UNIVERSITY of York
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Introduction to SOAP

CCS3341 Cloud Computing

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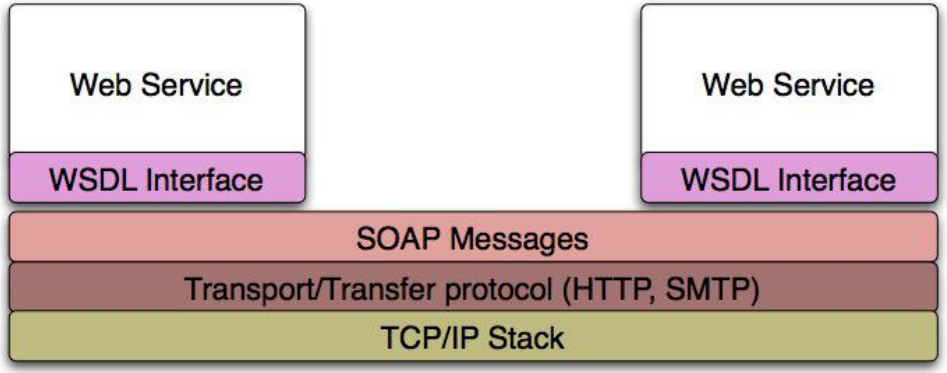
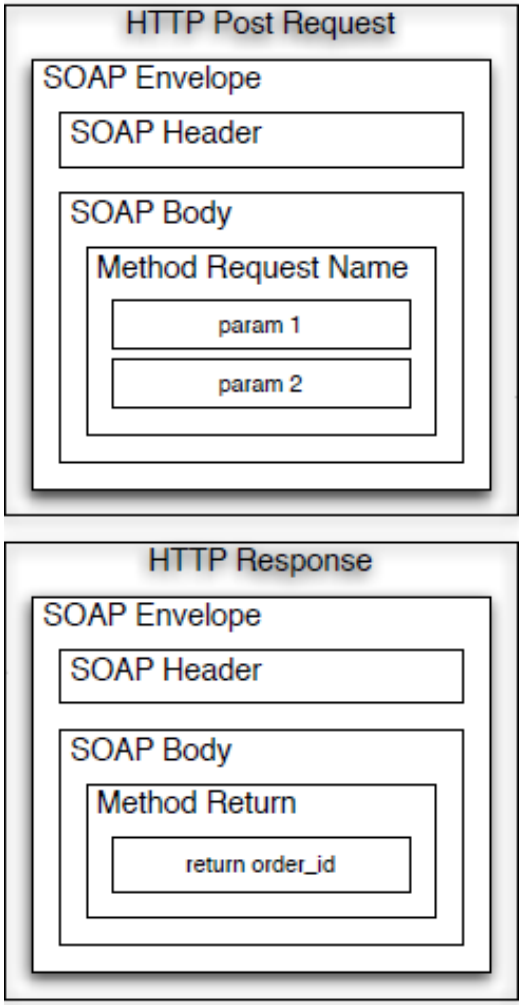
Basics

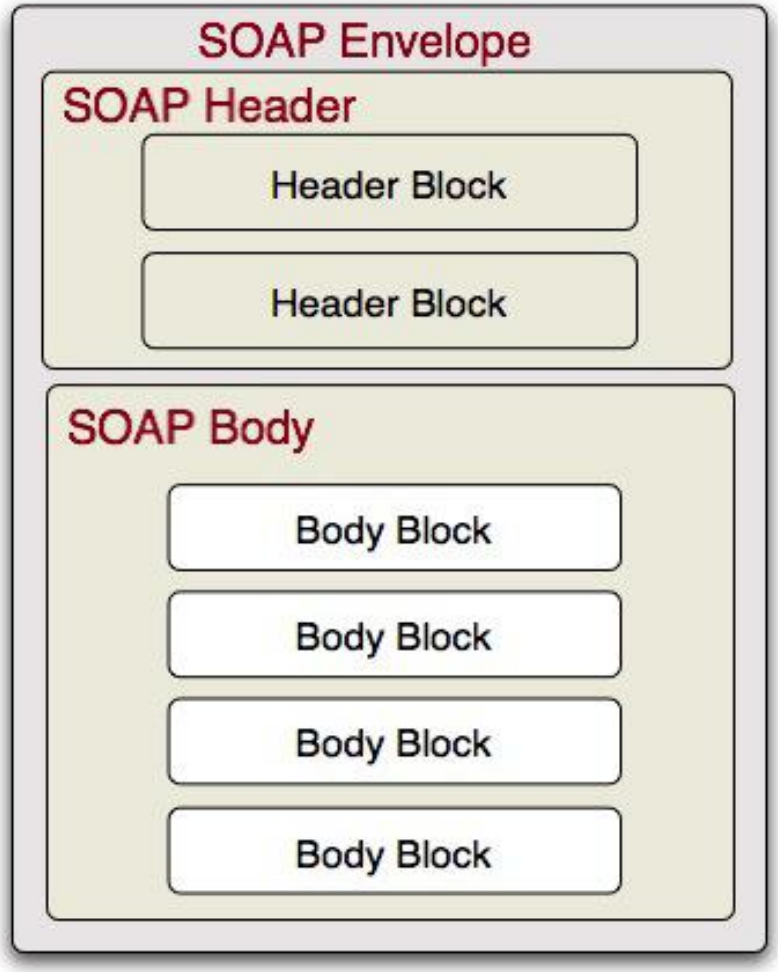
- Stands for Simple Object Access Protocol
- XML-serialised
- A messaging protocol spec

Specifies a format for sending and receiving messages typically (but not necessarily) over http





SOAP



- `<Envelope>`
  Identifies an XML document as a SOAP message
- `<Header>`
  Contains application-specific information (e.g., security, transaction)
- `<Body>`
  Contains call and response information
- `<Fault>`
  Contains error and status information

Elements

Envelope

Two main attributes:

```
<soap:Envelope
xmlns:soap="http://www.w3.org/2003/05/soap-envelope/"
soap:encodingStyle="http://www.w3.org/2003/05/soap-encoding">
  ⋮
</soap:Envelope>
```

xmlns:soap

Points to a URI (such as the one shown here) which defines a schema for a SOAP Envelope and therefore for a SOAP message

soap:encodingStyle

- Refers to how data in a programming structure (e.g., **int num = 5**) is serialized into XML
- In the default SOAP encoding style, two kinds of data types are discerned: scalar and compound

scalar

The former comprises all built-in types specified by the XML Schema specification (e.g., strings, floats, integers, etc.)

compound

The latter comprises arrays and structures (structs)

Elements

Header (Optional)

- Contains application-specific information contained in children elements called header entries
- May specify any kind of information e.g., authentication information, encryption information, transaction management information, etc.

- Authentication and Security Information: authentication credentials, security tokens,
- Message Routing and Handling Instructions: details about how the message should be routed within the SOAP processing pipeline
- Message Correlation: When dealing with a series of related SOAP messages (e.g. in a transaction), headers can be used to correlate messages to ensure they are processed in the correct order and context

```
<soap:Header>
  <m:Trans xmlns:m="http://www.w3schools.com/transaction/"
  soap:mustUnderstand="1">234
  </m:Trans>
</soap:Header>

<soap:Header>
  <m:Trans xmlns:m="http://www.w3schools.com/transaction/"
  soap:actor="http://www.w3schools.com/appml/">234
  </m:Trans>
</soap:Header>
```

Indicates the **recipient** of a header element

- A message may visit intermediate nodes prior to reaching the destination node
- Not all header entries are necessarily intended to be processed by all nodes

Elements

Body

A mandatory element that contains the actual SOAP message intended for the ultimate endpoint (and not for any intermediate hosts)

Semantically, a Body element can be viewed as a header entry with the `actor` attribute set to the URI of the default actor (the ultimate recipient of the message) and the `mustUnderstand` attribute set to '1'

Fault

- `<Code>`
  A mandatory element for identifying a fault. It contains a `value` and an optional `subcode` element
- `<Reason>`
  A mandatory element that contains one or more text elements each of which contains human-readable info about the fault in different native languages

- `<Node>`
  Information about the node that caused the fault
- `<Role>`
  Identifies the role in which a node was operating when the fault occurred
- `<Detail>`
  Holds application-specific error information

Elements

Fault

```
<env:Fault>

  <env:Code>
    <env:Value>env:Sender</env:Value>
    <env:Subcode>
        <env:Value>env:Sender</env:Value>
        <env:Subcode> <-- recursive Subcode's possible -->
        </env:Subcode>
    </env:Subcode>
  </env:Code>

  <env:Reason>
   <env:Text xml:lang="en-US">Error in Input Data</env:Text>
   <env:Text xml:lang="da">Fejl i input data</env:Text>
  </env:Reason>

  <env:Node>http://jenkov.com/theNodeThatFailed</env:Node>

  <env:Role>
    http://www.w3.org/2003/05/soap-envelope/role/ultimateReceiver
  </env:Role>

  <env:Detail
    <jj:maxRelayTime
        xmlns:jj="http://jenkov.com" >10000</jj:MaxRelayTime>
  </env:Detail>

</env:Fault>
```