Security System for Distributed Business Applications

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ABSTRACT

Internet-focused application components of cooperating enterprises need comprehensive security technologies that go far beyond simple Internet authentication and authorization mechanisms. Basically, authentication is the process of determining the identity of a user or system, whereas authorization is the process of specifying who is allowed to access which resources. XML-based Web services is an upcoming and very promising technology. It enables the communication among Internet application components regardless of their implementation language. A major drawback of existing Web service approaches is the missing security conventions. Therefore, we concentrated all our effort on developing a holistic extended enterprise authentication and authorization system to facilitate agile and secure enterprise-spanning business processes with Web service-enabled application components.

Keywords: authentication; authorization; business-to-business; enterprise integration; extended enterprise; Internet application; SAML; security; SOAP; Web services

INTRODUCTION

Collaboration between independent enterprises with different core competencies is a very important way to seize opportunities very fast in agile business environments (Goldman, 1991; Camarinha-Matos, 1999). To distinguish the approach described in the following from the general term “business-to-business,” the more specific term “extended enterprise” (Figure 1) will be used.

The following definition for extended enterprises is new but influenced by other related definitions and approaches: extended enterprises (EE) are temporary or permanent networks of independent enterprises including a coordinator cooperating with the aim to design, manufacture, and sell a product or service in a project-oriented way independent of enterprise borderlines, automated inter-enterprise communication through the usage of information technology, and communicating via Internet-related technologies like XML-based Web services.

The extended enterprise coordinator mentioned above is often described as an enterprise, which extends its boundaries to incorporate business partners. This coor-
A coordinator has to provide specific resources for operating the extended enterprise. As a matter of course, the same enterprise can be involved in various extended enterprises. Thus it may happen that two enterprises cooperate in one business segment and compete in other business segments at the same time.

**INTEGRATION CONCEPT FOR EXTENDED ENTERPRISES**

The common goal of the extended enterprise members is the support of the whole product life cycle composed of product design and development, process planning, logistics, production, marketing and sales, and etcetera. There is a need for several information systems to automate the particular life cycle steps. Different from isolated enterprises, the supporting information system functionalities are widespread in all participating enterprises. Therefore, a very extensive horizontal integration and collaboration between these enterprises is necessary (Zhang, 2003) so that each enterprise is able to contribute their part to the information systems inside the extended enterprise (*Figure 2*). The business value from such collaboration extends across the entire concept development, design planning, engineering, and supplier relationship management (Sayah, 2003).

All business processes that support the product life cycle — summarized into the term “extended enterprise business processes” — interact with the enterprise business processes of the respective company. One precondition for such a closely horizontal integration is the existence of a vertical integration inside the company to provide all internal business processes and business system functionalities to the business partners.

A very important ingredient for a successful software system enabling extended enterprises is security, particularly if the Internet is used as the communication technology. In *Figure 2* each participating company is enveloped with a security layer to guarantee a secure information exchange, authorization, authentication, and other security mechanisms. One enterprise, in the
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