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A Survey of Advances in Cloud Computing Interoperability

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Joint Techs

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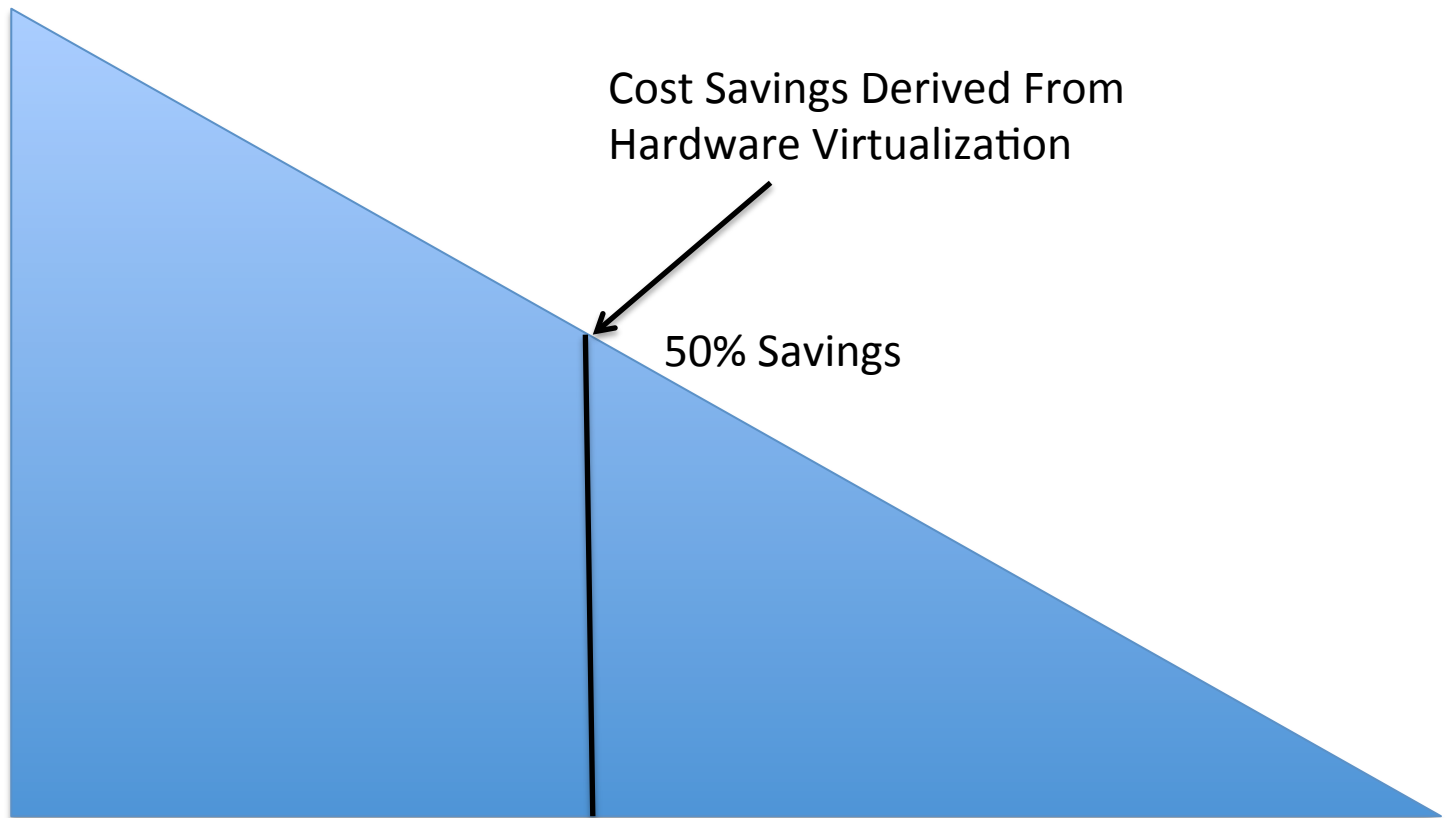
Today's Topics

- NIST
- Distributed Management Task Force (DMTF)
- IEEE

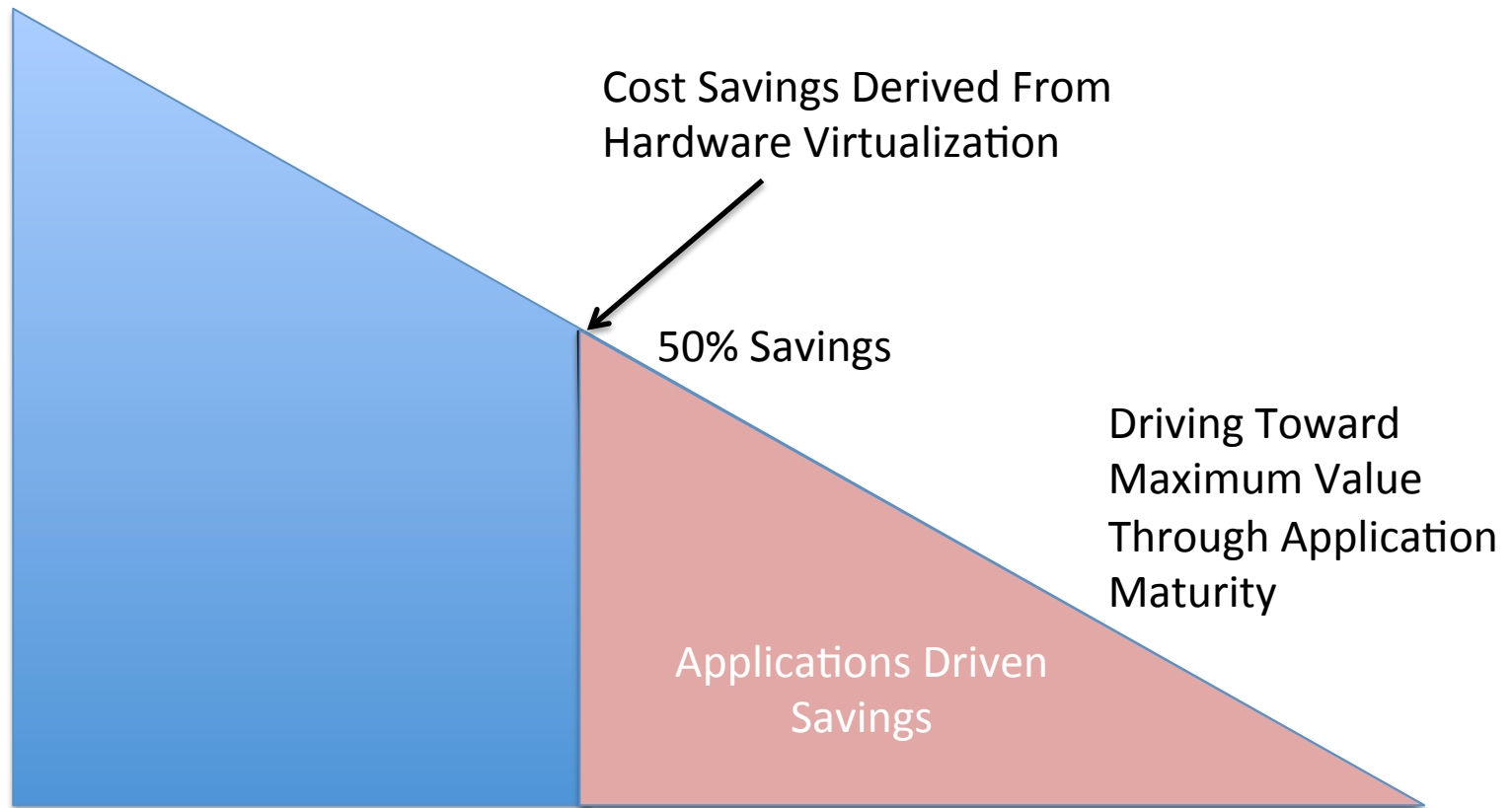
Some First Thoughts

- How much is the Cloud really buying us?
 - Virtualization does allow some cost savings in hardware and operating costs. Most of these have already been realized.
 - Many applications are not cloud ready
 - Licensing models are not mature enough yet to take advantage of multitenant environments

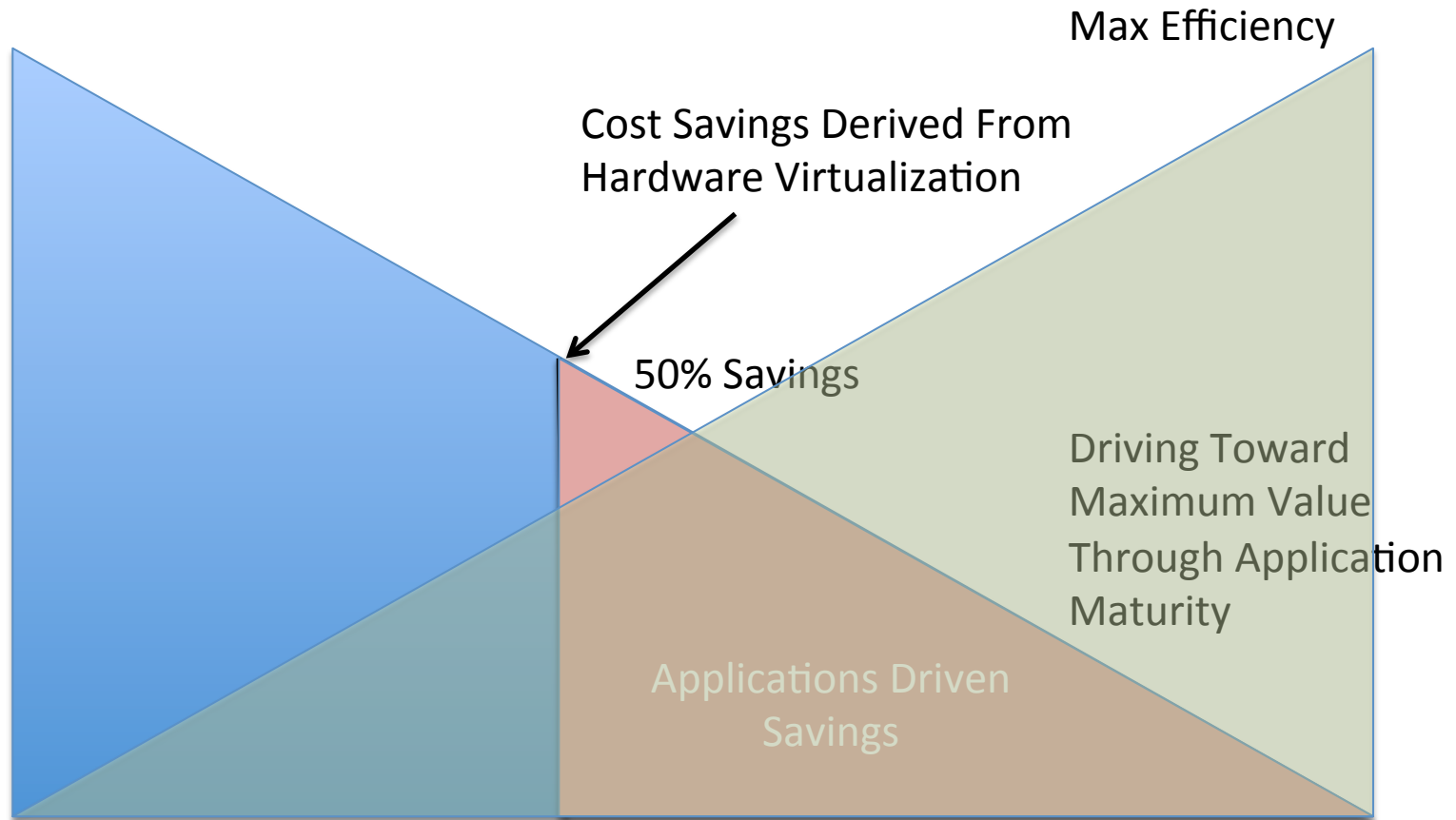
Virtualization Driven Cost Savings and Performance Improvements



Next Round of Savings and Performance Improvements Belong to Cloud Ready Applications



Improved Performance & Reliability Through Apps Architecture and Reuse



What is Cloud Computing?

Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. This cloud model promotes availability and is composed of five essential **characteristics**, three **service models**, and four **deployment models**. - *The NIST Definition of Cloud Computing*

What is Cloud Computing?

Cloud computing is a style of computing using scalability, elasticity and Internet technologies. – *Gartner*

Essential Characteristics

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

Service Models

- SaaS – Consumer uses providers application; has no access to underlying infrastructure/ services except minor configuration
- PaaS- Consumer deploys application on providers tools/OS
- IaaS- Storage, compute and network resources provided by provider; consumer can deploy apps, OS and appliances such as firewall

Deployment Models

- *Private cloud.* The cloud infrastructure is operated solely for an organization. It may be managed by the organization or a third party and may exist on premise or off premise.
- *Community cloud.* The cloud infrastructure is shared by several organizations and supports a specific community that has shared concerns (e.g., mission, security requirements, policy, and compliance considerations). It may be managed by the organizations or a third party and may exist on premise or off premise.
- *Public cloud.* The cloud infrastructure is made available to the general public or a large industry group and is owned by an organization selling cloud services.
- *Hybrid cloud.* The cloud infrastructure is a composition of two or more clouds (private, community, or public) that remain unique entities but are bound together by standardized or proprietary technology that enables data and application portability (e.g., cloud bursting for load-balancing between clouds).

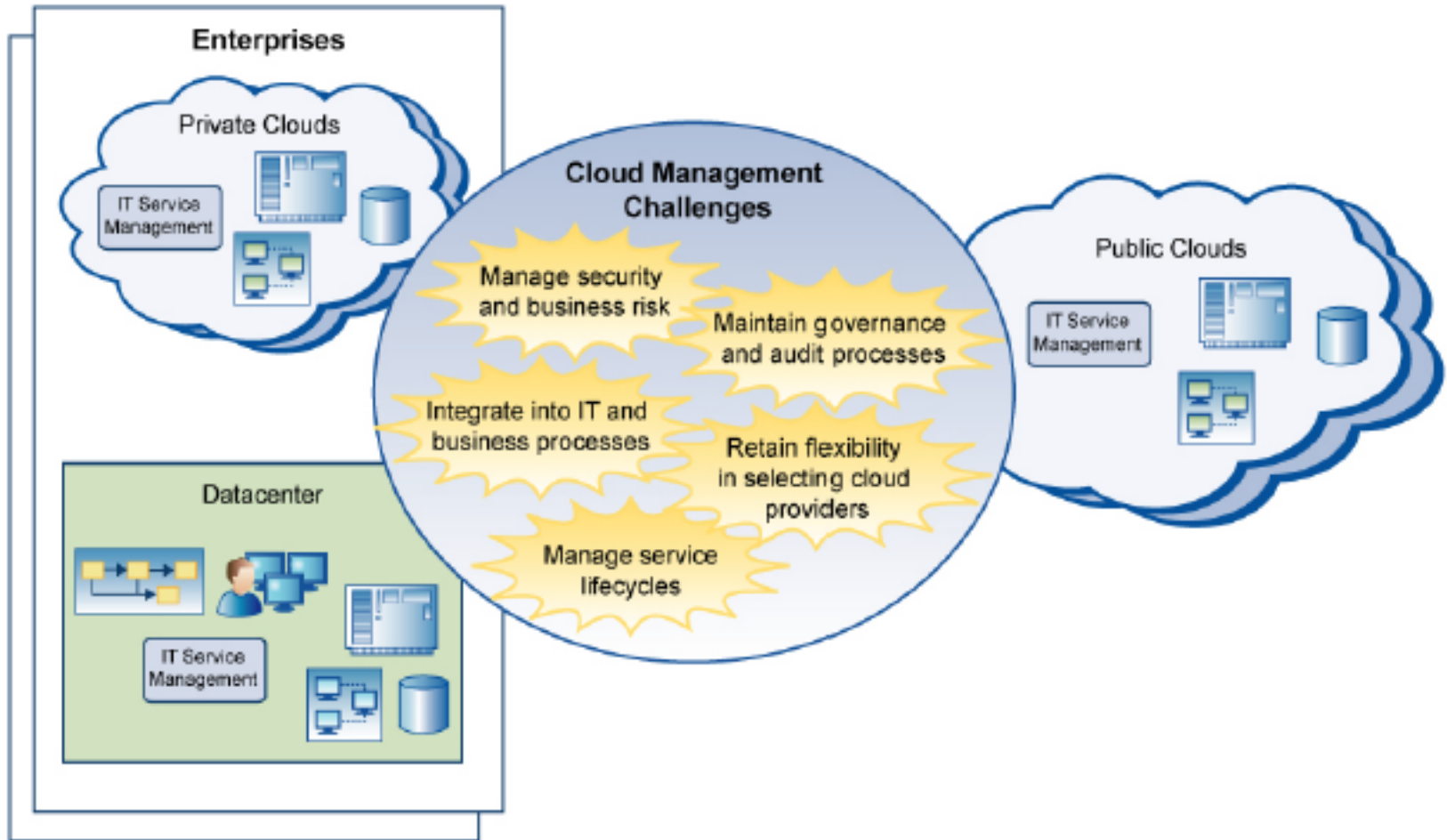
DMTF

- Interoperable Clouds - A White Paper from the Open Cloud Standards Incubator
- Sets up reference architecture
- Describes user/provider interface
- Describes use cases

Problem(s) in a Nutshell

- How do I integrate computer, network, and storage services from one or more cloud service providers into my business and IT processes?
- How do I manage security and business continuity risk across several cloud providers?
- How do I manage the lifecycle of a service in a distributed multiple-provider environment in order to satisfy service-level agreements (SLAs) with my customers?
- How do I maintain effective governance and audit processes across integrated datacenters and cloud providers?
- How do I adopt or switch to a new cloud provider?

Problem(s) in a Nutshell



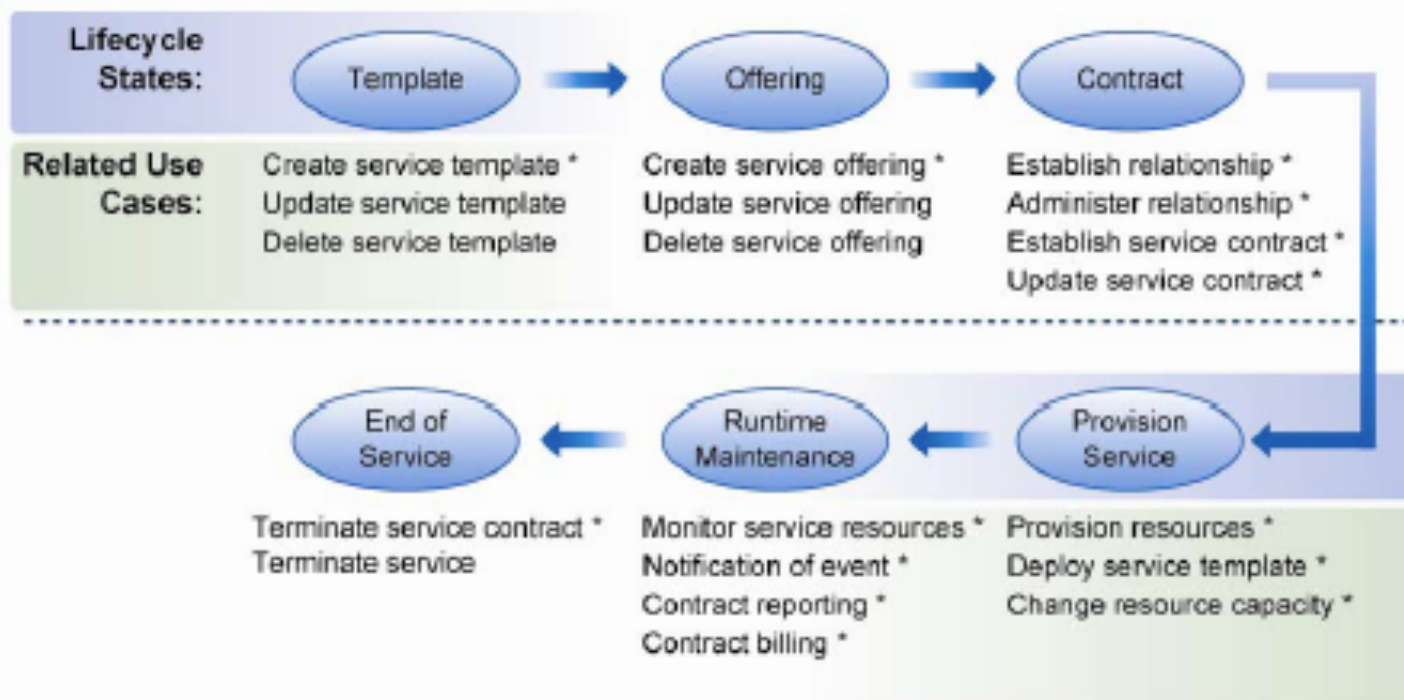
Use Cases

- Cloud Portability (Multiple Providers)
- Federated Cloud Providers
- Adapting Services to Changing requirements

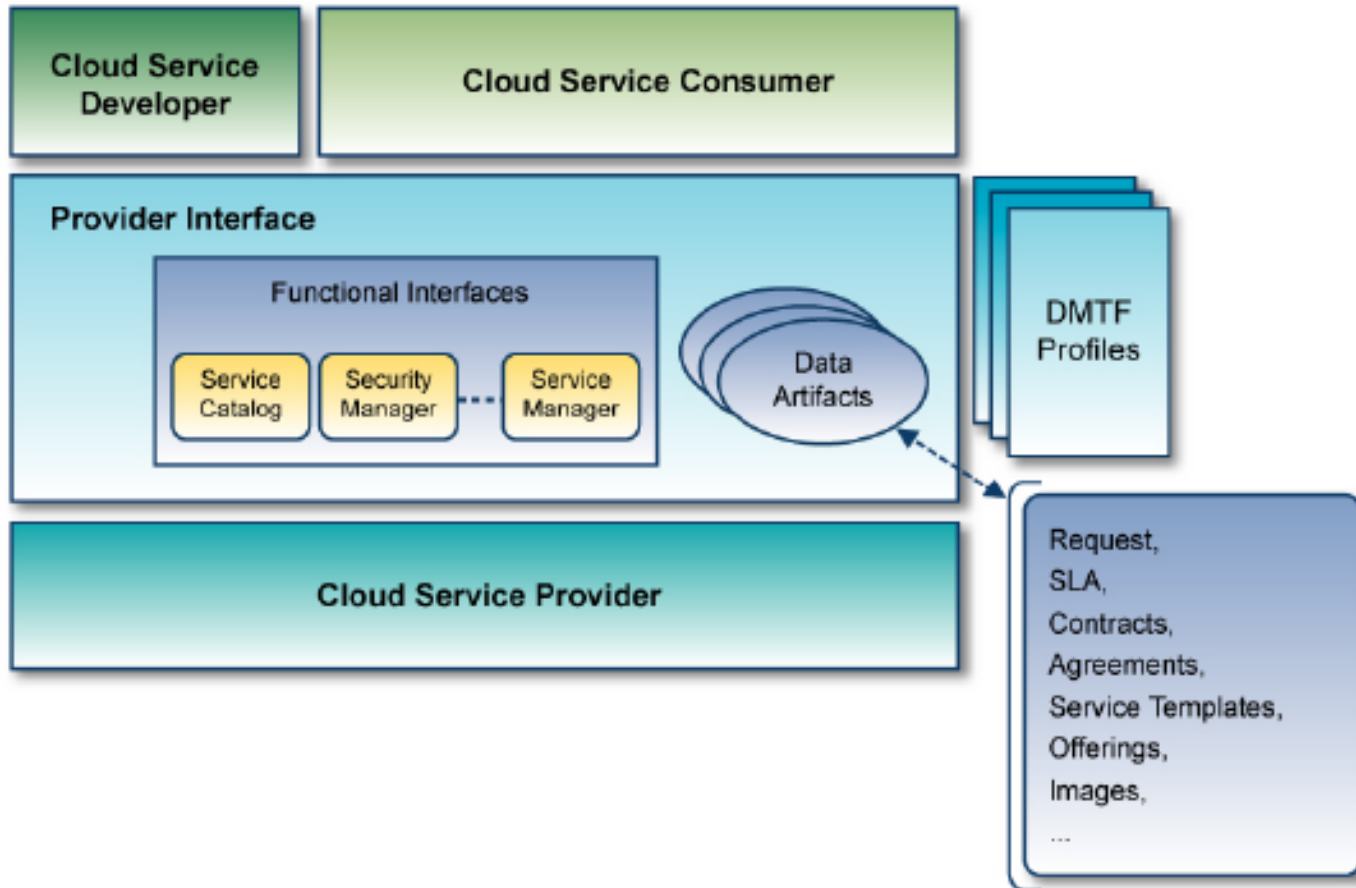
Provider Interface

- Functional Interfaces
 - Service Catalog
 - Security Manager
 - Service manager
- Data Artifacts
 - XML exchanged over Functional Interfaces
- DMTF Profiles
 - DMTF profiles are normative specializations or extensions of the interfaces and artifacts, or combinations of them, which are useful in addressing certain contexts, such as those of interest to a security manager or a contract billing administrator

Lifecycle



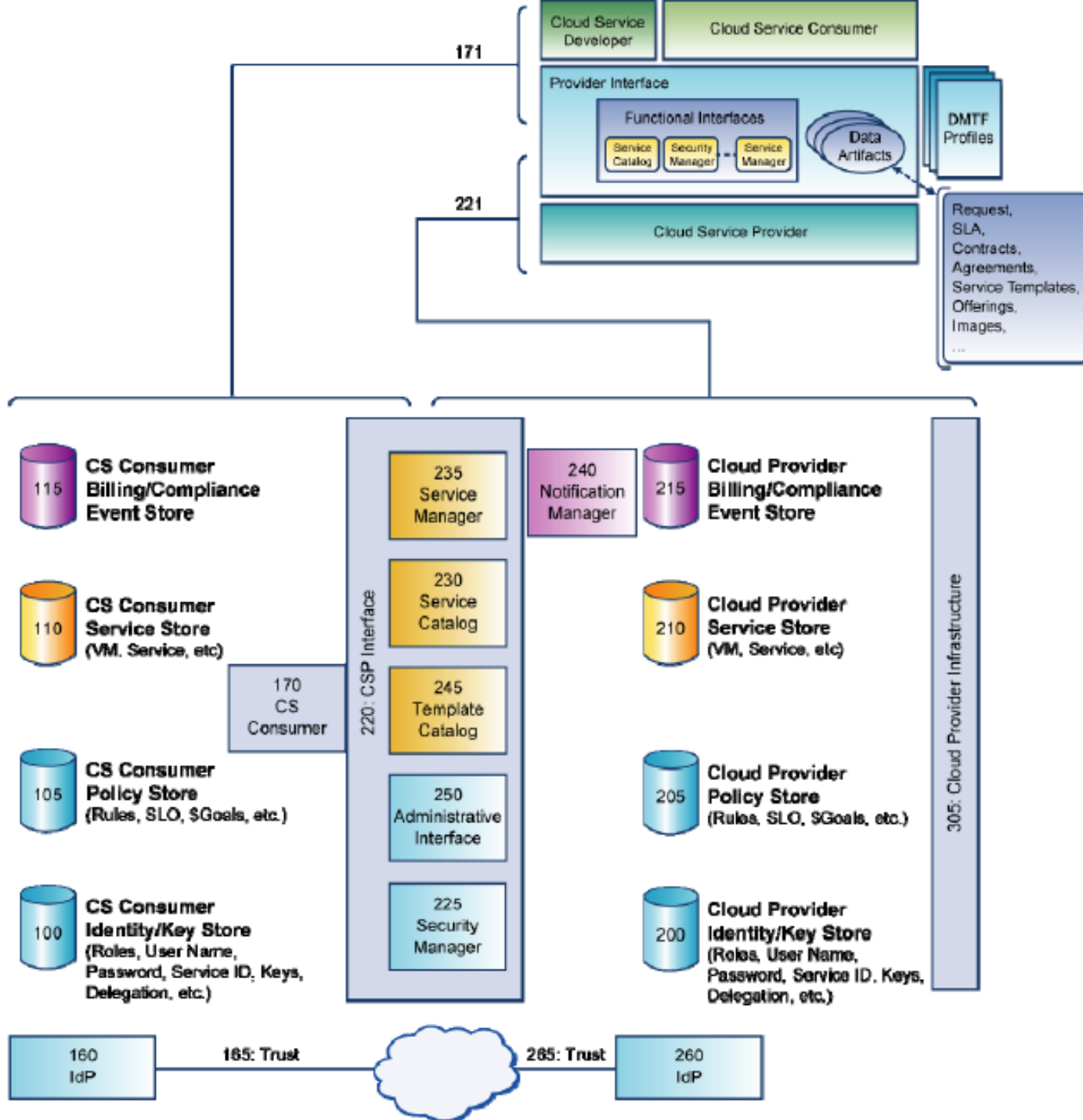
Reference Architecture

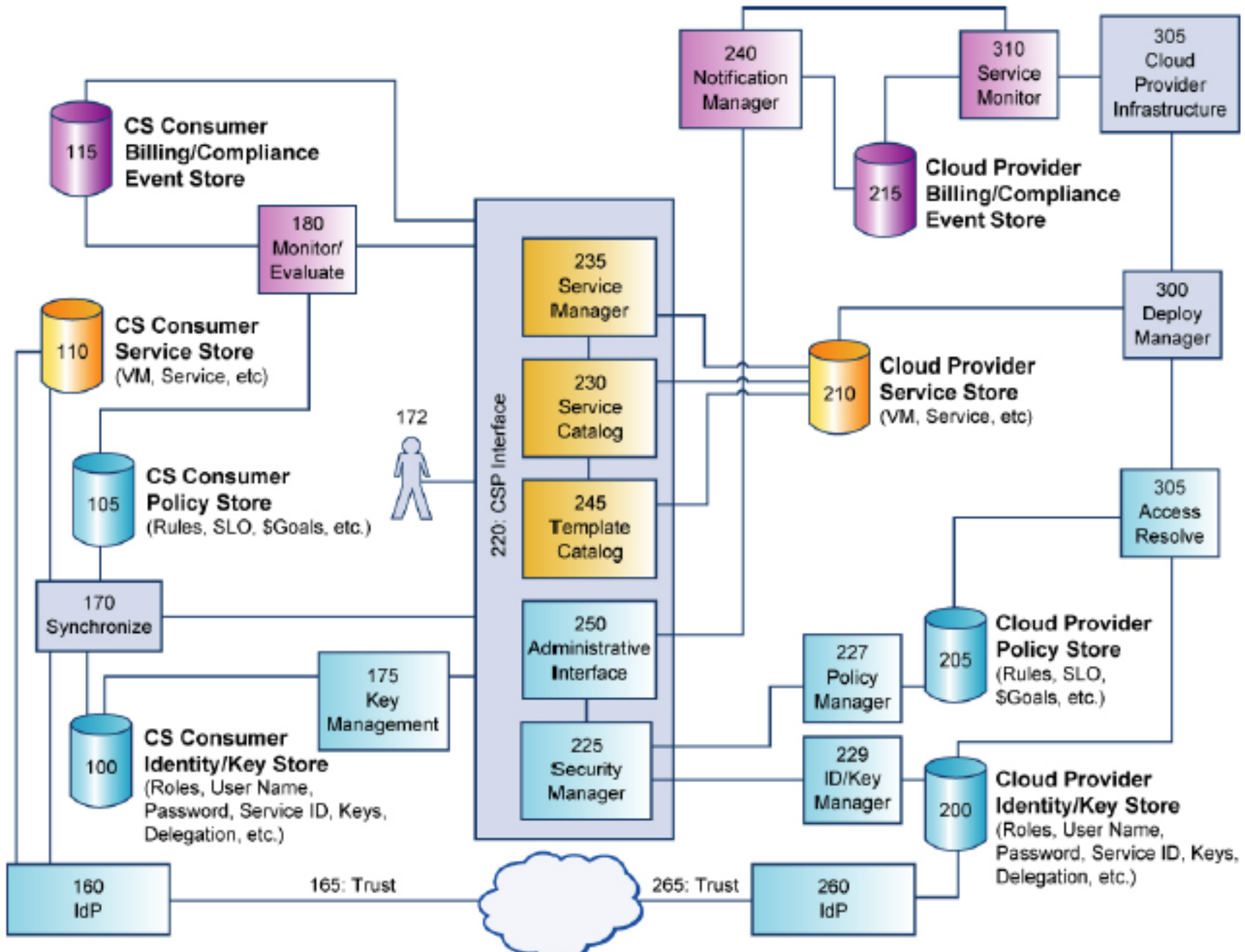


Source: DSP-IS0101 Interoperable Clouds - A White Paper from the Open Cloud Standards Incubator

Message Exchange Pattern (MEP)

- Commonly used protocols
 - HTTP
 - RPC, REST
- One Way
 - Push, Pull
- Two Way
 - Push, Pull
- Web Services Make Connection V1.1
- OASIS ebXML Messaging Services Version 3.0





Virtual Open Format

- Current Specification
 - Document DSP0243
 - V1.1.0

OVF Package

- OVF Package Structure
 - one OVF descriptor with extension .ovf
 - zero or one OVF manifest with extension .mf
 - zero or one OVF certificate with extension .cert
 - zero or more disk image files
 - zero or more additional resource files, such as ISO images
 - May be stored as single unit (TAR format (.ova)) or multiple files

OVF Descriptor

- dsp8023_1.1.0.xsd XML schema
- One Envelope element allowed at top level
- Describes all metadata for VMs (down to virtual hardware) as well as all information regarding structure of the OVF package
- Descriptions of one or more VMs that make up the instance

IEEE

- P2301 Cloud Portability and Interoperability Profiles (CPIP)
- P2302 (Standard for Intercloud Interoperability and Federation)
- Both started in April 2011
- Both have not yet had first meeting as of the creating of this presentation
- Allegedly will build on rather than compete with DMTF and others

Credits

- Unless otherwise noted all graphics are from *Architecture for Managing Clouds, DSP-IS0102*

Bibliography and Further Reading

DMTF DSP0243, *Open Virtualization Format Specification 1.0*,

[http://www.dmtf.org/standards/
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NIST Definition of Cloud Computing,

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DMTF DSP-IS0101, *Interoperable Clouds, A White Paper from the Open Cloud Standards Incubator 1.0*, http://www.dmtf.org/standards/published_documents/DSP-IS0101_1.0.pdf

DMTF DSP-IS0103, *Use Cases and Interactions for Managing Clouds, A White Paper from the Open Cloud Standards Incubator 1.0*, http://www.dmtf.org/standards/published_documents/DSP-IS0103_1.0.pdf

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- DMTF DSP-IS0102, Architecture for Managing Clouds, A White Paper from the Open Cloud Standards Incubator 1.0, http://www.dmtf.org/standards/published_documents/DSP-IS0102_1.0.pdf