RIF Glossary Entries

Some Intuitive Definitions

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Datalog

- Logic language for defining a **knowledge base** of **clauses** that can be used to answer **queries**
  - A **clause** is a **fact** or a **rule**
  - A **fact** is an unconditional relationship
    - Corresponds to a tuple in an SQL table
    - Variables as arguments of the relation are universally quantified
  - A **rule** is a derived relationship conditional on a **query**
    - Corresponds to a view in SQL
    - Variables as arguments of a derived relation are universally quantified
  - A **query** is an existentially closed conjunction of relationships to be proved using clauses, on success binding the variables
  - A relationship applies a relation constant to n≥0 positional arguments
  - An argument of a relation is a term that can be an individual constant or a variable

Horn Logic

- Logic language generalizing Datalog
  - An argument of a relation (or a function) need not be an individual constant or a variable but can also be a **function term**
  - A **function term** applies a **function** constant to n≥0 **positional arguments**, denoting (rather than naming) an individual
  - Corresponds to **complex domains** in a relational model using non-normalized relations
  - Useful also for representing function-‘tagged’ **complex data structures**, including lists

F-logic (with Michael Kifer)

- Object-logic language generalizing RDF[S] and Horn Logic
  - A relationship is generalized to a molecule with an object identifier (OID) described by n≥0 non-positional, keyed slots, similar to OWL properties
  - A conjunction of molecules describing the same OID can be merged into a single molecule
  - The OID can be typed with classes from an RDFS/ OWL-like subClassOf taxonomy
  - Rules can define molecules conditional on other molecules, generalizing rules in Horn Logic
  - Molecules can describe/query classes as well as OIDs
- Has FOL variant and LP variant

RuleML

- XML/RDF-based, fully webized, family of languages including Datalog, Horn Logic, and F-logic
- Modular, inheritance-based system of XSDs for various communities
  - Each community can have URI-named language
  - Compositional architecture with semantically compatible languages combined on a common syntactic basis
  - Agents can precisely “validate & execute” any received knowledge base
- XSLT translators to other languages
- Engines for Horn logic with Naf, e.g. OO jDREW
- Use cases, e.g. FOAF Rules

SWRL (Mike Dean)

- Semantic Web Rule Language
  - OWL + RuleML + builtins
    - Also applicable to other Semantic Web layers
  - Model-theoretic semantics
  - Abstract, XML, and RDF syntaxes
- W3C Member Submissions
  - SWRL
  - SWRL FOL
- Various implementations and users

SWSL

- Semantic Web Services Language
- Cf. Benjamin’s talk

WRL (Jos de Bruijn)

- Rules language for the Web based on Logic Programming and Deductive Databases tradition
- Rule-based ontology modeling
- Three variants:
  - WRL-Core: interoperability layer with Description Logics world (DLP)
  - WRL-Flight: Datalog with default negation and frame-based (F-Logic) extensions
  - WRL-Full: Full Logic Programming (function symbols) with default negation and frame-based extensions
- Interoperability with OWL DL through WRL-Core

Formal Semantics: Model Theory

- A model is formally defined in the context of some language L. It consists of:
  - A universe U which contains all the objects of interest (the "domain of discourse")
  - a mapping from L to U (the interpretation) which has as its domain all constants, relations and functions in the language
- A minimal Herbrand model is a special case for Horn Logic, which can use (bottom-up) fixpoint computation