SOAP

Simple Object Access Protocol (not anymore)

Origin of SOAP

SOAP is actually a precursor to REST based web services. It evolved from the old RPC days as RPC frameworks shifted to being XML based.

At its core SOAP is an envelope of xml to describe an object including its methods.

Example

```xml
<?xml version="1.0"?>
<soap:Envelope xmlns:soap="http://www.w3.org/2003/05/soap-envelope">
  <soap:Header>
  </soap:Header>
  <soap:Body>
    <m:GetStockPrice xmlns:m="http://www.example.org/stock/Surya">
      <m:StockName>IBM</m:StockName>
    </m:GetStockPrice>
  </soap:Body>
</soap:Envelope>
```

SOAP’s Meaning

Though at one point SOAP stood for Simple Object Access Protocol, it is no longer considered an acronym.

SOAP Based Webservices

- Web Service Description Language (WSDL)
- XML Schema
- Universal Description Discovery and Integration

WSDL

The WSDL describes services as collections of network endpoints, or ports. It is an XML file that describes the technical details of how to implement a web service, more specifically the URI, port, method names, arguments, and data types.

WSDL Document Components

- Port / Endpoint – URL of the web service
- Binding - Specifies interface, binding style, and transport(SOAP).
- Interface - Defines what operations can be performed.Defines the SOAP actions and the way the message is encoded
- Types - Describes the data used.

WSDL Interaction

A client program connecting to a Web service can read the WSDL file to determine what operations are available on the server. Any special datatypes used are embedded in the WSDL file in the form of XML Schema. The client can then use SOAP to actually call one of the operations listed in the WSDL file using for example XML over HTTP.

WSDL Document Format

```
<definitions>
   <types>
      definition of types........
   </types>

   <message>
      definition of a message....
   </message>

   <portType>
      <operation>
         definition of a operation.......
      </operation>
   </portType>

   <binding>
      definition of a binding....
   </binding>

   <service>
      definition of a service....
   </service>
</definitions>
```

WSDL Example

```
<definitions name="HelloService"
   targetNamespace="http://www.examples.com/wsdl/HelloService.wsdl"
   xmlns="http://schemas.xmlsoap.org/wsdl/"
   xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/"
   xmlns:tns="http://www.examples.com/wsdl/HelloService.wsdl"
   xmlns:xsd="http://www.w3.org/2001/XMLSchema ">
```

Message

```
<message name="SayHelloRequest">
      <part name="firstName" type="xsd:string"/>
   </message>
   <message name="SayHelloResponse">
      <part name="greeting" type="xsd:string"/>
   </message>
```

PortType

```
<portType name="Hello_PortType">
      <operation name="sayHello">
         <input message="tns:SayHelloRequest"/>
         <output message="tns:SayHelloResponse"/>
      </operation>
   </portType>
```

Modes of Operation

- One Way - One input, no output
- Request/Response - One input, One output
- Solicit Response - One output, One input
- Notification - One output.

Any may also have a fault message.

Binding

```
<binding name="Hello_Binding" type="tns:Hello_PortType">
    <soap:binding style="rpc"
       transport="http://schemas.xmlsoap.org/soap/http"/>
    <operation name="sayHello">
       <soap:operation soapAction="sayHello"/>
       <input>
          <soap:body
             encodingStyle="http://schemas.xmlsoap.org/soap/encoding/"
             namespace="urn:examples:helloservice"
             use="encoded"/>
       </input>

       <output>
          <soap:body
             encodingStyle="http://schemas.xmlsoap.org/soap/encoding/"
             namespace="urn:examples:helloservice"
             use="encoded"/>
       </output>
    </operation>
 </binding>
```

```
<service name="Hello_Service">
      <documentation>WSDL File for HelloService</documentation>
      <port binding="tns:Hello_Binding" name="Hello_Port">
         <soap:address
            location="http://www.examples.com/SayHello/" />
      </port>
   </service>
</definitions>
```

XML Schema

Used to define SOAP’s vocabulary as well as your own message vocabulary.

In general XML schema is used to define constraints commonly for validation.

Universal Description Discovery and Integration

UDDI was meant to be a way for clients to obtain WSDL’s through some form of public repository. Unfortunately it was never widely adopted but it is still used internally by some enterprise environments.

UDDI Components

- White Pages — address, contact, and known identifiers.
- Yellow Pages — industrial categorizations based on standard taxonomies.
- Green Pages — technical information about services exposed by the business.

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Wsimport tool

Java offers a command line tool that converts WSDL's to java classes. Using **wsimport** you can generated:

- Service endpoint interface (SEI)
- Service class
- Exception class that is mapped from the wsdl:fault class (if any)
- Java Architecture for XML Binding (JAXB) generated type values which are Java classes mapped from XML schema types

Using wsimport

```
wsimport -p [package] -keep [uri of wsdl]
```

-p says to store generated files under the [package] folder and add that package to the generated files.

-keep says to keep .java files.

More on WSDL Sections

Types

Though optional it is generally always found. This element contains xml schema to define the data types used.

Messages

Lists the messages used between SOAP clients and services.

PortType

Always exactly one element. This specifies the interface: the specification of the operations and message patterns used.

See: Modes of operation slide

Binding

One or more implementation details such as transport used (HTTP, SMTP, etc).

Service

Brings all the previous details together to define the service endpoint and where the service is located.

XML Schema Data Types

Xml Schema	Java	C#
xsd:unsignedInt	-> int	uint
xsd:int	-> int	int

Customized Bindings

You can specify a supplemental xml file to change the behavior of generated client code.

For instance. Making async calls.

Learning Resources

http://www.tutorialspoint.com/wsdl/wsdl_quick_guide.htm

http://www.java2blog.com/2013/03/soap-web-service-tutorial.html