Building an SOA with Infrastructure, Application, and Orchestration Services from the Ground Up

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A large amount of information is available describing the potential benefits of SOA as well as the best practices, architectural guidelines, and design patterns to achieve them. However, putting SOA to the test in a real-world project always provides the most valuable insights. The accompanying *Executive Report* discusses a case study based on a project that was conducted for one of the world's leading chauffeured services companies. Its value proposition is based on delivering a highly personalized level of service and mission-critical reliability, with a high level of consistency and safety.

THE BUSINESS CASE

At the project's start, the client had already completed the first phase of the project, thereby gaining initial experience with SOA. While the core application project continued, there was an urgent need to move away from mostly manual interaction with business partners and enable growth of the business by entering into automated B2B relationships with new partners. The multitude and complexity of these automated B2B interactions warranted the implementation of a B2B gateway, which shields the core applications from external partner systems and, on the other hand, provides a uniform and standardized interface that the external partner systems can access.

THE NEED FOR A SERVICE-ORIENTED DEVELOPMENT METHODOLOGY

Building a successful SOA requires an appropriate development methodology. Most development organizations have been utilizing a "traditional" methodology for their object or component-based projects. The major software development project tasks in an SOA project are the same as in traditional projects. They can, for example, be governed by a RUP approach. However, the traditional RUP needs to be extended in order to address the SOA-specific issues. The report discusses the adaptation of the RUP activities as well as whether or not a project should be approached with a top-down or bottom-up strategy.

THE B2B GATEWAY ARCHITECTURE

The report then discusses the architecture of the B2B gateway. The SOA for the gateway has been developed following best practice guidelines for service analysis, modeling, and design. Key architectural principles that were applied are the separation of concerns and design for reusability. This is achieved by a separation of functionality into layers. The breakdown into distinct layers facilitates decoupling of the services. A typical service layer model for SOA is comprised of an orchestration services layer (i.e., the business processes), an application services layer (i.e., the core business logic), and an infrastructure services layer (i.e., technology-specific code).

The B2B gateway needed to integrate with a legacy reservation system. It was essential that business partners were shielded from any incompatibilities that might have been caused during migration. Exposing specific business functions of the legacy reservation system as services was not a simple matter of implementing wrapper code around several object-based APIs. The reservation system was tightly coupled to a Web application, such that the code consisted of intermingled presentation logic and business logic. This logic had to be broken apart, restructured, and partially reimplemented in order to create a service wrapper, which could then be used not only by the B2B gateway, but also by a (fat) Swing client and a Web front end.

Reusability is achieved by designing application services and infrastructure services that are autonomous and agnostic of the business process context within which they are executed. This increases the potential for reusing them when a new business process is composed. The report shows how reuse was achieved in the first phase of the B2B gateway project, which focused on reservations from B2B partners, and in the second phase to enable rapid implementation of a third-party wireless system that facilitates interactions between field drivers and corporate applications.

Most companies face an increasing complexity of their enterprise application portfolios. They fulfill business demands by adding new applications and packages and by building more connections between systems in order to achieve integration. Therefore, the application portfolio complexity increases, which in turn slows down the responsiveness of IT to business requests. The end result is a negative effect on business agility. SOA allows streamlining the application portfolio by reducing redundancies and by simplifying the connectivity across internal and external enterprise boundaries through standardization.

Web services–based systems that follow the concept of REST have enjoyed a lot of publicity and attention. The growing popularity of REST is motivated by the fact that it exploits the proven concepts of the Web, its general simplicity, and the fact that the complications of having to use SOAP and WSDL are avoided. The report discusses the decision that was made in the B2B gateway project to employ a REST-like but not completely REST-ful architecture.

The diversity of systems that are connected to the B2B gateway necessitated the definition of a comprehensive data architecture. This data architecture deals with the interfaces of the services and the messages that are being exchanged between providers and consumers.

To reduce the number of point-to-point transformations that need to be built and maintained, a company-standard XML format was defined. This format was based on (and extended) a widely used standard in the travel industry. It constitutes a canonical format consisting of small XML schema components that all service messages build on. This building block approach to schema construction significantly reduced the effort in implementing schemas and the corresponding transformation logic for new services.

CONCLUSION

The B2B gateway provides two key benefits to the company: insulation and automation. It insulates business partners from the intricacies of the company's internal applications and business processes. At the same time, the B2B gateway insulates the company's internal (core) applications from any dependencies on business partners. They can evolve independently, relying on the B2B gateway to "make up" for any API changes. The second key benefit that the B2B gateway provides is the automation of a diversity of business processes. They range from dealing with reservation requests over exchange of billing information to wireless communication with drivers. This illustrates how a well-defined SOA can be utilized to support a variety of business requirements with an efficient low-cost approach.

Achieving ROI is one thing, but the success of SOA and the efforts it takes to get there also need to be conveyed to the business sponsors. We have found that a bubble chart provides an efficient means to illustrate this. The report explains this type of visualization of IT investment and the derived benefits.

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