Chapter 4
Design and Usage of a Process–Centric Collaboration Methodology for Virtual Organizations in Hybrid Environments

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ABSTRACT

This article describes a collaboration methodology for virtual organizations where the processes can be automatically executed using a hybrid web service, grid or cloud resources. Typically, the process of deriving executable workflows from process models is cumbersome and can be automated only in part or specific to a particular distributed system. The approach introduced in this paper, exemplified by the construction industry field, integrates existing technology within a process-centric framework. The solution on the basis of a hybrid system architecture in conjunction with semantic methods for consistency saving and the framework for modeling VO processes and their automated transformation and execution are discussed in detail.

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INTRODUCTION

Effective enterprise collaboration and efficient utilization of appropriate information technology are basic prerequisites for a successful cooperation between companies. Cooperation can follow different objectives which differently affect the creation of processes of the cooperation partners. Regarding the integration of different business processes of the cooperation, one can find different objectives of cooperation affecting the integration process. For example, added value units could be created and newly shown up in the model or elements are reduced by redundancies in the process of building conglomerates or pools, where all cooperation partners are taking part and using it. It is also possible that previous inaccessible software systems of a partner could be used.

The degree of variation of the cooperation is also important for the integration. Therefore, the dynamical cooperation is most challenging and hence a case of reference since the integration of business processes has to be often reactivated to react on the changes of the cooperation. Here, most of the coordination effort between the partners is expected. A wide spread form of cooperation is a virtual organization (VO). A virtual organization (VO) is built as a combination of persons, companies and other real organizational entities. It has a transient nature and can be subject to changes throughout its lifespan. Virtual organizations are defined through dynamic, i.e. alterable “relations” such as roles and access privileges, which in term define the participation of the involved real or virtual actors (Camarinha-Matos, Afsarmanesh, & Ollus, 2005). The use of process modeling techniques – an important component of VO management as such – allows to put emphasis on the execution of tasks related to internal or external work orders as well as to their time and space related coordination.

There are various platform approaches regarding the IT support of Virtual Organizations. However, centralized Client-Server systems based on proprietary interfaces as well as Corba-based systems are increasingly being replaced by more flexible technologies that enable stronger distribution of the information, unify the remote access to services by the use of the SOAP standard and warrant structural data interoperability via XML-based language constructs.

The present article aims at offering an improved collaboration methodology for managing and automatically executing collaborative business processes using hybrid web service, grid or cloud resources. This goal is particularly motivated by increasing process integration scenarios of collaborative business relations and the diffusion of the joint usage of distributed resources. The objective of design-science research is to develop technology based solutions for important and relevant business problems (Hevner et al., 2004). This article tends to information system research with new characteristics. The described shortcomings constitute the prerequisites for the beneficial implementation of a hybrid platform in combination with semantic methods for tasks like consistency checking, information retrieval for the different expert-views of the participating parties as well as functionally oriented process management. The central assumption of this concept is that the VO requirements can be fulfilled and the efficiency of the collaboration processes can be increased. This approach is innovative, because it allows all participants to collaborate with justifiable expenses and efforts through utilization of new universal process-oriented working methods and modern information and communication technology, based on an integrated grid platform allowing even mobile access to the platform. In this paper, we will design and apply such a methodology based on a case study from the construction industry field. We will close with an outlook and future research challenges.