Virtual Continent in the Classroom: Teaching e-Business Integration Issues with Web-based Technologies

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Abstract:

> In this extended abstract we outline a Web-based learning approach for e-Business integration issues. We present a virtual toolbox, including an advisable open source tool and Web Service Application Programming Interfaces (WS APIs). By applying a collaborative learning model and by incorporating Web 2.0 features such as Web services, operating with the SOAP protocol, we were able to increase the motivational background as well as the learning success of our students significantly.

1   Introduction

A current trend in practical internet computing as well as in research and development is the strategic focus on how to best use the World Wide Web (Web). Companies pursuing e-Business development face challenges from a technical as well as from a social perspective [7]. Since coining the phrase Web 2.0 by O'Reilly [9], much progress has been made toward user participation and among other achievements a collection of middleware services based on Web service interfaces emerged. Some of these innovations are powerful alternatives to proprietary and expensive solutions used so far. This is the reason why we extended our technology-enhanced learning environment by means of public WS APIs and open source tools in addition to an e-Commerce server and an integration server [6]. In the subject Enterprise Application Integration (EAI), which also incorporates e-Business issues [4], [13], we benefit from enhanced personal motivation, cost-effectiveness as well as from learning success. In order to support critical thinking, analytic strategies and working with classmates we foster a collaborative learning model that focuses on practical work in groups and on four activities related to *Active Learning* [10]: (a) collect, (b) relate, (c) create, and (d) donate.

2   Interdisciplinary Approach

It seems that the ability to intertwine different disciplines is a key characteristic of a successful education. We believe that the application of information technology in an interdisciplinary context will supervise a broader understanding of technology in general. By choosing the appropriate tools, interfaces and applications, we strive for this interdisciplinary challenge and try to interlink e-business products, services, applications, and activities with topics such as Artificial Intelligence (AI), the history of automation, or even knowledge management [2]. Perhaps the most important resource for the Web 2.0 is the user [8].

By choosing appropriate interfaces and applications, provided by the virtual continent, we aim at this interdisciplinary challenge and make use of Web-based services, WS APIs and

applications built within an interdisciplinary context. This way, different domains such as artificial intelligence, the history of automation or even knowledge management can be interlinked. The "Mechanical Turk" for example, implements a Web application for collecting and managing "human" intelligence [12]. This example works well for our approach.

3   Virtual Toolbox

In this chapter we present an outstanding open source tool, currently credited as a full-featured product for working with Web service interfaces. Furthermore, we present an example of a well-balanced WS API, shared code provided by Amazon.com [1]. In addition to our professional integration server, we use a "virtual toolbox" for teaching basics of asynchronous messaging, Web services interfaces, and Service-oriented Architectures (SOA) within the subject EAI.

3.1   *SoapUI*

SoapUI is a desktop application for inspecting, developing, mocking, testing, simulating, and invoking Web services over HTTP [11]. This tool is recommendable for any case of functional testing and for developing Web services. Many of the problems and errors that may occur while working with a WSDL-file, for example problems with a XML scheme, can easily be traced. Additional functionalities offered by this tool are real-time analyses, test cases, load testing, behavioural diagrams, performance statistics, and exporting logs. Its weakness in security matters serves as a practical example for teaching security in a collateral way [3].

3.2   *Amazon.com's e-Commerce Service*

The Amazon e-Commerce Service (Amazon ECS) exposes Amazon's product data and e-Commerce functionality. It allows developers, Web site owners and merchants to leverage the data and functionality that Amazon uses to power its own e-Commerce business. By taking advantage of this WS API, our students get the power to establish rapidly e-Business solutions based on well-tested resources that facilitate user participation (Figure 1).
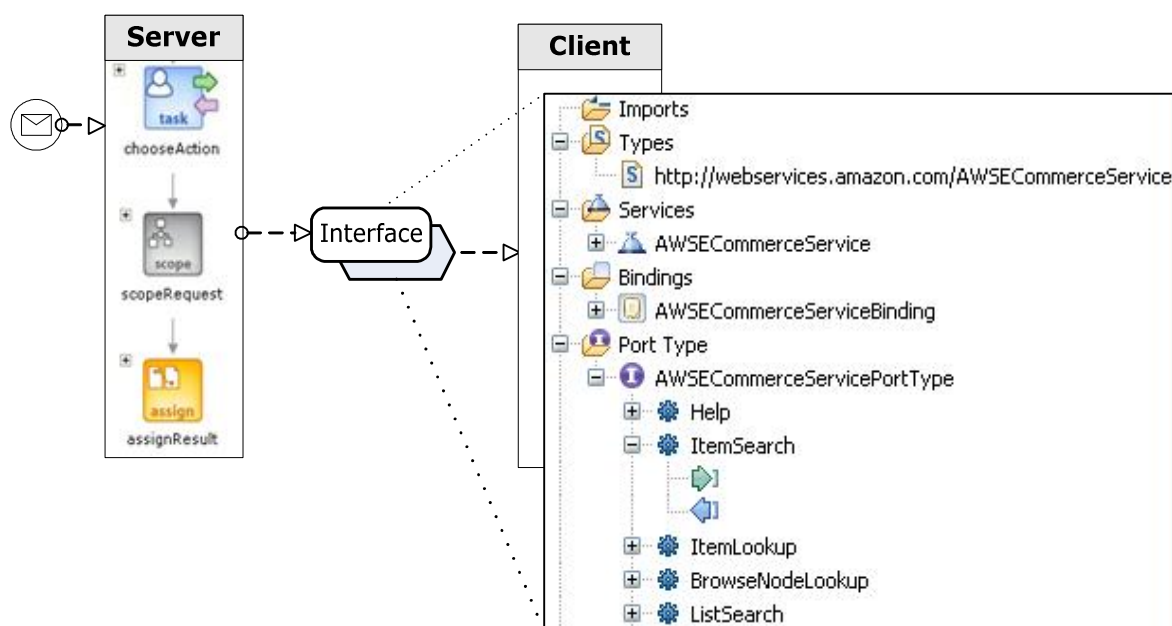
Figure 1: Interface description of the Amazon ECS including operations and messages

3.3 Amazon.com's Simple Queue Service

One of the latest achievements of technology leaders in the virtual world is the Amazon Web Services (AWS) collection. It also provides business integration technology based on Web service interfaces, performing Client-Server communication over the Internet, and allows a tremendous leap forward in teaching integration issues. From a technical point of view, the Amazon Simple Queue Service (Amazon SQS) offers a reliable and scalable virtually hosted message queuing system for the handling of messages as they occur in distributed computing [5]. In this system Amazon is responsible for (a) virtualized configuration, (b) virtualized message store, (c) hosted message routing, and (d) virtualized software repository. By taking advantage of this messaging backbone, our students get empowered to build loosely coupled workflow applications, combining human and automated tasks without the need of a cost-intensive local messaging system. This innovation is a powerful alternative to proprietary and expensive messaging solutions currently used in many enterprises.

4 Conclusion and Outlook

In this work we presented a Web-based e-Business infrastructure, provided by the virtual continent. The WS APIs introduced are highly suitable for teaching issues of enterprise application integration as well as e-Business integration. This was the reason why we adopted them for our collaborative learning model. We believe that this approach is an excellent way to prepare the next generation of engineers for the emerging global innovation environment, which most likely will require a much broader perspective of how innovative technologies and solutions are developed. After finishing their studies, some of the forward-thinking students will integrate, automate, and streamline core internal and external business processes while others probably will engage more in business development or even in research activities. For all of them e-Business and intra- as well as cross-enterprise application integration will be a good preparation for their daily business in the future.

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