

Chapter 2.24

Secure Identity Management in a Service-Based E-Learning Environment

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ABSTRACT

E-learning environments and their system functionalities resemble one another to a large extent. Recent standardization efforts in e-learning concentrate on the reuse of learning material, but not on the reuse of application or system functionalities. The LearnServe system under development at the University of Muenster builds on the assumption that a typical learning system is a collection of activities or processes that interact with learners and suitably chosen content, the latter in the form of Learning Objects. This enables us to divide the main functionality of an e-learning system into a number of stand-alone applications or services. The realization of these applications based on the emerging technical paradigm of Web services then renders a

wide reuse of functionality possible, thereby giving learners a higher flexibility of choosing content and functionalities to be included in their learning environment. In such a scenario, it must, however, be possible to maintain user identity and data across service and server boundaries. This paper presents an architecture for implementing user authentication and the manipulation of user data across several Web services. In particular, it demonstrates how to exploit the SPML and SAML standards so that cross-domain single sign-on can be offered to the users of a service-based learning environment. The paper also discusses how this is being integrated into LearnServe.

INTRODUCTION

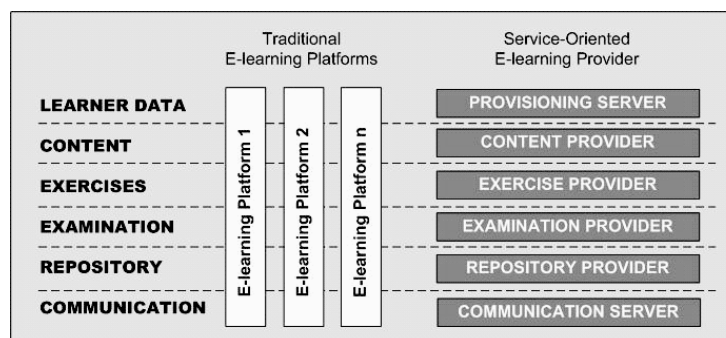
E-learning systems and environments have become widespread in recent years, as they are able to offer an improvement of many learning scenarios, independence of time and location for a learner, and availability of content even in remote areas, to name just a few of their advantages. The market for such “learning management systems” (LMS) has grown considerably, and today there is a host of experimental, open-source, and commercial systems around. At the University of Muenster in Germany, one of several systems under research and development is *LearnServe*, which provides e-learning through a service-based architecture.

LearnServe draws upon observations made in vastly different application domains. Indeed, the optimization of processes in a value or production chain is a key factor for the survival of a modern enterprise. To achieve this, more and more organizations concentrate on their core competences by offering those parts of the value chain of which the respective enterprise has special know-how, technologies, or abilities, and that are the most valuable for a customer and not imitable for competitors. By using modern Internet technologies as well as outsourcing and off-shoring, multiple companies are able to combine their abilities to organize production chains very efficiently. As

such a joining of forces is not obvious for a customer, these combinations have become known as *virtual companies* (Porter, 1985). Virtual companies are flexible in their configuration and are able to change partners on demand in order to optimize their output for the customer. In this paper, we essentially transfer the concept of a virtual company from enterprises to the emerging e-learning domain.

Differing from what happens in a virtual company, manufacturers of e-learning systems still do concentrate on their core competences in very limited or specialized areas only, and offer common tools and techniques otherwise. As a result, present-day e-learning platforms resemble each other to a large extent in their functionality. In particular, all systems implement maintenance of user data, tracking of user actions, ways to display learning content, authoring features, exercise modules, and search mechanisms for the discovery of content, to name just a few of their typical functionalities. However, each platform implements these anew, and a specialization can at best be found for authoring tools that try to build reusable Learning Objects (see Vossen & Jaeschke, 2002; Vossen & Jaeschke, 2003) to be used within different LMSs and in the offering of Learning Objects as special add-on packages. For other functionalities the process of offering specialized applications has only just begun (Bry,

Figure 1. Towards a specialization of e-learning providers



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