

Improving the Development of e-Business Systems by Introducing Process-Based Software Product Lines*

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Abstract. In the e-Business domain, workflows are central artifacts that are used to specify application systems. To realize reuse at a large scale for e-Business application systems, therefore, workflows need to be reused systematically. To this end workflows must be classified, documented, and stored in a way that enables their identification, evaluation, and adaptation in order to integrate them in an application. Software product line engineering is an established and approved software engineering approach that addresses these issues by handling a number of similar software systems together, enabling large scale reuse during the development and maintenance of the different systems covered by the product line.

In this paper, we transfer the concepts of software product line engineering to the domain of e-Business systems by applying the product line techniques to workflows and present initial validation results.

1 Introduction

Survival in today's highly dynamic business environments requires that organizations continuously adapt their business processes. Success and growth rather than mere survival require that this adaptation be rapid enough to realize the competitive advantage offered by new business opportunities. The conduction of business in the internet (e-business) including buying and selling but also services and collaboration can be seen as one of these new important business opportunities. Mechanisms for rapid description, implementation, and deployment of such business processes become important. Currently, business processes are often represented by business process models. Business processes models are partially implemented through workflows [9] and deployed and executed in workflow environments, which show graphically the different steps of a business process (i.e., the business logic). According to [16],

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business processes connect a set of business functions, where the connections are controlled by business rules. Those business rules are specific for an enterprise and specific at a certain point in time. However, changes in business rules and objectives are an everyday issue that demands capabilities to be able to react and adapt to such changes. Therefore, new rules and objectives can inevitably result in a large number of processes that vary in relatively minor ways. One way to control this proliferation and its attendant risks is to analyze commonalities and differences between the different process models in order to identify process variants and justifications for them [13], and to systematically integrate them in a software product line [6].

The following sections describe briefly the basic concepts of product line engineering and the mapping that we have done to process-based product lines, describe the details of the approach we have developed, and provide a preliminary validation (in terms of an example of its use).

2 Conceptual Foundation

2.1 Product Line Engineering Concepts

The underlying idea of product line engineering is to reuse common parts of related software systems. To this end, varying aspects of software systems, that is, differences among them are explicitly documented. Product line engineering distinguishes two development phases – domain and application engineering – as presented in Figure 1. The initial activity, scoping, defines which systems are members of a product line and which systems are outside the product line. Scoping is done by investigating a set of concrete products, be it already existing, planned, or envisioned products. The result of scoping is a set of products that make up the product line along with the features of the different product line members.

Based on a scope definition, domain engineering identifies the common features (commonalities) and the variable features (variabilities) of the identified products. Commonalities define the skeleton of the systems in the product line; variabilities bound the space of required and anticipated variations of the products in the product line. Each artifact produced during domain engineering contains the commonalities

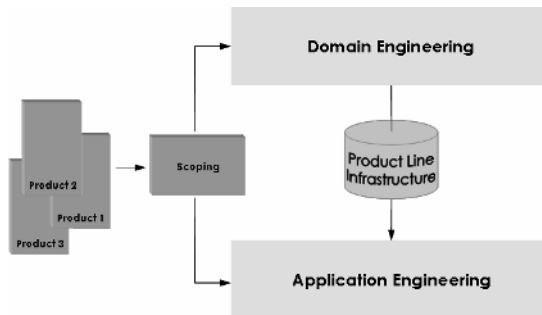


Fig. 1. Product Line Engineering