Cloud Computing & Service Oriented Architecture – An Overview

Sumantra Sarkar  
Georgia State University  
Robinson College of Business  
November 29 & 30, 2010

MBA 8125 – Fall 2010
Agenda

• Cloud Computing
  • Definition
  • Characteristics
  • Service or Delivery Model
  • Deployment Model

• Service Oriented Architecture (SOA)
  • Definition
  • Why is SOA Important
  • Attributes
  • Components
  • Standards
  • Ending thoughts
Definition

• “The interesting thing about cloud computing is that we’ve redefined cloud computing to include everything that we already do.... I don’t understand what we would do differently in the light of cloud computing other than change the wording of some of our ads.” – Larry Ellison

• “Cloud” is probably the most hyped word in the industry these days and everyone has a definition of what it is. And despite this being a running joke in the industry, everyone obviously needs definition conversion to happen so we can start speaking the same language here. – Cloudenterprise.info
Definition – searching…. 

• Gartner
  • represents a paradigm shift that will redefine the relationship between buyers and sellers of IT-related products and services.......
  • is an "emerging phenomenon." Phenomena emerge when conditions are right and multiple factors are in play. Much like the aurora borealis, which emerges when solar winds, charged particles, and Earth's atmosphere collide, "the cloud“ is emerging at the convergence of three major trends — service orientation, virtualization and standardization of computing through the Internet.
Definition – searching....

• Forrester
  • Strategists at product and service purveyors, big and small, are pondering the right paths to take as a variety of Web and Internet "cloud" technologies and cloud services offerings envelop the market
  • 3 myths are fogging up the options
    1. cloud service offerings are one large market;
    2. cloud equates to virtualization; and
    3. cloud providers will compete primarily on price.
Definition

• NIST* defines cloud computing as:
  • ...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.
Characteristics

• On-Demand Service
  • Few clicks of a button the application is up and running as and when you demand

• Resource Pooling
  • Users of the cloud can provision computing resources based on their needs - give them back to the shared pool once their needs are met e.g. Amazon’s Elastic Compute Cloud or EC2

• Rapid Elasticity
  • cloud provides ways of rapidly scaling to meet user demand - departments that use the cloud, it seems as if they have an endless supply of computing resources available. e.g. Amazon’s Web Services Simple Storage Solution (S3) allows users to upload files
Characteristics

• Broad or Ubiquitous Network Access
  • Office Use Applications have been client-based software – needed to be installed locally, upgraded locally. Trend to move them to the internet - e.g. Google Docs and Microsoft Office Web Apps 2010

• Measured Service
  • IT departments employ different monitoring tools and reporting systems
  • Cloud allows to monitor usage and charge users according to usage of computing resources – helps to trend and scale resources
  • e.g. Amazon Services’ CloudWatch
Service or Delivery Model

• Cloud Software as a Service (SaaS)
  • Very common in the IT community
  • Software companies host their software themselves and then upgrade to maintain users
  • e.g. Salesforce.com – online CRM, Live.com, Zoho, Google Docs, Microsoft Web Apps 2010

• Cloud Platform as Service (PaaS)
  • a platform describes some sort of hardware architecture and software framework (including application frameworks) that allows software to run
  • Supplies platform stacks to users, without the need to maintain the underlying hardware or upgrade the supporting software. e.g. Google App Engine, which supports Java and Python, and Engine Yard, which supports Ruby on Rails.
Service or Delivery Model

• Cloud Infrastructure as a Service (IaaS)
  • Traditionally, Infrastructure meant servers, wires, cooling systems, and all the other things necessary to run today's data centers
  • None of the above components are necessary except the network connection to the cloud
  • e.g. Amazon Web Service, Rackspace, GoGrid
Deployment Model

• **Public Cloud**
  - Cloud available to the general public for use – sign up and make payment based on price list
  - e.g. Amazon Web Services, Google Applications

• **Community Cloud**
  - Cloud made available to a certain group or association
  - e.g. consortium of schools

• **Private Cloud**
  - Available to one particular institution

• **Hybrid Cloud**
  - Combination of 2 or more above models
  - Cloud bursting – Eucalyptus allows to burst to Amazon’s cloud
Service Oriented Architecture (SOA)
Definition

• **Gartner**
  • A style of multi-tier computing that helps organizations share logic and data among multiple applications and usage modes

• **IBM**
  • An Application Architecture within which all functions are defined as independent services with well-defined invokable interfaces which can be called in defined sequences to form business processes

• **OASIS**
  • A paradigm for organizing and utilizing distributed capabilities that may be under the control of different ownership domains. It provides a uniform means to offer, discover, interact with and use capabilities to produce desired effects consistent with measurable preconditions and expectations.
Definition

• Wikipedia
  • Service-oriented architecture (SOA) is a flexible set of design principles used during the phases of systems development and integration in computing. A system based on a SOA architecture will package functionality as a suite of interoperable services that can be used within multiple separate systems from several business domains.

• SOA for Dummies
  • A software architecture for building applications that implement business processes or services using a set of loosely coupled black-box components orchestrated to deliver a well-defined level of service.
My Definition

- **Architecture**
  - Architecture – fundamental underlying design of computer hardware, software or both
  - Structure of anything – e.g. Roman Architecture – big domes and arches

- **Oriented**
  - To align or position with respect to a point or system of reference
  - Adjusted or located in relation to surroundings or circumstances

- **Service - a facility supplying some public demand**
  - Look for cheap hotel room, Buy on Amazon, Send confirmation - we seek them, consume them and provide them too a remotely accessible, self-contained application module
Another Definition

- A SOA is a software architecture that is based on the key concepts of an application front end, service, service repository and service bus. A service consists of a contract, one or more interfaces and an implementation.

Krafzig et al. 2006
Why is SOA Important

Result of Traditional Systems Implementation

Corporate Data

Data

Applications

Technology Platforms

Corporate Networks & Infrastructure Services

SOA
Why is SOA Important

• Hostage to Heterogeneous environments
  • Built without an architecture or plan – ad-hoc buying
  • Proprietary – do not talk to each other
  • Dependent on specific technology tools and/or vendor specific
  • Use code base where functions / services are not isolated and code is not reusable
  • Very dependent on hundreds of point-to-point interfaces

• Consequences
  • “Too long” and “costs too much” to integrate new systems
  • User frustrations at lack of efficiency
  • Innovation is stifled
  • Service levels and user satisfaction are bad
Why is SOA Important

• represents a fundamental shift in the way applications are built, requiring a rethinking of business processes and the role applications play in the enterprise

• institutions can integrate business functions into new and interesting applications
Attributes

• The process should have been defined well to be **reused**

• All functions are **well-defined** as independent services with invokable interfaces

• **exposes** well-defined **business functions as services**, which are **shared** between multiple applications through standard protocols.

• Modular / Distributed logic in **loosely coupled** black box components which may be reused by multiple applications

• Black box components hide specific technologies

• Multi-tier / distributed **networked** computing environments
Components and operations

SOA

Service registry

Service description

Find

Publish

Service requestor

Bind

Service provider
SOA Implementations

• Can use wide range of technologies
  • Web Services
  • SOAP, RPC
  • RMI--IIOP
  • REST
  • DCOM
  • WCF (Microsoft Implementation of Webservice forms)
The preferred method of building an SOA is via Web services.
Ending thoughts

• **NOT** an enterprise technology standard
  • Not dependent on a single technical protocol such as IIOP or SOAP

• *It *is* a architectural blueprint
  • Incorporating many technologies
  • Not requiring specific protocols or bridging technologies

• Goals:
  • defining cleanly cut service contracts with a clear business orientation
  • Opening up back end systems and services
Thank you
Questions?
References

• Cloud Computing Explained - By Rosalyn Metz -
  http://www.educause.edu/EDUCAUSE+Quarterly/EDUCAUSEQuarterlyMagazineVolum/CloudComputingExplained/206526
• http://cloudbootcamp.info/2009/08/04/cloud-deﬁnitions-nist-gartner-forrester/
• http://www.educause.edu/EDUCAUSE+Quarterly/EDUCAUSEQuarterlyMagazineVolum/ServiceOrientedArchitectureWha/161835
• SOA ppts from
  http://www.educause.edu/Resources/ServiceOrientedArchitecture/161920