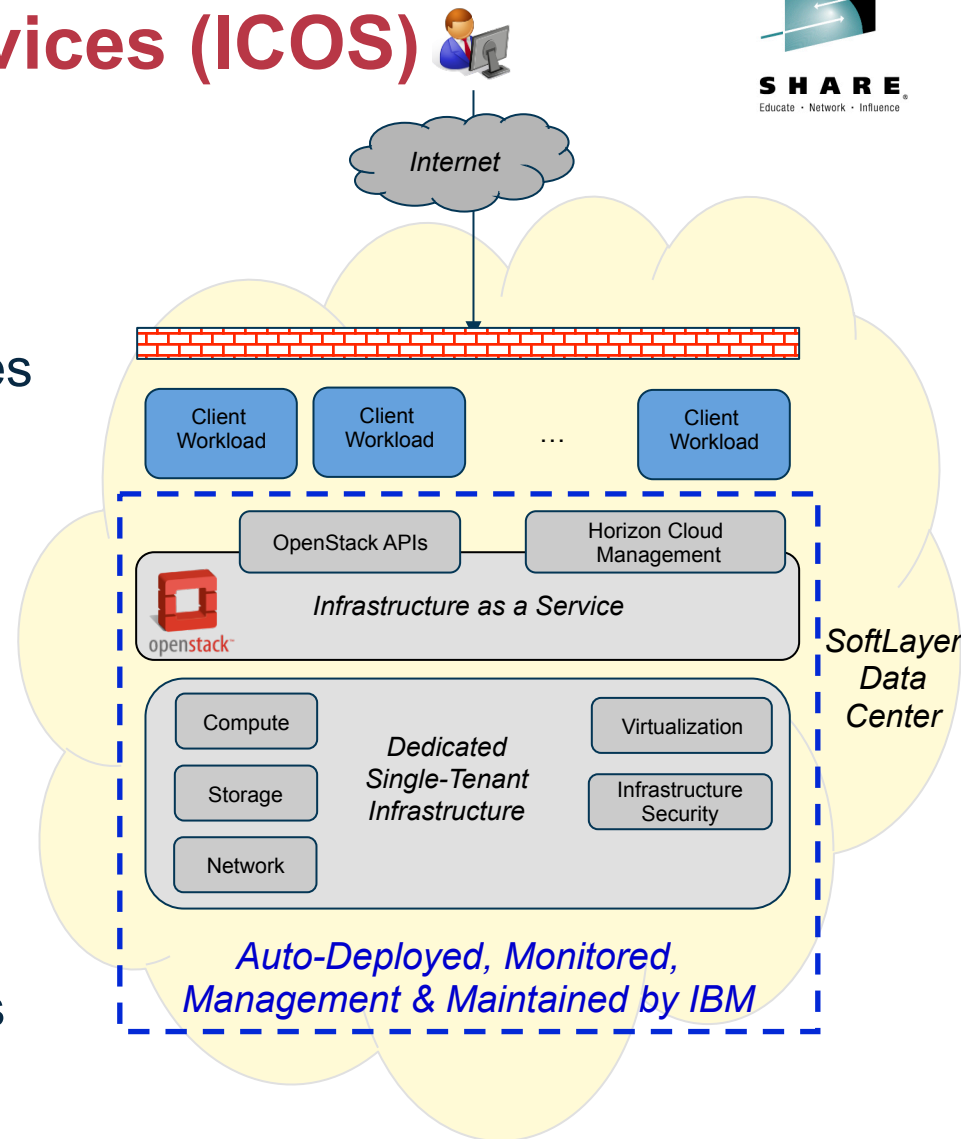
IBM Cloud OpenStack Services (ICOS)

- IBM's adoption of Open technologies based cloud offering
- Provides enterprise level support to customers with proven IT best practices
- Software Defined Networking(SDN) based Networking for BYOIP
- Pre-packaged IBM-provided software load balancer
- Auto scaling to scale infrastructure up/down based on demand
- OpenStack distribution for compute, storage, images, user management and IT Metering
- Customers can bring their own images (BYOI) and licenses (BYOL)

Internet

Client Workload | Client Workload | ... | Client Workload

OpenStack APIs | Horizon Cloud Management

Infrastructure as a Service

openstack

SoftLayer Data Center

Compute | *Dedicated Single-Tenant Infrastructure* | Virtualization

Storage | | Infrastructure Security

Network

Auto-Deployed, Monitored, Management & Maintained by IBM

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Security and Compliance in an OpenStack Cloud

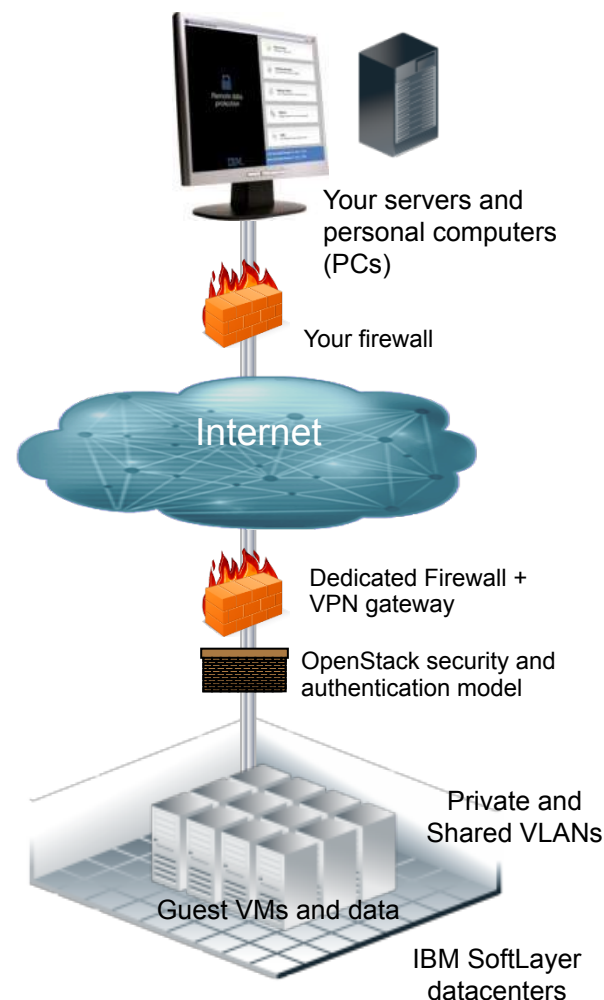**Dedicated Guest infrastructure**
- Compute nodes, the hypervisor and the Guest VMs on it are dedicated to single customer with FW separation at each tier
- Secure VPN Connectivity using IPSec and SSH based authentication

Admin Access
- Admin access interfaces is controlled over secure HTTP and Role Based Access Control audited for actions and operations

Compliant Data centers
- Enabled on Softlayer Data Centers adhering to ALL regulatory Compliance Certifications

Your servers and personal computers (PCs)

Your firewall

Internet

Dedicated Firewall + VPN gateway

OpenStack security and authentication model

Private and Shared VLANs

Guest VMs and data

IBM SoftLayer datacenters
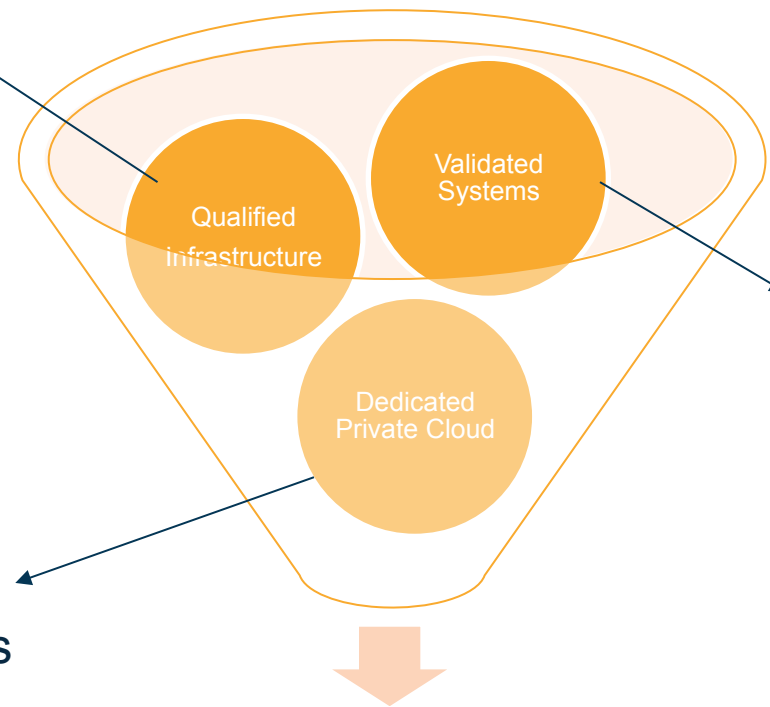
Life Sciences Customer Cloud Requires Additional GxP (Good "x" Practices) Compliance

Infrastructure provisioned is verified meeting defined specs by performing tests and documenting results for Audit

Documented evidence that IT system and defined process consistently produces same results with quality attributes

Qualified Infrastructure

Validated Systems

Dedicated Private Cloud

Secure single tenant private cloud with authorized and authenticated access controls

GXP Compliance

Benefits of OpenStack Cloud to Life Sciences Customers

Efficient R&D through collaboration

- Allows rapid and reliable information sharing
- Extends knowledge and data networks
- Reduces risk associated with compliance and delivery of compliant infrastructure

Cost reduction and streamlined operations

- Increases resource utilization
- Simplifies processes, reducing administration cost
- Integrates data silos and optimizes information flow

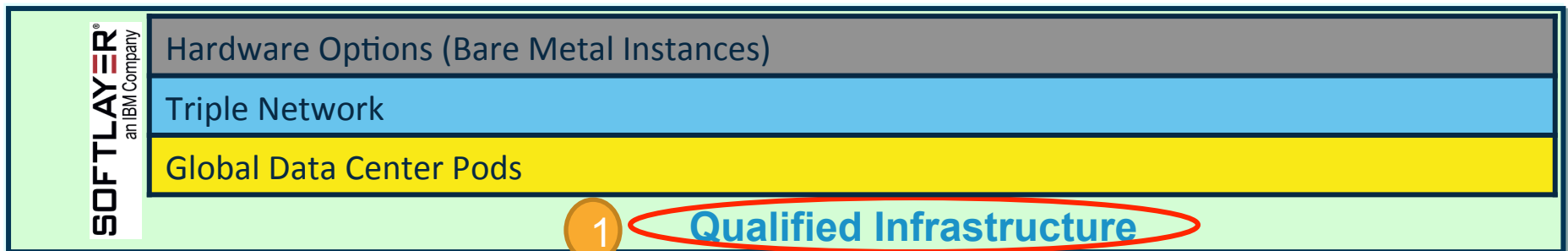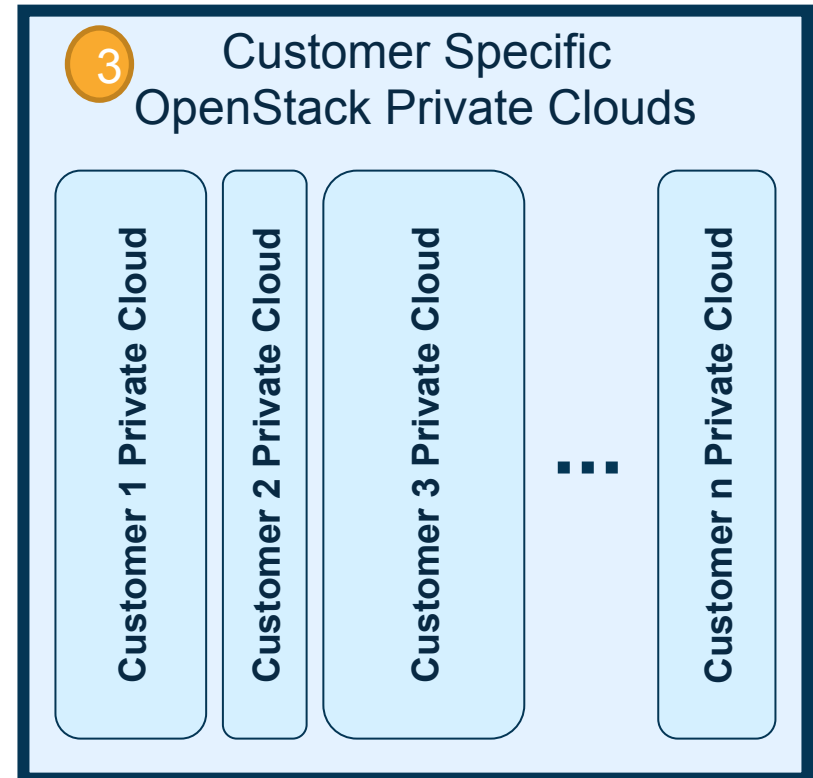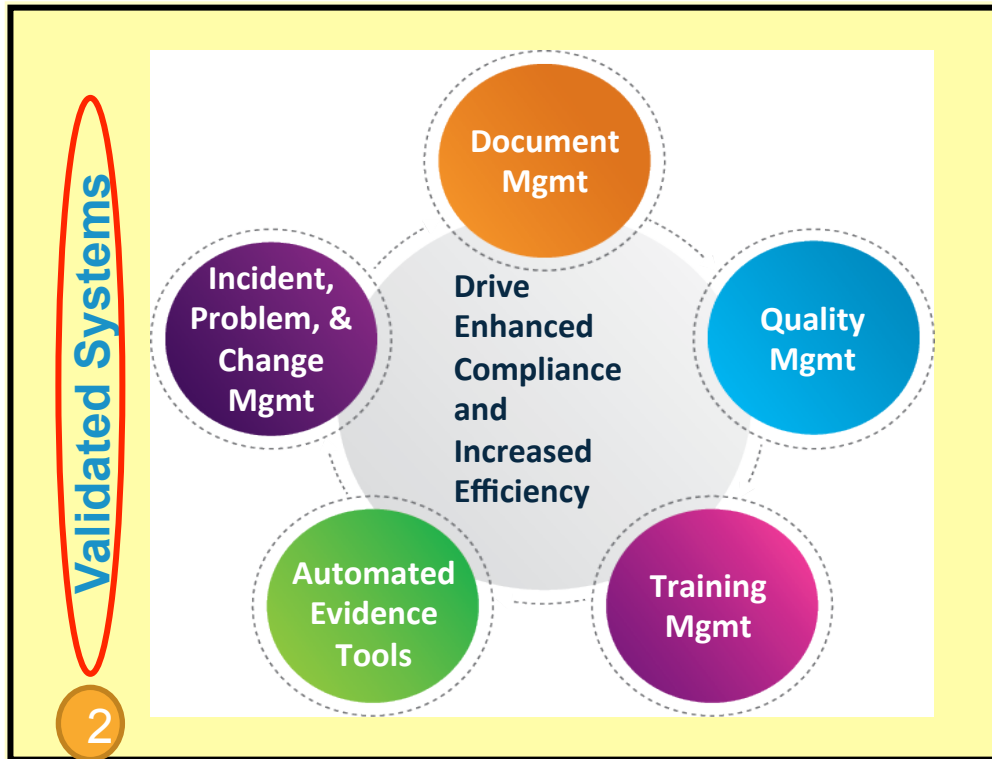### Accelerates innovation and unlocks value

- Resets focus on scientific innovation; reduces time spent on transaction work
- Facilitates new, multi-nodal business models
- Unlocks tremendous value through use of analytics

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GxP Compliant OpenStack Cloud And Customer Usage Patterns

Validated Systems

Drive Enhanced Compliance and Increased Efficiency

- Document Mgmt
- Quality Mgmt
- Training Mgmt
- Automated Evidence Tools
- Incident, Problem, & Change Mgmt

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3 Customer Specific OpenStack Private Clouds

- Customer 1 Private Cloud
- Customer 2 Private Cloud
- Customer 3 Private Cloud
- ...
- Customer n Private Cloud

SOFTLAYER an IBM Company

Hardware Options (Bare Metal Instances)

Triple Network

Global Data Center Pods

1 **Qualified Infrastructure**

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Summary and Recommendations

1. Transparency of Cloud infrastructure and views of customers run time environment details is mandatory to provide required Auditability for secure workloads

2. Documented best practices with prior experience of providing service delivery in regulated environments is a CRITICAL success factor for Cloud Service providers

3. Skills and on going investment into Open Standards and OpenStack assets is a MUST for lifecycle support of Cloud Iaas

4. IBM Compliant Cloud offering using OpenStack Cloud Services delivers Secure Cloud Iaas to Customers

About the Authors

Biographical Sketch: Prabhakar Attaluri is an IBM Distinguished Engineer and CTO for Cloud Solutions Management, He has more than 18 years experience in systems integration, solution architecture, service management and business process re-engineering. In his current role, he is responsible for developing technical strategy for SmartCloud offerings, establishing service definitions and ensuring IBM's cloud offerings meet market place needs. He is a certified IT Architect and frequently meets with customer CxO's presenting and providing early engagement guidance.

Biographical Sketch: Vinod Chavan is an Executive in IBM Cloud division responsible for building solutions for complex business challenges using new technologies. He is currently leading the development of solutions in the compliance space addressing significant regulatory requirements like GxP, ITAR and others that will offer advantages of cloud technologies to the clients. Vinod has been working with OpenStack as well as proprietary cloud technologies to build these solutions working with client business use cases. These solutions are designed for the end users with configurable flexibility to create new business scenarios with a cushion against the ever changing technologies. He earned his masters degree in Industrial Engineering and Operations Research from Indian Institute of Technology, Mumbai, India. Vinod has held positions with various technical and management responsibilities at IBM and other Fortune 100 companies like GTE (Verizon), Siemens, and Glaxo Pharmaceuticals.

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