

A Motivation for Multiple Activity Instantiation in BPEL4WS Processes

(Position Paper)

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Abstract We suggest to extend BPEL4WS with structured activities for multiple instantiation since this is a crucial feature of a business process modelling language. In particular, we propose to extend BPEL4WS with a `collect` and a `broadcast` activity to model multiple instances as well as `list` data structures to handle similar messages of multiple parties that act according to the same role.

1 Introduction

The Business Process Execution Language for Web Services (BPEL4WS or BPEL) [1] is the de facto standard for XML-based business process modelling. Although it provides a rich set of primitives to specify Web Service compositions, it does not support multiple instantiation (see also [2]). However, there is a need to model certain activities that are executed multiple times within the same process instance without knowing the number of parallel executions a priori. This is especially the case for interorganizational business processes that often include $1 : n$ interactions. Typically, they can be divided into two parts as the example of an auction process illustrates:

1. A set of potential partners is created (see e.g. [3]). In an auction process each bidder can be regarded as a potential business partner. The bidder with the best offer is chosen as a partner for further interaction.
2. The offerer and the auction winner continue the process in a bilateral way. The winner receives a bill, and the offerer initiates the shipment.

Auctions are only one case of such $1 : n$ situations in business processes. The interaction between a teacher and multiple students or request for quotes are further examples. The Business Process Modeling Notation (BPMN) [4] provides a dedicated control flow element for multiple instantiation in order to allow simple modelling of such interactions. However, BPEL does not support corresponding language constructs. Although corresponding work-arounds exist [2], they are too complicated in the general case for interorganizational business process modelling. Nevertheless, the second phase where the multi-party process converges to a bilateral interaction can be modelled with BPEL in a straight forward manner.

2 BPEL4WS and Multiple Instantiation

In order to allow for multiple instance modeling in BPEL, at least the following issues have to be addressed:

- *Structured Activities for Multiple Instantiation:* From our experiences two kinds of structured multiple instance activities are needed to extend BPEL:
 1. An activity to model the receipt of multiple messages of different parties acting as the same `partnerRole`; as for example in an auction where multiple parties act as bidders and send bid messages. We propose a new BPEL activity called `collect` to address this need.
 2. Multiple messages need to be sent to a set of external parties who were identified via a previous `collect`. In the auction example each bidder receives a notification after the auction. For this purpose, we propose to define a new BPEL element called `broadcast`.
For both activities, synchronization conditions need to be modelled.
- *List of Messages:* Furthermore, we need to address data handling for message exchanges with multiple parties. For this purpose, we propose to extend BPEL with `lists` and list related operations. For example different messages could be appended to a list via an `add()` operation. In a `broadcast` operation a `next()` operation will be helpful to pick up the next message for processing.
- *List of External Parties:* In a multiple instantiation activity different partners may participate in the same role. This implies the need for some correlation mechanism to retrieve messages of individual parties and vice versa.

3 Conclusion and Future Work

In this position paper, we motivated the need for a native support of multiple instantiation in BPEL. Furthermore, we proposed to define two additional language elements, the `collect` and the `broadcast` activity. In our opinion, such modeling constructs are a prerequisite to provide for a simpler alignment of business processes and their BPEL representation. One important goal in our future work is to implement a BPEL process engine including the multiple instantiation extensions outlined in this paper.

References

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