Chapter XII

Web Services Identification: Methodology and CASE Tools

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Abstract

Web services technology has been envisioned as an important trend in application development and integration. It allows pre-built applications/application components wrapped as Web services to interact with each other through standardized interfaces and to form larger application systems. This chapter describes a formal approach to Web services identification, which is a critical step in designing and developing effective Web services. The approach takes an analysis level object model, representing a business domain, as input and generates potential Web service designs, in which the classes in the object model are grouped into appropriate Web services based on static and dynamic relationships between classes. An initial hierarchical grouping of classes is derived using a maximum spanning tree algorithm or a hierarchical
clustering algorithm. A set of managerial goals for evaluating alternative designs is derived based on business strategy of Web service fabricator. Since the managerial goals are conflicting, a multiobjective genetic algorithm has been designed to search for alternative nondominated solutions, from which a preferred solution can be selected. The approach has been implemented in a Web services identification tool and used for designing Web services in an auto insurance claims domain.

Introduction

Web services are envisioned as the next technological wave. Leading software vendors, including Microsoft (Miller, 2003), Sun (Williams, 2003), and IBM (Kreger, 2003), are investing extensively in the development of protocols and products that facilitate the development, deployment, discovery, and composition of Web services. At the same time, a set of Web services technologies is being standardized and supported by the industry (Kreger, 2003).

Web services are expected to greatly enhance Web application interaction and integration and can facilitate assembly of larger business applications from reusable components wrapped as Web services. Based upon emerging standards, such as HTTP, XML, SOAP, WSDL, UDDI, and WPEL4WS, Web services allow loosely coupled Web based application systems to be quickly built by assembling application components wrapped and published as Web services. In these applications, the individual components that provide focused business functionalities can communicate with each other through standardized interfaces (i.e., XML messaging) to form larger application systems that carry out more complex business processes. Offering a language-neutral, environment-neutral computing model, Web services technology is promoting application interaction and integration through the Internet, both within and across enterprises (Gottschalk et al., 2002).

The development and integration of Web services resemble Component Based Software Development (CBSD), where pre-built parts, known as business components, are assembled into larger-scale applications (Herzum & Sims, 2000; Kim & Chang, 2004; Vitharana et al., 2003a, 2003b, 2004). A Web service is essentially a business component that implements an autonomous business concept or business process. Development of Web services typically requires following steps: Domain analysis and modeling, Web services identification, Web service design and implementation, testing, acceptance, and deployment and publication. A critical step among these is Web services identification, where related object classes are grouped into Web services.

The problem of identifying appropriate Web services has not been addressed in the literature. No formal methodology and tools that allow the designer to generate and
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