

Unit 7 Remote Procedure Calls using Web Services

Unit Outcomes. Here you will learn

- how remote procedure calls compare with REST principles and the distributed objects model as a basis for developing a DS
- about the important Web Services standards SOAP and WSDL; their purpose, design, operation and good practices
- to use the Axis tools via Eclipse to develop Java clients and servers for Web Services based on SOAP and WSDL

Further Reading: CDK 2005 Ch.19

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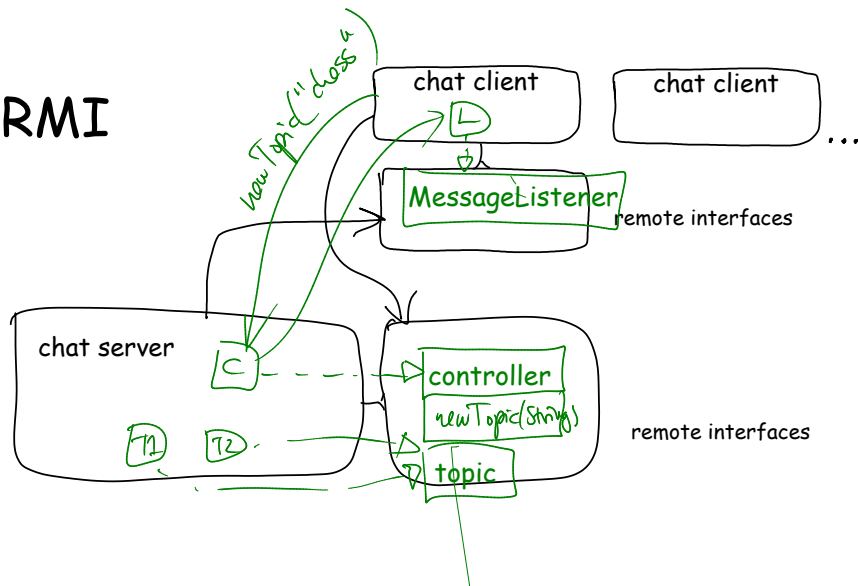
Introduction to RPC WS

Steps of RPC

- remote procedure call:
 - node A locates a “port” or “remote procedure” on distributed node B;
 - node A sends a call to this port together with appropriate parameters and waits for a response;
 - node B receives the parameters, does some work and sends a response to node A.
- all parameters and return values *serialised*

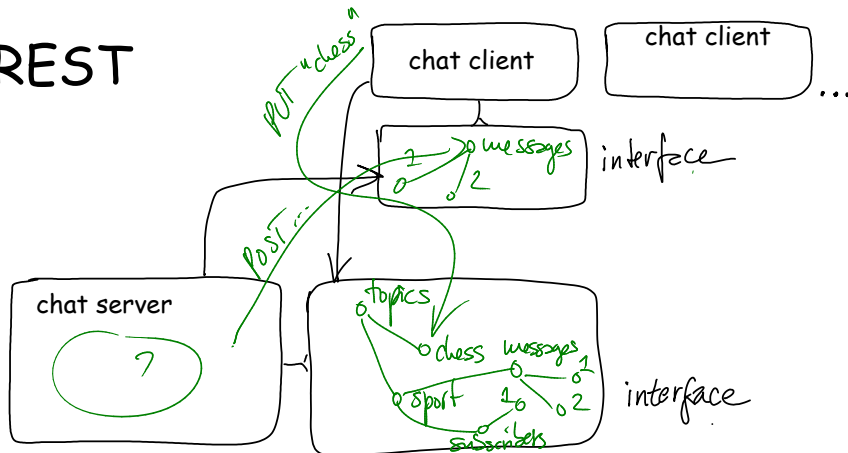
Conceptual comparison RPC-REST-RMI (RMI)

RMI



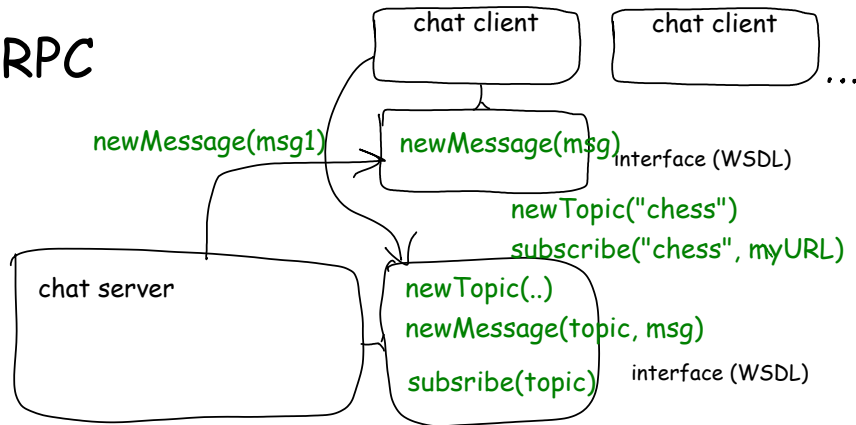
Conceptual comparison RPC-REST-RMI (REST)

REST



Conceptual comparison RPC-REST-RMI (RPC)

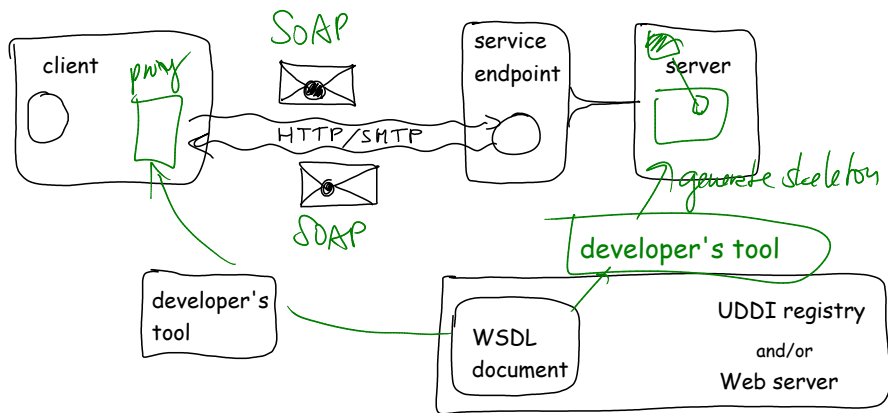
RPC



Introduction to RPC WS

Overview of WS RPC standards

- how to fully specify a RPC service?
- standards help...



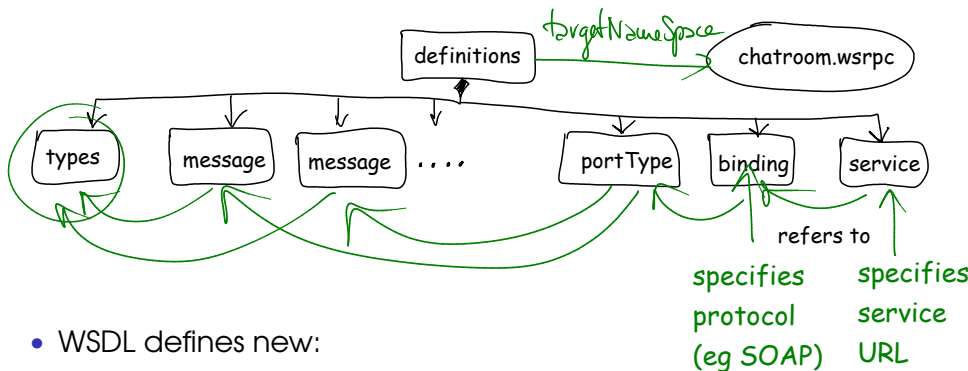
Introduction to RPC WS

Generic clients

- offer a human interface to any WSDL specified service
- eg:
 - Web Services Explorer in Eclipse
 - free web-based tools such as
`http://www.soapclient.com/soaptest.html`
- good for:
 - testing one's own service
 - understanding other people's services
 - WSDL: RPC format, but no meaning or intentions

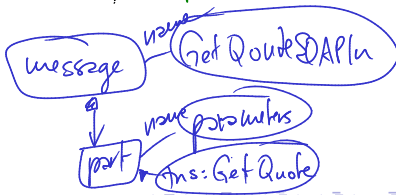
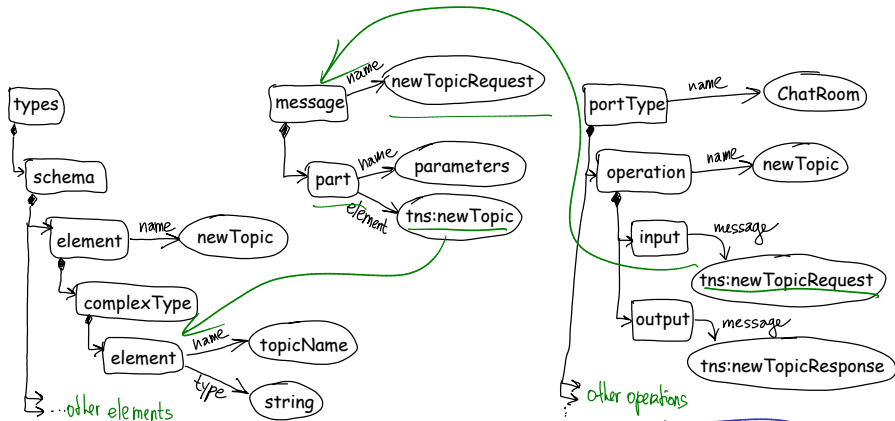
Introduction to WSDL

Structure overview — root element

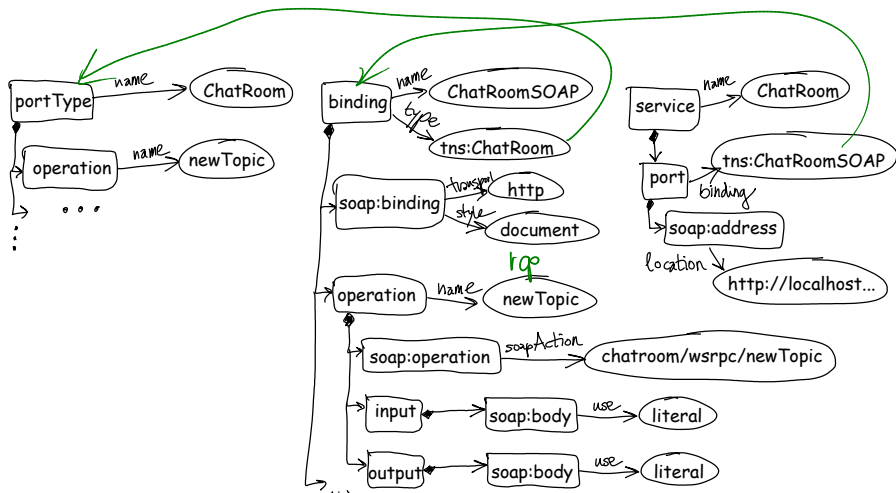


- WSDL defines new:
 - data types, message types, port types, binding types

Structure overview — port type



Structure overview — service



Structure overview — exercise

- draw a diagram for the 'quote of the day' service

1st schema element

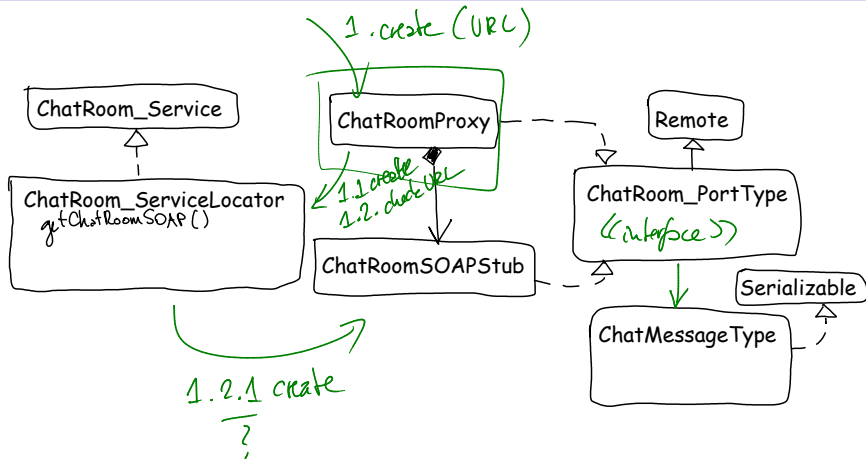
1st message

1st port type operation

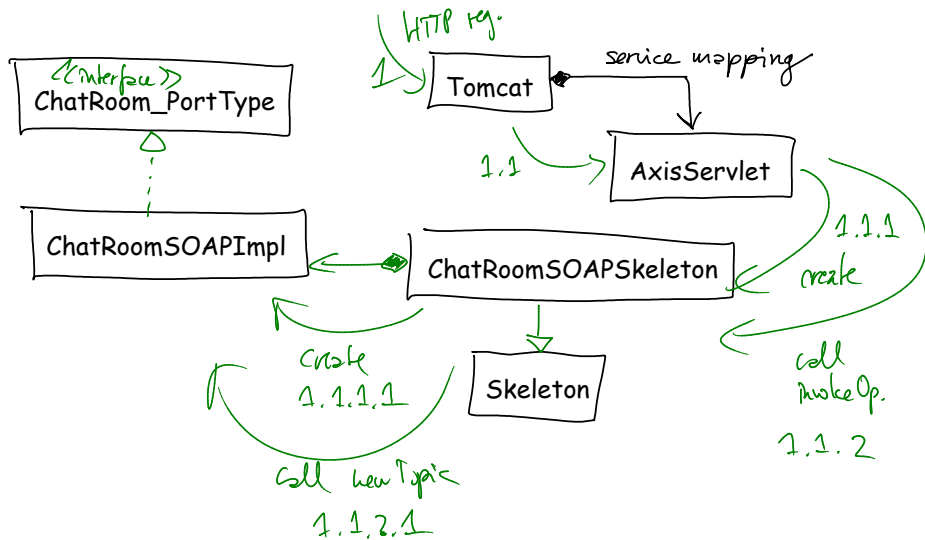
Composing WSDL from multiple documents

- embedded schema can *include* or *import* another schema
 - include: same effect as copy & paste, adding to target namespace
 - import: importing another namespace
- imported schema local or remote (use URL)
... good for sharing in DS
- WSDL can import another WSDL
 - importing document can use imported: data types, message types, port types and binding types
 - imported document can be incomplete, eg:
 - only data types
 - only data, message and port types

Generating Axis client proxy



Generating Axis server skeleton



Learning Outcomes. You should now be able to

- describe the conceptual differences between WS RPC and RESTful WS and RMI as DS development methodologies
- describe the roles of SOAP and WSDL in WS
- correctly interpret simple given WSDL document and represent the document by an appropriate diagram
- list the usual components of both a server and a client of a Web Service generated from a WSDL document and explain the function of each component
- generate a Java client proxy for a service described by a given WSDL document
- develop a Java program providing a service described by a given WSDL document