Web Services

Sabesan

Uppsala Database Laboratory
Dept. of Information Technology
Uppsala University
Sweden
Service Oriented Architecture

- **Service provider**: responsible for creating service description and deploying the service.

- **Service registry**: responsible for publishing the service description

- **Service requestor**: responsible for finding a service description to consume the service
Web Service basics

**XML**- Extensible Markup Language (XML) is a general-purpose specification for creating custom markup languages.

**SOAP**- Simple Object Access Protocol for exchanging structured information

**WSDL**- Web Service Description Language is an XML based description language for web services.

**UDDI** - Universal Description, Discovery and Integration (UDDI) is a platform-independent, XML-based registry for businesses worldwide

- Based upon the open standard technologies such as XML, WSDL, SOAP, UDDI
Web Service Scenario

Size of Iron pellet?
Web service is defined by W3C (World Wide Web Consortium) as:

- A Web service is a software system designed to support interoperable machine-to-machine interaction over a network.

- It has an interface described in a machine-processable format (specifically WSDL).

- Other systems interact with the Web service in a manner prescribed by its description using SOAP messages, typically conveyed using HTTP with an XML serialization in conjunction with other Web-related standards.
Publicly available Web services

1. Google web service
2. Amazon web service
3. Terraservice web service – Microsoft

www.xmethods.net – provide information about the publicly available web services
Key reasons for deploying a web service

1. **Scope of problems addressed** :- CORBA focused on technical architectures rather than problems of application integration.
   - Support both document centric messaging and remote procedure calls
   - Transport encoded data from both applications and business documents
   - Work with standard internet protocols such as HTTP and SMTP

2. **Using existing standard core technologies**: XML, SOAP, HTTP

3. **Industry Dynamics**: Customer needs, market pressure, and the desire to be the partner of the up-to-date trends
Web Service Architecture

- **Discovery:** UDDI
- **Description:** WSDL
- **Message packaging:** SOAP
- **Communication:** HTTP

- **Service discovery:** a dictionary of web services
- **Interface description:** describes how to call operations of a web service
- **Message packaging:** formats the data ready for communication
- **Communication layer:** transports data over network
Web Services Description Language (WSDL)

- WSDL uses XML for describing services
- WSDL describes:
  - What operations are provided
  - How operations are accessed
  - Where a service is located
Simple Object Access Protocol (SOAP)

- **SOAP header** provides a mechanism for adding features to the message such as routing and delivery setting, authentication assertions, and transaction contexts

- **SOAP body** contains the actual message to be delivered and processed
Our Problem Area

➢ It is difficult to find data provided by web services:

    Current web services applications must be developed using a regular programming language such as Java, C#.

➢ To simplify searching web services data:

    We propose efficient processing of database queries to views of wrapped web services.
Our Approach- Web Service MEDiator (WSMED) Architecture

Development of WSMED, a web service based mediator prototype:

Query \[\rightarrow\] WSMED \[\rightarrow\] Result

WSMED

WSDL

SOAP

Web Service
WSMED System

Local store

WSMED

OWF_1

OWF_n

WSDL descriptions

WO_1

WO_n
Research Issues

1. How can standards, such as WDSL, SOAP, and XML-Schema, be automatically utilized by a mediator engine?

2. How can database views be defined in terms of imported web service descriptions?

3. How can the modern query optimization be used to provide efficient access to wrapped web services?

4. What minimal set of extra semantic enrichment is needed to provide efficient queries?

5. How speed up the queries with dependent web service calls?
## WSMED View

### Food

<table>
<thead>
<tr>
<th>ndb</th>
<th>keyword</th>
<th>descry</th>
<th>gpcode</th>
</tr>
</thead>
<tbody>
<tr>
<td>19080</td>
<td>Sweet</td>
<td>Candies, Sweet chocolate</td>
<td>1900</td>
</tr>
<tr>
<td>........</td>
<td>........</td>
<td>........</td>
<td>........</td>
</tr>
</tbody>
</table>

**SQL Query:**

```sql
select descry
from food
where gpcode = ’1900’ and keyword = ’Sweet’;
```
Web service schema can represent *any* WSDL document that describes a web service.
Web Service MEDiator System Architecture

- **WSDL Importer**: extracts meta data from WSDL document using Web Service Schema and store them in the Web service meta-database.

- **Web Service Manager**: invokes the web service operation to retrieve the data.

- **WSMED enrichments**: contains the semantic enrichments.

Comparison of query execution strategies

Number of Food Items vs. Response Time (sec)

- **full semantic enrichment**
- **hash join strategy**
- **default cost model**
- **null implementation**
WSMED Process Tree

Finds information about places located within 15 km from each city whose name starts with 'Atlanta' in all US states.

Coordinator

Level 1

Level 2

q- query processes

• Lowest execution time region is achieved within the range 50 - 60 sec with the fanout vector \{5,4\}.

• Fastest execution time 56.4 sec outperformed with the speedup of 4.3 the central plan (244.8 sec).
Adaptive Results- Query1

![Bar chart for Query1 execution times with different process selections and execution times:]

- For p=1, no drop stage, fo1=3 fo2=3, execution time is 55.00.
- For p=2, no drop stage, fo1=4 fo2=5, execution time is 60.00.
- For p=3, no drop stage, fo1=5 fo2=3.4, execution time is 65.00.
- For p=4, no drop stage, fo1=6 fo2=8.7, execution time is 70.00.
- For p=5, no drop stage, fo1=7 fo2=7.5, execution time is 75.00.
- For p=4, drop stage, fo1=6 fo2=7.8, execution time is 80.00.

Legend:
- Best FF_APPLY
- p=1, drop stage, fo1=2 fo2=3
- p=2, drop stage, fo1=3 fo2=3
- p=3, drop stage, fo1=4 fo2=3.25
- p=4, drop stage, fo1=5 fo2=4.2
- p=5, drop stage, fo1=6 fo2=7.8

Execution time range: 0.00 to 100.00
Semantic Web Services

• An emerging framework that aims at machine-processable information for information sharing.

• Defines standards not only for syntactic form of documents, but also for the semantic contents

• RDF /RDFS schema to facilitate semantic interoperability

• An ontology defines a hierarchy of concepts within a domain through an attribute-value means
Resource Description Framework (RDF)

- RDF provides a method to decompose any knowledge into small segments, called *triples.*
- Each triple contains *subject, object and predicate.*

http://www.it.uu.se/edu/course/kursstart/spring.html

http://www.it.uu.se/edu/maintained

http://www.it.uu.se/edu/ Department of Information Technology
Questions ???

Thanking You for the attention

“The un-queried life is not worth living”