Chapter 6
Verification of E-Commerce Business Processes

Sven Feja
Christian-Albrechts-University of Kiel, Germany

Andreas Speck
Christian-Albrechts-University of Kiel, Germany

Elke Pulvermüller
University Osnabrück, Germany

Marcel Schulz
Intershop Communications AG, Germany

ABSTRACT

Like other large scale systems, large scale e-commerce systems are hard to be validated or verified, although the quality requirements for these systems are very high. Moreover, e-commerce systems mainly interact with other systems like inventory systems. The interoperations need to be verified. The question is now: are there any further possibilities to check these systems except doing this manually?

An approach is to focus on the models describing the systems, and specifically, to focus on the models of the behavior. Although the verification of temporal aspects is much more complex than checking static dependencies, there is a promising technology: model checking.

Nevertheless distinctive improvements are necessary before this technology can be applied in the real system development. Graphical formal requirement notations for different kinds of process model notations as representations of the specification of rules are also crucial, along with the ability to present the positive and especially negative results to the different types of stakeholders. And finally, the model checking technique has to be improved in order to deal with different types of model elements which are typical for business process models.

DOI: 10.4018/978-1-60960-485-1.ch006
INTRODUCTION

Most large scale e-commerce systems share similar modeling and architecture concepts: The systems’ behavior is expressed in business process models. Larger e-commerce systems typically use models which are divided into different levels of abstraction. Based on the requirements the systems’ models have to be validated. The quality of these models determines the success of the overall development. Since the fulfillment of requirements is the main satisfaction factor of every involved stakeholder the requirements as well as rules and regulations are the driving factor in the systems verification. For example customers may want a software solution which provides the desired functionalities as reliable as possible and in a specific order, while for developers (next to the customer desires) the time-to-market and reusability are more important factors. As mentioned by Boehm and Papaccio (1988) the economic effect of false or inaccurate requirements (models) in early stages of the development process should not be disregarded. As the requirements specifications (e. g. business rules or legal regulations) are the basis for software development processes their validity, consistency, completeness, realism and verifiability needs to be assured (Sommerville, 2006). Promising techniques to achieve this are formal methods (Jackson, 2006). Vaandrager (2006) gives an overview of different formal methodologies and distinguishes between invisible formal methods, automated abstraction, model checking and theorem proving or constraints checking (Runte, 2009). In our work the technique model checking is predominantly used as base.

In the paper we present our verification concept for large scale e-commerce systems. As example we take Intershop Enfinity. This is a high-performance e-commerce system suited for building large shop systems used by vendors like Otto Versand, T-Home, B2B systems like Schott AG (optical industries) and e-procurement systems like the one used by the German Federal Ministry of the Interior (Bundesministerium des Innern, BMI). The modeling method of Enfinity is ARIS4Enfinity a specific profile of the ARIS model (Architecture integrated Information Systems) supported by the ARIS tool set of IDS Scheer. The typical problems that arise from this modeling concept are:

- Specific business rules and best practices, which are valid in defined business domains, are to be kept.
- Dynamic models on different levels of abstraction must be kept consistent.

In this chapter we focus on the validation concepts of e-commerce systems as base of the development of e-commerce systems. However, such systems are mostly interacting with other systems like inventory control systems. Actually both systems are active in the same business processes interoperating with each other. E.g. in case a customer of the e-commerce system wants to buy something the e-commerce system has to request the inventory control system first and then finalize the contract. Then the e-commerce system has to initiate that the inventory control system starts the delivery and decreases the number of available goods.

In our approach the first step is to verify the business process defining the interoperation, for example that the sequence of actions of the two systems follows the correct order. In the chapter we present this approach. Further examples for such interoperations like search process and others may be found at (Speck, 2006).

Need for Automated Test Support

Current practice is to test and check systems manually. Besides specific rules and regulations, experiences are used as base. However, it is obvious that the manual tests are comparatively time-consuming and there is a high probability that not all possible errors are detected. Moreover, such