

Introduction to XML (III) - Web Services

Huibert Aalbers

Senior Certified Software IT Architect



IT Insight podcast

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SOAP

(Simple Object Access Protocol)

- SOAP is a W3C standard designed to standardize the interchange of XML messages
- A SOAP message is really simply an XML file that acts as an envelope for the XML file being transmitted
- The envelope contains three parts
 - A Header (optional)
 - The body, which contains the XML message
 - A Fault element (optional) that contains additional information when an error occurs while processing the message



SOAP sample files

RPC Request

```
<SOAP-ENV:Envelope
  xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/"
  SOAP-ENV:encodingStyle="http://schemas.xmlsoap.org/soap/encoding/">
  <SOAP-ENV:Body>
    <m:GetLastTradePrice xmlns:m="Some-URI">
      <symbol>DIS</symbol>
    </m:GetLastTradePrice>
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

RPC response

```
<SOAP-ENV:Envelope
  xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/"
  SOAP-ENV:encodingStyle="http://schemas.xmlsoap.org/soap/encoding/">
  <SOAP-ENV:Body>
    <m:GetLastTradePriceResponse xmlns:m="Some-URI">
      <Price>34.5</Price>
    </m:GetLastTradePriceResponse>
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```



SOAP message style

Document vs RPC

- Originally SOAP was designed exclusively for RPC operations. However, just before completing the 1.0 specification, it was decided that SOAP could also be useful as a general XML message container. This led to the adoption of two different SOAP message styles
 - RPC
 - In this style, each parameter is encoded independently SOAP section 5 or literal encoding
 - Originally preferred by early Java Web Services toolkits
 - Document
 - In this case, the whole message is included in the SOAP envelope Literal encoding only
 - Used by default by .Net



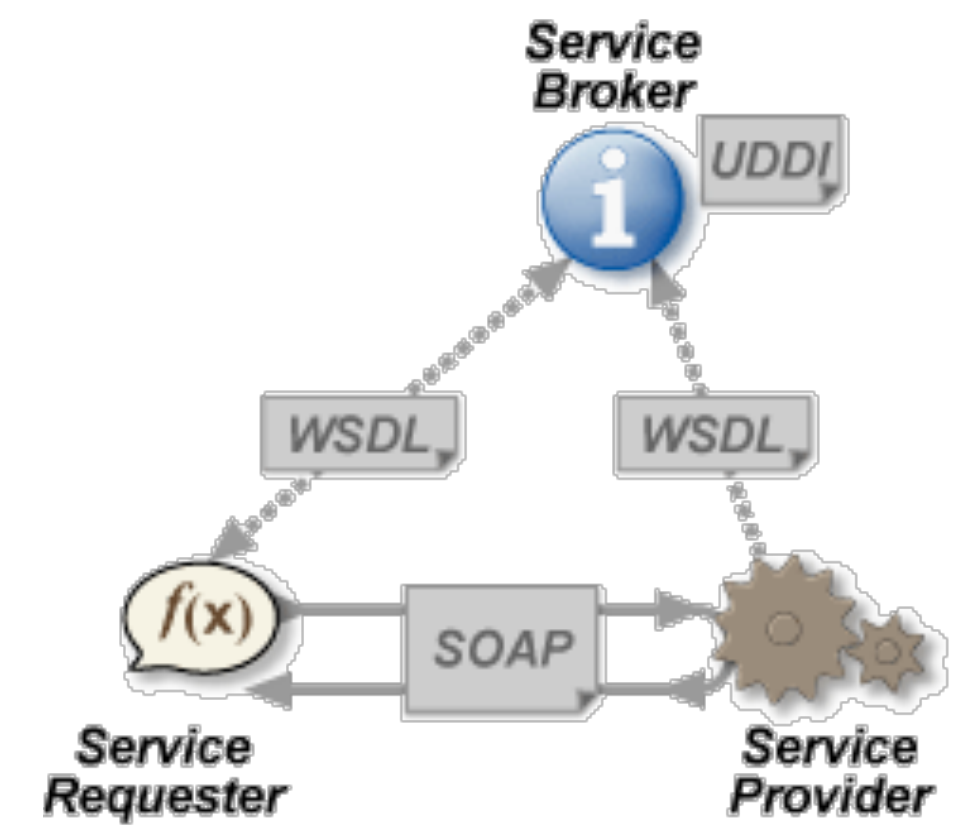
Parameter encoding

Literal vs SOAP Section 5

- Literal encoding
 - Data is an XML file validated by an XML-Schema
- SOAP Section 5 encoding
 - This was the original encoding, designed for RPC Supported by most SOAP toolkits
 - It will eventually disappear
- Other encodings exist but are not widely supported
 - Wrapped Document Literal
 - Other encodings may be developed in the futur

WSDL (Web Services Definition Language)

- WSDL is an XML file used to fully describe a web service
- WSDL files can be kept in a UDDI registry to simplify their distribution
- Most development tools can build a web service client from a WSDL file





WSDL

(Web Services Definition Language)

- A WSDL file is divided into four separate sections that represent:
- The protocol (HTTP, JMS, etc.) and location of the service The operations supported by the web service
- The messages that client and web service provider will interchange when invoking the service
- The structure of the data included in the messages, described using XML-Schema



WSDL

(Web Services Definition Language)

WSDL files can contain up to four separate parts

```
<definitions>
```

```
  <types>
```

If complex types are exchanged, they will be defined in this section and referenced by the messages.

A type can be referenced by multiple messages.

```
  </types>
```

```
  <message>
```

A message is the data structure sent to or returned by a service. A message can be used by multiple ports (i.e. the result of a service can be the input of another service).

```
  </message>
```

```
  <portType>
```

It is in this section that all the operations performed are described along with references to the input and output messages sent/received by each operation.

```
  </portType>
```

```
  <binding>
```

This section defines the message format as well as the message transport protocols supported to access the service

```
  </binding>
```

```
</definitions>
```



WSDL

(Web Services Definition Language)

This is an example of an incomplete WSDL file

```
<message name="romanNumber">
  <part name="term" type="xs:string"/>
</message>
<message name="decimalNumber">
  <part name="value" type="xs:nonNegativeInteger"/>
</message>
<portType name="romanNumbers">
  <operation name="romanToDecimal">
    <input message="romanNumber"/>
    <output message="decimalNumber"/>
  </operation>
  <operation name="decimalToRoman">
    <input message="decimalNumber"/>
    <output message="romanNumber"/>
  </operation>
</portType>
```



WSDL

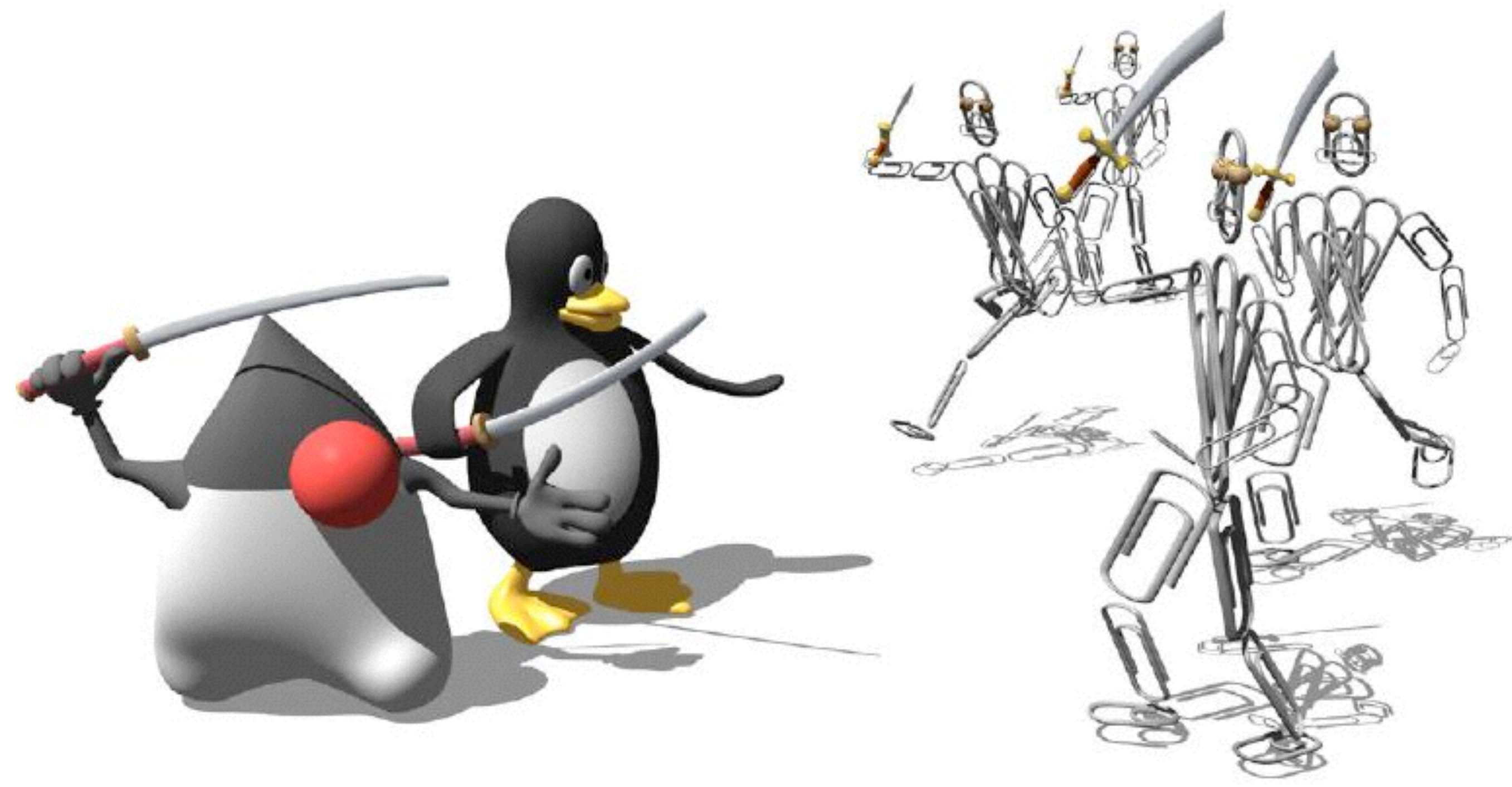
(Web Services Definition Language)

This is a sample binding section for the previous WSDL file

```
<binding type="romanNumbers" name="rn">
<soap:binding style="document" transport="http://schemas.xmlsoap.org/soap/http" />
  <operation>
    <soap:operation soapAction="http://huibert-aalbers.com/romanToDecimal"/>
    <input>
      <soap:body use="literal"/>
    </input>
    <output>
      <soap:body use="literal"/>
    </output>
  </operation>
  <operation>
    <soap:operation soapAction="http://huibert-aalbers.com/decimalToRoman"/>
    <input>
      <soap:body use="literal"/>
    </input>
    <output>
      <soap:body use="literal"/>
    </output>
  </operation>
</binding>
```

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For more information, please contact me at huibert_aalbers@mac.com