Maintaining WS-BPEL Workflows Using Aspects

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Abstract: In Service Oriented systems organisational processes are represented as WS-BPEL workflows, WS-BPEL is different from traditional workflow languages as a hybrid of block-based and graph-based language; it also has limited support for separation of concerns. Changes to such processes usually impact many places in the underlying system, without separating such cross-cutting concerns system maintenance is therefore difficult. This work proposed an Aspect Oriented solution to maintaining WS-BPEL workflows using meta-model transformation.

1 Introduction

Workflow language is the enabling technology in Business Process Management; it represent real world process that can be used to document organisational processes or carry out the process execution in its underlying management systems. In Service Oriented architecture where software system is more tightly aligned with organisational processes, service workflows represent these processes as well as organisational and non-functional requirements.

WS-BPEL has since become the emerging standard for representing workflows in Service Oriented systems. WS-BPEL is different from traditional workflow languages in that it is used by developers largely as a block-based structured language, as its origin is partly in XLANG, however, BPEL is also derived from WSFL, and therefore it is also partly graph-based. Because of these features traditional workflow techniques do not apply fully to such a hybrid language. Another limitation of BPEL is the lack of support for separation of concerns. Organisational processes are subject to constant change, maintaining the underlying system is to maintain the workflow they support. Changes usually affect many places in a process; without the support for cross-cutting concerns as first class entities, changes need to be directly integrated and implemented [CM07]. Maintaining Service Oriented workflows is therefore complexity and difficult.

Research in Aspect Oriented Software Development (AOSD) has introduced an powerful abstraction termed Aspects [KZ01], each aspect represents a cross-cutting concern and defines its implementation in respect of the base process. AOSD techniques are known to improve on modelling cross-cutting concerns as first class entities, such as changes to workflows. Model Driven Architecture (MDA) is a contemporary approach to describing and manageing meta-models. In particular executable models using imperative languages specify how models should behave at run time.

2 Proposed Approach

The contribution of this paper is in two fold, first it provides a model drive approach to weave executable aspects models into BPEL workflow model. Secondly the method uses a standard technology approach that preserves the service technology stack from aspectual language extensions. Previous AOSD approaches introduced aspectual constructs to existing languages[CF04][CM07] however there are risks involved in adopting closed solutions.

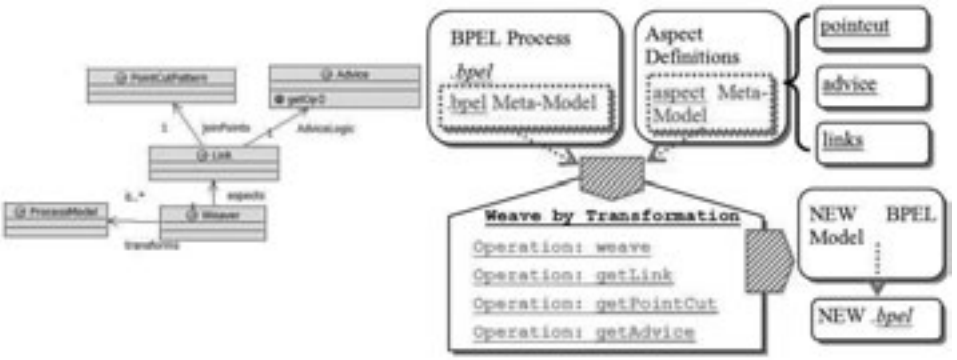

Figure 1. Design of Meta Weaver and the Weaving Framework

Using executable models as the weaving technique, the approach first propose a meta model for BPEL process. The meta model contains workflow constructs as well as point-cuts abstractions which represents possible cross-cutting concerns in BPEL workflow. Deriving from this meta model, aspect models are proposed, as shown on the left in Figure 1, with point-cut patterns, advice logic and a Link component that contains the associations between point-cuts and advice. A Weaver is modelled and implemented that contains the instructions for the executable aspect models to be woven into a BPEL process model. The diagram on the right of Figure 1 shows how the design is implemented. Instance of BPEL process and aspects are transformed into meta objects, by iternating the weaving rules on these meta objects a new process is created. The proposed approach is based on an aspect oriented modeling approach and shares similarities with reflective approach to meta-modelling.

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