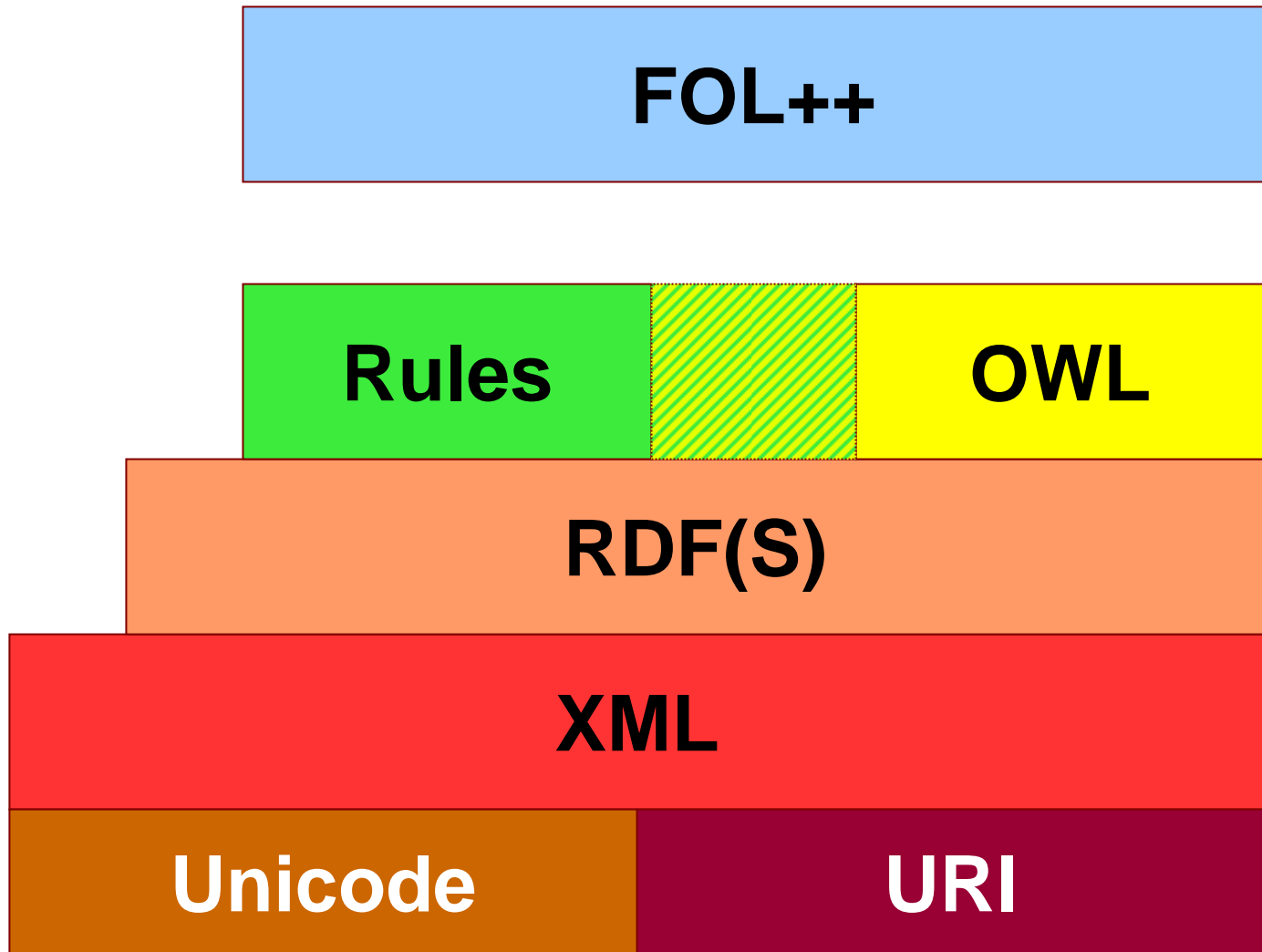


Requirements for an Expressive Semantic Web Rule Language

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The Role of a Rule Language: The RuleML, WSMO, SWSL View



It's The Features, Stupid!

- Prolog was unsuccessful **not** because of performance, but because of features
 - Semantics: Not really declarative hence
 - Features: Fairly feature-less and low-level

What Is To Be Done

- Fix the semantics
- Add features
- Web-ize

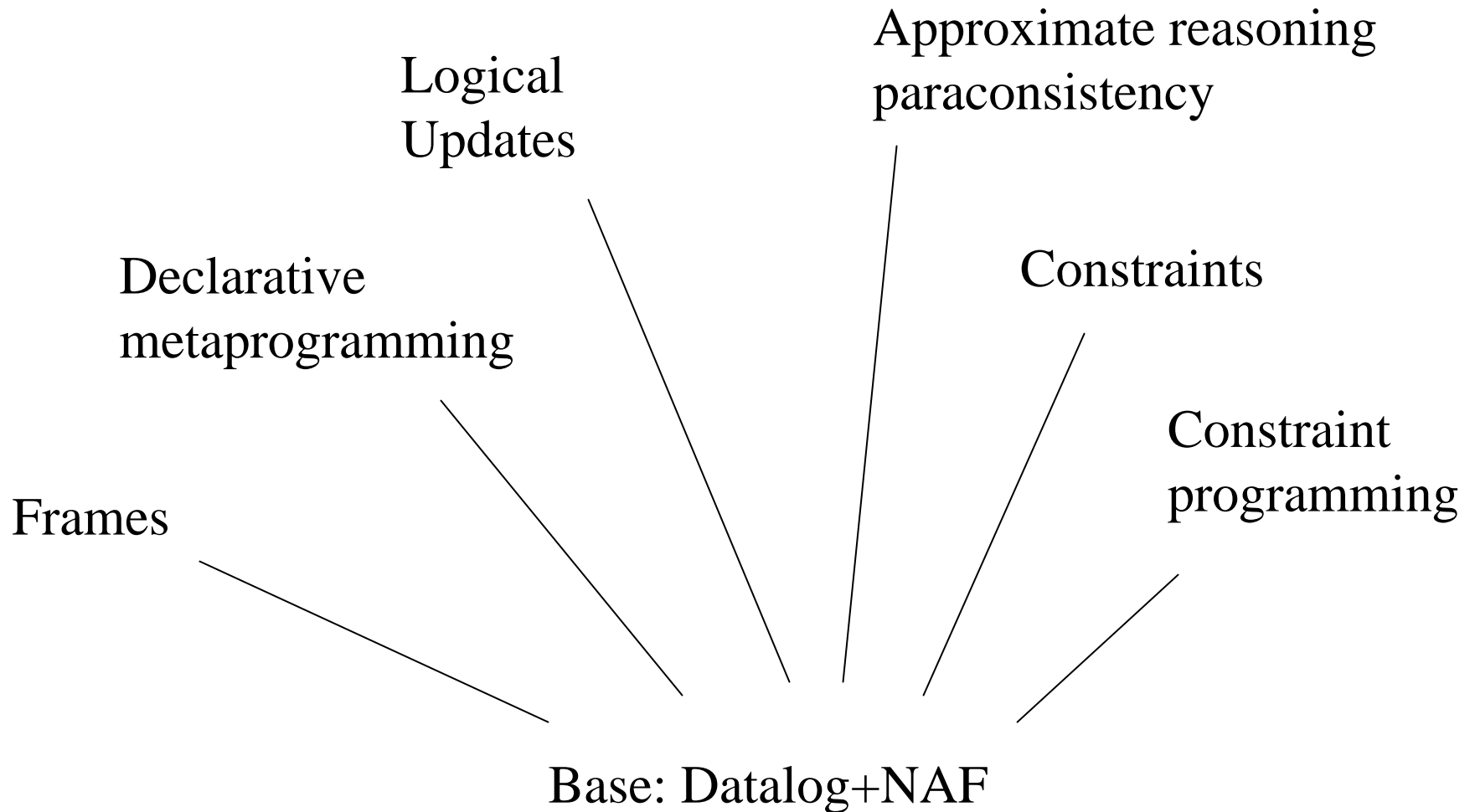
Fixing the Semantics

- Pretty much done: systems like XSB use tabling to
 - Fix the incomplete Prolog's search strategy
 - Implement the well-founded semantics for NAF (negation as failure)
- And they run fast!

Adding Features

- Not all features can be dropped into one language
- But the ones to be discussed are *orthogonal*: can be combined and *have been* combined (for the most part)
 - E.g., FLORA-2
 - Most of these are in SWSL-Rules

Feature Laundry List



Adding Frames

- *F-logic* is a popular way to combine frames with rules (and, more generally, FOL)
- Several implementations:
 - FLORA-2
 - FLORID
 - Ontobroker (commercial)
 - TRIPLE (partial)
- A basis for
 - WSMO-Rules
 - SWSL-Rules

Meta-Programming

- Need second order syntax, but not semantics
- One simple solution that goes a long way:
HiLog (has been confirmed by its rediscovery in the form of SKIF)
- Supports cleanly and tractably not only second-order syntax, but also *reification*

Logical Updates

- Prolog's assert/retract are not logical – hard to write programs correctly
- A good solution is *Transaction Logic*:
 - Logical updates
 - Attached procedures
 - Triggers
 - Supports a variety of tasks, including planning

Approximate Reasoning

- *Annotated logic*

- Supports:

- Paraconsistency
 - Easy to use
 - Naturally combines with rules

- Problem:

- Where are all the confidence factors coming from?

Constraints

- Constraints and constraint logic programming are not new; most Prolog systems support them

Web-izing

- URIs – a matter of syntax
- Modules
 - Need labels to attach to logical theories, not just names of predicates/objects
 - An extensible integration mechanism with other theories (e.g., DL) and languages (procedural and rule-based)
 - Seems severely under-appreciated by the Web/Rules community
 - Only FLORA-2 and TRIPLE (and now WSML) got it right

Additional Niceties

- Courteous rules
 - Prioritization
 - Classical negation
- Lloyd-Topor
 - More natural expression of universal statements

Discussion