The Promise of Web Services

How can e-learning architects capitalize on these benefits?

BY ROBBY ROBSON

There is a lot of buzz surrounding Web services in the e-business world. Major software vendors are in the midst of highly visible campaigns to promote Web services as the way of the future. Web services could also do a lot for e-learning. To appreciate the opportunities, one has to understand what Web services are, why they are attractive, and what is involved in re-architecting e-learning systems to take advantage of them.

What are web services?

Services (not necessarily Web services) are applications that can be accessed and used by other applications to perform specific tasks. For example, desktop computers run a service that sends e-mail over a network using a standardized protocol. When you send e-mail using a desktop application—such as Outlook, Pine, or Eudora—you’re e-mail program accesses this service behind the scenes. As an example of a different nature, there are companies that sell services for authorizing credit card transactions via the Internet. An e-store application must access one of these services in order to accept credit card payments.

For a service to be used, other applications must know how to access it, how to exchange data with it and how to ask the service to perform desired functions. In the credit card example, an e-store needs to know how to connect with the authorization service, how to transmit credit card numbers and associate information, and how to request that a charge be authorized. The idea behind Web services is to create services that provide access and communicate using the infrastructure and standards of the World Wide Web. Web services are accessed in the same way that Web browsers access Web servers, and applications using a Web service encode data and make requests using standards and protocols based on XML (Extensible Markup Language).

Why web services?

Web services hold out a lot of promise. They leverage existing investments in Web infrastructure and create a framework that can be used in any application domain, including e-commerce, enterprise resource planning, and e-learning. This should make it easier for applications from one domain to use services from another domain. For example, an e-learning system might use an external authentication service to offer a single log in, or it might access learner management services provided by a human resources or student information system.

Architecturally, Web services also offer some advantages that could make enterprise computing more reliable and more effective. Creating a Web service requires a good model of business processes. Web services also need to be self-contained, thereby reducing problems arising from technical dependencies. Using Web protocols to connect enterprise applications should also improve reliability and eliminate problems caused by having to maintain multiple protocols, especially proprietary ones.

Transitioning to web services

Given the attraction of Web services, it will come as no surprise that many e-learning software vendors, consortia, and standards and specifications organizations are paying a lot of attention to them. But moving from the existing e-learning architectures to a Web service approach requires significant work. Most of the functionality in e-learning products has been conceived in terms of data and objects and not in terms of services. Making the change requires a shift in thinking and modifications in product architectures.

As a case study, consider the problem of enabling learners to enroll in classes through an enterprise e-learning system. This seems an easy problem until multiple products are involved, such as a learning management system and a human resources system. If the learning management system (LMS) is being used as the delivery platform and data on people is owned by the human resources system, then the two have to communicate. Otherwise, you will end up with two completely separate and potentially uncoordinated databases of people—one in the LMS and one in the human resources system. This creates unfortunate situations where the same data has to be entered multiple times, where learners have to log on multiple times, and where records can’t be transferred because people who exist in one system don’t exist in the other.

When this problem was recognized in the late 1990s, it was viewed as a problem of passing the right data back and forth between systems. In response, the IMS Global Learning Consortium released a specification in 1999. This specification tells how to encode groups (corresponding to
classes), persons (corresponding to learners), and membership. The 1999 specification, however, does not say what protocol should be used to transmit the encoded data, nor does it specify any expected behavior on the part of a system receiving the data. This is not a negative comment on the specification—it is simply illustrative of the data-centric view that dominated the industry at that time.

Although the underlying need to pass data has not disappeared, a more effective approach to the problem is that of creating a service that could be asked to create classes, enroll learners, withdraw learners, etc. Here the emphasis is on the functionality provided, not on the data exchanged, and by saying, “Web service,” the underlying communication protocol and mechanisms for making requests are specified. Rather than just specifying the data objects to be shared between systems (the nouns), Web services also define the actions to be performed with or to those objects (the verbs).

**An opportunity for e-learning**

For e-learning to make the transition to Web services, it will be necessary to identify and reach consensus on what functionality and services are needed. Software vendors have started doing this for their own products, and standards organizations are doing the same. For example, the IMS has chartered a group to identify a set of Web services for interoperability between e-learning components and selected enterprise systems. But the really good news is that adoption of Web services is already beginning in commercial applications domains such as e-business and content management.

E-learning architects now have the opportunity to make liberal use of Web services offered by existing, scalable enterprise applications while offering specialized services that are particular to learning and performance support. Doing so will make it easier to integrate e-learning platforms into existing enterprise infrastructure, and, in turn, will enable other enterprise systems—such as content management systems, enterprise information portals, and human resource systems—to access e-learning services. This is part of the maturation of e-learning technology, allowing learning, training, and performance support to be woven into the fabric of the enterprise and helping to establish e-learning as an enterprise function.

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