Cloud Computing and SOA from Enterprise Perspective

Yan Zhao, PhD ArchiTech Consulting LLC <u>yan.zhao@architechllc.com</u> www.architechllc.com Oct., 2009

Content Summary

- The evolution of IT and IT infrastructure, as well as related business impact
- Concepts and relationships: Enterprise Architecture (EA), Service Oriented Architecture (SOA), Service Oriented Enterprise Architecture (SOEA), Service Oriented Infrastructure (SOI), Service Oriented Enterprise (SOE), Cloud Computing
- Cloud computing model elaboration
- The relationships of cloud computing with service orientation and other prior-art
- The impact of service orientation to an enterprise
- SOI and cloud computing in SOE (cloud computing continues SOE evolution)
- A SOI Framework, and its relationship with ITIL

The Evolution of IT and IT Infrastructure

IT in Business

Past

- Operation support
- Individual project based decision
- Ad hoc and technology driven implementation

Current Trend

- Involved into business strategies and decisions (the agility of business depends heavily on the flexibility of IT for automation)
- Have long-term blueprint and big pictures as guidance (strategic plan and EA)

IT Infrastructure

Past

- Hardware, software, network components
- Infrastructure silos

Current Trend

- IT infrastructure is a line of business; is a segment in Enterprise Architecture
- Service Oriented Infrastructure (infrastructure as a commodity service)
- Cloud Computing (promoted by Federal CIO, facilitated by industries)

Business Evolution Associated with IT



Enhanced IT Role in Business

Concepts: EA, SOA, SOEA, SOI, SOE, Cloud Computing

- Enterprise Architecture (EA): is an established discipline that deals with architectures in enterprise scope. It's a subject domain that is independent of approaches and methodologies for its development and presentation
- Service Oriented Architecture (SOA): is an architecture style and approach that emphasizes well-defined, loosely coupled, and sharable services
- Service Oriented Enterprise Architecture (SOEA): EA modeling with serviceoriented style and approach
 - EA provides SOA with an enterprise view
 - SOA as a practical modeling approach for appropriate part of EA development, which enables solution architectures and implementation by layered service components across business, application, and technology.
- **Service Oriented Infrastructure (SOI):** apply service orientation to IT infrastructure
- Service Oriented Enterprise (SOE): is an enterprise that applies service orientation to its full scope business management and operations where appropriate.
- Cloud Computing: is a computing model in which dynamically scalable and ondemand resources are provided as services from location independent resource pool via shared network.

Relationships: EA, SOA, SOEA, SOE, SOI, Cloud Computing

- SOA needs to be enabled by Service Oriented Enterprise (SOE), where Service Oriented Enterprise Architecture (SOEA) helps. Cloud Computing is a SOA implementation in IT infrastructure (part of SOI) where to provide commodity services
- SOEA is one way to develop EA, but not the only way, not cover the entire scope of EA either.
- One major characteristic of SOA is loosely coupling. EA provides guidance, but shouldn't restrict in component flexibility.

The Progress in Federal Enterprise Architecture

Federation

- The federation model fits federal government organization structure
- It provides horizontal partition to the complete EA domain

Segmentation

- Segments are defined based on the lines of business (LoB)
- It provides vertical partition to the complete EA domain

Service Orientation

- As an architectural style and approach, is well adopted in architectural practice.
- A practical approach for architecture development and implementation

Cloud Computing

- It fits the paradigm of service orientation with loosely coupled and sharable resources
- It further enhances segmentation and federation implementation by enabling shared services and resources across organizations and segments

Cloud Computing

- It is an evolution and re-packaging from what we have experienced already, is not a new technology, but is a new practice mechanism
- Prior-Art: Grid computing, utility computing, virtualization, SOA, SOI, Web Service, Application Service Provider (ASP), etc.
- Composition (extended from NIST draft):
 - Characteristics: on-demand service, ubiquitous network access, location independent resource pooling, rapid elasticity, measured service

Optional characteristics: multi-tenant enabled, resource virtualization, etc.

 Delivery Models: software as a service, platform as a service, infrastructure as a service

Additional delivery models: business process as a service, data as a service, human service behind cloud

 Deployment Models: private cloud, community cloud, public cloud, hybrid cloud

Additional deployment model: Peer-to-peer cloud (more suitable for IPv6)

- It enhances Service Oriented Infrastructure, and is a continuous evolution towards Service Oriented Architecture
- New innovations can be expected towards this new paradigm

Service Oriented EA in EA Domain



* This is applicable to each EA segment, as well as to the complete EA scope

Service Oriented Domain in Service Oriented Enterprise



The Impact of Service Orientation to an Enterprise

- Service Orientation introduces a paradigm shift to enterprise
 - Manage business functions into loosely coupled services to reduce complexities and lessen the impact of changes
- Service Orientation introduces changes to traditional organization culture and management mechanisms
 - Loosely coupled service organizations break stove pipes and promote collaboration
 - Dynamic relationships between service providers and service consumers
 - Achieve long-term benefits instead of short-term ones

Service Orientation can optimize enterprise operational cost

- Shared services
- Dynamic business changes supported by flexible IT service implementation
- Service Orientation can enhance enterprise lifecycle and governance by introducing service life cycle and governance
 - Enable better scoping for measurement and control

Service Oriented IT Infrastructure for SOE

Evolution of IT Infrastructure

- IT infrastructure as a commodity service
- IT infrastructure as a line of business
- IT infrastructure architecture as a segment architecture in EA

Cloud Computing for Service Orientation

- It further implements service orientation for enterprise IT infrastructure services
- It shares the common nature, benefits, and impact in service orientation practice
- It is started as a technology solution, but the implication is far beyond technologies
- It needs enablement from SOE in order to identify and apply appropriate service model, funding model, cost model, and operation model across organization boundaries

Service Oriented Infrastructure Framework

Service Oriented Infrastructure

Service Planning	Service Systems	Service Management	Service Stakeholders
 External and Internal drivers Strategies and objectives Economics and business cases Business plan and models Segment Enterprise Architectures Performance measurement model 	 Business processes and services Application services Data services Infrastructure services Servers, storages, networks Data center facilities 	 System operation management IT service management (ITIL) Service Lifecycle Business transformation and change management Contractual management 	 Business decision makers Service providers Service consumers Elected officials and regulatory bodies Industry associations and standards groups
Security			
Governance			

The Relationship between SOI Framework and ITIL

Objectives

- SOI Framework: demonstrate structure, components and relationships
- ITIL: provide management and operational guidance and reference

Components

- SOI Framework: focus on functional components
- ITIL: focus on operational components

Structure

- SOI Framework: categorized and layered components
- ITIL: management and operational lifecycle, and best practice references

SOI Life Cycle and Governance



Conclusion

This presentation discussed:

- The current trend of IT and IT infrastructure
- Cloud computing model elaboration
- The relationships of cloud computing with its prior-art, including service orientation
- There are natural dependencies in enterprise with respect to service sharing, which can not be solved by technologies
- The roles of SOI and cloud computing in a Service Oriented Enterprise (Cloud Computing is a continuation of service orientation efforts in enterprise)
- Introduction of a SOI Framework
- The relationship of the SOI Framework with ITIL