**REWERSE©**
reasoning on the web

REWERSE: Reasoning on the Web with Rules and Semantics

REWERSE is a research "Network of Excellence" (NoE) on "Reasoning on the Web" that is funded by the EU Commission and Switzerland within the "6th Framework Programme" (FP6).

The objective of REWERSE is to establish Europe as a leader in reasoning languages for the Web by networking a scientific community, and by providing tangible technological bases that do not exist today for an industrial software development of advanced Web systems and applications. The goal will be achieved by developing a coherent and complete, yet minimal, collection of inter-operable reasoning languages for the Web, by testing these languages on context-adaptive Web systems and Web-based decision support systems, and by bringing the proposed languages to the level of open pre-standards. REWERSE currently develops Education and Training activities targeted at Universities as well as Technology Transfer and Awareness activities targeted at the European industry on reasoning languages for Web systems and applications. REWERSE is a W3C member and is therefore involved in Standardization activities.

reasoning

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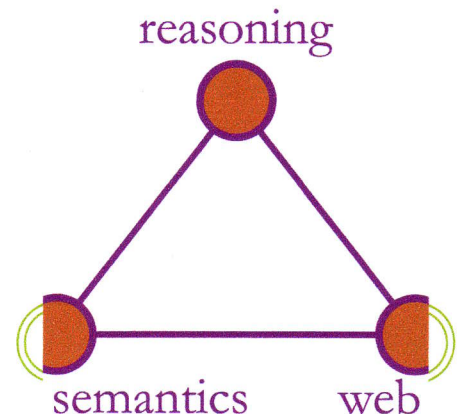
I1 Working Group on Rule Modeling and Markup

The mission of this group is to facilitate the use of rule formalisms and technologies for inference-enabled Web applications by developing an integrated modeling, visualization, verbalization and markup framework that is supported by tools.

Main activities of the group are towards R2ML - REWERSE Rule Markup Language and URML a UML-based Rule Modeling Language.

R2ML is a comprehensive and user-friendly XML rule format that allows interchanging rules between different systems and tools, enriching ontologies by rules, connecting your rule system with (our) R2ML-based tools for visualization, verbalization, verification and validation.

The working group actively participates in the W3C RIF (Rule Interchange Format) activity with its Core Condition Language Extension Proposal.

Another activity towards rule modeling includes URML, which defines a rule extension to the standard UML and is supported by the REWERSE modeling tool Strelka. URML has forward compatibility with R2ML, therefore, the Strelka tool can be used to model rules and deploy them to the rule engine via R2ML.

I3 Working Group on Composition and Typing

The REWERSE working group on "Composition and Typing" works in two fields. For typing, the group has developed a typing system for the XML query and transformation language Xcerpt, which can help to find errors in query programs. It is now investigated how the typing can provide valuable optimization strategies for the Xcerpt engine itself. For composition, the group has an invasive composition framework available ready to target languages developed within the REWERSE network and in the larger Web community, e.g. OWL and Xcerpt. While being able to simulate well-known composition techniques, such as aspect-orientation, the framework is flexible to easily allow new composition ideas to be prototyped and experimented with to find the future techniques needed for the Semantic Web. Examples of prototyped techniques include a module system for Xcerpt and the reuse of modeling decisions in OWL.

I4 Working Group on Querying

The group aims to enable more meaningful access to Web and Semantic Web data by integrating reasoning capabilities in a Web query and transformation language. Web query and transformation languages such as XPath, XQuery, and SPARQL inspired from database query languages give rise to an easier programming and software maintenance for information access in the Web. In the Web context, reasoning capabilities enhance traditional query and access technologies to be able to cope with heterogeneous, incomplete, and often even inconsistent information.

At the core of the group's work stands the Web query language Xcerpt (http://xcerpt.org) that realizes the described vision: a single versatile rule-based language. This language is a test-bed for many developements such as a query algebra and abstract machine presenting the first unified framework for efficient access to RDF and XML applicable also to other Web and Semantic Web query languages.

More information available at

http://rewerse.net

I2 Working Group on Policies

The main goal of this working group is developing methodologies, languages, and tools for specifying, enforcing, and integrating heterogeneous policies.
The challenge is reaching an appropriate level of trust in systems and users under the extreme flexibility and interoperability requirements posed by modern business models, application scenarios, and software architectures. The research interests of the group include strongly related issues such as policy languages for access control and sensitive information release, trust negotiation, cooperative enforcement, natural language specifications, and explanation facilities. The group has developed two major prototypes showcasting the developed technologies: "PROTUNE" and the "Attempto system".

I5 Working Group on Evolution and Reactivity

Evolution and reactivity on the Web are the main research issues of this Working Group, which cover updating data on the Web, exchanging information about events between Web nodes, and reacting to combinations of such events. Evolution and reactivity play an important role for upcoming Web systems such as online marketplaces, scientific workflows, adaptive Web and Semantic Web systems, as well as Web Services and Grids. The groups work has focused on:
■ a general framework based on Event-Condition-Action rules, which deals with language heterogeneity at the rule component level for realizing reactive behaviour on the Web,
■ the r3 (Resourceful Reactive Rules) research prototype of a Semantic Web rule engine for reactive rules, and
■ the reactive, rule-based language XChange, which offers support for composite event detection.

A1 Working group on Web-based Decision Support for Event, Temporal, and Geographical Data

The working group on "Web-based Decision Support for Event, Temporal, and Geographical Data" is working on languages and applications which provide reasoning and processing means for temporal and spatial information. With the already available temporal specification language GeTS and the first prototype of its spatial counterpart MPLL, the group provides very flexible and powerful mechanisms to integrate temporal and spatial reasoning and processing into different host languages and/or applications. Concurrently, several peripheral systems and applications have been developed, such as the Local-Data Stream Management System (L-DSMS) for processing streams of (XML) data, an ontology driven visualisation system based on OWL and SVG, and a flexible network routing applications (TransRoute). the working group currently focuses on the integration of these different components and data sources.

A2 Working Group on Bioinformatics

The bioinformatics group works towards a semantic web for the life sciences. Group members have developed systems, which use rules, reasoning, and the web to support biomedical researchers. Applications comprise among others the use of constraint satisfaction for sequence alignment, reasoning over interaction networks and metabolic pathways, rules to consistently intgrate online biological data, automated integration of biomedical ontologies, and GoPubMed.org, an intelligent literature search engine. GoPubMed has led to the spin-off of Transinight GmbH, which received seed funding by the High-techGruenderfonds.

A3 Working Group on Personalized Information Systems

The REWERSe working group on "personalized information systems" aims at advancing the state of the art of customized information delivery applications in the Semantic Web. The group has shown how reasoning enables personalization in the Semantic Web, various prototypes and applications have been developed, among them the Semantic Web Challenge Award laureate "Personal Publication Reader" (www.personal-reader.de). Current investigation of the group focus on personalization strategies and algorithms, re-usability of personalization functionality, and an architecture for realizing "Personalization Services" in the Semantic Web.

Presentation, Reviewing and Assessment

The activity group "Presentation, Reviewing and Assessment" (PRA) monitors all important REWERSE results and activities. The group communicates these achievements to the European Commission, to the IT professional communities and to a wide audience of interested people. In particular the group publishes all REWERSE related publications, deliverables and demonstrators on http://rewerse.net thus creating a valuable and up-to-date research archive on topics related to Rules and Reasoning on the Web.

Technology Transfer and Awarenes

The activities of the department "Technology Transfer and Awareness" aim at promoting REWERSE technologies in the European industry. By informing and teaching about REWERSE technologies and fostering cooperations, we want to spread and support the use of reasoning techniques in advanced Web applications and systems.

The work focuses on the
■ organisation of events such as the Semantic Web Days (www.semantic-web-days.net), an exchange forum for innovative companies and research institutions on the topic of Semantic Web technologies and their uptake in industry;
■ devolopment of training courses and online educational material on Semantic Web topics for innovators

Education and Training

The objectives of the Education and Training (ET) activity include Semantic Web education and spreading of excellence. The work focuses on
■ organisation of yearly Summer School "Reasoning Web" (http://reasoningweb.org/) with proceedings published by Springer-Verlag.
The edition 2007 will be located in Dresden.
■ building-up of an infrastructure for web-based Semantic Web courses. REWERSE is cooperating with the EU project Knowledge Web on developing REASE (http://rease.semanticweb.org), the repository of e-learning materials of the European Association for Semantic Web Education. The contribution of REWERSE concerns both the technical aspects of REASE and development of the course material for the repository.

■ Semantic Web courses and curricula. (http://wiki.ontoworld.org/index.php/Semantic_Web_Topic_Hierarchy).
Several universities participating in REWERSE offer Semantic Web courses.
The curriculum discussion initiated by ET deliverables resulted in a proposal for Semantic Web topics hierarchy.
The hierachy is used, among others, for classification of Semantic Web e-learning material in REASE.

Standardization

The Standardization Activity is devoted to promoting outcomes of REWERSE's research within standardization organizations and providing feedback towards REWERSE on relevant standardization work by realizing the technology watch within standardization organizations and the REWERSE project.

The NoE REWERSE is a W3C Member since October 2005. Currently, REWERSE members are actively involved within the standardization work of the W3C Rule Interchange Format Working Group (RIF WG) and the W3C Semantic Web Health Care and Life Sciences Interest Group (HCLSIG). The W3C RIF WG is to develop a format for rules, such that they can be interchanged between different rule languages and systems. The W3C HCLSIG is to improve research and development in the health care and life science industries.