Automated Composition of E-services: Lookaheads

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ABSTRACT

The e-services paradigm promises to enable rich, flexible, and dynamic inter-operation of highly distributed, heterogeneous network-enabled services. Among the challenges, a fundamental question concerns the design and analysis of composite e-services. This paper proposes techniques towards automated design of composite e-services. We consider the Roman model which represents e-services as activity-based finite state automata. For a given set of existing e-services and a desired e-service, does there exist a "mediator" which delegates activities in the desired e-service to existing e-services? The question was raised in an early study by Berardi et. al. for a restricted subclass of delegators which does not take into consideration of future activities. In this paper, we define a more general class of delegators called "lookahead" delegators and we show that the hierarchy based on the amount of lookahead is strict. We, then, study the complexity of constructing such delegators. We prove that in the case of deterministic e-services, a k-lookahead delegator can be computed in time polynomial in the size of target and subcontractor e-services, and exponential in k and the number of subcontractor e-services. We also present *W*ozart, an automated mediator construction tool implemented to realize our approaches.