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Enterprise Service Oriented Architecture

Dynamics of Cloud Integration – The Case of Salesforce.com

Cross-over business process integration

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DYNAMICS OF CLOUD INTEGRATION - THE CASE OF SALESFORCE.COM

Cross-over Business Process Integration

Introduction - the case for Cloud

Companies, large & small, are encouraged by evolving technologies to leverage the Internet for more than just access & communication requirements. Things have changed. Today, companies can deploy most aspects of their business on the Network of Networks while benefitting from better productivity and lower capital & operational expenditures. They can go beyond Internet-based email services and look at business critical services like Enterprise Resource Planning, Customer Resource Management, and financial applications being made available as Software-as-a-Service. Why incur substantial capex on data warehouses to deploy these applications, with their accompanying maintenance costs, when a lower, per-user, subscription-based pricing is available? And, to achieve all this while institutionalizing a Service-Oriented Architecture (SOA) philosophy built on a robust infrastructure platform. The only question is: *Why not?*

In its most general form, a SOA application is composed of multiple services that communicate with each other via messages over a distributed infrastructure platform. However, cloud-enabled applications, such as salesforce.com, have a number of characteristics that impose particular requirements on the underlying infrastructure over which composite SOA applications are deployed. Application integration that crosses over organizational boundaries and into the cloud, as Gartner rightly forewarns, entails due attention. Before addressing these challenges, a case for salesforce.com with its many applications, including Sales Cloud & Force.com, is stated.

New Paradigms with Salesforce.com

Traditionally, deployment & management of business applications has been cumbersome. They are characterised by expensive & extensive hardware and software requirements with specialized IT skills & personnel to maintain them. This stands true for requirements of large, small, & mid-sized companies alike.

With cloud computing, however, efforts related to managing the requisite hardware and software are eliminated. A vendor like salesforce.com with its shared infrastructure offers business applications as a “utility”. A capex cost gets accommodated as an opex only i.e. organizations only pay for what they need. Moreover, all management aspects such as upgrades are automatic. And so is scalability. The complete set of benefits can be summarized as follows:

- Reduced deployment times, often measured in days or weeks
- Reduced IT costs associated with lower upfront costs and per-user monthly fees only
- Reduced learning curve requirements with familiar browser-based interface
- Added mobility and collaboration with real-time information access

Cloud Challenges

A cloud-based application in and of itself adds only incremental value to any given organization. Dormant intelligence within various applications residing inside & outside the organization is unlocked when business processes spanning multiple applications, including those residing in the cloud, can be orchestrated. But each service in a cloud-enabled composite SOA application may be written in a different programming language or script and may run on a different platform, either on-premise or across the private/public cloud. Further, services need to have the ability to communicate across the cloud either synchronously or asynchronously. Integrating these services is a critical challenge. Lastly, since the services in a general SOA application may be distributed across multiple enterprises and private/public clouds, distributed *security* and *governance* are core requirements for the underlying infrastructure.

Some general examples of cloud integration scenarios, as well as specific ones for salesforce.com, include:

- Automating business processes across applications spanning on-premise and cloud worlds
- Opportunity closure in CRM and Order Generation in ERP
 - salesforce.com to SAP
- Data migration from legacy systems to salesforce.com
- End-user portal updates to salesforce.com
- Collation of comprehensive customer information from multiple systems incl. salesforce.com & ERP

The next section of this paper discusses various architectures for cloud-based integration in use today, together with the pros and cons of each architecture. This is followed by a discussion of the architecture requirements for a general purpose, cloud-enabled platform which enables the seamless integration of on-premise, public, and private cloud applications including salesforce.com.

Traditional Approaches to Cloud Integration

On-Premise to Cloud Integration

A popular pattern for integration today is one where integration middleware hosted within an enterprise integrates on-premise applications with cloud-based applications such as salesforce.com, NetSuite, and others.

This model has the benefits of easy invocation of remote SaaS APIs using Web Services. The on-premise client acts as a process-trigger. This architecture is particularly suited to the integration of on-premise applications with SaaS applications hosted in a public or private cloud. The licensing model is typically perpetual, based on server CPU/core utilization.

On the downside, this architecture does not work efficiently for inter- or intra-cloud integration because the core integration infrastructure is hosted within the enterprise. Inflexible data-source access, the low visibility of event/data flow, and the inherent lack of messaging & queuing capability make this model inefficient to invoke integration services from SaaS application.

Integration-as-a-Service (“IaaS”)

A second pattern that has seen some usage is the concept of “Integration-as-a-Service”. In this model, the integration infrastructure itself is hosted within the cloud. Applications that expose Web Services interfaces can be easily integrated using this approach, which also provides the benefits of easy SaaS-to-SaaS integration. In this model, the licensing is typically via an annual subscription, with charges based on the number of integration paths and/or on transaction volume.

Hosting of the infrastructure within the cloud does impose some limitations, however. Access to data-sources is typically limited to Web Services, often resulting in efficiency issues; not all interfaces to applications are exposed as Web Services, so critical application functionality may not be available for integration; the messaging and queuing capability of this topology is inherently limited in most implementations because of the inherent request/reply nature of Web Services protocols. Finally, this model is inefficient for the integration of on-premise to on-premise applications.

Hybrid Integration Platform

The inherent limitations and problems of the traditional on-premise integration and the Integration-as-a-Service approaches can be overcome via a hybrid of the two. Figure 1 illustrates the system architecture of the hybrid platform.

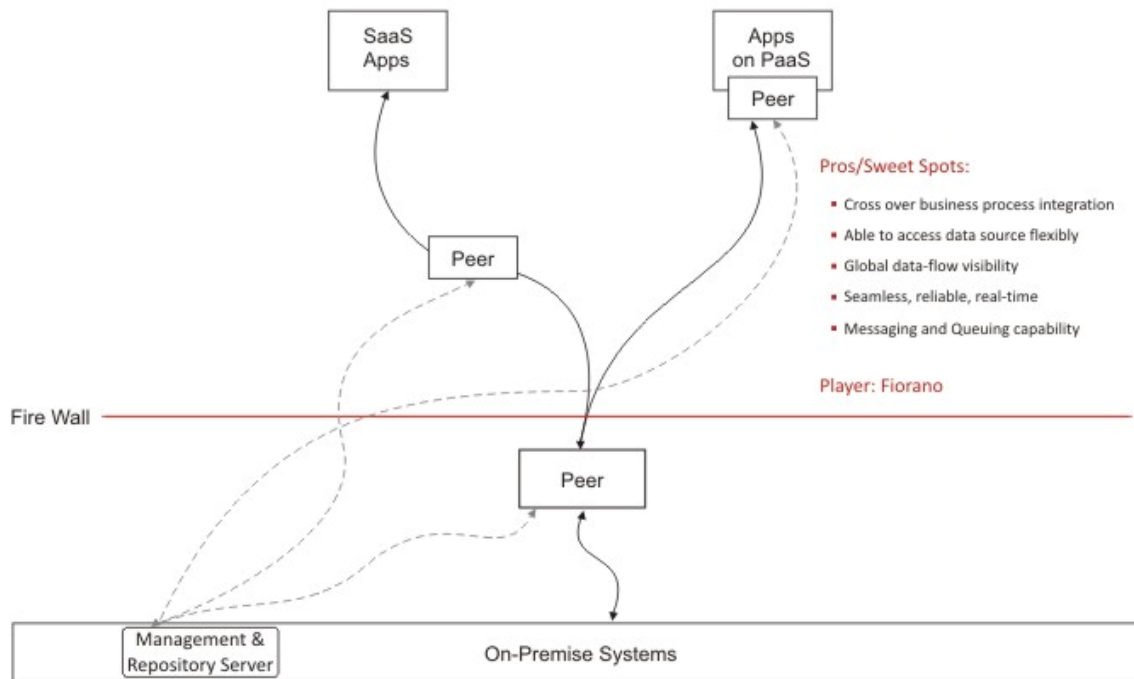


Figure 1: Hybrid, Peer-to-Peer Integration Platform

The Peer-to-Peer approach of the hybrid model provides the following benefits:

- Data sources can now be accessed flexibly, via Web Services or via messaging and other APIs.
- Separate peer-servers for SaaS and PaaS clouds ensure that applications within a given cloud are efficiently integrated since there is no longer any need for integration data to leave the cloud.
- Centralized control while maintaining the inherent efficiency of peer-to-peer architectures.

Therefore, the platform blends cloud-based integration with general business-process integration since cloud-based applications can now be integrated easily with on-premise applications.

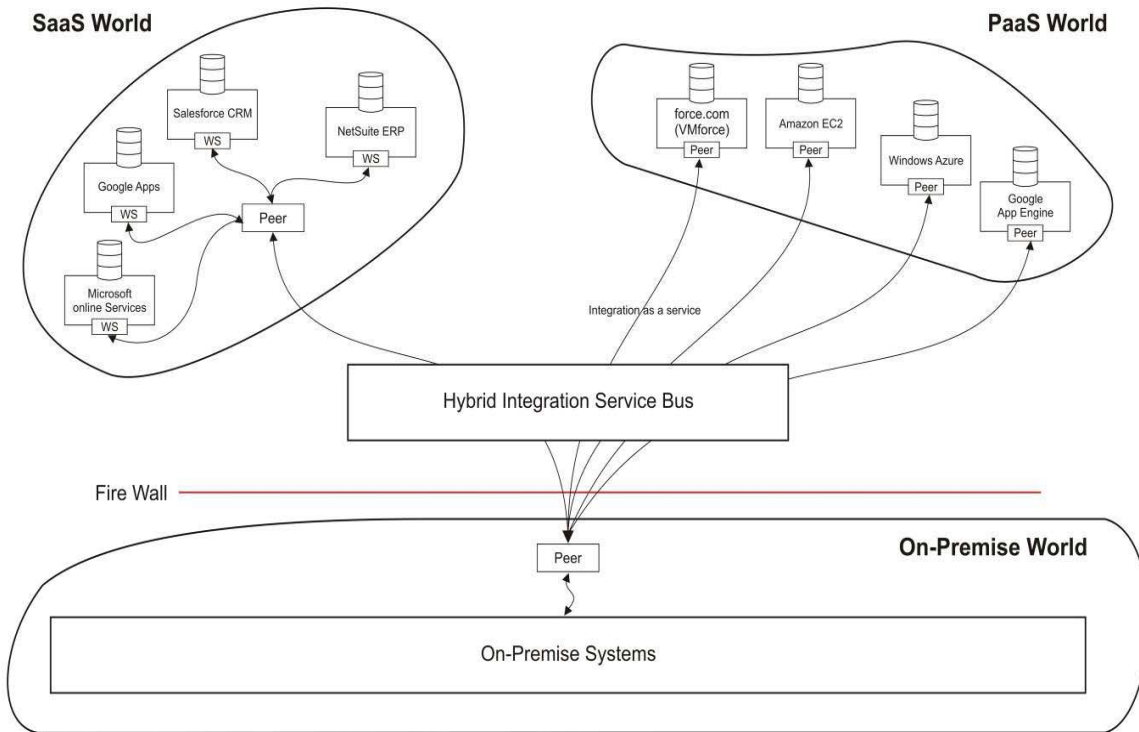


Figure 2: *Involving Cloud Users via Peer-to-Peer Hybrid Integration*

Figure 2 illustrates how the hybrid, peer-to-peer integration platform involves cloud and enterprise users together. Note that the management of the distributed bus is centralized; control information flows to a central server, typically hosted within the enterprise (or in a data centre controlled by the enterprise for security purposes), while data flows directly between peers. The platform, thus, incorporates all of the administrative benefits of a central-broker architecture while avoiding the inefficiencies of the hub becoming a data-bottleneck.

A Closer Look at Salesforce.com

The case for Cloud Computing is apparent. Salesforce.com, in particular, affords unprecedented cost & time benefits to the IT staff along with productivity multipliers to the entire organization. However, as stated above, a cloud-based application in and of itself adds only incremental value to any given organization. Dormant intelligence within various applications residing inside & outside the organization is unlocked when business processes spanning multiple applications, including those residing in the cloud, can be orchestrated.

It is to be noted that the simplicity of use of salesforce.com is marginalized if its integration with the rest of the organization's applications, SAP for instance, is rendered cumbersome. It is precisely in this case that a hybrid integration platform provides IT Departments with the ability to reliably and flexibly integrate systems, whether on-premise or in public and private clouds. This section considers the benefits that accrue on account of using a hybrid integration platform from the viewpoint of a common enterprise integration pattern: SAP integration with salesforce.com.

Fast Time to Market

- Pre-built connectors for all leading ERP and CRM applications (see Figure 3)
- Zero-coding, graphical-configuration approach
- Available library of Pre-built Integration Processes (PIPs) for common integration scenarios

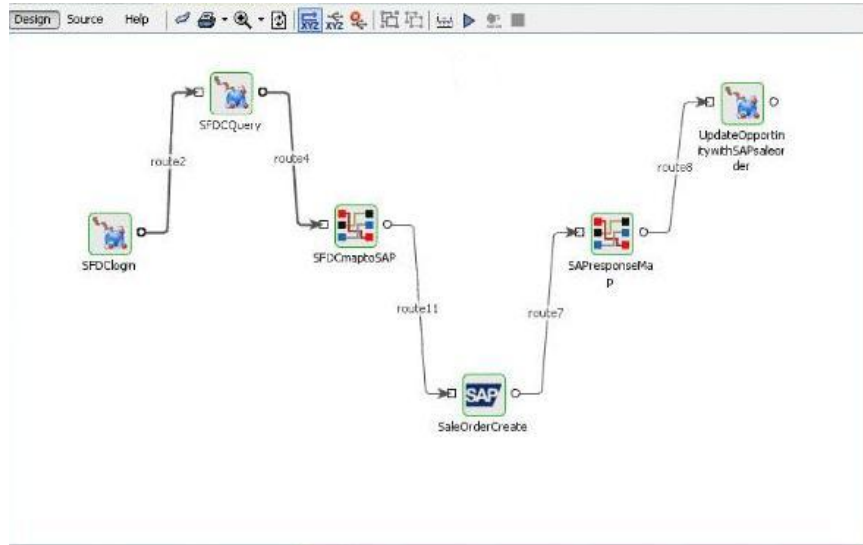


Figure 3: Ease of integration using pre-built adapters for SAP & Salesforce.com

Lowest Costs

- Low monthly subscription pricing; add/remove end-points at will
- No maintenance costs; updates/upgrades built into infrastructure and connectors
- No need to purchase and maintain hardware or software including web servers, ESBs, or other platform software

Efficient Development and Deployment

- Rapid, configuration-based development with intuitive graphical tools; zero coding (see Figure 4)
- 100% standards based; no need for any middleware expertise
- Supports runtime process changes (pause/resume processes, add/remove steps), in practice.



Figure 4: Zero coding with XSLT transformation between SAP & salesforce.com

Easy Monitoring and Management

- Configurable alerting of process-flow bottlenecks, data and connectivity errors
- Monitor remotely via the web from anywhere, anytime
- Highly flexible exception handling

Sample Customer Use Case

Ecole hôtelière de Lausanne

Over the past several years, Ecole hôtelière de Lausanne (EHL), world's first hotel school, acquired substantial hardware and software infrastructure, with a data centre hosting over 100 servers (both physical and virtual VMware instances), together with over 70 applications ranging from simple portlets to complex applications. The school's pillar applications include Salesforce.com for CRM, Microsoft Dynamics AX 2010 as an ERP platform, academic and end-user portals, Microsoft Exchange for email and calendaring, and Microsoft ActiveDirectory for Identity and Access Management.

To serve an increasingly larger body of students, EHL needed to automate various business processes. For instance, the automated creation of leads and prospects from EHL's website, the creation of student profiles from Admission and Enrolment information, feeding data for the automatic creation of invoices for students based on varying criteria, automatic updates of Alumni profiles from the end-user portal to salesforce.com, etc.

After initial manual efforts with several point-to-point integrations & batch loads, EHL soon realized that it needed to invest in a quality integration platform to automate business processes, increase transactional visibility, and gain agility by developing capabilities to incorporate new business processes seamlessly without disrupting existing systems.

EHL performed proofs-of-concept with various products based on criteria including zero-coding composition, rapid debugging & deployment of integration flows, web-based monitoring tools, and scalability & affordability. A hybrid integration platform emerged as the clear winner. The platform forms the integration layer moving data between the pillar applications. Its "event processes" implement specific business processes, allowing EHL to automate operations incrementally. Testing was simplified with the help of the platform's sophisticated debugging capabilities. With a peer-to-peer architecture EHL has managed to evolve its infrastructure as requirements have grown and the experience with the solution has matured.

Conclusion

Business intelligence is unleashed when information residing in distinct applications is orchestrated in the form of value-added business processes that automate & accomplish business activities across enterprise boundaries. Application location, interface-type, & ownership shouldn't, in any way, be constraining factors in accomplishing organizational goals.

The move toward cloud computing and growth of enterprise application vendors such as salesforce.com will affect all future software application deployments. SOA provides a layer of abstraction over all existing architectures, allowing distributed solutions to be built by composing asynchronous services into composite applications over a network. Deploying a SOA across the cloud requires software that provides service-oriented management, integration, security, tools, and processes. While these segments are currently served by individual packages and solutions, they'll evolve into a single, cloud-enabled platform.

A cloud-enabled, hybrid, peer-to-peer integration platform includes all the distributed computing functionality an organization needs to develop, deploy, manage, and extend distributed cloud-enabled applications; such platforms will come to dominate enterprise computing over the next few years.

About Fiorano Software

Founded in 1995, Silicon Valley based Fiorano is a California Corporation with proven leadership in enterprise middleware and peer-to-peer distributed systems. Fiorano's innovative [event-driven](#) SOA platform integrates applications and complex technologies into an enterprise nervous system, increases business process performance, yields higher message throughput and enhances availability through agent-based [visual composition](#) that bridges the capability gap between business models and their implementation – the model is the application, ready to run.

Global leaders including ABN AMRO, Boeing, British Telecom, Capgemini Telecom, Chicago Mercantile Exchange Group, McKesson, NASA, POSCO Steel, Qwest Communications, Rabobank, Schlumberger, Lockheed Martin, United States Coast Guard and Vodafone have deployed Fiorano to drive innovation through open, [standards-based](#), event-driven SOA applications built in just days, yielding unprecedented productivity.

[Fiorano Enterprise Service Bus](#) (ESB) and [Fiorano Message Queue](#) (MQ) deliver the industry fastest, lowest latency, highest throughput [real-time messaging](#) (asynchronous and synchronous) to power [high performance](#), highly available, and collaborative workflow applications whose application services are distributed throughout the IT landscape. Fiorano's distributed peer-to-peer agent's abstract complexity of developing and deploying services to unlock value in a customer's enterprise architecture framework.