

# Chapter 4.11

## Case Study: Service-Oriented Retail Business Information System

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### **ABSTRACT**

The primary objective of this case study is to discuss a retail business information system illustrating an e-business integration example among a biometric attendance system, a surveillance system, and a point-of-sale system. Using a service-oriented architecture allows businesses to build on top of legacy applications or construct new applications in order to take advantage of the power of Web services. Over the past years, Web services have finally developed enough to allow such basic architectures to be built. Each of the components in the system will be designed and developed using a service-oriented architecture that clearly illustrates how such cutting-edge

systems can be put together. By designing these components in such a fashion, this example will focus on applying service-oriented development and integration techniques to the retail sector. The result of this project will be an integrated system that can be used by businesses everywhere to learn how their organizations can benefit from service-oriented architecture. Also, the application of the service-oriented development and integration to systems that were previously stand-alone and heterogeneous is discussed. All previous experiences in object-oriented architectures and design methodology are naturally streamlined with the service-oriented architecture, supporting the loose coupling of software components.

## INTRODUCTION

The purpose of this case study is to discuss a retail business information system (BIS) illustrating a service-oriented development and integration example among a biometric attendance system, a surveillance system, and a point-of-sale (POS) system. Various software systems typically used in businesses can be developed and integrated using SOA (service-oriented architecture; Alonso, Casati, Kuno, & Machiraju, 2004; Erl, 2004). An SOA is a way of designing a software system to provide services to either end-user applications or other services through published and discoverable interfaces.

The three heterogeneous applications used in this case study are a system for keeping track of how long an employee works called EAS (employee attendance system), one using surveillance systems to monitor an establishment called 3S (Smart Surveillance System), and a POS system. They are typical applications that are found in a majority of retail BISs. Unfortunately, each of these applications is almost always used in isolation and is difficult for users to interact with since they have been developed by different software companies, and integration with other systems is not considered at the beginning of their designs. In many instances, these components are constructed using different programming languages and are very difficult to upgrade and integrate with newer systems. For example, many POS systems need to manage employees and need a secure access mechanism through a fingerprint recognition system. Although EAS supports this functionality, EAS cannot be easily integrated into the existing POS system.

This case study demonstrates some of the advantages of SOA-based development and integration, which we call service-oriented development and integration (SODI), to construct a loosely coupled information system that can be effectively altered and upgraded as time passes. In order to demonstrate how the SODI can be

applied to the development of software systems for a retail business and the integration of the software systems, this case study considers two problems. The first problem is to propose how the SODI can be defined without losing the valuable experiences of the developers in object-oriented analysis and design. The second problem is to propose how the SODI can be applied to the development and integration of a retail business information system.

Web service technologies are still relatively immature in comparison to other networking protocols and technologies. At this time, the only relatively stable aspects of Web service technologies are the simple object access protocol (SOAP; World Wide Web Consortium Extensible Markup Language [W3C XML] Protocol Working Group, 2006), the Web service description language (WSDL; W3C Web Services Description Working Group, 2006), and universal description, discovery, and integration (UDDI; Organization for the Advancement of Structured Information Standards [OASIS], n.d.). Other standards such as WS-Addressing (W3C Web Services Addressing Working Group, 2006), WS-Policy (IBM, 2006b), WS-Security (OASIS, 2006), and semantic Web services such as the Web ontology language for services (OWL-S; W3C Semantic Web Services Interest Group, 2006b), Web services modeling ontology (WSMO; W3C Semantic Web Services Interest Group, 2006c), semantic Web services framework (SWSF; W3C Semantic Web Services Interest Group, 2006a), and Web services semantic (W3C Semantic Web Services Interest Group, 2006d) are still being researched and are not mature enough to be applied to real BISs yet by using industry-supported platforms such as .NET or Java.

SODI is a software development and integration approach that is architecture centric, integration ready, evolution based, and model driven. SODI is architecture centric and integration ready since three architectural patterns—three-layered architecture (Alonso et al., 2004), multitier archi-

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