Towards Truly Flexible and Adaptive Process-Aware Information Systems*

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Abstract. If current process management systems shall be applied to a broad spectrum of applications, they will have to be significantly improved with respect to their technological capabilities. Particularly, in dynamic environments it must be possible to quickly implement and deploy new processes, to enable ad-hoc modifications of running process instances on-the-fly (e.g., to dynamically add, delete or move process steps), and to support process schema evolution with instance migration (i.e., to propagate process schema changes to already running instances if desired). These requirements must be met without affecting process consistency and by preserving the robustness of the process management system. In this paper we describe how these challenges have been addressed and solved in the ADEPT2 Process Management System. Our overall vision is to provide a next generation process management technology which can be used in a variety of application domains.

1 Introduction

More and more contemporary information systems (IS) have to be aligned in a process-oriented way. This new generation of IS is often referred to as Process-Aware IS (PAIS) [1]. Recently, numerous technologies and paradigms have emerged in this context such as Workflow Management, Business Process Management, Enterprise Application Integration, and Service-oriented Architectures (SOA). They all focus on the realization of PAIS [1]. By offering system-based support for implementing business processes, these technologies aim at an increased efficiency and adaptivity of enterprises regarding their internal processes. By combining process management with SOA the interaction between enterprises and their customers and partners shall be improved as well.

To provide effective process support, PAIS should capture real-world processes adequately, i.e., there should be no mismatch between the computerized processes and those in reality. To achieve this, PAIS enabling technologies must fulfill a number of requirements:

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1. They must cover a broad spectrum of applications ranging from form- or document-centered workflows to complex production workflows (where application integration constitutes a major task).
2. They must allow for the rapid and cost-effective implementation of a large variety of business processes.
3. The implemented processes must run in a robust and stable manner. The overall objective should be "robustness by design".
4. PAIS must not lead to rigidity and freeze existing business processes. Instead, they must allow authorized users to flexibly deviate from the predefined processes as required (e.g., to deal with exceptions). Such ad-hoc process changes should be enabled at a high level of abstraction and without affecting robustness of the PAIS.
5. Due to process optimization or legal changes PAIS implementations evolve over time. Respective process changes have to be accomplished in an easy and cost-effective way. For long-running processes the "on-the-fly" adaptation of already running process instances to the new process schema should be possible as well.

Fig. 1. Overhead caused by realizing system functions within the application programs is avoided by providing the required functionality as integral part of the ADEPT2 system

Off-the-shelf process management systems do not meet these requirements or offer restricted features [1,2]. Several vendors promise flexible process support, but are unable to cope with fundamental issues related to process change (e.g., correctness). Most systems, however, completely lack support for deviating from the predefined processes in an ad-hoc manner or for migrating process instances to a changed process schema. Thus, application developers are forced to "enrich" applications with respective process support functions to deal with these limitations. This, in turn, aggravates PAIS development and maintenance significantly and shifts the risk of errors and the task to deal with them to application developers or end-users.