

Chapter 76

Handling the Dataflow in Business Process Models

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ABSTRACT

This chapter stresses the importance of the dataflow in business process models and illustrates a notation called DMA that is meant to fulfill two major goals: promoting the integration between business processes and information systems and leveraging the dataflow to provide flexibility in terms of human decisions. The first goal is fulfilled by considering both tasks and business entities as first-class citizens in process models. Business entities form the dataflow that interconnects the tasks: tasks take the input entities from the input dataflow and deliver the output entities to the output dataflow. Human decisions encompass the selection of the input entities when a task needs more than one, and the selection of the task with which to handle the input entities when two or more tasks are admissible. DMA provides a number of patterns that indicate how tasks affect the dataflow. In addition, two compound patterns, called macro tasks, can be used to represent task selection issues. An example related to an order handling process illustrates the notation.

INTRODUCTION

Over the years, various approaches and notations have been proposed to define business process models. They are based on different perspectives and the most important ones are the activity-centric, the artifact-centric and the case-centric perspective.

The activity-centric approach has inspired the industry standard BPMN (Business Process Model and Notation) (OMG-BPMN, 2013), whose focus is on the tasks (work units) and the control flow. The control flow is mainly based on the completion events of the tasks through the intermediation of control-flow elements called gateways: the choice of the paths in the process is carried out automatically on the basis of conditions related to the process variables. This approach provides an efficient way to handle repetitive situations (i.e., routines): the process orchestrates work by distributing tasks to automatic services or to human participants through their worklists. However, participants are mainly considered

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as resources needed to carry out tasks that are not automatable; human choices are limited and they are not explicitly represented in process models.

The artifact-oriented approach has shifted the focus to the business entities involved in the process; its roots can be found in past research on entity-based dynamic modeling (Sanz, 2011). The term artifact has been introduced to designate a concrete and self-describing chunk of information used to run a business (Nigam & Caswell, 2003). It encompasses both the informational aspects of an entity type and its life cycle consisting of states and transitions. The major benefit is the right level of granularity, which facilitates communication among the stakeholders and helps them focus on the primary purposes of the business (Chao et al, 2009).

However, the artifact-oriented approach does not pay more attention than the activity-oriented one to human tasks: the participants in the process continue to be considered as mere resources needed for tasks that are not automatable.

Flexibility (Schonenberg, Mans, Russell, Mulyar & van der Aalst, 2008) is at the heart of knowledge-intensive processes (Di Ciccio, Marrella & Russo, 2015), i.e., processes calling for some degree of creativity and adaptation to specific circumstances (Alvesson, 2004). What distinguishes knowledge-intensive processes from routines is that participants are not considered as mere resources needed to carry out tasks which are not automatable; on the contrary, their involvement is required at a higher level where they can make choices which affect the control flow.

Flexibility is needed in situations calling for customized treatment: they are called cases and are well known in the medical and legal realms. In the treatment of a case, the participants can decide the tasks to be carried out on the basis of the circumstances. The recent standard CMMN (Case Management Model and Notation) provides a notation to define the process governing the evolution of the case under consideration (OMG-CMMN, 2016). The process is based on an information structure called case file: it is a hierarchical structure (made up of case file items) similar to the one used in document management systems. However, the notation does not show the dataflow in the process model in that there is no visual representation of the inputs and outputs of tasks in terms of the case file items affected.

This chapter stresses the importance of the dataflow and illustrates a notation called DMA (Dataflow-oriented Modeling Approach) for the representation of business processes. The major purposes are as follows.

First, DMA promotes the integration between business processes and information systems: for this reason, the dataflow in process models is based on the entities of the underlying information systems, and process models are complemented by information models that show the types of the entities along with their relationships and attributes. The business entities form the dataflow that interconnects the tasks: tasks take the input entities from the input dataflow and deliver the output entities to the output dataflow. The dataflow in DMA shows the types of the entities involved in the process as well as their states; the states indicate the progress in their life cycles. Therefore, DMA pays tribute to the artifact orientation in that the process models can be thought of as combinations of artifact life cycles.

The second purpose is to leverage the dataflow to provide flexibility in terms of human decisions.

They encompass the selection of the input entities when a task needs more than one, and the selection of the task with which to handle the input entities when two or more tasks are admissible. The ability of selecting the input entities is needed, for example, by an account manager who is in charge of producing a procurement order out of a number of requisition orders. An example of task selection can be found in the operation of a broker who combines requests and offers in transactions and can reject requests and

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