Updatable Process Views
for Adapting Large Process Models:
The proView Demonstrator

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Abstract. The increasing adoption of process-aware information systems (PAISs) has resulted in large process model collections. To support users having different perspectives on these processes and related data, a PAIS should provide personalized views on process models. Especially, changing process models is a frequent use case in PAISs due to evolving business processes or unplanned situations. While process views have been suggested as abstractions for visualizing large process models, no work exists on how to change these models based on respective views. This software demonstration presents the proView framework for changing large process models through updates of corresponding process views, while ensuring up-to-dateness and consistency of all other process views related to the changed process model. Respective update operations can be applied to a process view and are correctly propagated to the underlying process model. Furthermore, all views related to this process model are then correctly migrated to its new version as well. Overall, the proView framework enables domain experts to evolve large process models over time based on appropriate model abstractions.

Keywords: process model abstraction, process view, process change, view update, process visualization, user-centered process management

1 Introduction

Process-aware information systems (PAISs) provide support for business processes at the operational level [1]. A PAIS strictly separates process logic from application code, relying on explicit process models. This enables a separation of concerns, which is a well-established principle in computer science to increase maintainability and to reduce costs of change [2]. The increasing adoption of PAISs has resulted in large process model collections. In turn, each process model may involve different domains, organizational units, and user roles as well as dozens or even hundreds of activities [3]. Usually, the different user roles need customized views on their process models, enabling personalized process
abstraction and visualization [4][5]. For example, managers rather prefer an abstract overview, whereas process participants need a detailed view of the process parts they are involved in [6]. Hence, providing personalized process views is a much needed PAIS feature. A variety of approaches for creating process model abstractions based on process views have been proposed [7][8][9][10]. However, these proposals focus on creating and visualizing views, but do not consider another fundamental aspect of PAISs: change and evolution [11]. More precisely, they do not allow changing a large process model through editing or updating any of its view-based abstractions. As a consequence, process changes still must be directly applied to the core process model, which constitutes a complex as well as error-prone task for domain experts, particularly when confronted with large process models [12]. To overcome this limitation, in addition to view-based process abstractions, users should be allowed to change large process models through updating respective process views. However, this must not be accomplished in an uncontrolled manner to avoid inconsistencies or errors.

The proView framework addresses these challenges by providing powerful view-creation operations [13]. The operations allow abstracting process models through the reduction and aggregation of process elements as well as through changes of the process model notation [14]. In addition, view-update operations allow adapting process views and propagating the respective changes to the underlying process model as well as to other related process views [15]. Our tool presentation will demonstrate these aspects of the proView framework in an integrated and comprehensible way.

Section 2 introduces the application scenario we use for our demonstration. Section 3 presents the proView framework and the view operations it supports. Section 4 then describes how the application scenario can be supported by using the proView framework. Section 5 concludes the paper.

2 Application Scenario

Figure 1 shows a credit request process modeled in terms of BPMN. The process involves human activities referring to three user roles (i.e., customer, clerk and manager) as well as automatic activities executed by the PAIS without user interaction. Assume that the process is started by the customer filling out a credit request form (Step 1). Afterwards, the PAIS checks whether an entry for the customer needs to be created in the CRM system or the customer has been already registered (Step 2). In the latter case, customer information is retrieved from the CRM. Then, the clerk reviews the credit request (Step 3), calculates the risk, and checks the creditworthiness of the customer with the credit protection agency (Step 4). After completing these tasks, he decides whether to reject the request (Step 5) or forward it to his manager who finally decides about granting the credit request or not (Step 6). If the manager rejects the request, a respective email is sent to the customer (Step 7). Otherwise, a confirmation email is sent and the CRM database is updated. Finally, the clerk calls

1 http://www.dbis.info/proView
Assume that an evolution of this process model becomes necessary: Before filling out the credit form, the customer shall select the desired credit type. For this purpose, an activity is added by the clerk to the process model. Obviously, this change is relevant for all participants.

The proView framework addresses the user-centered visualization and adaptation of large process models. Hence, in the given scenario, it enables personalized views and visualizations of the credit request process for each user role, i.e., the customer, clerk, and manager roles. In particular, the following requirements must be met in order to properly support such a scenario:

R1: It should be possible to provide specific process views on a process model for each user role and to flexibly define those views.
R2: The visual appearance of the process model and process view respectively needs to be flexibly adaptable for each user (role) to meet needs best.
R3: Based on personalized process views and visualizations, elementary model adaptations should be possible, e.g., to insert or delete activities in a user-centered process model (i.e., process view).
R4: In case of changes introduced by a user, all other process views need to be updated to ensure up-to-dateness of all process participants.
R5: Since domain experts hardly have technical process knowledge, high-level operations for creating and adapting user-centered process views are required.

3 proView Framework

Figure 2 gives an overview of the implemented proView framework, which consists of two major components: proViewServer and proViewClient. The proViewClient is instantiated for each user and takes care of interactions with the user as well as the visualization of his process models and process views respectively. The proViewClient is based on the vaadin web-framework and interacts with the proViewServer using a RESTful communication protocol. The proViewServer
implements the logic of the proView framework and provides engines for visualization, change, and execution & monitoring. It captures a business process through a Central Process Model (CPM). In addition, for a particular CPM, so-called creation sets (CS) are defined. Thereby, each CS specifies the schema and appearance of a particular process view

The visualization engine generates a process view based on a given CPM and the information captured in a creation set CS, i.e., the CPM schema is transformed to the view schema by applying the corresponding view-creation operations specified in CS (Step 5). Afterwards, the obtained view schema is simplified by applying well-defined refactoring operations (Step 6). Finally, Step 7 customizes the visual appearance of the view (e.g., creating an tree-, form-, or activity-based visualization [8,14]) and delivers it to the proViewClient.

When a user updates a view schema, the change engine is triggered (Step 1). First, the view-based model change is propagated to the related CPM using well-defined change propagation algorithms (Step 2). Next, the schema of the CPM is simplified (Step 3), i.e., behaviour-preserving refactorings are applied to foster model comprehensibility (e.g., by removing surrounding gateways not needed anymore). Afterwards, the creation sets of all other views associated with the CPM are migrated to the new CPM schema version (Step 4). This becomes necessary since a creation set may be contradicting with the changed CPM schema. Finally, all views are recreated (Steps 5-7) and presented to users by the proViewClients.

4 proView Demonstration

We revisit our scenario from Section 2 and show how the described requirements can be addressed by proView.

Requirement R1: The proViewServer allows creating an arbitrary number of process views by applying aggregation and reduction operations specified in the creation set. Thereby, a reduction removes an activity from the respective view, while an aggregation combines a set of connected activities to one activity.

Requirement R2: The proViewClient enables users to change the visual appearance of process views, e.g., by switching between the notations provided by
BPMN, ADEPT [16], and proViewForms. The latter allow visualizing process models and views in terms of forms, which support users, not familiar with activity-centered process notations, in understanding complex process logic. Further visual appearances for process views are under construction (e.g., text-based representation).

Requirement R3: The proViewServer provides view-update operations which allow inserting and deleting activities as well as AND/XOR branchings [15]. These operations can be applied by an end-user to his process view using the proViewClient and are then be propagated to the proViewServer. Furthermore, parametrization of these operations allows for automatically resolving ambiguities when propagating view changes; i.e., change propagation behaviour can be customized. However, at this stage concurrent changes are not enabled in the proViewServer, i.e., only one change at a time is allowed.

Requirement R4: Updates triggered by users are applied to the CPM as well as to associated process views. Their view creation sets are then migrated to the new version of the CPM. Hence, all affected views will be re-created.

Requirement R5: The proViewServer supports high-level operations to create process views. For example, a new view can be created based on the role of a user displaying only those activities he is involved in.

All these aspects are illustrated in our screencast and can be watched at the projects' website: www.dbis.info/proView.

5 Conclusion

In our demonstration, we present the proView framework and its operations; proView supports the creation of personalized process views as well as the view-based change of business processes, i.e., process abstractions not only serve visualization purpose, but also lift process changes up to a higher semantical level. A set of update operations enables users to update their view and propagate the respective change to the process model representing the overall business process. Finally, we provide migration rules to update all other process views associated with a changed CPM. Similar to this propagation, it can be decided per view, how much information about the change shall be displayed to the user.

The proView framework is implemented as a client-server application to simultaneously edit a process model based on views. The implementation of the proView framework has proven the applicability of our approach. Furthermore, user experiments based on the proView demonstrator are planned to systematically analyze whether view-based process changes improve the handling and evolution of large process models. Moreover, the proView demonstrator shall be extended to also execute process views in a PAIS [17]. Overall, we believe that the proView framework offers promising perspectives for process participants for evolving their business processes.
References