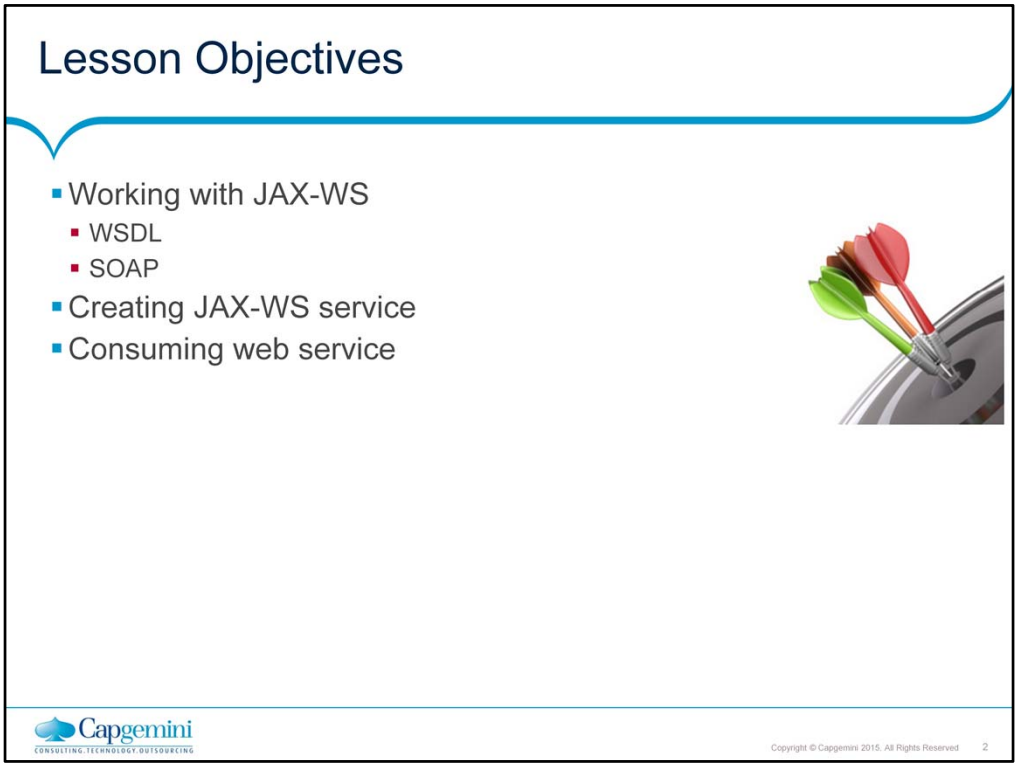
Introduction to Web Services (SOAP & REST)

Working with JAX-WS



Following contents would be covered:

2.1: Working with JAX-WS
- 2.1.1: What is WSDL
- 2.1.2: Structure of WSDL
- 2.1.3: Generating WSDL
- 2.1.4: What is SOAP
- 2.1.5: Structure of SOAP

2.2: Creating JAX-WS service

2.3: Consuming JAX-WS service

2.1: Overview

Working with JAX - WS

- Java API for XML web services (JAX-WS), is a set of APIs for creating web services in XML format
- In JAX-WS, a web service operation invocation is represented by an XML-based protocol, such as SOAP. The SOAP specification defines the envelope structure, encoding rules, and conventions for representing web service invocations and responses. These calls and responses are transmitted as SOAP messages (XML files) over HTTP
- Although SOAP messages are complex, the JAX-WS API hides this complexity from the application developer. On the server side, the developer specifies the web service operations by defining methods in an interface written in the Java programming language.

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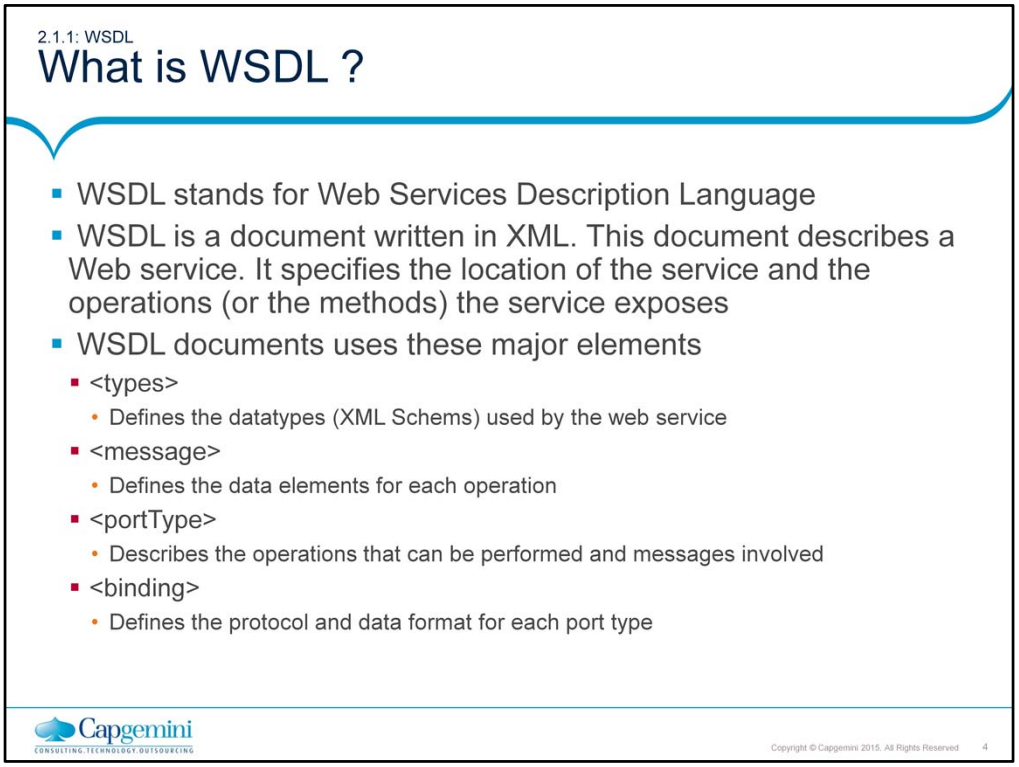


The main structure of WSDL document looks as below:

<definitions>

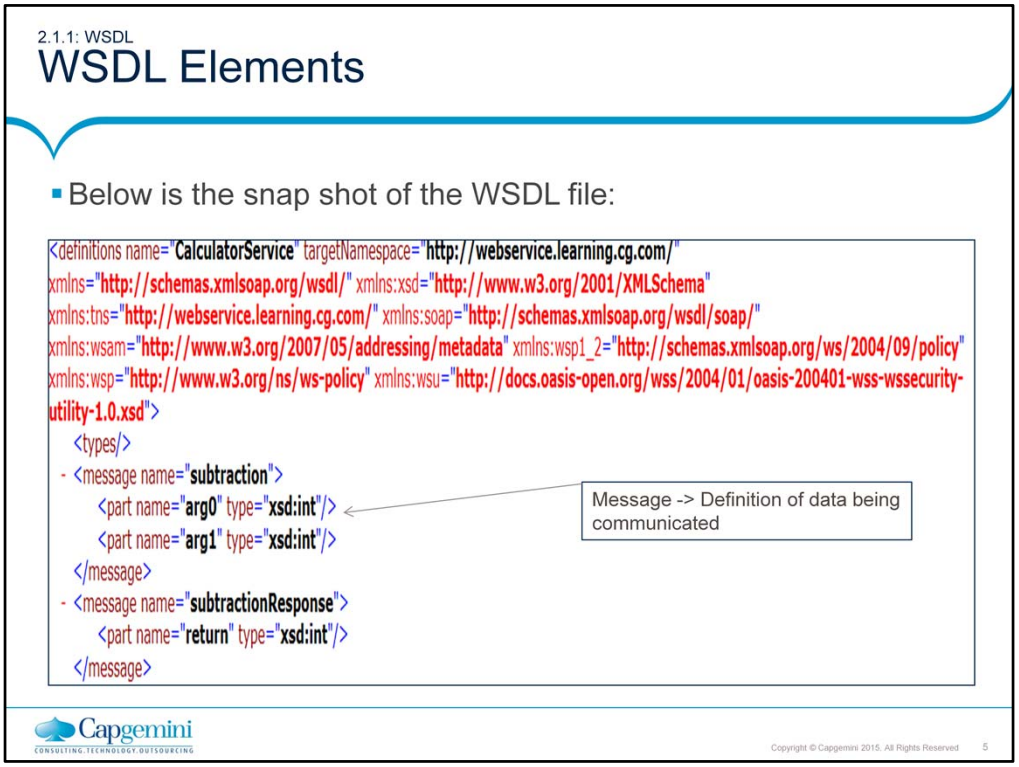
<types>
  data type definitions.....
</types>

<message>
  definition of the data being communicated....
</message>

<portType>
  set of operations.....
</portType>

<binding>
  protocol and data format specification....
</binding>

</definitions>



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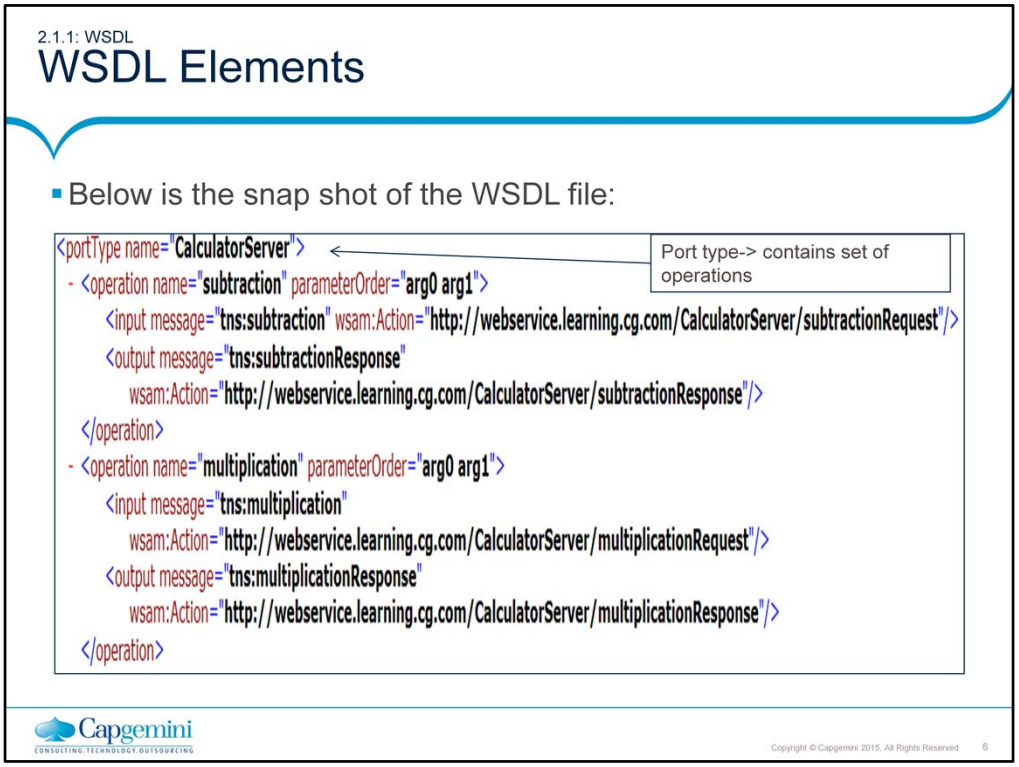

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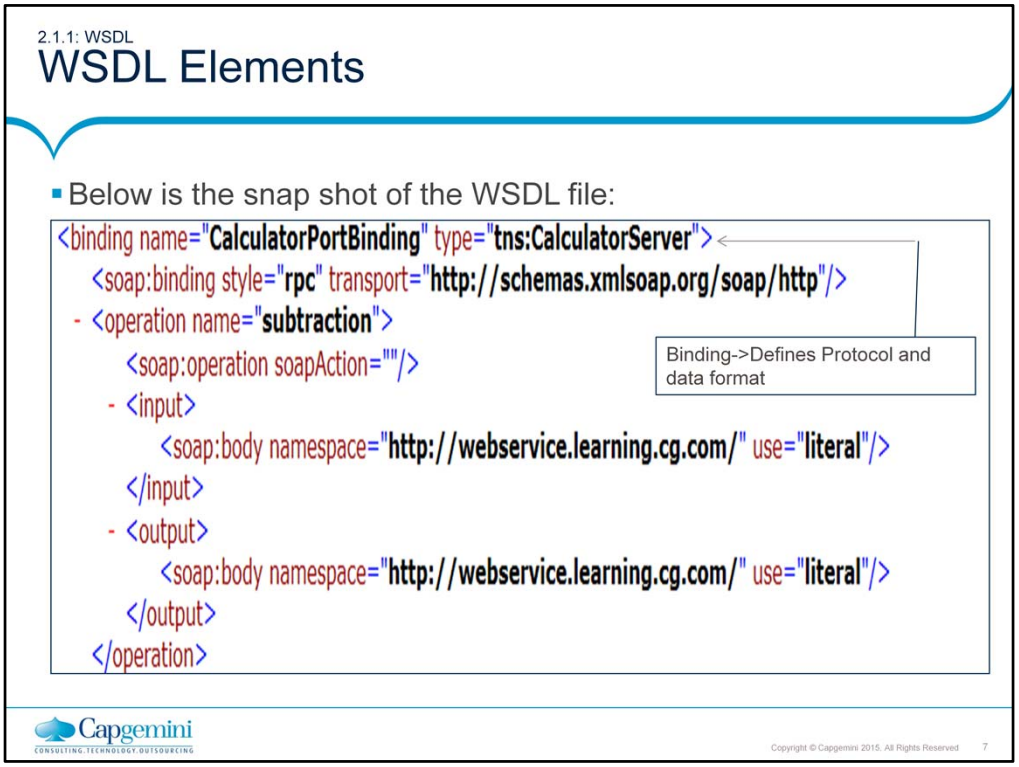

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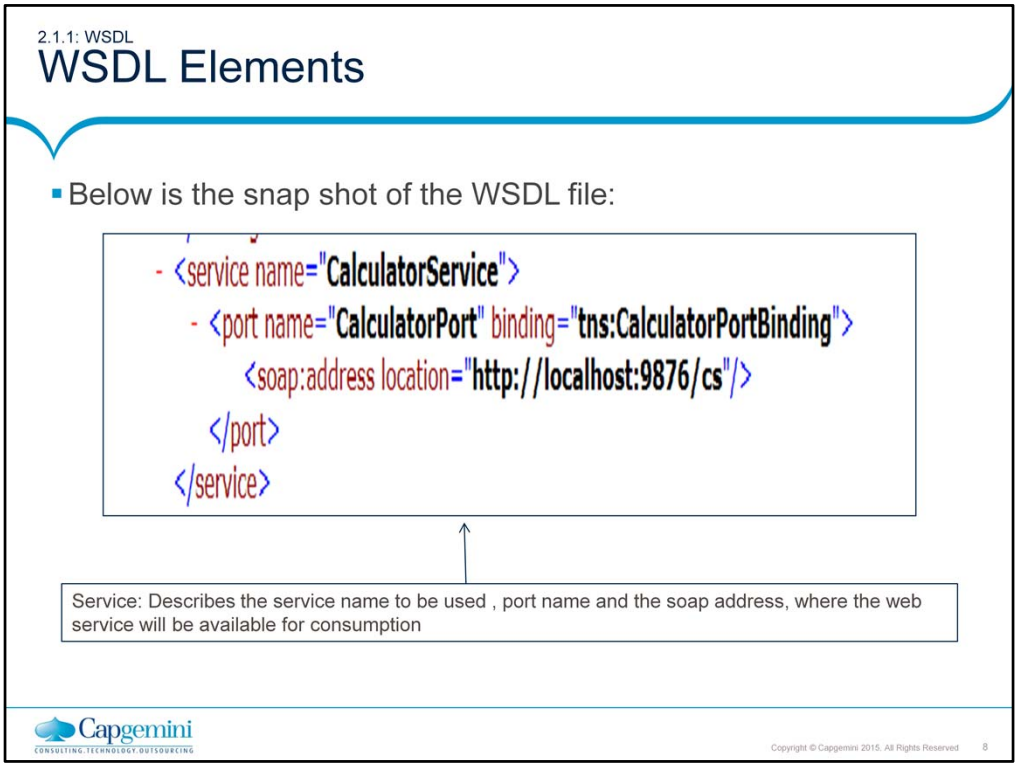

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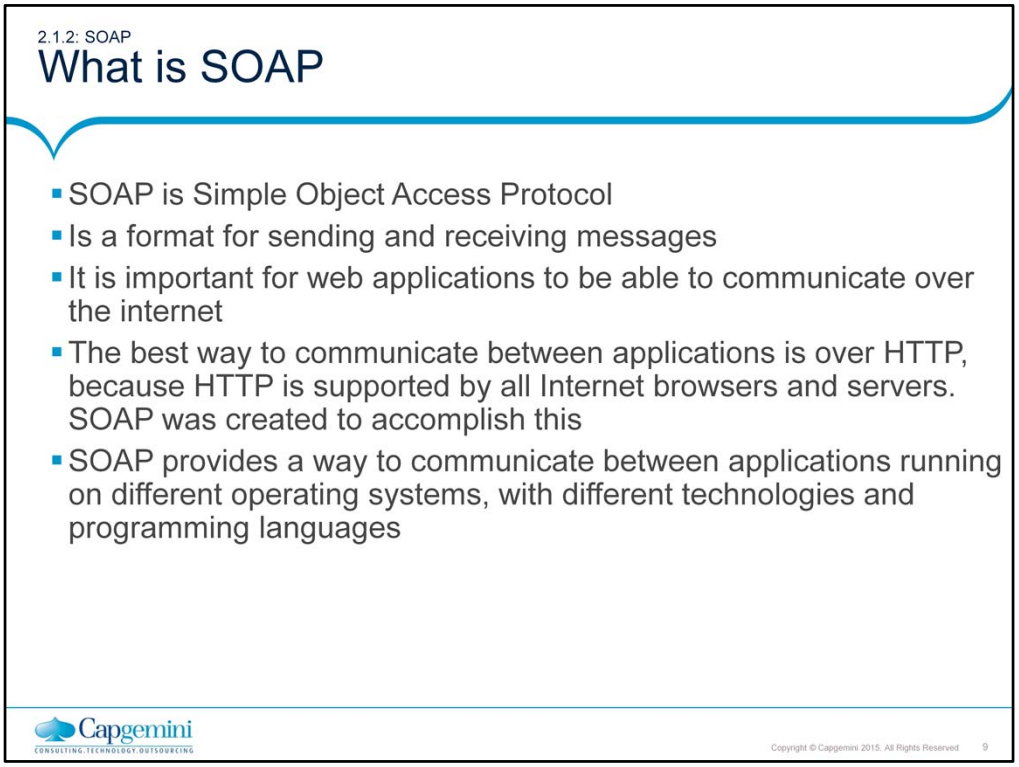
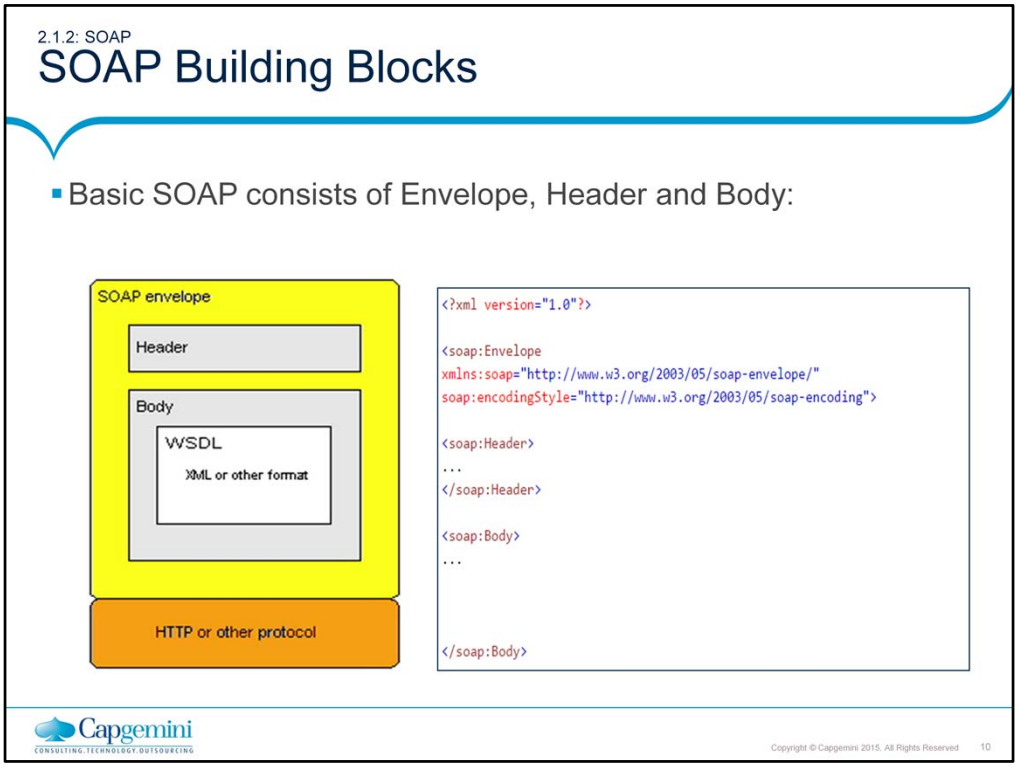


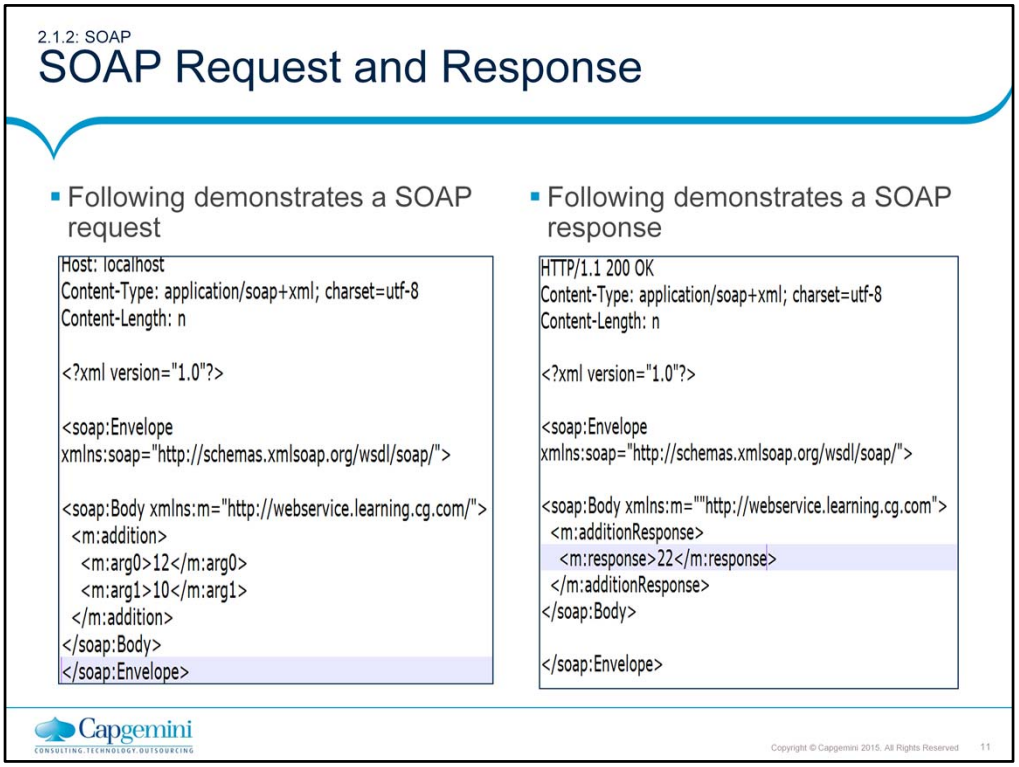
SOAP stands for **S**imple **O**bject **A**ccess **P**rotocol
SOAP is an application communication protocol
SOAP is a format for sending and receiving messages
SOAP is platform independent
SOAP is based on XML
SOAP is a W3C recommendation



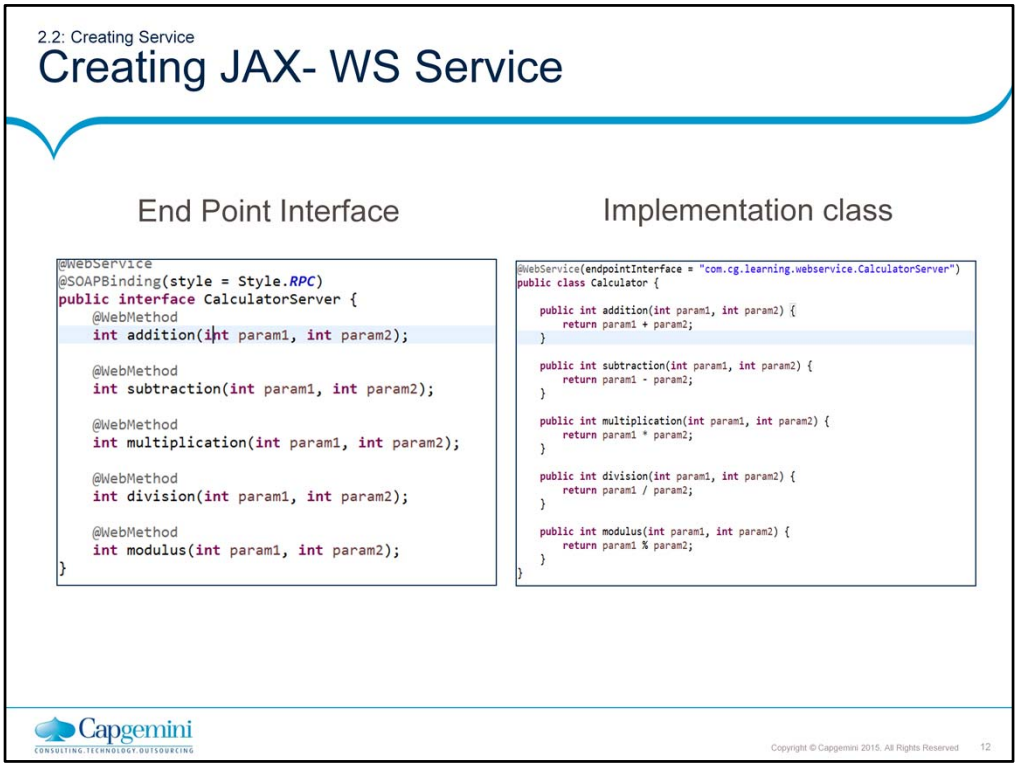
A SOAP message is an ordinary XML document containing the following elements:
An Envelope element that identifies the XML document as a SOAP message
A Header element that contains header information
A Body element that contains call and response information

A few syntax rules…..

A SOAP message MUST be encoded using XML
A SOAP message MUST use the SOAP Envelope namespace
A SOAP message MUST use the SOAP Encoding namespace
A SOAP message must NOT contain a DTD reference
A SOAP message must NOT contain XML Processing Instructions



In the example above, an addition request is sent to a server. The request has 2 parameters as number1 and number2 and addition of 2 numbers is returned in the response. The namespace for the function is defined in "http://webservice.learning.cg.com/".



The starting point for developing a JAX-WS web service is a Java class annotated with the javax.jws.WebService annotation.

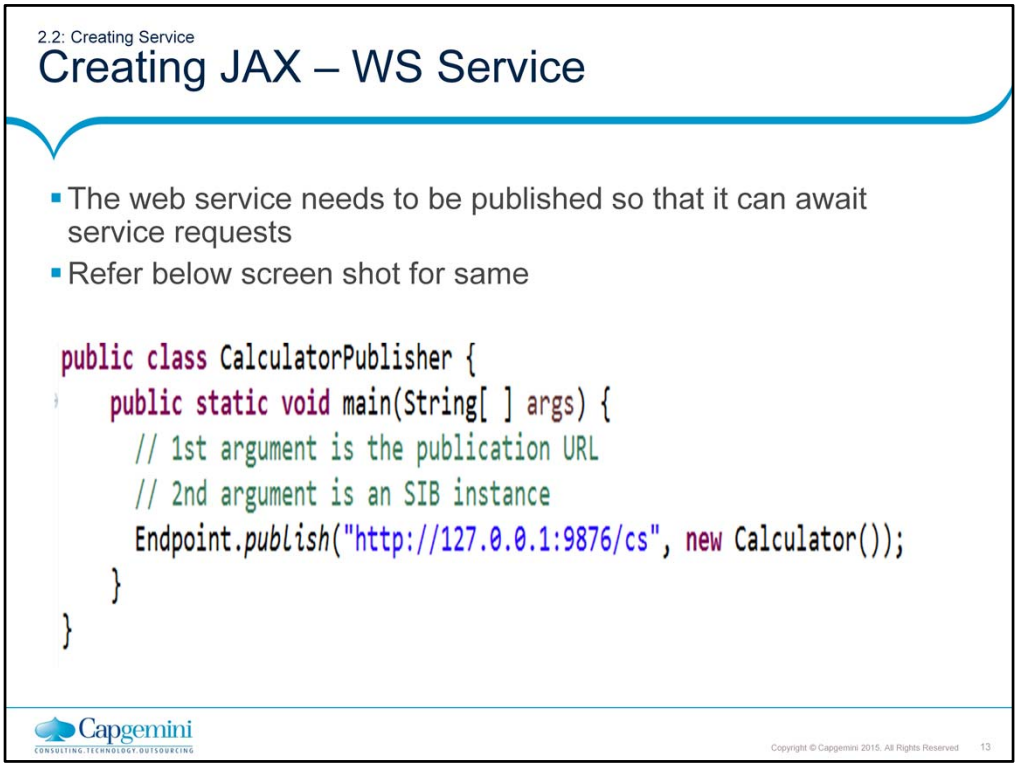
The WebService annotation defines the class as a web service endpoint. SOAP binding style is given as RPC.

A *service endpoint interface* (SEI) is a Java interface that declares the methods that a client can invoke on the service

The web service implementation class implicitly defines a SEI.

You may specify an explicit SEI by adding the endpointInterface element to the WebService annotation in the implementation class.

You must then provide a SEI that defines the public methods made available in the endpoint implementation class.



Currently the service is published at network address 127.0.0.1.which is localhost, and at port number 9876,

The application path /cs is an arbitary name.

The Endpoint class has an overloaded publish method. In this two-argument version, the first argument is the publication URL as a string and the second argument is an instance of the service SIB, in this case com.cg.learning.Calculator.

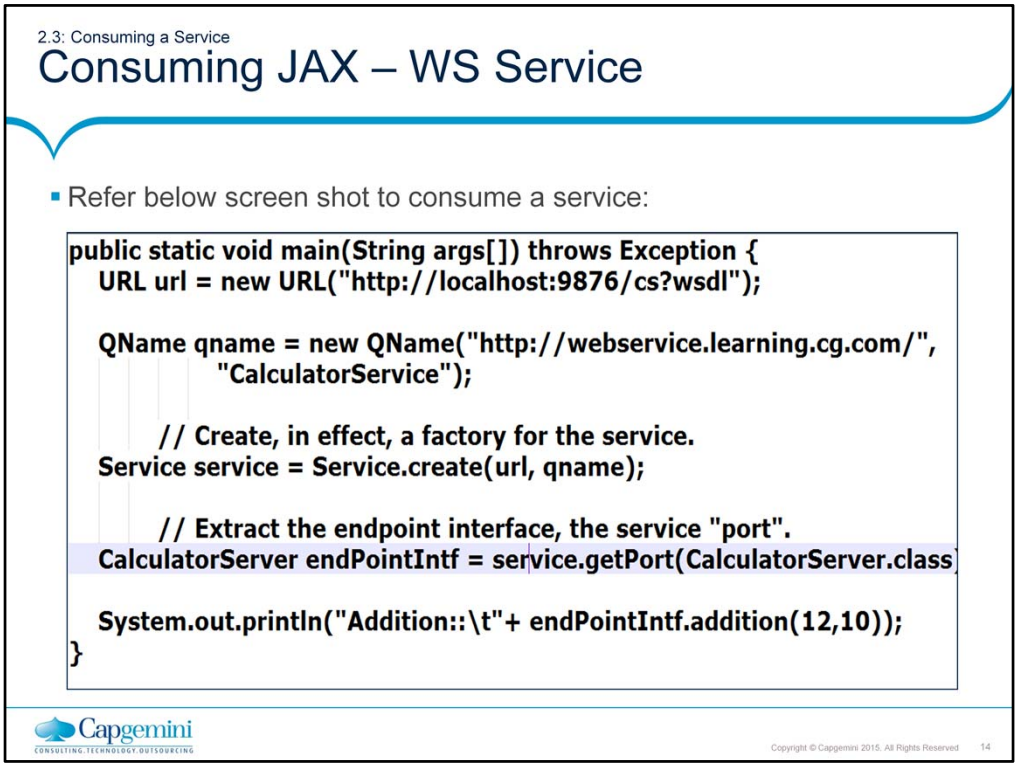
The application runs indefinitely, awaiting service requests.

It needs to be terminated at the command prompt with control-C or the equivalent.

You can check the following URL in browser:

http://127.0.0.1:9876/cs?wsdl

To view the service contract, the WSDL document.



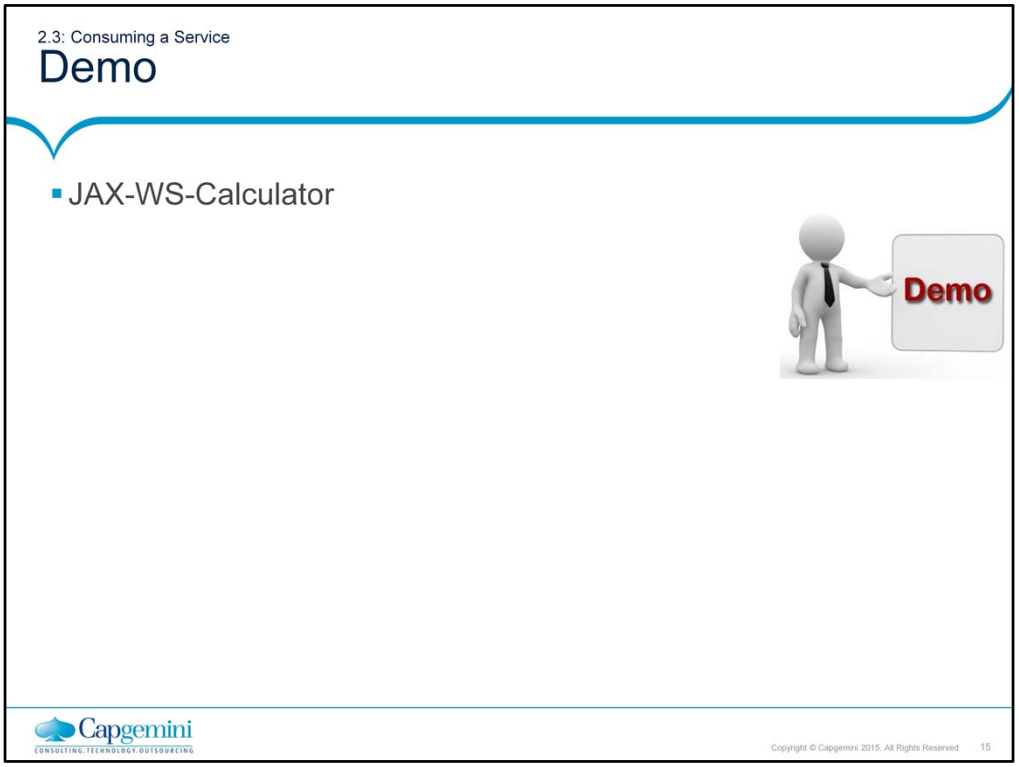
Here basic XML API is being used to consume a service.

The URL defines the location of wsdl document.

The Qname (qualified name) prints the service URI (as to where the service will be available). “CalculatorService” is the service name to be exposed in wsdl document.

Next we create a factory for the service with the URL and Qname at a port number where SEI (Service Endpoint Interface) is available.

Lastly by using endPoint interface we can consume the service.



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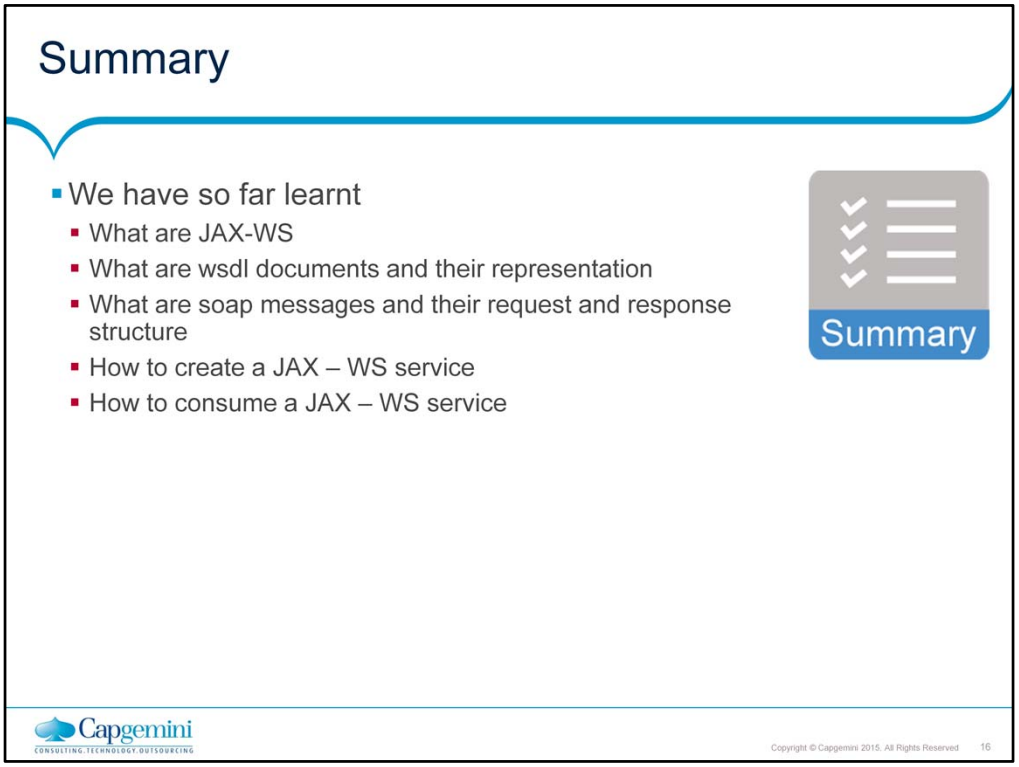

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Working with JAX-WS

Lab

- Lab 1

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Review Question

- Question 1: What gives information about the web service location and operation?
  - SOAP message structure
  - WSDL document
  - Service End Point interface
- Question 2: @WebMethod signals that each method is a service operation (True or False)
  - True
  - False
- Question 3:_____ is used to define protocol and data format?
  - Message
  - Port type
  - Binding

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