



SOAP



Authored by Chris Bohnet



Agenda

1. What is SOAP?
2. The SOAP Message Structure
3. SOAP Responses
4. End-to-end Data Flow of a SOAP API
5. Advantages of SOAP
6. Disadvantages of SOAP

What is SOAP?

Simple Object Access Protocol

SOAP is a communication protocol.

It tells how web services talk to each other or how client applications may invoke them.

It is used to interact with other programming language applications and to access web services over HTTP.

SOAP uses XML to encode the messages sent and received.

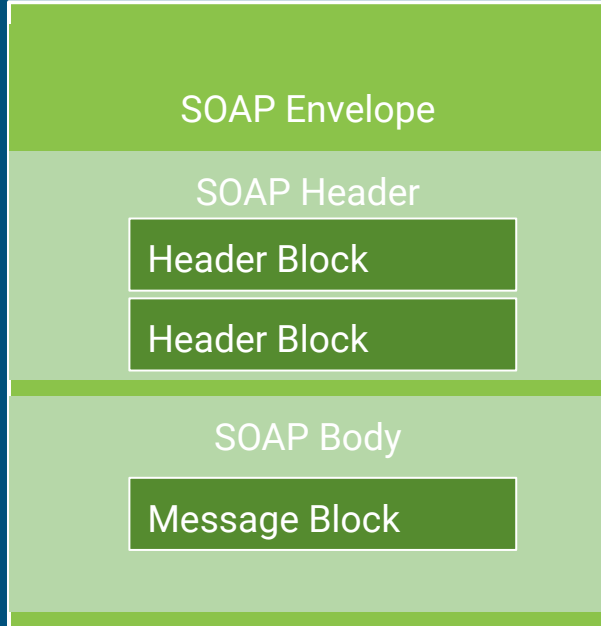
The XML core elements are Envelope, Header, Body, and Fault.

The SOAP XML schema is from the <http://schemas.xmlsoap.org/soap/envelope/> namespace in SOAP 1.1.

SOAP uses a WSDL (Web Service Description Language) to describe the service functionality.

The SOAP Message Structure

The **SOAP message** tells the the web service name, parameters needed by the service and their data types.



The **SOAP Envelope** is the XML root element that identifies the document as being SOAP and encapsulates the entire details of the message. It indicates the message beginning and end.

SOAP Headers contains management and control information such as the authentication used by a calling application, or defines complex data types that are used in the body of the message. Headers are defined before the body and are the first child element of the envelope.

The **SOAP Body** contains the call and response data. All the actual data that is sent between the web service and calling application are in the body. Every message must contain at least one body.

SOAP Responses

SOAP responses will either indicate success or failure.



Successes will be returned as a SOAP/XML message.



Faults are failures and returned as an HTTP 500 error message.

A fault message returns 4 possible elements.

faultString is a text message that gives the description of the error message.

faultActor is a text string that says who caused the fault. It is an optional element.

detail is an element for the application to give more details on the error and is used in cases to describe errors in business logic scenarios. It is optional.

faultCode identifies the error code.

- **SOAP-ENV:VersionMismatch**
An invalid XML namespace was encountered.
- **SOAP-ENV:MustUnderstand**
An immediate Header child element was not understood.
- **SOAP-ENV:Client**
The message was not correctly formatted or had invalid data.
- **SOAP-ENV:Server**
The message failed from a problem with the server.

End-to-end Data Flow of a SOAP API

The Preparation Phase

The Execution Phase

The client posts a method call wrapped in SOAP/XML to the server.

The server receives the SOAP/XML request.

The server parses the XML for the method name and parameters passed and performs the method call.

The server sends a SOAP/XML response to the client indicating success or fault.

The client receives the SOAP/XML response.

The client may parse the SOAP/XML response to use the return data.

Advantages

WS Security - SOAP defines its own security called WS Security.

Language Independent - SOAP web services can be written in any programming language.

Platform Independent - SOAP web services can be executed on any platform or operating system.

“Translator” - SOAP is used as the intermediary language for web services to talk with each other or other client applications of different languages and platforms.

Lightweight - SOAP is based on XML which is considered a lightweight data exchange language in comparison for needing to write customizations specific to every language.

HTTP Friendly - SOAP works on the HTTP protocol which is primarily used by all web applications, therefore eliminating the need for customizations.

Disadvantages

Performance

SOAP uses XML that is parsed in order to read and has many standards to follow when developing making SOAP slow with using more bandwidth & resources.

WSDL Dependent

There is no way to dynamically discover the web service. The only way to discover a SOAP web service is by its WSDL.

Complexity

The XML to build the requests and responses can get complex in more robust applications making it difficult to read.

Security

The ability of SOAP to go through firewalls may open up corporate systems to external access.

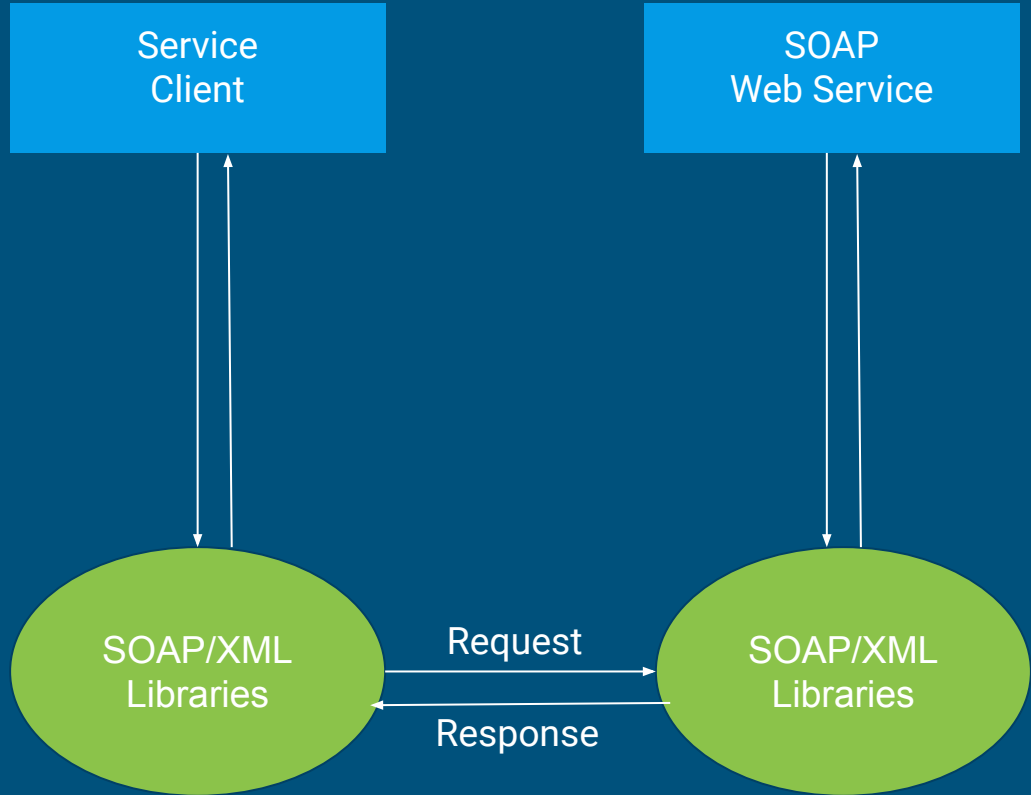
Limited Representations

SOAP only uses XML as a representation of data rather than having others available for clients such as JSON.

Declined Popularity

With the advent of REST, SOAP is not as widely used. It's still a matter of choice however technologies are being built around REST+JSON and also have greater browser support.

SOAP Diagram



Java T Point, SOAP Web Services as referenced at <https://www.javatpoint.com/soap-web-services>.

Guru99, SOAP Web Services Tutorial: Simple Object Access Protocol EXAMPLE, as referenced at <https://www.guru99.com/soap-simple-object-access-protocol.html>.

Jaxenter, Creating SOAP Web Services Using JAX WS, as referenced at <https://jaxenter.com/creating-soap-web-services-using-jax-ws-117689.html>.

Stackify, SOAP VS REST, as referenced at <https://stackify.com/soap-vs-rest/>.

Techrepublic, An Introduction to the Simple Object Access Protocol (SOAP), as referenced at <https://www.techrepublic.com/article/an-introduction-to-the-simple-object-access-protocol-soap/>.

TutorialsPoint, WSDL - Introduction, as referenced at https://www.tutorialspoint.com/wsdl/wsdl_introduction.htm.

Resources