

Constraint-Based Runtime Prediction of SLA Violations in Service Orchestrations*

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Service-Oriented Computing is an approach to creating applications where different loosely-coupled software services are composed in order to accomplish a goal that is more complex than what the constituent services can do. The composition is performed in a platform-independent manner (component services are executed in heterogeneous, usually non-local environments and accessed through a standardized interface) and is usually a long-running process which spans across organizations and administrative boundaries. In turn, these combinations are usually exposed as services themselves.

Service combinations are usually divided into orchestrations and choreographies. In the former case there is a single agent which controls the individual services and routes the data between them. In the latter, data movements and control are not centralized. In this talk we will focus on service orchestrations.

A critical point for the usability of service compositions is the Quality-of-Service (QoS) they offer. Execution time, availability, or monetary cost are some usual metrics. The acceptable values for QoS attributes in a business relation are usually defined in Service Level Agreements (SLAs), along with the penalties in case they are violated.

We present and evaluate a method whereby, using techniques from constraint logic programming, we derive, at a given point of execution of a service composition, a set of constraints that predict SLA conformance and violation scenarios over a certain time horizon. This is done on the basis of the structure of the composition and known or empirically measured properties of the component services. SLA failure and conformance constraints are expressed symbolically and may be used by other components for, e.g., development of data-mining models, optimized service matching, or triggering preventive adaptation or healing. Additional precision can be obtained within the same analysis framework by inspecting the state of the composition at the point of prediction.

References

1. D. Ivanović, M. Carro, and M. Hermenegildo. *Constraint-Based Runtime Prediction of SLA Violations in Service Orchestrations*. In Gerti Kappel, Hamid Motahari, and Zakaria Maamar, editors, *Service-Oriented Computing – ICSOC 2011*, number 7084 in LNCS, pages 62–76. Springer Verlag, December 2011. Best paper award.

* The authors were partially supported by the EC's 7th Framework Prog. Network of Excellence *S-Cube* (GA# 215483), Spanish MINECO project 2008-05624/TIN *DOVES*, and Community of Madrid project P2009/TIC/1465 *PROMETIDOS*.