A year on the Semantic Web @ W3C (or: what is happening these days?)

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The Past…

- Some technologies have been recently finalized:
  - OWL 2
  - Rule Interchange Format (RIF)

The present…

- Technical work is going on
  - SPARQL 1.1
  - RDFa 1.1
  - RDB2RDF
- "Community" contacts at W3C are also happening with
  - health care and life science community
  - financial world, eg, XBRL
  - (digital) library world
  - eGovernment

The (possible) future

- Finalize the present
- Possible new technical activities:
  - Provenance
  - Revision of RDF
  - …

OWL 2

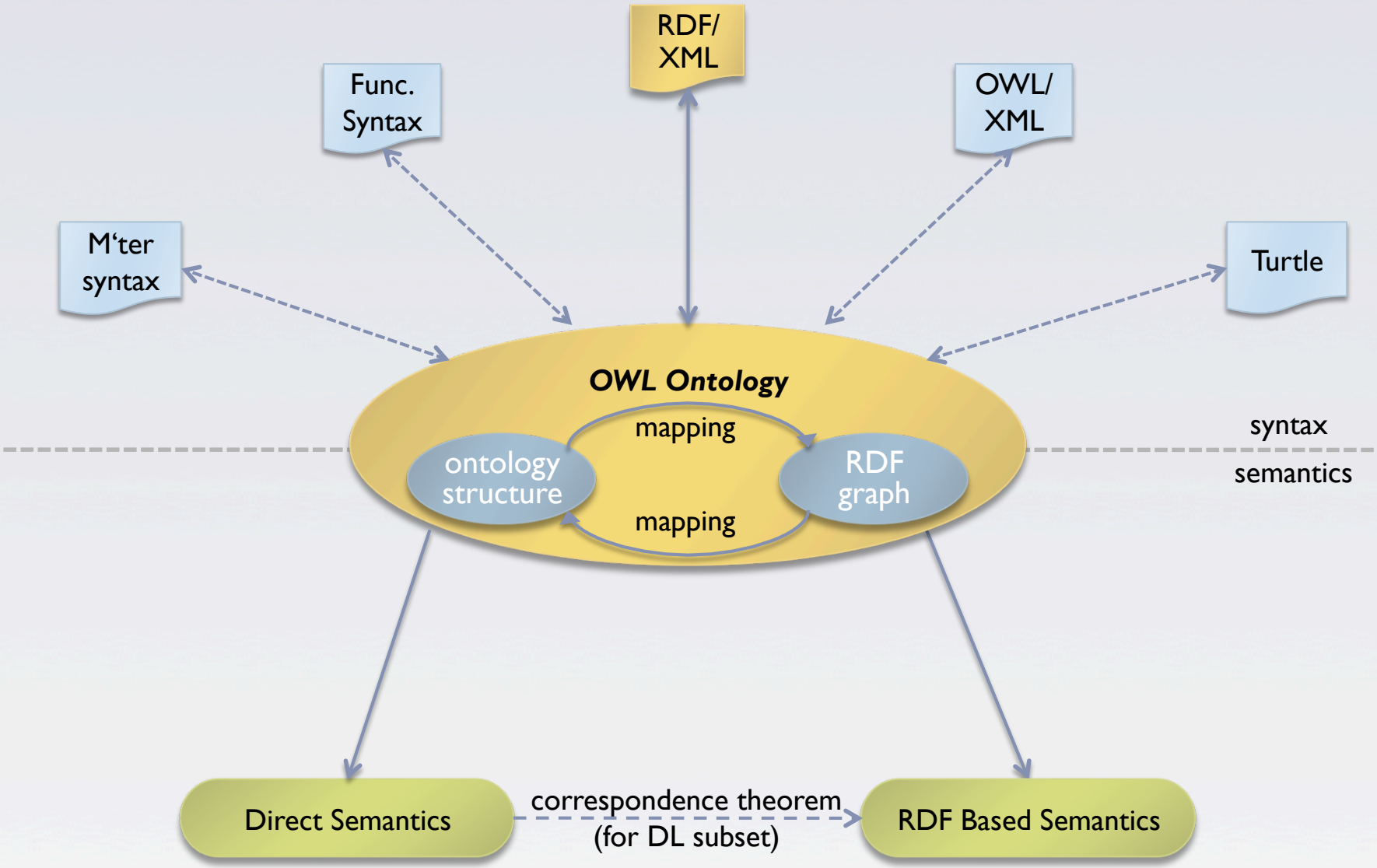
OWL 2

- A small revision of the 2004 version of OWL
- Some new features:
  - keys
  - extended datatypes facilities
    - eg, numerical intervals without relying on XML Schemas
  - property chains
    - the "uncle" example can now be formulated in OWL
  - qualified cardinality restrictions
  - profiles
  - …
- Better documents, clearer structures

It was a slightly stormy process…

- There were misunderstanding between the "core" RDF and the OWL communities
  - "does OWL abandon RDF?"
  - will there be an OWL 2 Full specification at all?
- Luckily, all those were really just misunderstandings

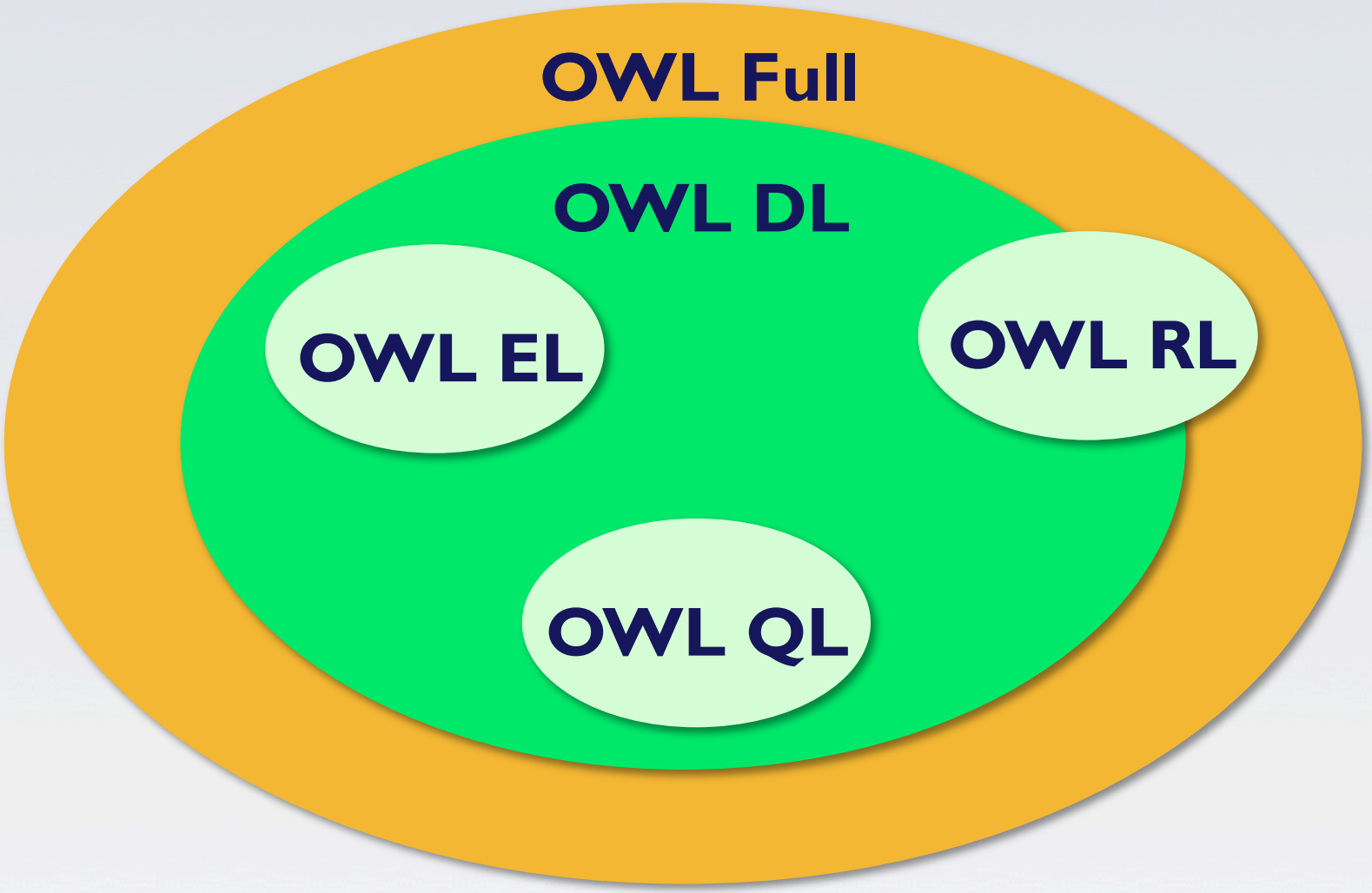
The overall structure has *not* changed



OWL 2 profiles

- OWL 2 maintains the OWL Full and OWL DL "duality"
- But OWL Lite has been replaced by "profiles":
  - syntactic restrictions to OWL
  - restricted facilities ⇔ better reasoning performance
- Goal is to make lighter OWL reasoners possible

OWL profiles



An example: OWL RL

- Goal: to be implementable through rule engines
- Usage follows a similar approach to RDFS:
  - merge the ontology and the instance data into an RDF graph
  - use the rule engine to add new triples (as long as it is possible)
  - then, for example, use SPARQL to query the resulting (expanded) graph
- This application model is very important for RDF based applications

What can be done in OWL RL?

- Many features are available:
  - identity of classes, instances, properties
  - subproperties, subclasses, domains, ranges
  - union and intersection of classes (though with some restrictions)
  - property characterizations (functional, symmetric, etc)
  - property chains
  - keys
  - some property restrictions (but not all inferences are possible)

What cannot be done in OWL RL?

- Some features are not available or are restricted:
  - not all datatypes are available
  - no datatype restrictions
  - no minimum or exact cardinality restrictions
  - maximum cardinality only with 0 and 1
  - some consequences cannot be drawn
- Very informally: rules cannot draw conclusions that involves a "there is a resource such as…"

Rule Interchange Format (RIF)

Why rules on the Semantic Web?

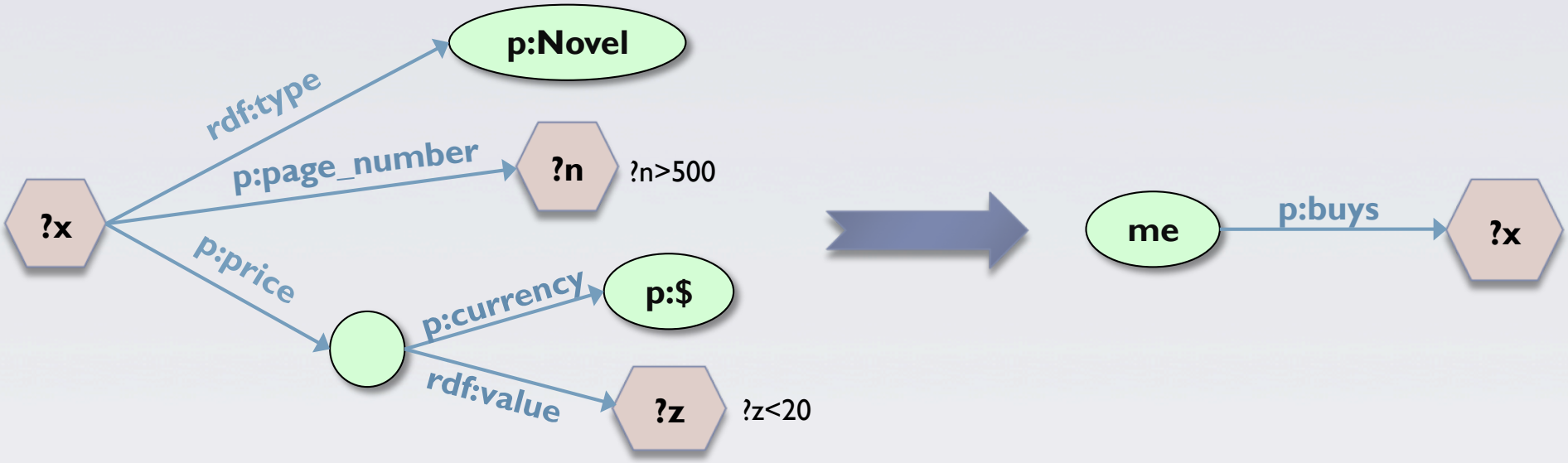
- Some conditions may be complicated in ontologies (ie, OWL)
  - eg, Horn rules: (P1 & P2 & …) → C
- In many cases applications just want 2-3 rules to complete integration
- Ie, rules may be an alternative to (OWL based) ontologies

Things you may want to express

- An example from a bookshop integration:
  - "I buy a novel with over 500 pages if it costs less than $20"
  - something like (in an ad-hoc syntax):

```
{
  ?x rdf:type p:Novel;
     p:page_number ?n;
     p:price [
         p:currency p:$;
         rdf:value  ?z
     ].
  ?n > "500"^^xsd:integer.
  ?z < "20.0"^^xsd:double.
}
=>
{ <me> p:buys ?x }
```

Things you may want to express



RIF (Rule Interchange Format)

- The goals of the RIF:
  - define simple rule language(s) for the Semantic Web
  - define interchange formats for rule based systems
- RIF defines several "dialects" of languages
  - some are geared towards production rule systems, for example
  - ie, RIF is not bound to RDF only
- Ie, RIF is also a general framework to define/ interchange rule languages

RIF Core

- The simplest RIF "dialect"
- A Core document is
  - some directives like import, prefix settings for URIs, etc
  - a sequence of logical implications
    - technically, Horn rules without functions
  - can use the familiar datatypes and operators
  - has the notion of "anonymous" resources, a bit like blank nodes

RIF Syntaxes

- RIF defines
  - a "presentation syntax"
    - a bit like the functional syntax for OWL
  - a standard XML syntax to encode and exchange the rules
  - there is a draft for expressing Core in RDF
    - just like OWL is represented in RDF

Remember the what we wanted from Rules?

```
{
  ?x rdf:type p:Novel;
     p:page_number ?n;
     p:price [
         p:currency p:$;
         rdf:value  ?z
     ].
  ?n > "500"^^xsd:integer.
  ?z < "20.0"^^xsd:double.
}
=>
{ <me> p:buys ?x }
```

The same with RIF Presentation syntax

```
Document (
  Prefix …
  Group (
    Forall ?x ?n ?z (
      <me>[p:buys->?x] :-
        And(
          ?x rdf:type p:Novel
          ?x[p:page_number->?n p:price->_abc]
          _abc[p:currency->p:$ rdf:value->?z]
          External(pred:numeric-greater-than(?n "500"^^xsd:integer))
          External(pred:numeric-less-than(?z "20.0"^^xsd:double))
        )
    )
  )
)
```

A word on the syntax

- The RIF Presentation syntax is… only syntax
- It can express more than what RDF needs
- Hopefully, a syntax will emerge with
  - close to one of the RDF syntaxes with a better integration of rules
  - can be mapped on Core implementations

Usage of rule with RDF

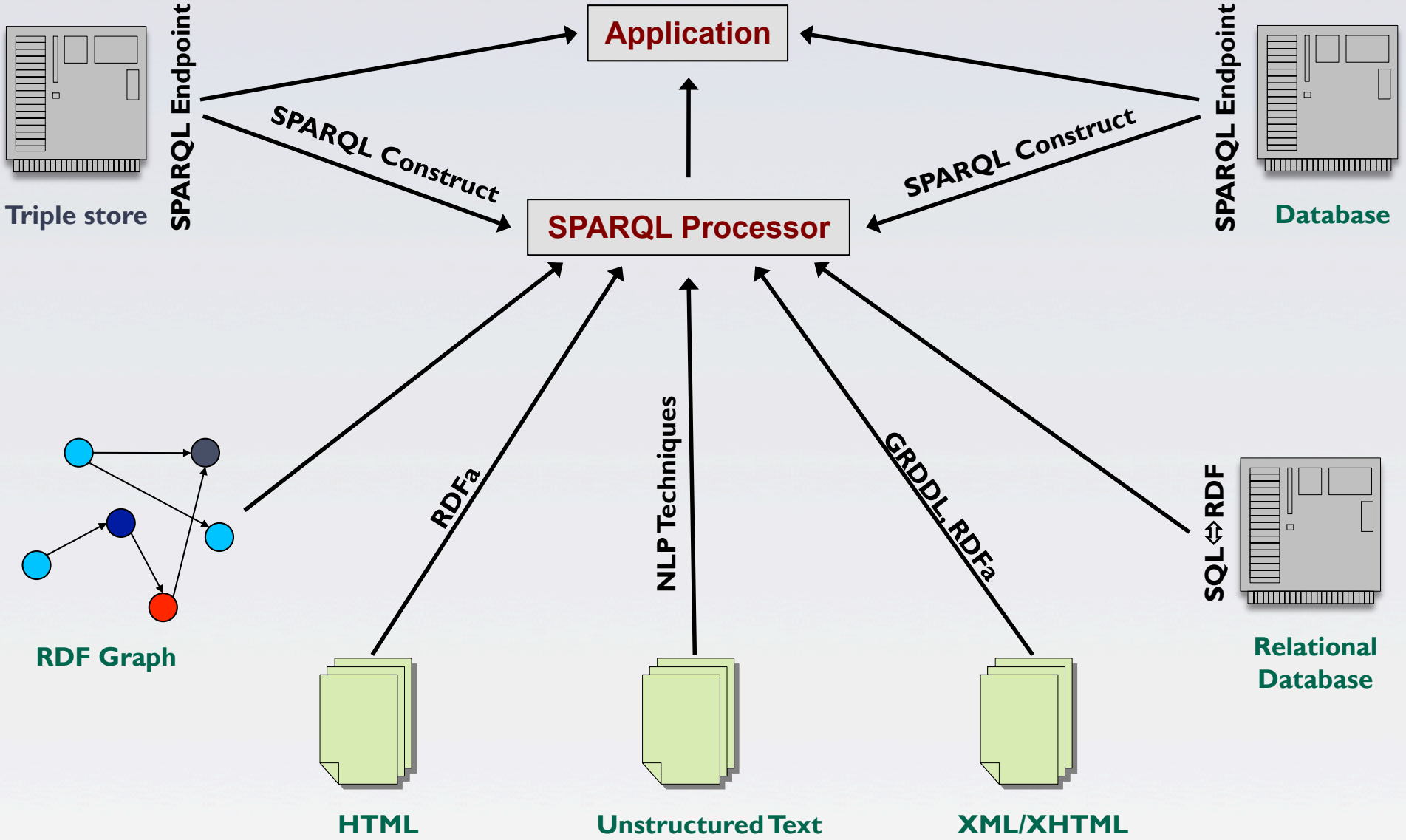
- A system gets
  - a set of RIF Core rules in some syntax
  - data in RDF
  - new RDF triples are generated
- Sounds familiar? Remember OWL RL?

What about OWL RL?

- OWL RL stands for "Rule Language"…
- OWL RL is in the intersection of RIF Core and OWL
  - inferences in OWL RL can be expressed with rules
    - the rules are precisely described in the OWL spec, b.t.w.
  - there are OWL RL implementations that are based on RIF
- An application may also "declare" a subset of OWL RL rules it uses and let a RIF engine do the rest…

SPARQL 1.1

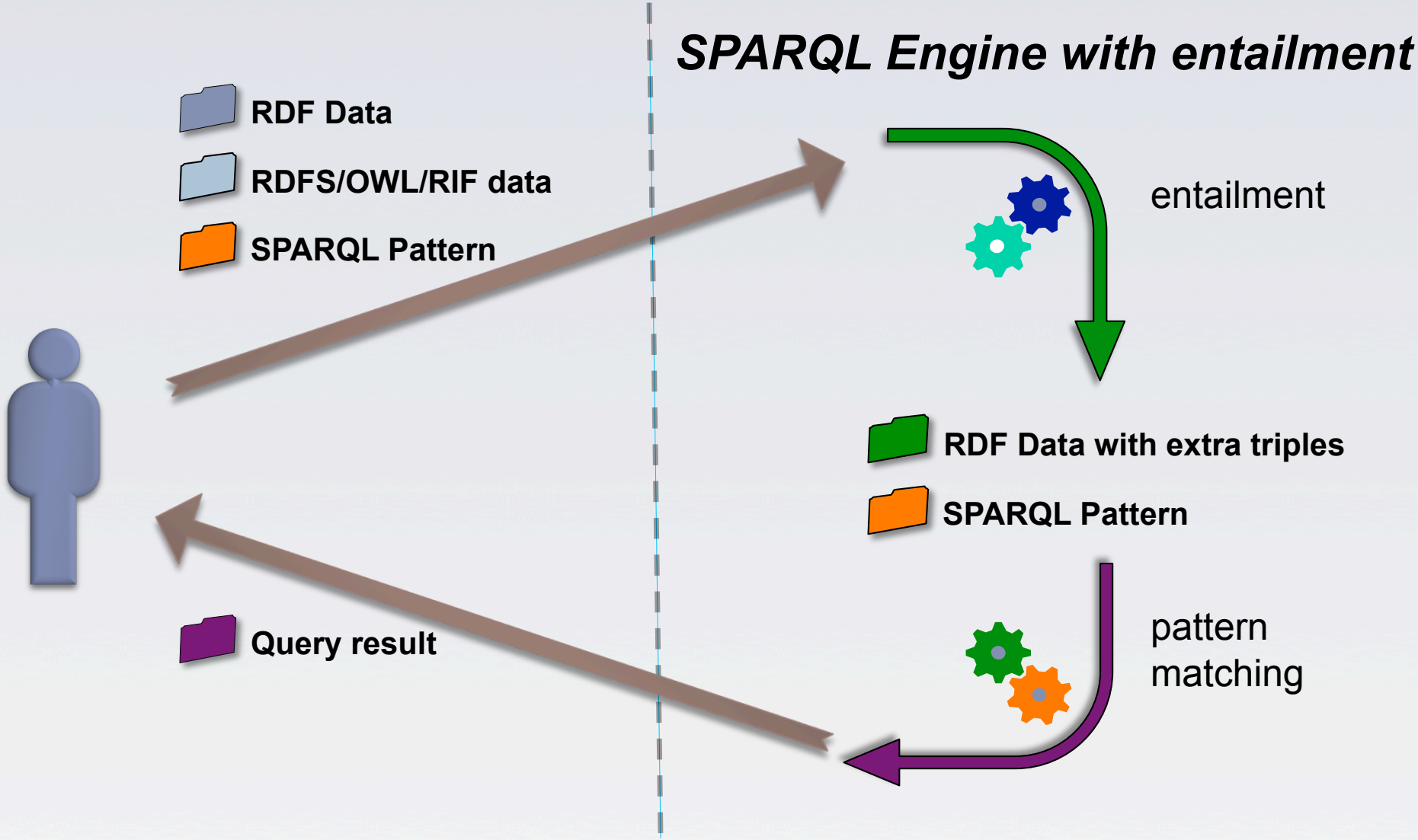
SPARQL as a unifying point



SPARQL 1.1: filling some missing features

- Update, ie, to change the RDF store
  - remove or add triples
- Nested queries (ie, SELECT within a WHERE clause)
- Negation (MINUS, and a NOT EXIST filter)
- Aggregate functions in SELECT (SUM, MIN, MAX…)
- Property path expressions (?x foaf:knows+ ?y)
- Basic federated queries
- Combination with entailment regimes (RDFS, OWL, RIF)

SPARQL 1.1 and RDFS/OWL/RIF



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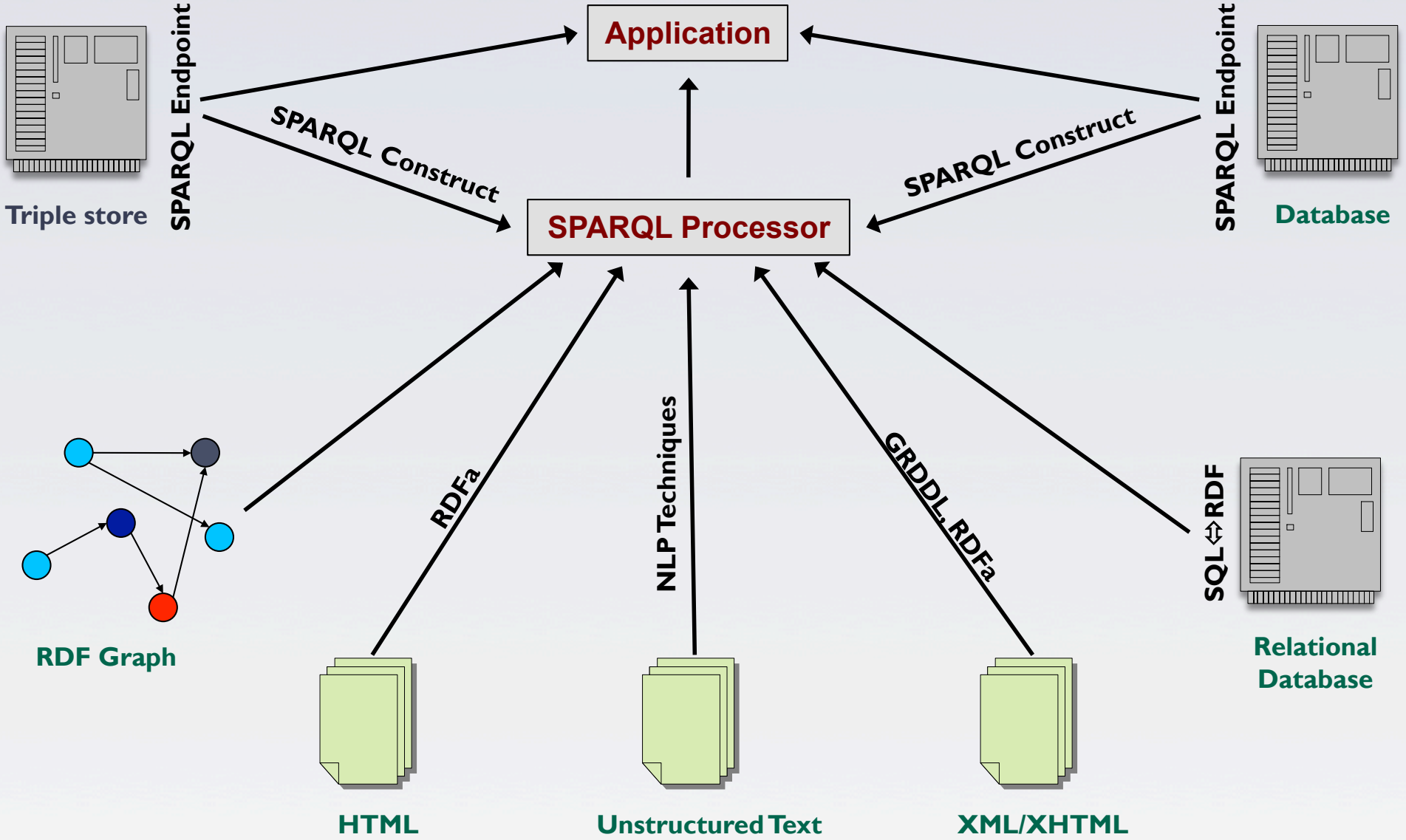
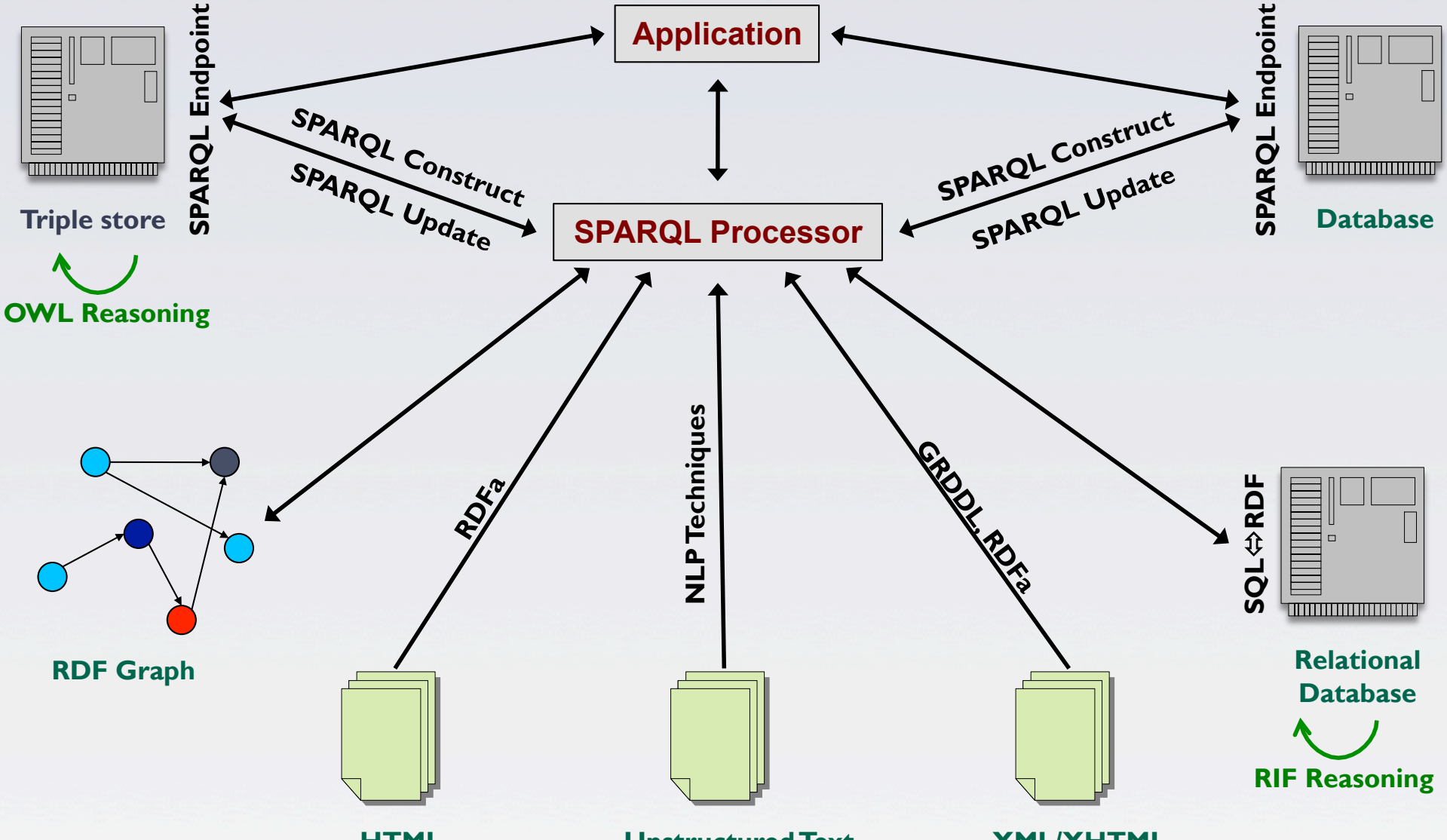


SPARQL 1.1 as a unifying point



RDFa 1.1

RDFa has a significant traction

- RDFa (and microformats) are indexed by Yahoo!, by Google,…
- Commercial, governmental, etc, sites add it to pages (BestBuy, Tesco, UK egov sites, LCS)
- Is used by Facebook's Open Graph Protocol
- *May turn into the largest source of RDF data on the Web…*

RDFa 1.1

- A new Working Group on a new release of RDFa
- Goals
  - simplify the work of RDFa authors via new features
  - separation of RDFa "Core", that can be used with any XML dialect, and XHTML+RDFa and HTML5+RDFa
  - definition of a separate RDFa API
- It is still at the beginning, first public drafts have just been published

Revision of RDF?

“RDF Next Steps” Workshop

- Workshop takes place in Stanford in a week
- There were over 30 submissions
- Issues:
  - do we need a revision of RDF?
  - if yes, what would that entail?
- Discussions will happen at the Workshop
- A new Working Group *might* be created in 2010

Preliminary conclusions from the submissions

- There is probably no need for a radical overhaul of RDF
- Some new features/changes may become necessary

Some of the discussion topics

- Feature changes:
  - deprecation (reification, containers)
  - new features
    - named graphs, quads, n-quads
    - lists as first class entities
- Semantic changes:
  - change bnode semantics
  - adopt "ter Horst" semantics for RDFS
  - remove current restrictions (literal subjects, bnode predicates)

Some of the discussion topics

- Syntaxes:
  - standard Turtle syntax
  - Json
  - new (schema friendly) XML syntax
  - Atom
- Special vocabularies:
  - unordered lists, measurement units
  - n-ary relations, identity management

These are all discussion topics!

- Only future can tell what the community will agree upon in a charter (or charters)
- RDF is the basis for many things, any change must be carefully considered from a deployment point of view!

That is all I have time for…

- There are many issues that were not discussed
  - provenance, linked data, open government initiatives, applications, open R&D issues, …
- There is work for everyone!
- Think of
  - convincing your employer to join W3C…
  - … and then join one of the current or upcoming groups!

Thank you for your attention!

These slides are also available on the Web:

http://www.w3.org/2010/Talks/0617-Seattle-IH/