Chapter 9
Recovering Business Process Models with Process Patterns

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ABSTRACT

Originating from a pragmatic need to document strategies for modelling recurrent business scenarios, collections of workflow patterns have been proposed in the business process management community. The concrete applications of these workflow patterns in forward engineering have been extensively explored. Conversely, the core concern of business process archaeology is on recovering business process models from legacy systems utilizing reverse engineering methods. Little attention is given to the relationship between business process recovery and workflow patterns. This chapter aims to give a compact introduction to workflow control-flow patterns, workflow data patterns, workflow exception patterns, and service interaction patterns. In particular, the feasibility of combining workflow patterns with business process archaeology is examined by drawing on the research results of the MARBLE framework.

INTRODUCTION

In today’s highly competitive world, business processes are invaluable assets for an organization. Capturing and automating business processes are regarded as key activities during the implementation of a software system. Due to the rapid change of business environment, business processes embedded in an information system often evolve in a manner that leads to mismatches with the corresponding documents. As a consequence, a reverse engineering approach to extract business process models from existing information systems is of crucial importance.

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In the context of business process archaeology, different types of business process recovery methods based on reverse engineering techniques have been propounded. Pérez-Castillo et al. (Pérez-Castillo, García-Rodríguez de Guzmán, Piattini, & Places, 2012) classify business process recovery methods into four categories: model-driven static analysis, model-driven dynamic analysis, non-model driven static analysis and non-model driven dynamic analysis. Static approaches concentrate on the analysis of source code, documentation and database schemas. In contrast, dynamic approaches recover business process models through the analysis of the execution of use cases, Web-based user interfaces and business processes.

While reverse engineering and business process recovery techniques have been cataloged in prior studies, the use of patterns in business process archaeology is largely ignored. In the software engineering community, a solution to a recurring problem is generalized as a design pattern. This notion has been adapted to the business process management (BPM) field by van der Aalst, ter Hofstede, Kiepuszewski and Barros. They identify a set of 20 control-flow patterns in van der Aalst, ter Hofstede, Kiepuszewski and Barros (2003). In the same spirit, 23 additional control-flow patterns are defined in Russell, ter Hofstede, van der Aalst and Mulyar (2006). These workflow patterns not only play a pivotal role in the construction of business models as illustrated in Gschwind, Koehler and Wong (2008), but they also facilitate the reconstruction of business models during business process recovery. Additionally, the adoption of workflow patterns leads to a better representation of business processes.

In this chapter, an overview of the main workflow patterns in accordance to different perspectives is provided. Besides, an exploratory study of adapting workflow patterns to the area of business process archaeology is presented. The content of this chapter is self-contained and forms the basis for business process archaeology.

**Background**

In the BPM domain, reverse engineering is a process for generating a high-level abstraction represented as a business process model via the analysis of the respective software system. The workflow recovery process is not limited to the examination of program code. It derives the business process model by means of either a static or dynamic analysis. The static analysis focuses on source code, documentation and database schemas, whereas the dynamic analysis relies primarily on the execution of use cases, Web-based user interfaces and business processes. Business process archaeology is about the extraction of business process models from existing software systems. Compared to reverse engineering, forward engineering is a process for transforming business process models into implementation artifacts.

Patterns, which are originated in architecture, delineate solutions to recurring problems. Each pattern documents a best practice and has a context to which it is applicable. In the computing field, patterns are initially utilized for object-oriented modeling and programming. The pioneering work on workflow patterns was carried out by van der Aalst, ter Hofstede, Kiepuszewski and Barros. Hundreds of workflow patterns were identified since then. The benefits of applying workflow patterns in forward engineering are widely recognized.

Up till now, there are a limited number of studies on the integration of business process modelling patterns and business process archaeology. The objective of this chapter is twofold. Firstly, the main part of the chapter provides an overview of various business process patterns in the literature classified into four groups: workflow control-flow patterns (van der Aalst, ter Hofstede, Kiepuszewski, & Barros, 2003; Russell, ter Hofstede, van der Aalst, & Mulyar, 2006), workflow data patterns (Russell, ter Hofstede, Edmond, & van der Aalst, 2004a, 2004b, 2005), workflow exception patterns (Russell, van der Aalst, & ter