RuleML 1.02: Deliberation, Reaction, and Consumer Families

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Introduction

RuleML is a knowledge representation architecture designed for the interchange of the major kinds of Web rules in an XML format that is uniform across various rule logics and platforms. It has broad coverage and is specified as a system of extensible language families, whose modular definition of schemas permits rule interchange with high precision. Realizing the "overarching" design in [BPS10], RuleML 1.0 spans the complementary families of Deliberation RuleML 1.0 and Reaction RuleML 1.0 [Pas14]. Deliberation RuleML 1.01 increases the resolution of the language lattice of this family with refined language options, e.g. for Datalog$^+$ and Hornlog$^+$. There is no corresponding Version 1.01 release of Reaction RuleML. The most recent release of RuleML, Version 1.02, is surveyed in the following parts.

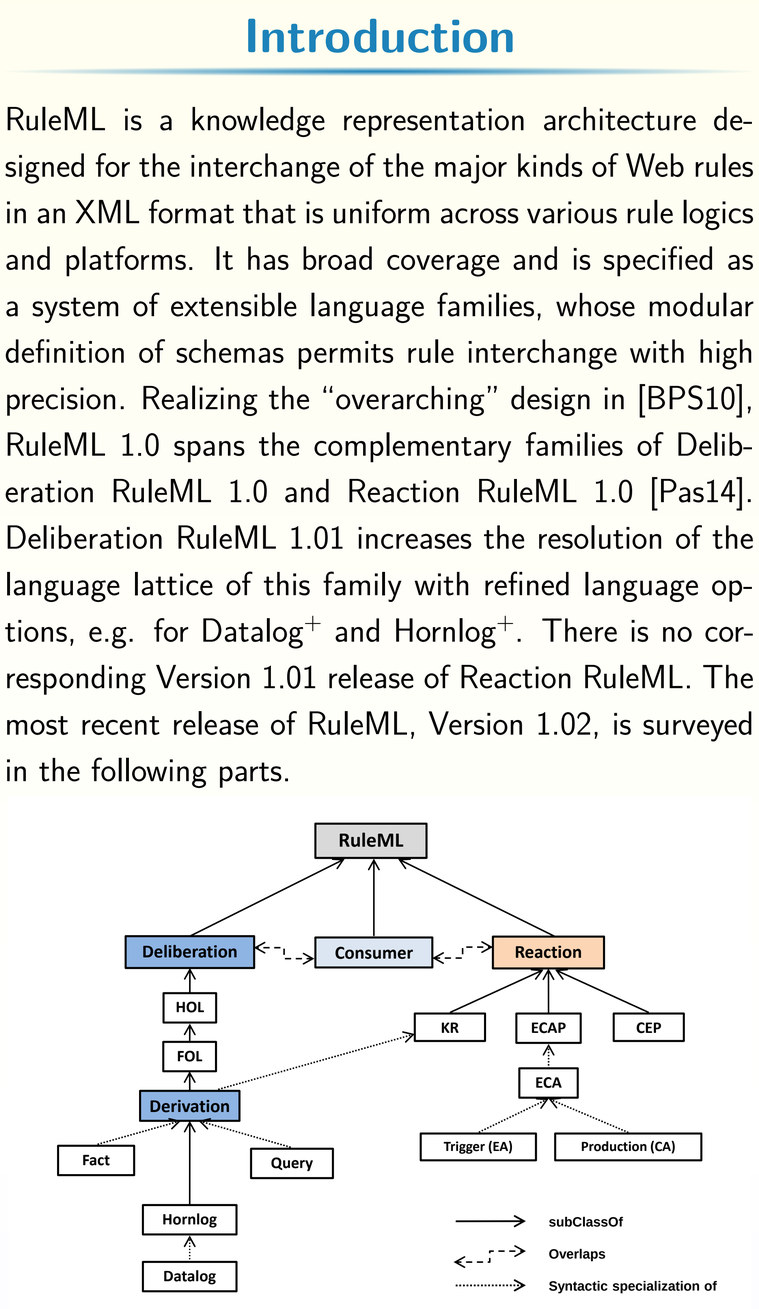

Figure: An overview of the subclass, syntactic specialization, and overlap relationships between the Deliberation, Reaction, and Consumer RuleML families of RuleML 1.02 is given in this diagram.

Features of RuleML 1.02

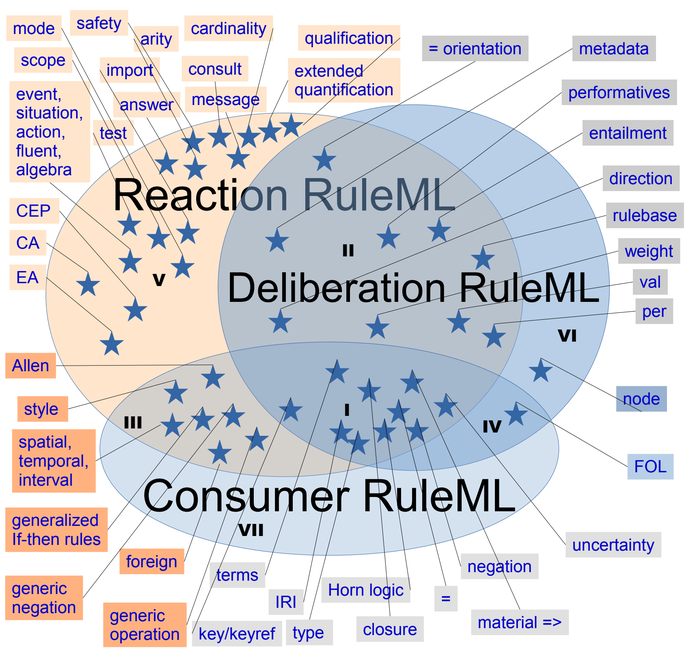

Figure: Details of the syntactic containment relationships between the Reaction, Deliberation and Consumer families are shown in this Venn diagram. The filled ellipses indicate sets of language *constructs*. The stars indicate language *features*, e.g. rules, first-order logic expressivity, or performatives, that may be combined to generate language constructs.

Example

This example illustrates a Consumer RuleML 1.02 rule that uses the specialized temporal syntax of Reaction RuleML to support an inference about the temporal scope of German climate data in dbpedia.org.

```
<Rule closure="universal" style="rs:psoa">
 <if>
  <Atom>
   <oid><Var>location</Var></oid>
   <Rel iri="dbp:ontology/Place"/>
   <slot>
    <Ind iri="dbp:property/janMeanC"/>
    <Var>temp</Var>
   </slot>
   <slot>
    <Ind iri="dbp:ontology/country"/>
    <Ind iri="dbp:resource/Germany"/>
   </slot>
  </Atom>
 </if>
 <then>
  <Operation
    type="aggregation:WindowedRecurring"
    style="aggregation:profile">
   <Atom>
    <Rel iri=
    "clim:DailyMeanSurfaceAirTempCelsius"/>
    <Var>location</Var>
    <Var>temp</Var>
   </Atom>
   <Interval>
    <Data xsi:type="xs:gYear">1981</Data>
    <Data xsi:type="xs:gYear">2010<Data>
   </Interval>
   <Time>
    <Data xsi:type="xs:gMonth">--01</Data>
   </Time>
  </Operation>
 </then>
</Rule>
```

The premise of this rule would unify with the following fact, derived from dbpedia. While the fact's elevation slot has no counterpart in the rule premise, this is taken care of by the "look-in"/"slotribution" semantics [Bol15] specified via "rs:psoa".

```
<Atom style="rs:psoa">
 <oid><Ind iri="dbp:resource/Berlin"/></oid>
 <Rel iri="dbp:ontology/Place"/>
 <slot>
  <Ind iri="dbp:ontology/elevation"/>
  <Data xsi:type="xs:double">34.000000</Data>
 </slot>
 <slot>
  <Ind iri="dbp:property/janMeanC"/>
  <Data xsi:type="xs:double">0.500000</Data>
 </slot>
 </slot>
  <Ind iri="dbp:ontology/country"/>
  <Ind iri="dbp:resource/Germany"/>
 </slot>
</Atom>
```

Deliberation MYNG GUI

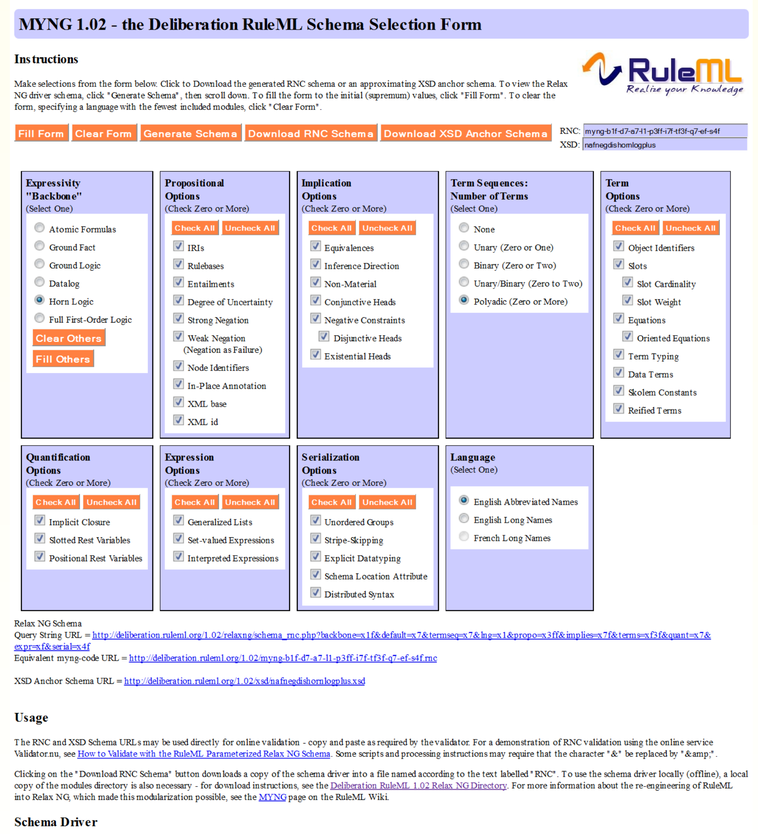

Figure: The top portion of the MYNG GUI includes brief instructions, a set of buttons for managing the form and downloading schemas, and text fields displaying the myng-code and anchor. The figure shows the two rows of GUI facets, followed by URLs for the schemas and usage instructions.

Conclusions

RuleML 1.02 has been specified in terms of its families of languages – Deliberation, Reaction, and Consumer RuleML. Consumer RuleML is seen to be a nexus of integration between Deliberation and Reaction RuleML, paving the way for an expansion of their common core of syntactic features. We expect that feedback from the further integration of Consumer RuleML into other languages, such as LegalRuleML, will foster additional development of the RuleML architecture.

References

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