

Bioinformatics reactivity features through the Semantic Web

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Abstract

In order to propagate changes in, and between information nodes in the Web, a high-level architecture has been proposed for a reactive framework aligned with the goals and technologies of the Semantic Web – r^3 (see <http://reverse.net/15/r3/>). As part of the validation of this framework, we have used Bioinformatics as a case study. This approach required the design and implementation of a service ontology for the Bioinformatics domain (B-Domain). The ontology describes both the static and dynamic concepts of the domain, enabling reasoning and rule composition, without disregarding language heterogeneity in the Semantic Web.

B-domain example: Reasoning with SPARQL

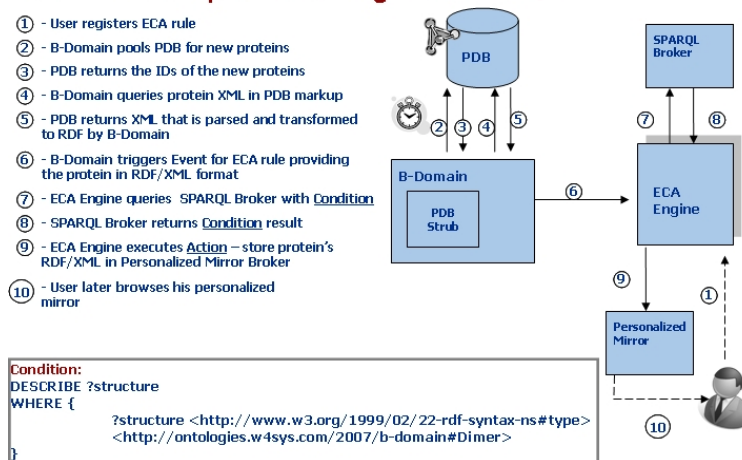


Fig. 1. Validation Scenario: inferring the presence of Dimers in a new PDB structure

The concept was validated with 4 scenarios similar to the one presented in Fig. 1. This particular scenario shows a user being notified whenever a new dimer is published in PDB. To accomplish this task the scenario depicts the use of the B-Domain and SPARQL Brokers and of a Personalized Mirror. The first component integrates information sources relevant to bioinformatics exposing its features through B-Domain's ontology. The second leverages the features of the SPARQL query language to the framework's Enterprise Service Bus. The Event Condition Action (ECA) Engine is an r^3 rule engine that allows the registration and execution of Event-Condition-Action rules. Finally, the Personalized Mirror is a simple component that allows users to store RDF/XML data. The external interfaces of each component are described using the r^3 framework's ontology. The execution of the validation scenarios showed that Bioinformatics would strongly benefit from the features provided by B-Domain. Its characteristics allow the description of the static and dynamic semantic features of the domain, enabling reasoning on top of those concepts. It also offers a way to create and deploy declarative rules (ECA), which can be chained to create complex meaningful rules. The running version of B-domain can be found at <http://reverse.net/15/r3/TST/install/dev/other/b-domain/>.