Chapter 6.10
Integration of Business Event and Rule Management with the Web Services Model

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ABSTRACT

Web services technology is emerging as a promising infrastructure to support loosely coupled, Internet-based applications that are distributed, heterogeneous and dynamic. It provides a standards-based, process-centric framework for achieving the sharing of distributed heterogeneous applications. While Web services technology provides a promising foundation for developing distributed applications for e-business, additional features are required to make this paradigm truly useful in the real world. In particular, interactions among business organizations need to follow the policies, regulations, security and other business rules of the organizations. An effective way to control, restrict and enforce business rules in the use of Web services is to integrate business event and rule management concepts and techniques into the Web services model. In this paper, we focus on incorporating the business event and rule-management concepts into the Web services model at the service provider side. Based on a code-generation approach, we have developed techniques and implemented tools to generate Web service "wrappers" and other objects required to integrate an Event-Trigger-Rule (ETR) technology with the Web services technology.

INTRODUCTION

Web services technology (Gottschalk, 2000) is emerging as a promising infrastructure to support loosely coupled, Internet-based applications that are distributed, heterogeneous, and dynamic. It provides a standards-based (Ballinger et al., 2001; Bellwood et al., 2002; Box et al., 2000; Christensen et al., 2001), process-centric framework for achieving the sharing of distributed heterogeneous applications. The Web services model provides dynamic binding to services and allows larger granules of application system functionalities and business processes to be shared over the Internet. Due to the encapsulation of Web services and the use of standards for their description, discovery and integration, Web services can be accessed independently of the communication mechanisms, programming languages and frameworks that are used to implement them (Snell, 2002).

While the emerging Web services technology provides a promising foundation for developing distributed applications for e-business, additional features are required to make this paradigm truly useful in the real world. In particular, interactions among business organizations need to follow the policies, regulations, security and other business rules of the organizations. An effective way to control, restrict and enforce business rules in the use of Web services is to integrate business event and rule management concepts and techniques into the Web services model. Things of importance that can happen within or outside of collaborating business organizations can be defined as events. For example, operations that change the data states of a system, or actions taken by users through a browser, before and/or after invocation of a Web service, can be events of interest to business organizations. In a business environment, the occurrence of an event may require the invocation of some business rules to enforce security and integrity constraints, policies and regulations, or to enact a business process.

In our project, we explore techniques that can be used to enhance the Web services model by using events, event filters, event notifications and business rule processing to control, monitor and restrict the publication, discovery and access of Web services. In this paper, we focus on incorporating business event and rule-management concepts into the Web services model at the service provider side.

Based on a code-generation approach, we have developed techniques and implemented tools to generate Web service "wrappers" and other objects required to integrate an Event-Trigger-Rule (ETR) technology with the Web services technology on the service provider side. The build-time tool used in the system consists of four main components: GUI for Web Service Creation, Wrapper Generator, WSDL Document Generator and the Events Installer. Using the GUI, a service provider is allowed to choose the operations to be exposed along with the events (such as before operation invocation and/or after operation invocation) to be installed on an ETR server. Based on the inputs, a Web service wrapper is generated that implements the posting of the installed events and invoking of the underlying service implementation. Also, the interface and implementation WSDL documents of the selected Web service are generated and placed in the appropriate directory. The Web service wrapper is then deployed as the actual Web service. The wrapper provides an interface identical to that of the underlying service implementation.

At run-time, when a client invokes an operation in a Web service, the appropriate method in the wrapper is invoked to post the events to trigger any required business rules in an ETR Server in addition to invoking the underlying implementation of the Web service operation. A trigger in the ETR Server can be simple or it can include event history specification that is used to model complex relationships among the subscribed events. During the processing of a trigger, the

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