Chapter 3
Enterprise Integration: Architectural Approaches

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ABSTRACT

Enterprise Integration enables the sharing of information and business processes among the various applications and data sources within and beyond an organization. Over the years, due to changes in business requirements and availability of sophisticated technology, the architectures for integrating applications and data sources have evolved from simple point-to-point integration technique to more comprehensive architectures leveraging Service Oriented Architecture (SOA) and Event Driven Architecture (EDA). In this chapter, the authors trace this evolution, and examine the architectures in terms of complexity versus business benefit. The architectures are presented in a logical progression starting with the simplest form.

INTRODUCTION

Enterprise integration includes a broad set of activities that ensure both business processes and information technology applications are coordinated within and beyond the enterprise. It deals with solving a range of issues relating to business process definition, common data standards, architectural compatibility, technical interoperability, and organizational alignment (Lam et al., 2004; Lam et al., 2007).

First, let’s examine why applications need to integrate. A stand-alone application that is purpose built and can fulfill all of its business functionality without sharing information with other applications would not need to be integrated. Any new functionality would be added incrementally, until the application becomes “monolithic.” This style is reminiscent of the mainframe era, where one application and a set of terminals could operate an entire business.

We now know that monolithic applications are not flexible enough to adapt to today’s ever changing business landscape. The speed of doing business is increasing. Customers are becoming more sophisticated and demanding better, faster,
and cheaper services, anytime and anywhere. In today’s best practice architecture, business processes are decomposed into distinct components or applications integrated together to fulfill business functionality (Shankararaman et al., 2011). As a matter of necessity then, applications must integrate.

This chapter explores the various architectural styles for integrating applications, ranging from simple point-to-point messaging, to more comprehensive service-oriented and event-driven architecture styles. The integration patterns examined here vary in terms of complexity versus business benefit and will be presented in a logical progression starting with the simplest form.

BACKGROUND

A number of authors have attempted to classify enterprise integration based on integration approaches. One of the earliest classifications of enterprise integration is based on the point in the system where the integration occurs, namely, data, method, application or interface (Linthicum, 1999). For example, method integration focused on integrating one application with another by invocation of APIs in the second application; interface integration focused on screen scraping as a means for exchanging information; and data integration focused on the data where there is a direct exchange between the databases of the integrating applications.

More recently, Al Mosawi et al. (2006) proposed a more comprehensive classification for enterprise integration. The authors suggested two general categories, Category 1 and Category 2. Category 1 consisted of approaches that focused on data or process, which is similar to the classification proposed by Linthicum. Within this Category, they identified nine different approaches, namely, data integration, object integration, function or method integration, user interface integration, application interface integration, presentation integration, process integration, internal process integration, and cross-enterprise process integration. Category 2 consisted of approaches that focused on the architecture layers. Within this category they identified seven layers, namely, business architecture layer, business process layer, information architecture layer, inter-organizational layer, application layer, enterprise application layer, technology layer, and middleware integration layer.

Lam et al. (2007) take a very different approach by classifying integration approaches based on three categories namely enterprise application integration (EAI), B2B integration (B2Bi) and Web integration. Enterprise application integration dealt with integrating applications within the organization. The drivers included operational efficiency, customer relationship management, and business process automation. B2Bi dealt with integrating applications between two or more organizations. The drivers included supply chain management and B2B commerce. Web integration dealt with integrating an organization’s existing application with new Web-based front-end applications. The drivers included E-Business and Web-channel services. In the same article, the authors suggested five categories of integration based on the level at which integration occurred, namely, presentation, data, application, service, and process integration. They then proposed four basic kinds of integration architectures, namely, batch integration, point-to-point integration, broker-based integration, and business process integration.

In this chapter, we build on the above approaches to classify enterprise integration but specifically focus on the architectural styles for integrating applications. We identify five different architecture styles:

- Point-to-point integration.
- Hub-and-spoke messaging.
- Service oriented architecture with enterprise service bus.
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