

Chapter 5

Extending Business Processes with Mobile Task Support: A Self-Healing Solution Architecture

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ABSTRACT

Process management technology constitutes a fundamental component of any service-driven computing environment. Process management facilitates both the composition of services at design-time and their orchestration at runtime. In particular, when applying the service paradigm to enterprise integration, high flexibility is required. In this context, atomic as well as composite services representing the business functions should be quickly adaptable to cope with dynamic business changes. Furthermore, they should enable mobile and quick access to enterprise information. The growing maturity of smart mobile devices has fostered their prevalence in knowledge-intensive areas in the enterprise as well. As a consequence, process management technology needs to be extended with mobile task support. However, process tasks, hitherto executed in a stationary manner, cannot be simply transferred to run on smart mobile devices. Many research groups focus on the partitioning of processes and the distributed execution of the resulting fragments on smart mobile devices. Opposed to this fragmentation concept, this chapter proposes an approach to enable the robust and flexible execution of single process tasks on smart mobile devices by provisioning self-healing techniques to address the smooth integration of mobile tasks with business processes.

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INTRODUCTION

Daily business routines increasingly demand a mobile and flexible access to Information Systems. However, the integration of smart mobile devices into existing IT infrastructures is laborious and error-prone. In particular, the IT infrastructure must cope with ad hoc events, various errors (e.g., connectivity problems), physical limitations of smart mobile devices (e.g., limited battery capacity), misbehavior of users (e.g., instant shutdowns), and environmental data collected by mobile sensors (Schobel et al., 2013).

In general, proper exception handling constitutes a prerequisite for any mobile task support. In this context, adaptive and flexible process management technology offers promising perspectives based on a wide range of techniques (Reichert & Weber, 2012; Reichert & Weber, 2013; Kolb & Reichert, 2013; Lanzet et al., 2013; Weber et al., 2008). In particular, it allows for the proper handling of runtime exceptions. However, executing tasks on smart mobile devices in the same way as on stationary computers is not appropriate when taking these specific challenges of mobile environments into account.

Any service-oriented environment should allow for mobile task support during business process execution. This chapter presents an approach developed in the MARPLE (Managing Robust Mobile Processes in a Complex World) project. This approach enables the robust execution of single process tasks on smart mobile devices. Basically, it relies on two fundamental services, a backup service and a delegation service. These services ensure that mobile tasks do not harm the overall process execution in case task failures occur. Finally, a service-oriented architecture is presented that integrates the backup and delegation services with an existing process engine.

Note that implementing a process engine, which provides all functions for creating and executing mobile tasks from scratch would constitute another option. However, if a process management system

is already in use in an enterprise, the introduction of another process engine might not be acceptable, due to the high effort needed for transferring process models and their configurations to the new engine. Therefore, the presented approach provides an engine-independent interface for executing mobile tasks and services. For this purpose, the services are implemented in a layer between the process engine and the smart mobile devices. In particular, this service layer enables the instantiation, activation, and robust execution of mobile tasks (including error handling). Furthermore, the mobile task execution approach presented in this chapter allows handling runtime errors without need for any manual involvement of users. Generally, the provisioning of respective *self-healing techniques* is crucial for executing mobile tasks in the large scale as well as for achieving higher user acceptance for mobile business processes.

The chapter is organized as follows. First, we discuss fundamental issues relevant to the context of mobile environments. Their understanding is required for developing the delegation and backup services as well as for designing the overall system architecture. In particular, this architecture addresses the challenges (e.g., device failures) to be tackled in order to enable robust mobile task execution. Furthermore, these challenges must be considered in the context of business process execution, i.e., they must cover aspects beyond the characteristics of a mobile environment. In detail, the chapter addresses challenges posed by the mobile environment itself (e.g., a mobile device loses its connectivity), challenges related to process execution (e.g., missing data due to task failures), and challenges caused by the behavior of mobile users (e.g., instant shutdowns).

BACKGROUND

Many domains crave for the integration of smart mobile devices into business process execution (Pryss et al., 2012; Lenz & Reichert, 2007). Figure

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