Cloud Computing and SOA from Enterprise Perspective

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**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

1. Business Online
   - Web access via static web pages
   - Web access with web applications
   - Online transactions with connections to backend applications

2. Integrated Business
   - Backend IT system integration (interoperation across Systems, e.g. EAI)
   - Business integration (EA efforts across organizational stove pipes, SOA)

3. Business On Demand
   - Flexible IT infrastructure (SOI, IPv6, mobility, virtualization, cloud computing)
   - Dynamic and adaptive business processes (EDA, service on demand)

The Evolution Path

Enhanced IT Role in Business

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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 service-oriented 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 on-demand resources are provided as services from location independent resource pool via shared network.
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 Planning
- External and Internal drivers
- Strategies and objectives
- Economics and business cases
- Business plan and models
- Segment Enterprise Architectures
- Performance measurement model

## Service Systems
- Business processes and services
- Application services
- Data services
- Infrastructure services
- Servers, storages, networks
- Data center facilities

## Service Management
- System operation management
- IT service management (ITIL)
- Service Lifecycle
- Business transformation and change management
- Contractual management

## Service Stakeholders
- 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

ITIL Lifecycle components

SOI Framework components
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