Lightweight Semantic-enabled Enterprise Service-Oriented Architecture

Dipl. -Inf. Tariq Mahmoud
Oldenburg 07.12.2012
Agenda

- Introduction: Service-Oriented Architecture
- Semantic-enabled Enterprise SOA
- Business Case
- Prototypical Implementation
- Evaluation
- Conclusion
• Service-Oriented Architecture (SOA) is a software architecture model that provides services either to end-user applications, to executable business processes or to other services through published and discoverable service interfaces.

• SOA motivations include a range of technical and business reasons. The most common motivations are:
  – Agility, flexibility and alignment
  – Reuse, integration of applications and data
  – Reduce costs, Speed and ease of project deployment
  – Support external collaborators
  – …
Semantic-enabled Enterprise Service-Oriented Architecture

- SESOA can be considered as an enhanced SOA concept. It is an enterprise solution fully based on semantic-annotated Web Services. It represents a lightweight Web development framework. Thereby, the indexing and discovery of these services will be more dynamic and comprehensive.

- SESOA is dynamically adapting to the potential changes that might accompany any enterprise requirements, goals and visions. This is realized by easing the phases of Web Services discovery, selection, invocation, composition and monitoring in any distributed and open environment.
SESOA Reference Architecture

Semantic Web Service- Based System

- Assemblage Unit

- Semantic Service Repository

Consumer System

Front End

Processing System

Validation System

- Ranking Unit
- Annotation Provider Unit
- Announcement Unit
- Service Test Unit

Web Service Directory

Provider System
Add Assemblage - Service Relation

<<Interface>>
Add Relations

Assemblage Unit

Semantic Service Repository

<<Interface>>
SESOA Database

addSemanticRelation(parameters)

relationNotExist(parameters)

alternative

RelationNotExist or assemblageExists == false

relationNotExist and assemblageExists == true

assemblageExists(GUID assemblageID)

addSemanticRelation(parameters)

storeSemanticRelation(parameter)
Business Case - ERP Selling Business Process

Customer
- Purchase Order
  - Resubmit Charge
  - Charge Declined
  - Charge Confirmed
- Shipping Details
- Delivery Report

Company Side
- Sales and Accounting
  - Receive Purchase Order and Create Sales Order
  - Charge Approval Request
    - New Charge
    - Charging Result
      - Customer Declined Notification
      - Customer Approved Notification
  - Customer Order Delivery Notification
  - Customer Order Shipment Notification
    - Order Picked Up
    - Shipment Request

Warehouse
- Packing Order
  - Request Pickup from Shipments Company
  - Request Pickup from Shipment Company

Payment Company
- Charge Payment
  - Charging Process

Shipping Company
- Pickup Request
  - Pick up Order
  - Deliver Order
Prototypical Implementation - SESOA Development Framework

<table>
<thead>
<tr>
<th>Number</th>
<th>Subject</th>
<th>Predicate</th>
<th>Object</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><a href="http://asbl.wi-ol.de/sesoa/assemblage/Database">http://asbl.wi-ol.de/sesoa/assemblage/Database</a></td>
<td><a href="http://asbl.wi-ol.de/sesoa/hasMember">http://asbl.wi-ol.de/sesoa/hasMember</a></td>
<td><a href="http://asbl.wi-ol.de/sesoa/services/AccessDatabase">http://asbl.wi-ol.de/sesoa/services/AccessDatabase</a></td>
</tr>
</tbody>
</table>

```xml
<?xml version="1.0"?>
<rdf:RDF xmlns:assemblage="http://asbl.wi-ol.de/sesoa"
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:sesoa="http://asbl.wi-ol.de/sesoa/"
  xmlns:sesca="http://asbl.wi-ol.de/sesoa/services/AccessDatabase">
  <rdf:Description rdf:about="http://asbl.wi-ol.de/sesoa/assemblage/Database">
    <sesca:hasMember rdf:resource="http://asbl.wi-ol.de/sesoa/services/AccessDatabase" />
  </rdf:Description>
</rdf:RDF>
```

Graph of the data model

[Graph showing relationships between the elements listed in the table]
Prototypical Implementation - Selling Business Process
These questions need to be answered while evaluating the concept in any business domain:

- What requirements are already designed, covered and implemented?
- What artifacts in the system have particular importance?
- How does the prototype change from its previous versions?
- Which elements of other partial subsystems are affected by changes on a particular artifact?
- What percentage of completion for the implementation can be adopted based on outcomes-objectives relations?
Evaluation (2/2)

- ERP Systems
  - Selling Business Process

- CEWE Color AG & Co.
  - Customer care service as a main application unit

- On-Demand Business Intelligence

- IT-For-Green EU-EFRE project

- Corporate Environmental Management Information Systems
Conclusion

• SESOA is an enterprise Web Service-enabled SOA solution that links businesses to external systems by assembling Web Services in assemblages

• Web Services are registered in assemblages based on business criteria and annotated using RDF statements

• SESOA reference architecture has been presented

• Different evaluation scenarios were illustrated
Questions?

Thank you very much

Dipl.-Inform. Tariq Mahmoud
Informatics Department
Very Large Business Applications (VLBA)
Ammerländer Heerstr. 114-118
26129 Oldenburg - Germany
Tel. +49 (0) 441 798 – 4494
Fax +49 (0) 441 798 – 4472
mahmoud@wi-ol.de
http://vlba.wi-ol.de