Enterprise System Integration
Session 5: Integration and Building SOAP APIs

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Agenda

1. Intro
2. Overview
3. Introduction
4. Web Services
5. SOAP Web Services
6. Standards
   - SOAP Architecture
   - SOAP Message
Human Communication

Medium
Telephone, Network

Format
For input and output messages
English Grammar
invoke function 1()

Location
LAN, Internet using HTTP

Format
For input and output messages
HTTP, SOAP, XML, JSON

def function 1(self): ...
A **Web Service** is a software system that supports **interoperable** machine-to-machine interaction.

- **Interaction** means that more than one application is involved.
- **Interoperable** means that applications can operate with one another without sharing the same platform, operating system, programming language, etc.
Web Services

Definition

A Web Service is a standards-based, language-agnostic software entity, that accepts specially formatted requests from other software entities on remote machines via vendor and transport neutral communication protocols, producing application specific responses.

- Standards based
- Language agnostic
- Formatted requests
- Remote machines

- Vendor neutral
- Transport neutral
- Application specific responses
SOAP Web Services

- SOAP is a protocol for accessing a Web Service.
- SOAP is a simple XML-based protocol to let applications exchange information over HTTP.

Figure: Layered Architecture Model
Basic Web Service Standards

- XML is the standard for data representation
- SOAP specifies the transport layer to send messages between consumers and providers
- WSDL describes Web Services
- UDDI is used to register and lookup for Web Services
Web Services Architecture

SOAP

Service Broker

UDDI

Service Consumer

UDDI Inquiry
find service_xyz

WSDL

Service Provider

UDDI Publish
publish service_xyz

Client

Bind SOAP, XML

Service

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invoke function 1()

Location
Where is the web service located?

Description
What’s the description of the web service?

Client
(Service Consumer)
With the help of WSDL file, the client can access the services

Server
(Service Provider)
Captures all the services in XML (WSDL) format
SOAP Message

Transport (HTTP)

SOAP Envelop
<Envelope>

SOAP Header
<Header>
XML header block
XML header block

SOAP Body
<Body>
XML Message

Transport (HTTP)

SOAP Envelop
<Envelope>

<Header>
<Security>
<UsernameToken>
<Signature>
</Security>

<Body>
Signed Payload
SOAP Message

Request

```xml
<?xml version="1.0" encoding="utf-8"?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <CapitalCity xmlns="http://www.oorspron.org/websamples.countryinfo">
      <sCountryISOCode>DE</sCountryISOCode>
    </CapitalCity>
  </soap:Body>
</soap:Envelope>
```

Response

```xml
<?xml version="1.0" encoding="utf-8"?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <m:CapitalCityResponse xmlns:m="http://www.oorspron.org/websamples.countryinfo">
      <m:CapitalCityResult>Berlin</m:CapitalCityResult>
    </m:CapitalCityResponse>
  </soap:Body>
</soap:Envelope>
```
Summary

- SOAP Works with XML by design
- SOAP is used when an enterprise requires tight security and clearly defined rules to support more complex data exchanges and the ability to call procedures.
- SOAP works well with processes (actions)
Thank you!

Questions?

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