User-centric Process Modeling and Enactment: The Clavii BPM Platform

Klaus Kammerer, Jens Kolb, Kevin Andrews, Stefan Bueringer, Britta Meyer, and Manfred Reichert

Institute of Databases and Information Systems
Ulm University, Germany
{klaus.kammerer,jens.kolb,kevin.andrews,stefan.bueringer,britta.meyer,
manfred.reichert}@uni-ulm.de
http://www.uni-ulm.de/dbis

Abstract. The increasing adoption of process-aware information systems (PAISs) has resulted in large process model collections involving different process participants. We present the Clavii BPM platform, which enables end users to participate not only in process model execution, but model creation as well. Clavii offers a modern user interface with a strong focus on ease of use, unifying different aspects of the BPM lifecycle in one tool, i.e., process model editor and process engine. As a result, end users are supported in managing and executing process models.

Keywords: Process Modeling; Process Execution; Process Change; Process Model Abstraction; User-centered Process Management

1 Introduction

Process-aware information systems (PAISs) provide support for business processes at the operational level [9]. Usually, a PAIS 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 reduce costs of change [6]. The increasing adoption of PAISs has resulted in large process model collections involving different domains, organizational units, and user roles as well as dozens of activities [12]. Participating in the BPM lifecycle requires that each user role is able to create, evolve or execute such process models [13]. Additionally, customizable visualizations and abstractions of process models improve their management by enabling personalized views for end users [10, 11].

Usually, the creation of business process models is fragmented. To be more precise, process models are created with different tools compared to the ones used for model execution. Enabling end users to participate in the entire BPM

lifecycle, however, requires integrated tooling and ease of use. The Clavii BPM platform addresses these challenges by supporting users with numerous functions integrated in an intuitive and uniform user interface.

Figure 1 gives an overview of the Clavii BPM platform. Clavii enables users to create (Step ①), change (Step ②), and abstract process models (Step ③) intuitively. Created process models can be shared across registered users (Step ④) in order to document (Step ⑤), change, and execute them collaboratively. Users are enabled to execute process models at any time (Step ⑥). Finally, a dashboard allows monitoring executed processes (Step ⑦).

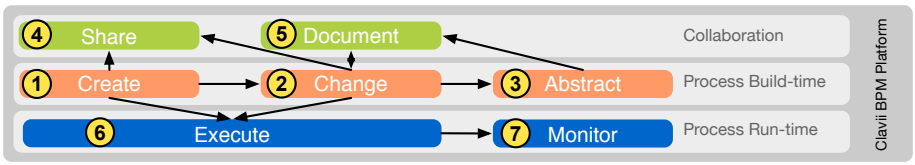

Fig. 1. The Clavii BPM Platform

Section 2 introduces the application scenario we use for the demonstration. Section 3 presents the Clavii BPM platform. Section 4 then describes how the application scenario can be supported with the Clavii BPM platform. Finally, Section 5 concludes the paper.

2 Application Scenario

Figure 2 shows the running example–a simple process that handles PDF forms modeled in BPMN. A PDF form may be first loaded. Then, its form fields can be filled out by the user. Afterwards, the filled out PDF form is sent to an e-mail address or to a web service (e.g., Dropbox). The process involves one human task referring to a user role as well as a set of service tasks. The process is started by the user selecting an empty PDF form (Step ①). Afterwards, the Clavii platform determines the empty PDF form fields and then fills them with data (Step ②). Following this, the PDF form is checked for correctness by another user (Step ③). After completing task "Review PDF", the PDF form is uploaded to the web service, i.e., Dropbox (Step ④). In parallel, the PDF form is sent by e-mail. Therefore, the user first specifies the subject, the body, and the recipient's e-mail address (Step ⑤). Afterwards, he is asked whether or not the PDF form shall be compressed (Step ⑥). If he chooses the former option, the PDF form is zip-compressed by a service task. Finally, the PDF is sent by e-mail (Step ⑦).

In particular, the following requirements should be met to properly support this scenario:

- **R1**: It should be possible to create BPMN 2.0 process models.
- **R2**: Visual appearance of process models should be adaptable for each user (role) according to his BPM knowledge. In particular, this necessitates process model abstractions; e.g., hiding service tasks from end users.

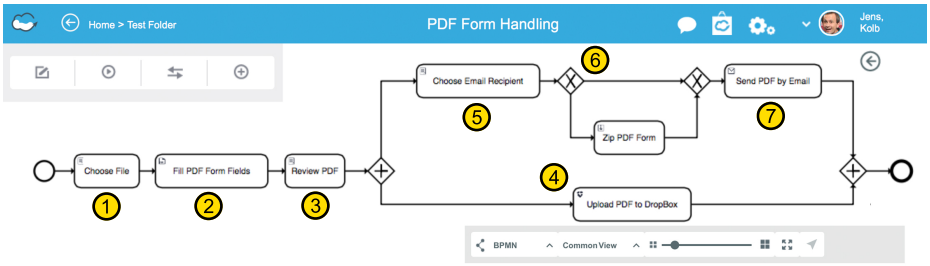

Fig. 2. PDF Form Handling Process

- **R3**: In order to involve multiple users, process models should be shareable.
- **R4**: Process models need to be enriched with a sophisticated, yet intuitive data flow perspective to support process execution.
- **R5**: Service tasks in process models should be connectable with executable program code. Additionally, user task forms should be generated automatically.
- **R6**: Created process models should be executable at any time, i.e., while designing, modeling, monitoring, or evolving them. Furthermore, modeling should obey the correctness-by-construction principle. In order to support process model execution at any lifecycle stage, process models lacking execution-relevant information, like gateway decisions (cf. Step ⑤), should still be executable.
- **R7**: Process instances should be monitored in a respective dashboard.

3 Clavii BPM Platform Architecture

Figure 3 gives an overview of the Clavii BPM platform. In particular, Clavii is implemented as a Java EE application utilizing the Activiti BPM engine for process execution [8]. Clavii consists of two major components: *Clavii Controller* and *Clavii Web Interface*. Clavii Web Interface is based on the GWT web framework. It interacts with Clavii Controller using remote procedure calls. Clavii controller, in turn, implements the logic of the Clavii framework and provides engines for visualization, change, execution, and monitoring. Additionally, various managers, such as the *TaskManager* that executes program code for service tasks, exist.

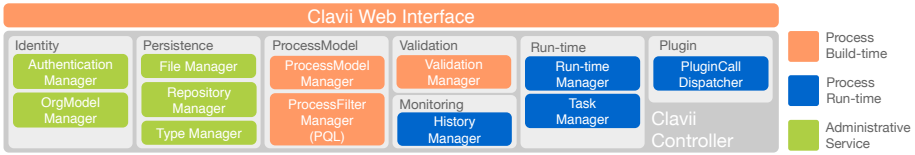

Fig. 3. Architecture of Clavii

4 Clavii Demonstration

We revisit the scenario and requirements from Section 2 in the context of Clavii.

- **R1:** Clavii allows creating an arbitrary number of process models by offering an intuitive web interface [2, 7]. The modern user interface supports multi-touch and drag&drop operations in order to conveniently create and modify process models while preserving their control flow correctness.
- **R2:** Clavii allows users to interact with process models at different levels of abstraction. For this purpose, well-defined declarative abstraction descriptions (e.g., "show only tasks assigned to the currently logged-in user") can be applied [3, 5]. Further, Clavii enables users to change the visual appearance of process models, e.g., by switching between various notations. Further notations may be added to the Clavii framework [2, 4].
- **R3:** Clavii provides a powerful *OrgModelManager* that allows for the specification of organizational units, roles and users for authenticating and assigning tasks.
- **R4:** Modeling data flows in process models is supported by a sophisticated *TypeFramework* that allows users to specify hierarchical business objects as well as their association with tasks [1]. Clavii aims to (semi-)automate the assignment of business objects to service tasks.
- **R5:** Clavii offers an extensible plugin architecture for service tasks, e.g., uploading files to cloud storage providers, sending e-mails, retrieving and storing data in databases, or managing web calendars. Plugins are connectable to tasks using drag & drop operations. Furthermore, user task forms are automatically generated by analyzing data element types (cf. R4).
- **R6:** A Clavii process model may be executed in any stage of its lifecycle. In case information provided by a process model is missing for proper execution (e.g., conditional gateways lack correct decisions). Users can provide them during run-time. Additionally, the run-time perspective is seamlessly integrated into Clavii's process modeling environment, allowing for the execution of process models without switching away from the modeling context of the Clavii Web Interface (cf. Figure 4).
- **R7:** Process instances can be monitored as well. To this end, the instance is enriched with additional information, like execution times of tasks (cf. ① in Figure 4).

These aspects are illustrated by a screencast on the project's website: www.clavii.com/screencast.

5 Conclusion

In the demo, we present the Clavii BPM platform and its key functions as proof-of-concept to allow for the collaborative creation and execution of process models. A modern web-based user interface offers an intuitive way to manage process models.

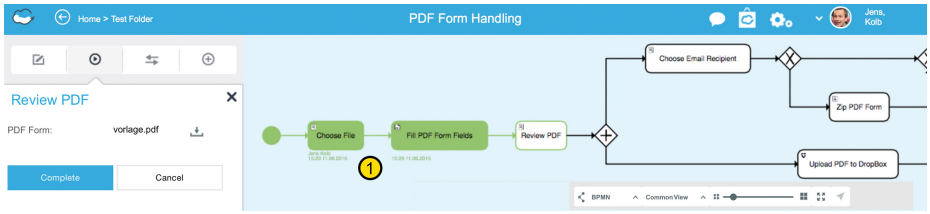

Fig. 4. Execution of PDF Form Handling Process

The Clavii BPM platform is implemented as a web-based application platform. This allows users to simultaneously change and execute process models. Furthermore, user experiments are planned in order to systematically analyze whether the evolution of large process models can be improved by using the Clavii BPM platform. Overall, we believe that the Clavii BPM platform offers promising perspectives for small and medium businesses lacking BPM expertise.

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