SOA and Cloud in practice
-
An Example Case Study

2nd RECOCAPE Event
"Emerging Software Technologies: Trends & Challenges"

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ITIDA, Smart Village,
Giza, Egypt
Agenda
What is SOA?
What is Cloud?
How do they fit together?
Example Case Study
Conclusions
What is SOA?
The SOA “Triangle”

1. Publish a Service
2. Find a Service
3. Invoke the Service

Service Registry
Repository for Service “Contracts”

Service Consumer (Business Model)

Service provider (Business Service)
What is SOA?

... a service?
A repeatable business task. For example, check customer credit, open a new account.

... service orientation?
A way of integrating your business as linked services and the outcomes that they bring.

... service oriented architecture (SOA)?
An IT architectural style that supports service orientation.

... a composition application?
A set of related and integrated services that support a business process built on SOA.

Source: Cypress Management Group Corp.
What is SOA?

**From the point of view of the business**
- SOA is a set of services that are configured to form composite applications with dynamic and flexible process flows. Those processes and services can be exposed to customers and partners, or to other parts of the organization.

**From the point of view of an enterprise architect**
- SOA is an architectural style that promotes the concepts of business processes and the orchestration of enterprise-level business services. It is also a set of architectural principles, patterns and criteria which address characteristics such as modularity, encapsulation, loose coupling, separation-of-concerns, reuse and composability.

**From the point of view of a project manager**
- SOA is a development approach supporting highly productive parallel development.

**From the point of view of a tester and/or quality assurance engineer**
- SOA represents a way to simplify overall system testing.

**From the point of view of a software developer**
- SOA is a programming model supported by standards, tools and technologies including, but not limited to Web Services.

Source: Cypress Management Group Corp.
What is SOA?

Source: Cypress Management Group Corp.
Benefits of SOA

– Greater interoperability
– Increased reuse
– Greater business flexibility
– Reduced maintenance and development costs
– Improved visibility
What is Cloud?
Cloud computing is a model for enabling ubiquitous, 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 is composed of five essential characteristics, three service models, and four deployment models.

Source: National Institute of Standards and Technology (http://www.nist.gov)
## 5-4-3 Rule

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Configurations</th>
<th>Service Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. On demand service</td>
<td>1. Public</td>
<td>1. IaaS</td>
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<tr>
<td>2. Ubiquitous and standard access</td>
<td>2. Private</td>
<td>2. PaaS</td>
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<td>4. Elasticity</td>
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<td>5. Measured Service</td>
<td>4. Community</td>
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Source: National Institute of Standards and Technology (http://www.nist.gov)
Cloud Characteristics

- **On demand service**
  - Customer provisions resources via management interface

- **Ubiquitous and standard access**
  - Accessible through internet and with heterogeneous devices

- **Resource sharing**
  - Low level resources (data base, cpu, storage, etc.) are shared transparently among different users

- **Elasticity**
  - Resources can be infinitely scaled

- **Measured Service**
  - Consumed resources and services are monitored for billing and ensuring compliance with SLAs
Cloud Configuration

PUBLIC CLOUD

The service provider offers its resources to the general public.

PRIVATE CLOUD

The cloud and its resources are installed at the organization that will use them.

COMMUNITY CLOUD

A private cloud which is shared among different organizations in order to consolidate infrastructures and technologies.

HYBRID CLOUD

Combination of a private and a public cloud usually through safe mechanisms (VPN).
Cloud Service Models

- **Infrastructure (IaaS)**
  - eg. Rackspace, Amazon E2C

- **Platform (PaaS)**
  - eg. Google App Engine

- **Application (SaaS)**
  - eg. CRM on demand

Built by customer

Provided by cloud
Benefits of Cloud computing

- **Reduced Cost**
  - Cloud technology is paid per use, saving organizations money
  - Helps shifting capital expenses (CAPEX) to operational expenses (OPEX)

- **Increased Storage**
  - Organizations can store more data than on private computer systems

- **Highly Automated**
  - No longer do IT personnel need to worry about keeping software up to date

- **Flexibility and Scalability**
  - Cloud computing offers much more flexibility and scalability than past computing methods

- **More Mobility**
  - Employees can access information wherever they are with whatever device

- **Allows IT to Shift Focus**
  - No longer having to worry about constant server updates and other computing issues, IT departments can concentrate on innovation
How do they fit together?
There are important overlaps between SOA and Cloud computing

- But they have a different emphasis, resulting from their original focus on different problem sets

<table>
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<th><strong>Cloud Computing</strong></th>
<th><strong>Overlap</strong></th>
<th><strong>SOA via Webservices</strong></th>
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<td>Software as a Service (SaaS)</td>
<td>Application Layer Components/Services</td>
<td>System of Systems integration focus</td>
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<td>Utility Computing</td>
<td>Network dependence</td>
<td>Driving consistency of integration</td>
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<td>Storage on demand</td>
<td>Cloud/IP Wide Area Network (WAN)-supported service invocations</td>
<td>Enterprise Application Integration (EAI)</td>
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<td>Data distributed in a Cloud</td>
<td>Leveraging distributed software assets</td>
<td>Reasonably mature implementation standards (REST, SOAP, WSDL, UDDI, etc.)</td>
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<tr>
<td>Platform as a Service (PaaS)</td>
<td>Producer / Consumer model</td>
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<td>Standards evolving</td>
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Source: MITRE Corporation
SOA and Cloud are not the same

- SOA is an architectural pattern
- Cloud computing is "a set of enabling technologies as a potential target platform or technological approach for that architecture." (David Linthicum)

SOA and Cloud Computing are complementary, not competitive

- SOA supports Cloud Computing by
  - enabling easy migration of services to Cloud servers
  - leveraging the advantages of virtualization
    - Applications as logical instances can run on any number of physical instances
  - allowing the creation of mash-ups or on-the-fly composite applications with services
- Cloud computing does not replace SOA as an integration technology
SOA and Cloud

Source: IBM / CBDI
Example Case Study
– Retail company with online web store and 900 retail stores
– Strategic objective: become the most profitable retailer in the industry through aggressive growth with minimal risk

– Delivering a unique, seamless, cross channel experience.
– Being the first to offer popular products that match customer desires

– Capabilities needed according to Business Process Analysis:
  – share consistent product information across multiple channels.
  – quickly and accurately incorporate new products
  – 24h availability for product purchase and delivery
  – sell services associated to products
Two primary initiatives:

- **Online-to-store, multi-channel initiative**
  - consistent customer experience across multiple channels (Web, retail stores, and catalogues)

- **Product information management**, new product introduction initiative
  - central management of information about products
  - focus on data required to market and sell products through one or more distribution channels

Source: IBM
SOA Case Study – As Is Architecture

Source: IBM
Online to store realization

- Business analysis
- Business process design
- Service Modelling
  - Defining atomic service patterns:

Data Consolidation

Internal Connectivity

Source: IBM
Data Consolidation
- Corporate Data Warehouse provides timely, accurate, trustable data for business decisions
  - eg. calculation of sales revenues and cash flow

Internal Connectivity
- ESB facilitates to quickly and effectively adapt to changes in the online-to-store business processes
  - Invocation of alternative services (incl. in the Cloud)

ESB Federation
- accurate and timely product information across retail stores, Web, and catalogue channels through near real-time inventory checks
  - while allowing for heterogeneous infrastructures

Source: IBM
**Process Automation**
- shortened time for changing business processes
  - eg. change return policy consistently for all channels

**Business Activity Monitoring**
- improved understanding of the online-to-store business processes
- fast identification of problem areas
- generation of meaningful, custom-tailored business reports
- facilitates identification of emerging opportunities

Source: IBM
Conclusions
- SOA is an architectural paradigm
  - Focused on application- and business integration
  - Flexibility through concept of loose coupling
  - Interoperability through standardized message protocols
- Cloud Computing is a set of technologies that enables the transparent virtualization of scalable and ubiquitous resources
- SOA helps to leverage the benefits of Cloud Computing
- The combined adoption of SOA and Cloud Computing can bring substantial improvements in terms of
  - Business process agility and flexibility
  - Business-IT alignment
  - CAPEX to OPEX shift in IT-expenses
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