

Position paper: from Description Logics to Configuration Techniques in the Semantic Web

P. Albert (ILOG), C. de Sainte Marie (ILOG),
L. Henocque (LSIS), M. Kleiner (ILOG)

April 29, 2005

The Semantic Web has a strong filiation with description logics since its inception. Reasoning about semantically described Web Services is needed in various aspects of the general scheme, including matching, discovery, data and protocol mediation, or composition. When it comes to reasoning about semantical web service descriptions, many options exist, that again range from advanced pattern matching to using formal proof systems.

Our research builds upon the observation that some reasoning problems incurring in the context of the semantic web bear strong relationships with finite model search on the one hand, and constraint reasoning on the other hand. For instance, when composing (semantic) web services, the result is a finite arrangement of workflow constructs involving parameter web services, that can be viewed as a finite model for some first order formula denoting the possible constructs. Accordingly, protocol (process) mediation can be viewed as a restricted case of composition, with comparable properties. Matching Web Services for discovery (and ultimately composition or mediation) has been presented in various results as a particular instance of classification reasoning, with connections to constraint programming.

We currently study which areas in the general Web Service reasoning field may suitably be addressed using an object oriented evolution of constraint programming called configuration. Solving a configuration problem amounts to finding a finite model for a precise constrained object model. We have observed how OWL or WSMO based semantical descriptions of web services can be mapped to such constrained object models.

Early experiments using ILOG JConfigurator have confirmed that the problem of Semantical Web Service Composition can be solved in already rather advanced cases, involving the construction of an auxiliary required complex workflow. Interestingly enough, the logic underlying JConfigurator is an object oriented variant of a combination of description logics and constraints, as defined by its authors, that allows for classification reasoning as well as the enumerative construction of complex interconnected structures that match a precise constrained object model.

Our interest in this workshop therefore is to share and improve the global

understanding of which areas in Semantic Web Reasoning may suitably be addressed using such techniques, and whether constrained based configuration indeed forms a suitable generic tool in the global SWS framework, and/or which extensions to current configuration techniques are required in so doing.