Chapter 9
Integrating the Cloud Scenarios and Solutions

Venky Shankararaman
Singapore Management University, Singapore

Lum Eng Kit
Singapore Management University, Singapore

ABSTRACT

Cloud computing adoption is on the rise due to reduced infrastructure resources and a need for agility in meeting IT demands. However, many organizations will still have on-premise applications along side with applications in the cloud, and will have to deal with the challenges that arise from integrating all these applications. In this chapter, the authors briefly introduce the various cloud computing architecture layers, provide detailed cloud integration scenarios, and discuss some of the challenges and present some integration solutions. They also provide points for consideration to help organizations decide appropriate integration solutions to suit their needs.

BACKGROUND

Cloud computing provides a number of benefits that act as key drivers for their adoption. These drivers include optimizing use of hardware infrastructure, offloading the burden of managing various computing resources and thus minimizing IT management overhead, reducing capital and operating costs by obtaining resources on a need to basis and paying for what is used, and ensuring business agility by dynamically meeting the IT needs of the business by scaling up or down to suit rapidly changing market demands of the consumer (Amrhein and Scott, 2009), (Plummer and Smith, 2009) and (Mell and Grance, 2009).

The above drivers have encouraged a number of organizations to adopt cloud computing as a paradigm for offering enterprise solutions.

As more and more enterprise applications are moved to the cloud infrastructure it will lead to a number of integration challenges. For example, organizations will still have a lot of business applications that are not moved to the “cloud” due...
Integrating the Cloud Scenarios and Solutions

to regulatory constraints such as HIPPA (Health Insurance Portability and Accountability Act), GLBA (Gramm–Leach–Bliley Act), and general security and NPPI (Non-Public Personal Information) issues. As a result, these on-premise applications have to be integrated with those in the cloud. Additionally, organizations must also face the challenge of integrating cloud-to-cloud applications. An example would be integrating a best of breed SaaS application (e.g. CRM) with another best of breed SaaS application (e.g. ERP).

In the past this best of breed systems architecture problem in which an organization chooses to select the best application software for each of its business functions has often resulted in the need to integrate these silo applications. This led to the emergence of EAI (Enterprise Application Integration) middleware (Linthicum, 2003). EAI supports the creation of new integrated business solutions by enabling applications, databases, interfaces and people to exchange business-critical information in batch mode and in real-time. It includes both the process of creating the solution and the tools and services required to develop the solution. EAI middleware provides capabilities for data transformation, information routing, connectors for invoking services in enterprise applications, process design and process execution. With the maturity of technology most EAI is currently achieved at the data, application and process levels. At the data level, data from various sources is aggregated into a single view. At the application level one application invokes the API (Application Programming Interface) of another application. At the process level, organizations are interested in increasingly looking to streamline entire business processes. A business process is implemented in the process engine component of the EAI middleware and activities in this process invoke services in other applications (Caforiol et. al., 2005). More recently EAI middleware has adopted the web services standards and integration among applications has been achieved through web services invocation through the SOA framework (Cao et. al., 2007) and (Gu and Zhang, 2010). Within the practice community some refer to this standard based EAI middleware as Enterprise Service Bus (ESB). ESBs help bind the services together within a Service Oriented Architecture (García-Jiménez et. al., 2010). They eliminate point-to-point connection between service provider and service consumer by providing capabilities such as intelligent routing, data transformation, load balancing, and security while also coordinating the flow of service calls. Conceptually, ESBs provide similar functionality to EAI middleware but through leveraging the web services standards and the SOA framework. With the emergence of cloud computing, integration faces a number of new challenges such as limited access to the applications hosted on the cloud through their APIs, additional difficulty in handling version changes to the integration middleware, performance issues due to data latency and security issues due to multi-tenancy and information flow across geographical boundaries. In Section 3, we give a brief overview of the different cloud computing architecture layers and provide some examples of current vendor offerings for each layer. Section 4 discusses some integration scenarios that organizations are most likely to face. Section 5 highlights some integration challenges that arise within these scenarios. In Section 6, we present the various integration solutions along with some points for consideration when selecting them. Section 7 concludes by highlighting the future trends in integration solutions for the cloud.

CLOUD COMPUTING ARCHITECTURE LAYERS

The traditional layers of a typical IT solution include hardware, software for building applications, software for integrating applications and enterprise applications (e.g. CRM, ERP, small
Related Content

A Framework for Assessing Governmental Websites Quality: The Case of Iranian Free Economic Zones Websites
Mohammad Amin Zare and Ahad Zare Ravasan (2014). *International Journal of E-Services and Mobile Applications* (pp. 44-65).
[www.igi-global.com/article/a-framework-for-assessing-governmental-websites-quality/111065?camid=4v1a](www.igi-global.com/article/a-framework-for-assessing-governmental-websites-quality/111065?camid=4v1a)

A Proposed Model for Using Cloud Computing and Web2.0 in Deploying E-Learning Ecosystem (ELES)

A Quality Driven Web Service Selection Model
[www.igi-global.com/chapter/quality-driven-web-service-selection/60885?camid=4v1a](www.igi-global.com/chapter/quality-driven-web-service-selection/60885?camid=4v1a)

Marketing of Services: New Paradigm and Perspectives
[www.igi-global.com/chapter/marketing-of-services/179986?camid=4v1a](www.igi-global.com/chapter/marketing-of-services/179986?camid=4v1a)