AG Heterogene Informationssysteme
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Middleware for Heterogeneous and Distributed Information Systems – Exercise Sheet 14

Wednesday, February 11, 2009 – 10:00 to 11:30 – Room 48-379

BPEL Web Service Composition

The Web Services Business Process Execution Language (WS-BPEL)[1] defines a model and a grammar for describing the behavior of a business process based on interactions between the process and its partners. The interaction with each partner occurs through Web Service interfaces. The WS-BPEL process defines how multiple service interactions with these partners are coordinated to achieve a business goal, as well as the state and the logic necessary for this coordination.

Consider a sample composite web service for employee travel arrangements realized as a BPEL process[2]: The client asynchronously invokes the composite web service and passes the employee's name, the destination, the departure date, and the return date. First, the BPEL process checks the employee travel status (economy, business, or first) using a synchronous web service call. Second, the BPEL process concurrently invokes two asynchronous web services to learn the prices for the flight with American Airlines and Delta Airlines. Finally, the BPEL process chooses the best offer and returns the information to the client.

1. Model the control flow of the travel arrangements process as a directed graph.
2. Define *partner link types* to characterize the conversational relationship between the sample process and the web services it invokes!
3. Create a BPEL process definition that implements the travel arrangements web service! What *partner links* need to be specified? How can the control flow be expressed using BPEL's *structured activities*? How can the data flow be specified in the BPEL process definition?

[1] Web Services Business Process Execution Language Version 2.0
http://docs.oasis-open.org/wsbpel/2.0/wsbpel-v2.0.html
[2] Matjaz B. Juric, A Hands-on Introduction to BPEL
http://www.oracle.com/technology/pub/articles/matjaz_bpel1.html

BPEL Fault Handling and Compensation

Consider another composite web service that allows for flight bookings. Once the client invokes the composite web service it performs two concurrent activities. First, it books the flight with the selected airline. Second, it deducts the expenses from the department's travel budget. Note that both activities may fail since flights may be fully booked and the travel budget may not be sufficient.

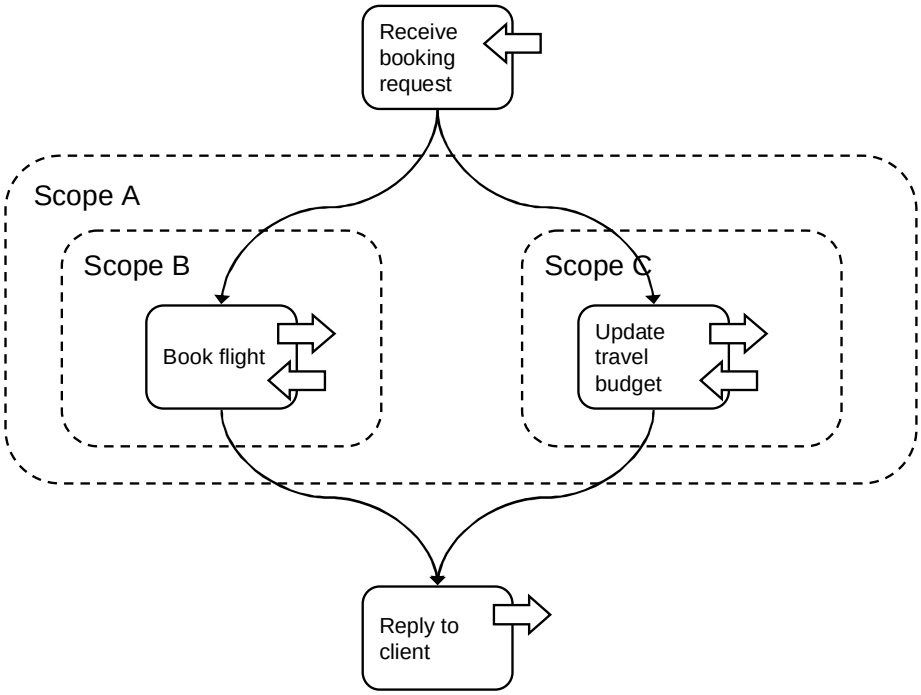

Figure 1: BPEL process with nested scopes

1. Explain the concepts of *scopes* used in BPEL!
2. What is the purpose of *compensation handlers*? Specify suitable compensation handlers for scopes B and C depicted in Figure 1.
3. What is the purpose of *termination handlers*? Specify suitable termination handlers for scopes B and C depicted in Figure 1.
4. What is the purpose of *fault handlers*? Specify a suitable fault handler for scope A depicted in Figure 1.
5. Assume the following faults occur while the BPEL process is being executed. How does fault handling proceed?
    a. The flight booking fails after the travel budget was successfully decreased.
    b. The flight booking fails. Deducting the travel budget was requested but the acknowledgment has not been received yet.