The Open RuleML Standard for Semantic Web Rule Interchange

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Introduction

• Rules are part of the Semantic Web
• Rule interchange in an open format is important for e-Business
• RuleML is the de facto open language standard for rule interchange/markup
• Collaborating with W3C, OMG, OASIS, and other standards/gov'nt bodies
RuleML Enables ...

Rule
modelling
markup
translation
interchange
execution
publication
archiving

in

UML
RDF
XML
ASCII
RuleML Identifies ...

• Expressive sublanguages
  – for Web rules
  – started with
    • *Derivation* rules: extend SQL views
    • *Reaction* rules: extend SQL triggers
  – to empower their subcommunities
RuleML Specifies ...

- Derivation rules via XML Schema:
  - All sublanguages: (OO) RuleML 0.89
  - First Order Logic: FOL RuleML 0.9
  - With Ontology language: SWRL 0.7
- A Semantic Web Rule Language
  - Combining OWL (W3C) and RuleML
  - With Web Services language: SWSL 0.9
- Translators in & out (e.g. Jess) via XSLT
"The **discount** for a *customer* buying a *product* is 5 percent if the *customer* is **premium** and the *product* is **regular**."
Business Rule: Slotted (for OO)

"The **discount** for a **customer** buying a **product** is 5 percent if the **customer** is **premium** and the **product** is **regular**."
RuleML Initiative Structure

- Steering Committee:
  - Asaf Adi (IL)
  - Harold Boley, Co-Chair (CA)
  - Mike Dean (USA)
  - Andreas Eberhart (DE)
  - Benjamin Grosof (USA)
  - Michael Kifer (USA)
  - Steve Ross-Talbot (UK)
  - Bruce Spencer (CA)
  - Said Tabet, Co-Chair (USA)
  - Gerd Wagner (DE)

- Technical Groups:
  - Reaction Rules, Co-Chairs: A. Adi & G. Wagner
  - Ontology Combination, Co-Chairs: B. Grosof & A. Eberhart
  - Defeasible Rules, Co-Chairs: G. Antoniou & M. Schroeder
  - Frames, Objects, and Rule Markup, Co-Chairs: M. Kifer & S. Decker

- Participants:
  - >40, including companies such as IBM, Sun, Oracle, and Sybase
Standards Bodies and RuleML

- **W3C**: Ongoing technical collaboration
  - Member Submission of [SWRL](#) and of [SWRL FOL](#) (including [FOL RuleML](#))
  - Led to [Workshop on Rule Languages for Interoperability](#) with papers from (#9 #29 #57, #67) & about (#23, #59) RuleML

- **OMG**: Responses to Requests For Proposal (RFPs) on Business and on Production Rules

- **OASIS**: Technical Committee plan for [Policy RuleML](#)
Government Efforts and RuleML

- DARPA: Joint (Agent Markup Language) Commitee [archived discussion list](#)
- NRC:
  - IIT: Hosts portals [ruleml.org](http://ruleml.org), [jdrew.org](http://jdrew.org), mailing lists (e.g. [ruleml-all](http://ruleml-all)), and more
  - CISTI: Leads team (with Network Inference and Stanford University) for SWRL submissions to W3C
  - IRAP: Evaluates real-world use scenarios
- DFKI: Hosted startup
RuleML 0.87 (Now: 0.88, Soon: 0.89)

- Complete release announced: 2004-08-12
- Full specification: www.ruleml.org/0.87
  - XML Schemas: www.ruleml.org/0.87/xsd
  - Examples: www.ruleml.org/0.87/exa
  - Auto-Upgrade: www.ruleml.org/0.87/xslt

- Highlights
  - UML model for system of sublanguages
  - Type/role “stripe-skipping” syntax, also for OO RuleML
  - Slot changes for improved F-logic compatibility
  - Validation stability
FOL RuleML 0.9

• Packaged in SWRL FOL release: 2004-11-04
• First specification: www.ruleml.org/fol
  – Monolithic DTD: www.ruleml.org/fol/#SynSem
  – Examples: www.ruleml.org/fol
  – Auto-Upgrade: forthcoming

• Highlights
  – Modular combination of
    • Quantifier RuleML: explicit ‘Forall’ and ‘Exists’
    • Disjunctive RuleML: ‘Or’ in the head
  – Connectives for equivalence and negation added
  – Will benefit all other sublanguages of RuleML 0.9
jDREW

- Java Deductive Reasoning Engine for the Web by Bruce Spencer: www.jdrew.org
- Open Source on SourceForge
- Top-down and bottom-up execution
- RuleML input for rule bases
OO jDREW

- Object-Oriented engine by Marcel Ball: [www.jdrew.org/oojdrew](http://www.jdrew.org/oojdrew)
- Top-Down and Bottom-Up Web-Start Applications plus JAR file download
- OO RuleML input for rule bases
- Used for most new applications
Applications

- RACSA, RALOCA, RACOFI: Rule Applying Agents for Comparison Shopping, Learning Object Comparison, and COllaborative FIItering (led to inDiscover.net)
- **NBBizKB**: New Brunswick Business Knowledge Base uses OO RuleML for data validation and integration
- **AgentMatcher**: e-Learning metadata interchanged in Weighted OO RuleML
- **Teclantic**: Startup project descriptions for Atlantic technology transfer in Weighted OO RuleML
- Regulatory guidelines for financial services in the US, Can, and UK by Said Tabet, Inference Web Inc.
Conclusions

• The **POsitional-SLotted** presentation syntax for OO RuleML will help people; tutorial: [http://www.ruleml.org/posl/poslintweb-talk.pdf](http://www.ruleml.org/posl/poslintweb-talk.pdf)

• The **Web Rules** and **Open Source** communities should **learn more from each other**, as already prepared by Kendall Clark’s [A Web of Rules](http://www.ruleml.org/posl/poslintweb-talk.pdf)

• Give **your input for** work towards the release of **RuleML 1.0** by late 2005