

Using context to improve data semantic mediation in Web services composition

Michaël Mrissa and Philippe Thiran

PReCISE Research Center - University of Namur

firstname.lastname@fundp.ac.be

1 Introduction and background knowledge

The adoption of Web services is a stepping stone towards the development of interoperable distributed systems. Web services are XML-based software components that can be deployed and accessed in a platform- and language-agnostic fashion. Also, Web services provide the possibility to be composed, i.e. coordinated in a single workflow, referred to as business process. Composition of Web services provides users with value-added functionalities that a single Web service cannot answer. However, composition raises several problems due to existing heterogeneities between participant Web services. Indeed, the latter were not designed to interact with each other, and thus adopt heterogeneous data representations, message exchange sequences, security levels, etc. . .

While reconciliation of Web services raises several challenges, in this talk we focus on solving heterogeneities related to the semantic representation of data, as a summary of our previous work detailed in [1, 2]. We motivate our work with a simple but explicit travel planning example, and we propose a context-based solution for solving semantic data heterogeneities with the help of mediation mechanisms.

2 Motivation and proposition

Semantic heterogeneities of data hamper the smooth execution of Web services compositions as they affect data understanding. For instance, a travel planning composition typically involves international flight agencies and local hostel bookings. Computing the total cost of a trip includes converting costs to the user's preferred currency. A typical solution is to describe data semantics with a specific vocabulary described in a common ontology that is agreed on by service providers.

However, local assumptions on the semantic interpretation of data, referred to as context in our work, are often ignored. Agreeing on a common ontology requires providers to adapt their services to the ontology semantics, which is a tedious task. Also, it hampers the binding of Web services to other ontologies with different semantic representations. In our travel booking example, agreeing on a unique currency is problematic for local Web services that follow their countries' own currency representation.

Our proposal relies on context ontologies to describe the different contexts of providers. The task of service providers is then facilitated, as they need only updating context ontologies and annotating their service descriptions (we provide a graphical annotation tool for this purpose) with their own local view on data semantics. The role of typical domain ontologies is focused on describing the terms of the domain knowledge and their relations. Our proposal includes the following elements, described in [1, 2]:

1. a context-based, WSDL-compatible annotation of Web services descriptions,
2. context ontologies used together with domain ontologies to describe services' contexts,
3. mediator Web services inserted into composition workflows via a specific algorithm.

References

- [1] Michael Mrissa, Chirine Ghedira, Djamel Benslimane, and Zakaria Maamar. A context model for semantic mediation in web services composition. In David W. Embley, Antoni Olivé, and Sudha Ram, editors, *ER*, volume 4215 of *Lecture Notes in Computer Science*, pages 12–25. Springer, 2006.
- [2] Michael Mrissa, Chirine Ghedira, Djamel Benslimane, Zakaria Maamar, Florian Rosenberg, and Schahram Dustdar. A context-based mediation approach to compose semantic web services. *ACM Transactions on Internet Technology*, 8(1), February 2008.