

A Semantic Protocol-Based Approach for Developing Business Processes *

Amit Chopra Nirmal Desai Ashok Mallya Leena Wagle Munindar P. Singh
{akchopra, nvdesai, aumallya, lvwagle, singh}@ncsu.edu
Department of Computer Science
North Carolina State University
Raleigh, NC 27695-7535, USA

ABSTRACT

A (business) protocol is a modular, public specification of an interaction among different roles that achieves a desired purpose. We model protocols in terms of the commitments of the participating roles. Commitments enable reasoning about actions, thus allowing the participants to comply with protocols while acting flexibly to exploit opportunities and handle exceptions. A policy is a (typically private) rule-based description of a participant's business logic that controls how it participates in a protocol. We propose that a business process be conceptualized as a cohesive set of protocols, and be enacted by agents playing specified roles in the protocols in which they participate. The agents would respect the given protocols while adhering to their local policies.

We propose OWL-P, a language for specifying protocols, and implement it using a multiagent architecture. We compile OWL-P specifications of protocols into skeletons for each role. Each skeleton corresponds to a set of rules with place-holders for policies. Developing an agent involves using the rules for its intended roles and supplying the necessary policies.

The key benefits of this approach are (1) a separation of concerns between protocols and policies in contrast to traditional monolithic approaches; (2) reusability of protocol specifications based on design abstractions such as specialization and aggregation; and (3) flexibility of enactment of processes in a manner that respects local policies while adapting continually.

This paper develops further results on a programming methodology through which agents can be implemented to realize desired processes. This methodology includes design patterns that ensure that agents built according to those patterns will be guaranteed to be compliant to the stated protocols.