

# RuleML Opening Remarks for the Ontolog Mini-Series on RulesReasoningLP

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Ontology, Rules, and Logic Programming  
for Reasoning and Applications (RulesReasoningLP)

Ontolog Mini-Series Launch Event, October 24, 2013

# Some (Meta-)Terminology

We often say “Ontology and Rules” ... but:  
How does (Formal) Ontology relate to (Formal) Rules?

- $\text{Ontology}_{\text{DL}} \sqcap \text{Rules}_{\text{Datalog}} = \text{DLP}$  (used in OWL 2 RL)
- $\text{Ontology}_{\text{FOL}} \sqcap \text{Rules}_{\text{Horn}} = \text{Rules}_{\text{Horn}}$
- $\text{Ontology}_{\text{FOL}} \sqcap \text{Rules}_{\text{RuleML}} = \text{Ontology}_{\text{FOL}}$  (cf. next slides)

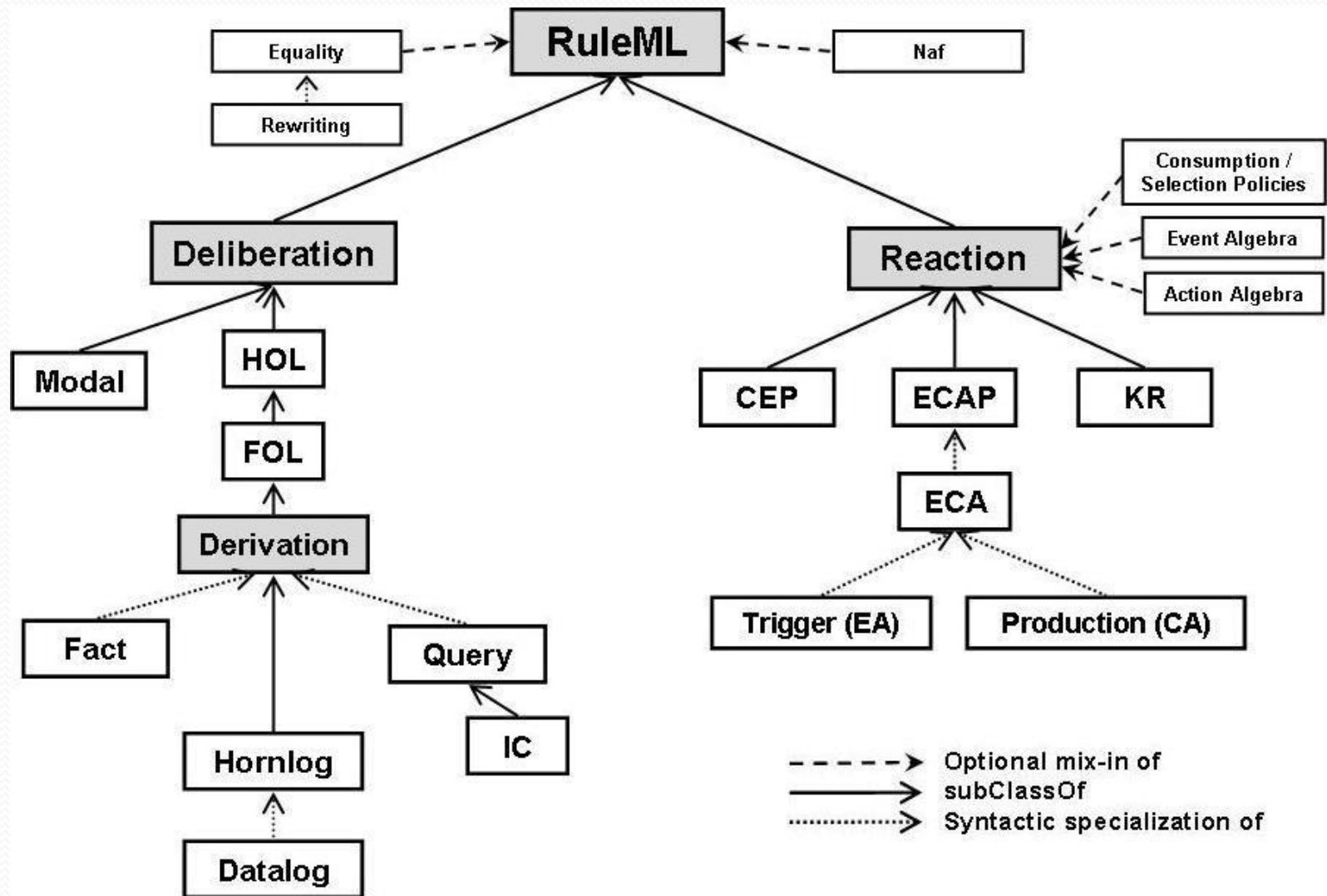
Legend:

Datalog = Horn\* without complex terms, DL = Description Logic, DLP = DL Programs, FOL = First Order Logic, Horn = Horn logic, RuleML = Rule Markup Language

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\*Often, e.g. in LP, Naf Horn (Horn with Negation as failure) is used as the basis

# RuleML Family of Sublanguages (1)



# RuleML Family of Sublanguages (2)

- RuleML family covers a wide rule spectrum, from **Deliberation** rules to **Reaction** rules
  - Rule condition part reused across the spectrum
  - Syntactic uniformity enables further reuse
- Family constitutes a deep sublanguage lattice
  - Major sublanguage inclusion path:  
Deliberation  $\supset$  HOL  $\supset$  **FOL**  $\supset$  Derivation  $\supset$  **Hornlog**  $\supset$  Datalog  $\supset$  ...
- Naf mix-in customization of Hornlog RuleML (Naf Hornlog RuleML) leads to Logic Programs

# Reaction Rules

## Reaction RuleML

Active Databases

Production Rule Systems

Rule-Based Event Notification Systems / Distributed Complex Event Processing

KR Event / Action / Transition / Process Logic Systems

- \* Transient Events
- \* ECA Paradigm
- \* Global Active Rules
- \* Trigger (EA Rules)
- \* Complex Event Algebra

- \* Implicit Sequence of Knowledge Updates
- \* CA Rules

- \* Event / Action Messages
  - Inbound / Outbound
  - Enterprise Service Bus
- \* (Agent) Conversation
  - Protocols
  - Performatives (e.g. FIPA ACL)

- \* Event / Action Axioms
- \* Reasoning on Effects / Transitions
  - fluents / states / processes
  - akin to e.g. state machines, petri-nets or pi-calculus

Spatio  
Ontology

Action  
Ontology

Situation  
Ontology

Process  
Ontology

Agent  
Ontology

Temporal  
Ontology

Event  
Ontology

# Endorsement and Support

- It is crucial for the ontology community at this point to *connect* **Web rule/ontology** efforts *across academia, standards bodies, and industry*
- The **RulesReasoningLP** collaboration of *Ontolog* with *RuleML* and *others* will foster and enhance these connections
- This Ontolog Mini-Series is a **Big Step** for our networked community of communities!