Accessing and Manipulating Ontologies using Web Services

Olivier Dameron, Natalya F. Noy, Holger Knublauch, Mark A. Musen

SMI - Stanford University

Semantic Web Services Workshop - ISWC 2004
Context

- Semantic Web
  - Ontology scope
  - Web Services scope

- Ontology and WS address complementary needs
- acceptance in industry
Current limitations:
WS need semantic descriptions

- WS operate on data that conform to an (implicit) understanding shared between the provider and the client
  - WSDL, UDDI
  - Still require human intervention
    - for composition
    - for interfacing
- Need explicit description of
  - What WS do
  - What they operate on
Current limitations:

WS need semantic descriptions

- WS operate on data that conform to an (implicit) understanding shared between the provider and the client
  - WSDL, UDDI
  - Still require human intervention
    - for composition
    - for interfacing
- Explicit description of
  - What WS do
  - What they operate on

OWL-S
ONTOLOGIES
Current limitations:
WS need ontology-manipulation tools

- access to semantic descriptions
- process of semantic descriptions

- WS also need to access to these tools

**OWS** Ontology Web Services
- Ontology manipulation tools
- Implemented as Web Services
∃ some generic ontology manipulation tools

- standard bricks for leveraging SW development (so that previous investments start to pay off)
- cumulative effect
- allow to build on technologies accepted by the business world (amazon, google...)
- for human AND for programs (automation)

These tools can be implemented as Web Services
Approach

1. Identify major classes of Ontology manipulation tools

2. Architecture
   - Web Services
     - assessing relevance of regular WS
     - achieving interoperability
   - OWL-S description of OWS
OWS Capabilities

- Queries
- Views
- Translations
- Mapping
- Versioning
- Merging
- Reasoning
Architecture

Semantic description of (regular) Web Services
- (semi) automatic discovery
- automatic invocation
- composition and interoperability

Interconnection OWL-S / OWS
- hinges on OWL-S
- enable use of OWL-S
OWS for assessing WS relevance
OWS for assessing WS relevance

- OWS Reasoning
- OWS Mapping
- OWS ...

WS Client

OWL-S Description
OWS for assessing WS relevance

OWS Reasoning → 2 → OWL-S Description

OWS Mapping → 1 → WS Server

OWS → ...
OWL-S description of OWS may be necessary

WS Client → OWS Reasoning → OWL-S Description
WS Client → OWS Mapping → OWL-S Description
WS Client → OWS → OWL-S Description

WS Server
OWS for semantic interoperability

Compute WS
Input params

OWS

WS Relevance
(prev. slide)

OWL-S
Description

WS Client
OWS for semantic interoperability

Compute WS
Input params

WS Client

WS Server

OWL-S Description

WS Relevance (prev. slide)

1

2

3

4
OWS for semantic interoperability

Compute WS
Output params

OWS

5

WS Client

Compute WS
Input params

OWS

3

OWL-S Description

WS Relevance (prev. slide)

WS Server

2

OWS

1

4
Discussion

Relies on existing widespread technologies
- from design to implementation era

Not suited for every business domain
- ontology of the domain (amazon vs. medical app)
- semantically rich and structured domains

Chicken and egg problem
- OWS broker ?
Conclusion

- Identify some generic ontology-manipulation functions
- Use of OWS for linking isolated resources
  - OWS = semantic duct tape
- OWS also play a role in the SW development
  - Automatic (as much as possible) processing of OWL-S descriptions