Iridescent: Tool for Semantic Web Service Annotation

Demo Presentation

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Outline

• Part I - Background Study
  1. The Semantic Web
  2. Web Service Technology
  3. Semantic Web Services
    • SAWSDL

• Part II – Iridescent Usage Scenario
  A. Iridescent Presentation
  B. Smart IHU Usage Scenario
Part I

Background Study
1 The Semantic Web

• Data on the Web
  ▫ Syntactically described (HTML)
  ▫ Human interpretable
  ▫ Keyword search

• Semantic Web
  ▫ Semantically annotated data
  ▫ Machine interpretable
  ▫ Semantic search
1 The Semantic Web

• Ontology
  ▫ Taxonomy of interrelated concepts

• Markup-languages
  1. XML
  2. RDF
  3. OWL

• Material
  ▫ IHU Virtual Lab
    • http://vlabs.ihu.edu.gr/index.php?id=29
  ▫ CSD AUTH Semantic Web MSc Course
    • http://lpis.csd.auth.gr/mtpx/sw/index.htm
2 Web Services

- Service Computing
- Data as a Service
- W3C Standards
  - Web Service Description Language – WSDL
    - Syntactic Descriptions of IO
  - More
    - WS-* Stack (Discovery, Policy, Security)
2 Web Services

WSDL
3 Semantic Web Services

• Synergy of
  ▫ Semantic Web
  ▫ Web Service

• Approaches
  ▫ Top-down (Ontologies mapped to endpoints)
    • OWL-S
    • WSMO
  ▫ Bottom-up (Endpoints annotated)
    • SAWSDL, W3C Recommendation
3 Semantic Web Services
SAWSDL

1. Annotation of WSDL in place
   - SAWSDL : modelReference

2. SchemaMappings: Transformations between
   - Ontological Structures
     - OWL, RDF
   - Web Service I/O
     - XML Schema
   - E.g.
     - XSLT ->
     - <- SPARQL
Part II

Iridescent Usage Guide
Evaluation Scenario
Iridescent Tool Overview

- SAWSDL Creator & Editor
  - Open multiple Web Service Descriptions
    - WSDL
  - Open multiple Ontologies
    - OWL, RDF
  - Semantically annotate
    - Add namespace
    - Add annotations (modelReferences)
    - Add transformations (XSLT, SPARQL)
    - Recommendations: Auto-match names
Iridescent Representation

- SAWSDL namespace import
  - sawsdl:http://www.w3.org/ns/sawsdl
- modelReference
  - Annotation
- liftingSchemaMapping
  - Transformation
    - e.g. XML to RDF/OWL (XSLT)
- loweringSchemaMapping
  - Transformation
    - e.g. RDF/OWL to XML (SPARQL)
## antiRadiant Features

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<th>Iridescent</th>
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Usage Scenario

Smart IHU

• Live services that
  ▫ Switch appliances On and Off
  ▫ Read Power Consumption
  ▫ Read Temperature, Humidity, Luminance etc.

• [http://155.207.113.31:8080/aWESoME/](http://155.207.113.31:8080/aWESoME/)

• Smart Building Ontology for Ambient Intelligence
  ▫ BOnSAI
  [http://lpis.csd.auth.gr/ontologies/bonsai/BOnSAI.owl](http://lpis.csd.auth.gr/ontologies/bonsai/BOnSAI.owl)
Scenario 1

1. Open Web Service description SmartPlugService.wsdl from local file

2. Add the SAWSDL namespace to the WSDL

3. Open BOnSAI.owl from local file

4. Search BOnSAI for class PowerConsumption
Scenario 1 (cont’d)

5. Add ModelReference of PowerConsumption to ReadPower

6. Add ModelReference of PowerState to ReadStatus

7. Observe Tree & code
Scenario 2

1. Open BOnSAI from URL http://lpis.csd.auth.gr/ontologies/bonsai/BOnSAI.owl


3. Run Recommendations on .xsd, .wsdl
Scenario 2 (cont’d)

4. Select Recommendations for .xsd
   ▫ Temperature -> getRecentTemperatureResponse element
   ▫ Humidity -> getRecentHumidityResponse element
   ▫ Luminance -> getRecentLuminance element

5. Select Recommendations for .wsdl
   ▫ Temperature -> getRecentTemperatureOperation
   ▫ Humidity -> getRecentHumidityOperation
   ▫ Luminance -> getRecentLuminanceOperation

6. Observe tree and code
Scenario 3
Schema Mappings

1. Open the PurchaseOrder Service from W3C
   http://www.w3.org/2002/ws/sawsdl/spec/examples/wsdl/PurchaseOrderService.wsdl

2. Add a lifting Schema mapping
   http://www.w3.org/2002/ws/sawsdl/spec/examples/mapping/OrderRequest2Ont.xslt
   to the OrgerRequest element

Right Click WSDL node
OR use button
Scenario 3 (cont’d)

• Observe code

```xml
<wSDL:types>
  <xsd:schema
      targetNamespace="http://www.w3.org/2002/ws/sawSDL/spec/examples/wsdl/PurchaseOrderService.wsdl"
  >
    <xsd:element name="OrderRequest">
        <xsd:sequence>
          <xsd:element name="firstName" type="xsd:string"/>
          <xsd:element name="lastName" type="xsd:string"/>
          <xsd:element name="item" type="item" minOccurs="1" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
  </xsd:schema>
</wSDL:types>
```
Evaluation

• Ratings and Suggestions on
  ▫ Understanding of Background
  ▫ Functionality
  ▫ Usability
  ▫ Presentation
• Thank you