Creo: An Integration Case Study

Creo Integrates Salesforce and SAP to Give Users a Single, Up-to-Date View of Customer Data

With over 4,000 employees worldwide, Creo is a leading provider of printing systems, equipment, and services. As is typical of companies of its size, Creo uses a range of enterprise systems of varying ages and architectures to support front- and back-office business processes. Systems currently in use include SAP for ERP (enterprise resource planning) and finance, and salesforce.com's sales force automation (SFA) application, Salesforce.

In selecting a customer relationship management (CRM) solution, Creo was drawn to Salesforce based on its ease of use, the prospect for high adoption within its sales teams, its simple deployment, and the rapid return on investment it offered. While Creo was confident about the success it would achieve with users, for its CRM strategy to succeed, Salesforce would need to integrate with the rest of the company's enterprise architecture and, specifically, its existing SAP deployment.

Integration Requirements

Creo's architecture is designed so that different groups access prospect and customer information using two different systems: Salesforce and SAP. In integrating the two systems, Creo needed to be certain the outcome would:

- Provide a single "360-degree view" of the customer: Regardless of which system was used to view or update information about a given customer, it should present the same up-to-date information, providing a single view of the customer across the enterprise.

- Eliminate duplicate data entry: To ensure high data quality and promote adoption by making the system easier to use, Creo required that information in the two systems be synchronized automatically, without the need for users to perform manual data entry.

- Bring efficiencies to sales representatives and other users: Making accurate customer information available immediately should mean greater efficiency in the case of both individual tasks and company business processes as up-to-date information would be available without requiring extra work or coordination.

By integrating Salesforce.com and SAP using Sforce, Creo is able to enjoy the benefits of a best-of-breed CRM solution, without having to compromise the capabilities of existing systems or the users who depend on them.

Solution Architecture and Technology

While several integration design patterns were possible, Creo choose the one that would maximize user flexibility by synchronizing account and contact information between Salesforce and SAP. This bi-directional approach is more complex to implement than its uni-directional counterpart, but the result is a system that is easier to use because there are fewer restrictions on which system must be used to create new accounts. With full synchronization, a new or changed record in either system is automatically propagated to the other, which gives users of both systems full control of all data in their respective applications and user interfaces.
To implement this integration design pattern, Creo worked with five technologies: Salesforce, the Sforce Web services interface to Salesforce, SAP, the iWay SAP Adapter, and Microsoft's BizTalk 2004 server. The iWay Adapter provides access to SAP data from within BizTalk; as salesforce.com provides an open Web services interface via its Sforce platform, and BizTalk natively supports Web services, no special adapters were required to connect with salesforce.com.

With those five pieces, it is possible to create the architecture that Creo used to integrate Salesforce and SAP (see Figure 1).

**INTEGRATION IMPLEMENTATION**

To understand the technical implementation details behind this integration, it is useful to think of synchronization as two separate business processes: one that moves data from Salesforce to SAP and another that moves data from SAP to Salesforce. As the expectations and requirements of each system are different, the integration process and logic will have different requirements based on the direction in which the data moves.

**SALESFORCE TO SAP**

For insight into the business process behind the need to move Salesforce data to SAP, consider the scenario of a sales representative who creates a new account and contact record in Salesforce. To replicate this data in SAP, BizTalk will identify the data during a regular poll of Salesforce for changes, transform it into a standard BizTalk message format, and place it on a queue. BizTalk will then transform field-level data validation and calculation as required by SAP, place the new message in an outbound queue, and have the iWay adapter deliver the message as part of a regular poll of the outbound queue.

This entire process is defined and handled as part of BizTalk’s standard process management capabilities in the following manner:

1. **Delivery from Salesforce to BizTalk**: To generate the set of new and changed account and contact records, BizTalk executes a call to the Sforce Web services API (written in .NET) that queries for the appropriate data based on when the process was last run. This query, written in Sforce's SOQL (Sforce Object Query Language) syntax, resembles a standard SQL statement:

   ```sql
   select firstname, lastname from contact where sysmoddate > 050525T12:05:10
   ```

   To assist in these and similar use cases, Sforce provides both the ability to retrieve new and changed data via the Web services API and the ability to delete records. Once accessed via the Web services API, via the .NET code, the messages are transformed from standard SOAP (Simple Object Access Protocol) format to an internal BizTalk format using BizTalk's transformation capabilities. The transformed messages are placed in an inbound queue (implemented as a SQL Server database).

2. **Transformation and validation**: In the core transformation step, messages are de-queued and routed through a .NET module that defines specific field-level validations necessary to ensure that Salesforce-originated data meets specific SAP validation rules. For example, phone number formats, address field lengths, and similar field elements must be checked, and modified if necessary, to ensure they can be inserted into SAP without error. The process also includes a lookup to determine if the record is new or whether it has a duplicate within SAP. When this step is completed, the record is placed in an outbound queue for delivery to SAP.

Because of Sforce’s open, industry-standard Web services interface, Creo completed the project quickly using its existing integration platform and the technical skills its staff already possessed.
3. Delivery to SAP: In the final stage of moving Salesforce data to SAP, the iWay SAP adapter de-queues the waiting messages at a scheduled time, transforms them from BizTalk to the native SAP IDOC format, and delivers them to the SAP system. If a conflict occurs between the Salesforce and SAP data, the most recently modified record wins. (As the CRM elements of the SAP data model are not as frequently used as their ERP counterparts, finding robust adapters for this step requires appropriate technical diligence.)

SAP to Salesforce
The process of replicating data from SAP to Salesforce is conceptually similar to that of replicating data from Salesforce to SAP. The primary differences have to do with the details of how transformation takes place. In the SAP to Salesforce replication process, data is received in the IDOC format via the iWay adapter, placed in an inbound queue as a BizTalk message, transformed to meet Salesforce data model requirements, placed in an outbound queue, and delivered to Salesforce via the Sforce Web services API. This process is completed through the following steps:

1. Delivery from SAP to BizTalk. In this process, SAP IDOC messages are pushed to the iWay adapter for delivery to BizTalk. In the SAP data model, accounts and contacts are represented as "Business Partners," with their relationship(s) modeled as "Relationship Objects." iWay is configured to listen for messages of either type and, when they are received, to place them in the inbound queue in BizTalk. As iWay exposes these IDOC messages as XML documents, they are transformed into the BizTalk format by BizTalk's standard transformation and mapping tools.

2. Transformation and validation. Record relationships are then transformed between SAP's many-to-many Business Partner model, and Salesforce's one-to-many Account and Contact schema. In cases of conflict between the two models, new Salesforce duplicate contacts are created to mirror the representation of the data with SAP. (As Salesforce's field validation requirements are less strict, fewer field-level validations are required than in the Salesforce-to-SAP replication process.) Once transformed, messages are placed in an outbound queue to await delivery.

3. Delivery to Salesforce. In the final step, via .NET code, messages are taken from the outbound queue and packaged into batch updates for delivery via the Sforce API. Since the Sforce API supports per-record-error reporting on batch transactions, the .NET code is able to go back into the message queue and mark messages that could not be delivered. In a separate ASP.NET-based Web application, built by Creo, users can view failed transactions and correct them as appropriate.

Integration Results
By integrating Salesforce with SAP, Creo has achieved its goal of creating a single customer view and has ensured that the information used across business operations is consistent and up to date. Since making the best-of-breed CRM solution available to its sales team, Creo is enjoying high user adoption and the operational visibility that widespread adoption provides. Because of Sforce's open, industry-standard Web services interface, Creo completed the project quickly using its existing integration platform and the technical skills its staff already possessed. The company was not required to spend time or resources mastering the new or proprietary tools that are required by many CRM vendors.