

# Preface

The *Semantic Web* is a major endeavor aimed at enriching the existing Web with metadata and processing methods so as to provide Web-based systems with advanced (so-called intelligent) capabilities, in particular with *context-awareness* and *decision support*.

The advanced capabilities striven for in most Semantic Web application scenarios primarily call for *reasoning*. Reasoning capabilities are offered by existing Semantic Web languages, such as BPEL4WS, BPML, ConsVISor, DAML-S, JTP, TRIPLE, and others. These languages, however, were developed mostly from functionality-centered (e.g., ontology reasoning or access validation) or application-centered (e.g., Web service retrieval and composition) perspectives. A perspective centered on the reasoning techniques (e.g., forward or backward chaining, tableau-like methods, constraint reasoning, etc.) complementing the above-mentioned activities appears desirable for Semantic Web systems and applications. The workshop on “Principles and Practice of Semantic Web Reasoning,” which took place on December 8, 2003, in Mumbai, India, was the first of a series of scientific meetings devoted to such a perspective.

Just as the current Web is inherently heterogeneous in data formats and data semantics, the Semantic Web will be inherently heterogeneous in its reasoning forms. Indeed, any single form of reasoning turns out to be irreal in the Semantic Web. For example, ontology reasoning in general relies on monotonic negation (for the metadata often can be fully specified), while databases, Web databases, and Web-based information systems call for non-monotonic reasoning (for one would not specify non-existing trains in a railway timetable); constraint reasoning is needed when dealing with time (for time intervals have to be dealt with), while (forward and/or backward) chaining is the reasoning of choice when coping with database-like views (for views, i.e., virtual data, can be derived from actual data using operations such as join and projections).

This book contains articles presented at the first workshop on “Principles and Practice of Semantic Web Reasoning” (PPSWR 2003). The workshop addressed both reasoning methods for the Semantic Web and Semantic Web applications relying upon various forms of reasoning.

The workshop organizers invited three papers on *Foundations of Semantic Web Reasoning*: A methodology for a framework and component technology for Semantic Web applications, based on layered frameworks and the semantic separation principle of architecture systems, is proposed in “Composing Frameworks and Components for Families of Semantic Web Applications.” “Semantic Web Logic Programming Tools” discusses recent contributions from logic programming to Semantic Web research and proposes well-founded semantics for the WWW. In “Web Rules Need Two Kinds of Negation” it is argued that the Semantic Web will benefit from distinguishing between open and closed predicates using both strong negation and negation-as-failure.

Accepted papers for the workshop discuss Reasoning in Practice, Query and Rule-languages, and Semantics & Knowledge Representation: *Reasoning in Practice* is demonstrated via the embedding of personalization techniques in a distributed reasoning architecture, suitable for the Semantic Web, as proposed in “Towards the Adaptive Semantic Web.” “On Reasoning on Time and Location on the Web” shows the integration of temporal and locational reasoning into XML query and transformation operations. An approach to interpret Semantic Web and Web services in a framework of multi-agent interoperation systems is proposed in “Reasoning about Communicating Agents in the Semantic Web.”

*Query and Rule Languages* are developed. A visual query language for XML, based on a positional approach, is proposed in “A Visual Language for Web Querying and Reasoning.” A web query language for data retrieval for adaptation, and formalisms for expressing adaptation functionality are shown in “XML Document Adaptation Queries (XDAQ): an Approach to Adaptation Reasoning Using Web Query Languages.” “On Types for XML Query Language Xcerpt” discusses type systems for rule languages and algorithms for automatically checking the correctness of rule-language programs. A conceptual logic programming language for reasoning about ontologies in a rule-based manner is proposed in “Integrating Description Logics and Answer Set Programming.”

Finally, the issues of *Semantics and Knowledge Representation* are investigated. “Extracting Mathematical Semantics from L<sup>A</sup>T<sub>E</sub>X Documents” allows the mapping from mathematical information in L<sup>A</sup>T<sub>E</sub>X documents to MathML. Automatic reasoning in the knowledge representation language Attempto Controlled English is the aim of “Reasoning in Attempto Controlled English.” “Systematics and Architecture for a Resource Representing Knowledge About Named Entities” introduces special resources for formalizing and encoding types of information for named entities.

The first workshop on “Principles and Practice of Semantic Web Reasoning” took place as a satellite event of the 19th International Conference on Logic Programming (ICLP 2003), thus bringing closer together such scientific communities as the Logic Programming, Adaptive Web, and Web communities, each concerned with reasoning on the conventional Web and the Semantic Web. Because of the very positive resonance this first workshop on “Principles and Practice of Semantic Web Reasoning” caused in the international research community, the organizers intend to continue this new workshop series.

Mumbai, December 8, 2003

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