

Overview of ISWC-2009 Tutorial: “Semantic Rules on the Web”

(Oct. 26 half-day: 14:00-18:00)

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Abstract:

The area of semantic rules is perhaps the most important frontier today for the Semantic Web’s core technology and standards, and includes a number of exciting research issues. Rules extend databases and ontologies with more powerful, flexible, and active forms of “structured” knowledge (as opposed to “unstructured” knowledge such as text), and have a number of close relationships to other aspects of the overall Semantic Web such as ontologies, query and search, wikis, policies and trust, e-science and e-commerce, and services. Recent progress includes: major initial industry standards from W3C and OMG nearing finalization; and fundamental advances in the underlying knowledge representation techniques in declarative logic programs, including most recently for efficient higher-order defaults with sound integration of first order logic ontologies (OWL). Recent progress also includes: methods to use rules for, or with, more expressive OWL ontologies; increasing integration of rules with query/search in SPARQL and relational databases; substantive translations between heterogeneous types of commercial rule engines; development of open-source tools for inferencing and interoperability; performance benchmarking of rule systems; a wide range of emerging applications including in business, science, and trust; and accelerating industry investments/acquisitions in the technology including by integrated software companies such as Oracle, IBM, and Microsoft. Major software companies such as Oracle are now supporting web rules functionality in their core products. This tutorial will provide a comprehensive and up-to-date introduction to these developments and to the fundamentals of the key technologies and outstanding research issues involved. It will explore example application scenarios, overall requirements and challenges, and touch upon business/social value and strategy considerations.

Prerequisite Knowledge of Audience:

The tutorial will cater to those first learning about semantic web rules, as well as those who already have some background in them. It will assume only background knowledge of: (1) basics of logical knowledge representation: first order logic and relational DBMS; and (2) basics of XML, RDF, and OWL. (Almost all of the ISWC audience actually has this background.)

Outline (Preliminary):

1. **Intro & Uses** (14:00-15:00)
 - Overview of tutorial, get acquainted, Rules on the Web, Semantic Rules
 - Uses and Kinds of rules: commercial, web
 - Requirements, business value, IT lifecycle, strategic roadmapping of future adoption
 - Example Use Cases: e-science and biomedical; e-commerce pricing, ordering; trust, compliance, policies, financial services; info integration, ontology mapping, business reporting; e-contracts, e-commerce life cycle; Semantic Web Services
2. **Concepts & Foundations** (15:00-17:30 -- includes break)
 - Overview of Logical Knowledge Representations: First Order Logic (FOL), Logic Programs (LP)

- Nonmonotonicity: Defaults, Negation, Priorities, Courteous, Argumentation Theories;
 - Additional Features: Lloyd-Topor, Skolemization, Datatypes, Integrity Constraints, Equality, Aggregation
 - Procedural Attachments to Actions, Queries, Built-ins, and Events; Production/Situated LP, Production Rules
 - HiLog, Higher-Order Syntax, Reification, Meta-Reasoning
 - F-Logic, Frame Syntax, Object Oriented Style
 - Combining LP and FOL: Rule-based Ontologies, Sound FOL Interchange via Hypermonotonic Mapping, Description LP, OWL RL
3. **Conclusions & Directions** (17:30-18:00)
- More about Tools; Future research; General Discussion; References and Resources