QUALITY-AWARE SERVICE DELEGATION IN AUTOMATED WEB SERVICE COMPOSITION: AN AUTOMATA-THEORETIC APPROACH[1]

OSCAR H. IBARRA

Computer Science Dept., University of California, Santa Barbara,
Santa Barbara, CA 93106, USA
e-mail: `ibarra@cs.ucsb.edu`

BALA RAVIKUMAR

Computer Science Dept., Sonoma State University,
Rohnert Park, CA 94928, USA
e-mail: `ravi.kumar@sonoma.edu`

and

CAGDAS EVREN GEREDE

Computer Science Dept., University of California, Santa Barbara,
Santa Barbara, CA 93106, USA
e-mail: `gerede@cs.ucsb.edu`

ABSTRACT

Automated Web Service Composition has gained a significant momentum in facilitating fast and efficient formation of business-to-business collaborations where an important objective is the utilization of existing services to respond to new business requirements in a timely manner. In this context, the service delegation problem can be formulated as follows: When a user poses a sequence of requests to a "service community", how to delegate the requests to the available services registered in the community so that the user requests are satisfied via a collaboration of these services. Here, we present a formal analysis of the *constrained service delegation* problem where users also provides a set of quality constraints about the delegation of their requests. We follow the "Roman" service composition framework and extend it with a QoS model. We use the Presburger arithmetic to specify constraints. We show that there exists a linear time algorithm for the service delegation problem. In fact, this algorithm is a finite memory algorithm that solves two variations of the service delegation problem by reading the activity sequence in two or multiple passes. We also show that these results are tight in the sense that the number of passes can't be further reduced. We also prove that the constrained service delegation problem can be solved in polynomial time in the number of service requests and delegation constraints.

Keywords: Automated service composition, quality of service, deterministic finite transducers, Presburger arithmetic, suffix problem

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