Web services
paper-5

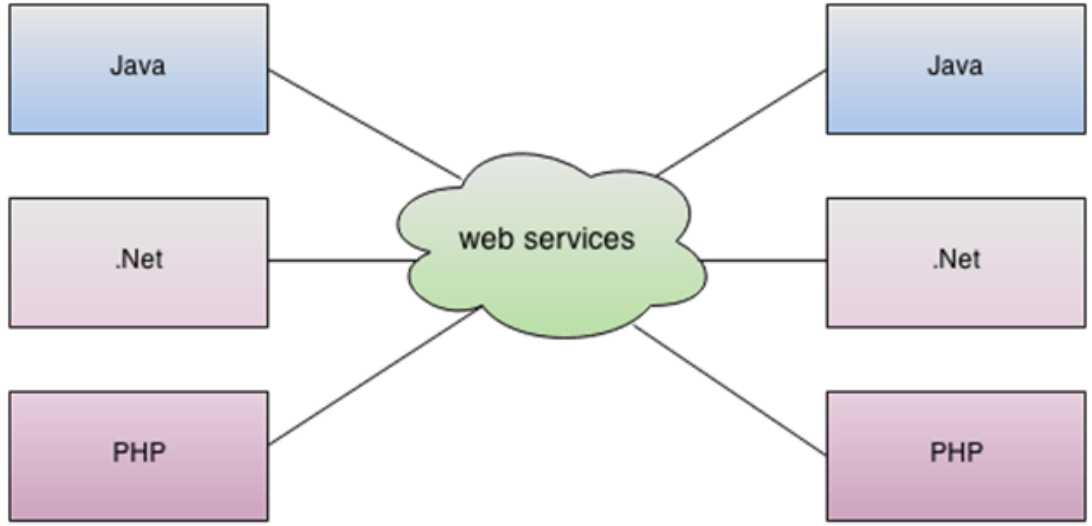
USCS505

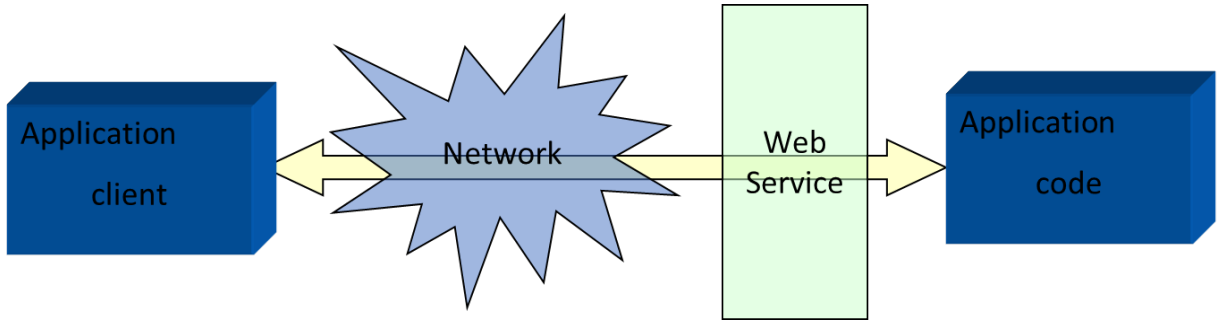
Unit 1
Web services basics

- What Are Web Services?
- Types of Web Services
- Distributed computing infrastructure
- overview of XML
- SOAP
- Building Web Services with JAX-WS
- Registering and Discovering Web Services
- Service Oriented Architecture
- Web Services Development Life Cycle
- Developing and consuming simple Web Services across platform

Web Service ?

- It is a client-server application or application component for communication.
- The method of communication between two devices over the network.
- It is a software system for the interoperable machine to machine communication.
- It is a collection of standards or protocols for exchanging information between two devices or application.





Features of WS

- XML-Based
- Loosely Coupled
- Coarse-Grained
- Ability to be Synchronous or Asynchronous
- Supports Remote Procedure Calls (RPCs)
- Supports Document Exchange

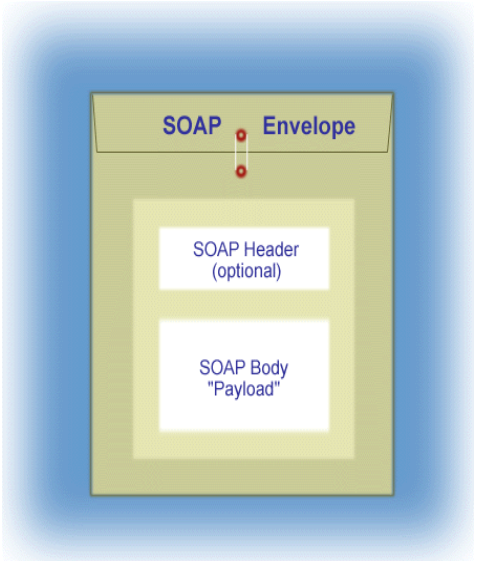
Web Service Components

- SOAP
- WSDL
- UDDI
- An application allows other applications to connect to it over the Web using SOAP
- This Web Service exposes its methods in a WSDL file
- The Web Service is published in a UDDI registry to allow other businesses to find it

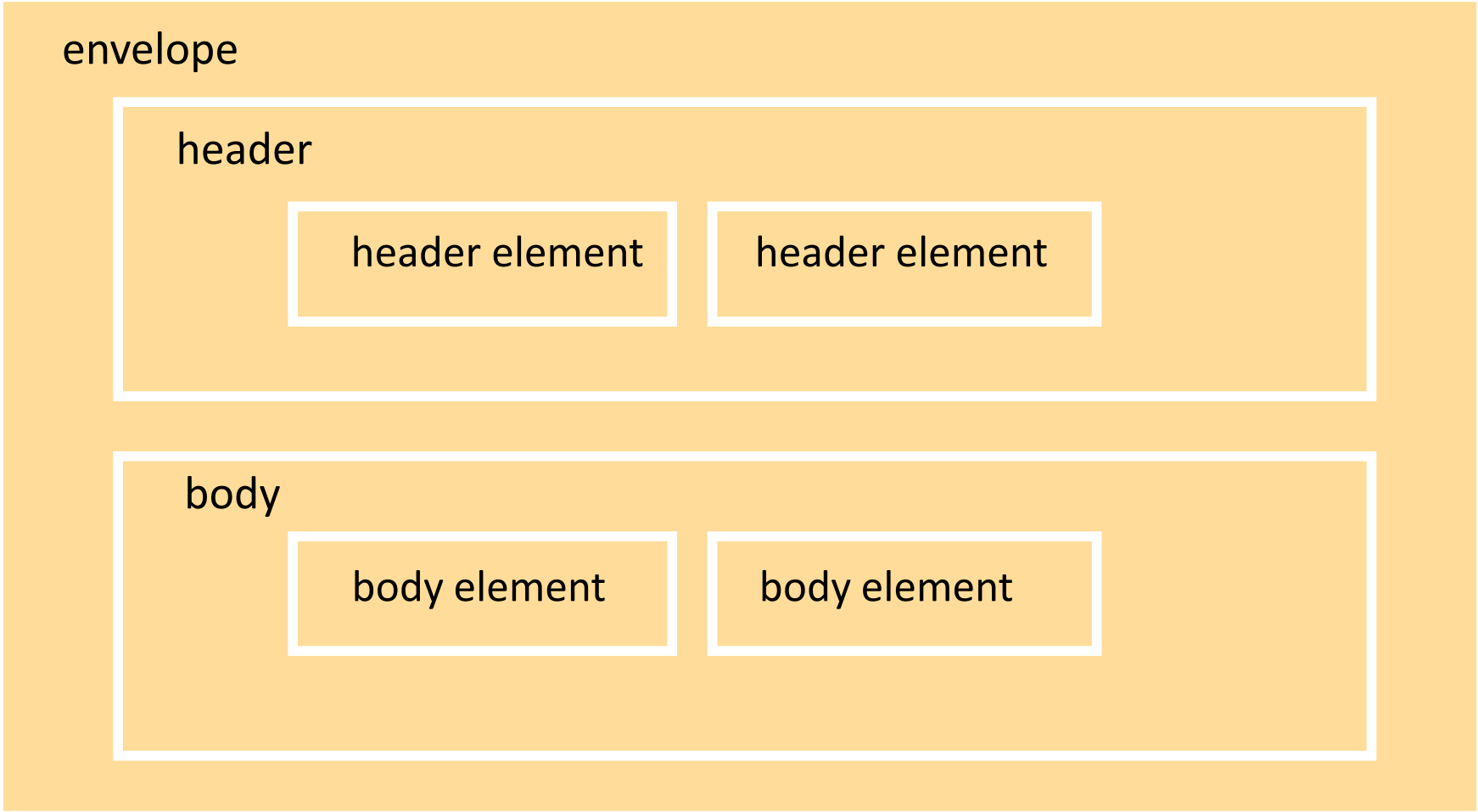
SOAP

- Simple Object Access Protocol
- SOAP is designed to enable both client-server and synchronous interaction over the Web
- Web services communicate using W3C standard SOAP messages.
- SOAP formalizes the use of XML as a way to pass data (therefore can be Objects) from one process to another.
- Originally SOAP was based only on HTTP, but other transport protocols such as TCP are also allowed.

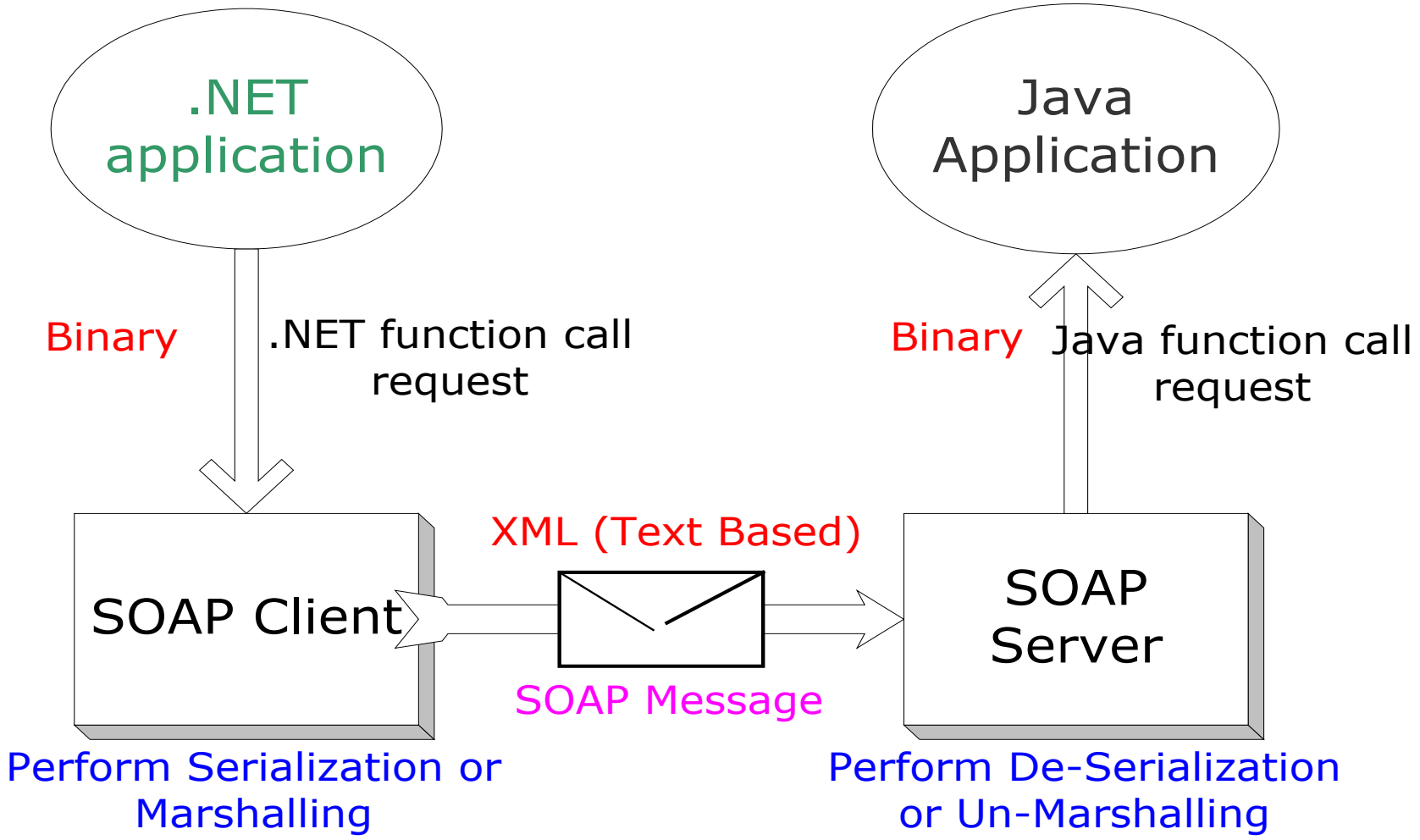
```
<env:Envelope
xmlns:env="http://www.w3.org/2001/12/soap-envelope">
  <env:Body>
    <ns:Order xmlns:ns="urn:it.uu.se:Students">
      <item>Bill</item>
      <item>Bob</item>
      <item>Tony</item>
    </ns:Students>
  </env:Body>
</env:Envelope>
```



SOAP MESSAGES

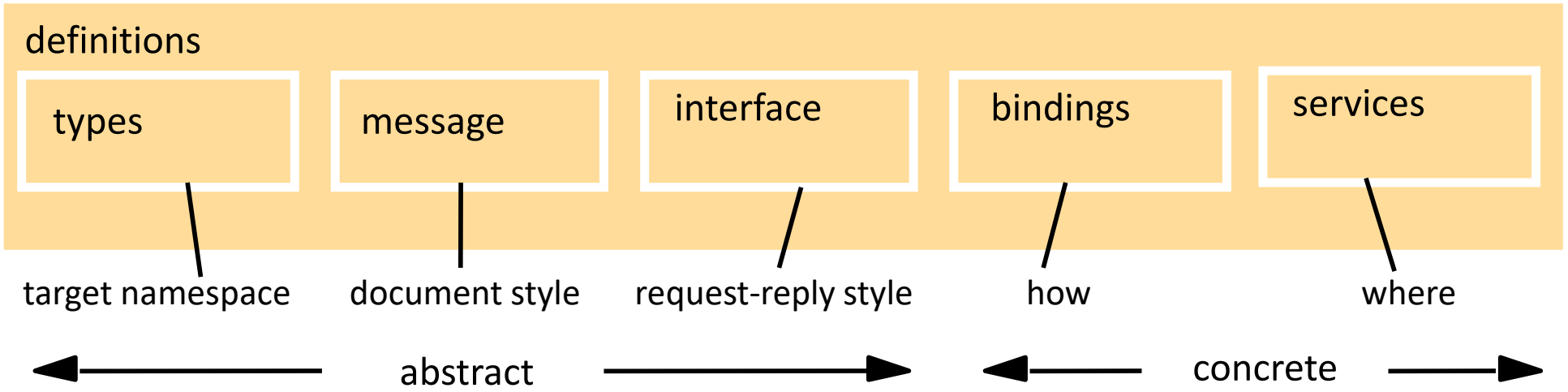


Transport of SOAP Messages



Service Descriptions and IDL for Web Services

- Interface definitions are needed for clients to communicate with services.
- *Service description* specifies two characteristics – how the message are to be communicated and the URI of service.
- Web Services Description Language (WSDL)



WSDL

- WSDL has a well-defined XML vocabulary to answer the following questions regarding the web service involved:
- What does the service do?
  - Both in machine and human-readable forms
- What language does the service speak?
  - The format/data structure of the message exchanged
- How does the client talk to the service?
  - HTTP/SMTP/FTP
- Where is the location of the web service?
  - The access point (URL)

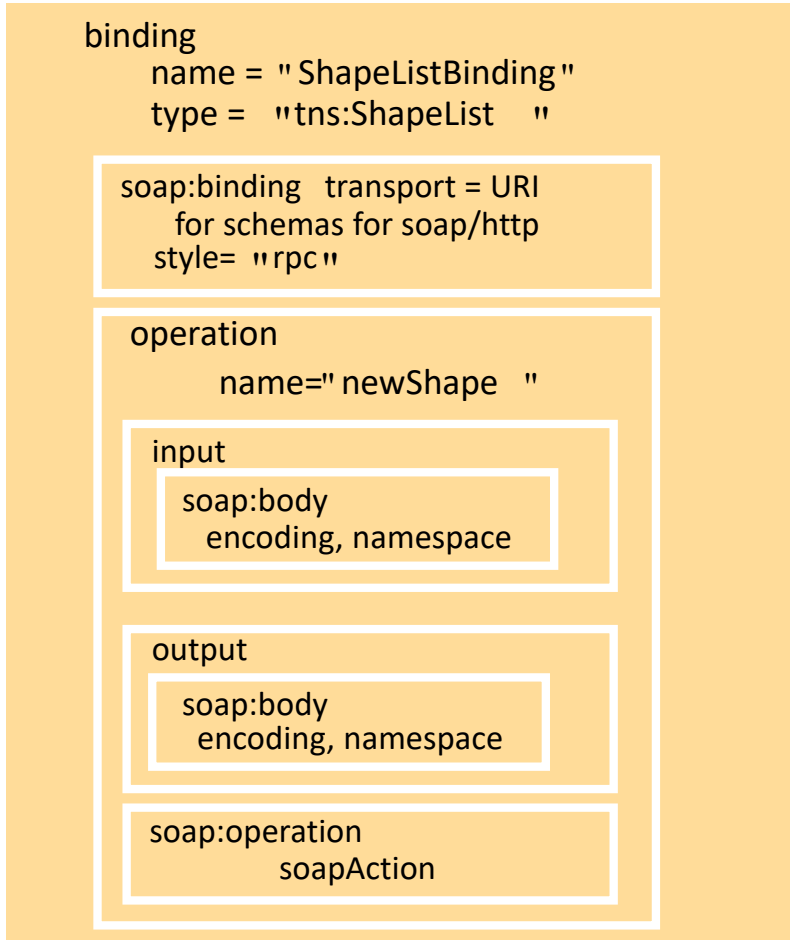
WSDL – INTERFACE

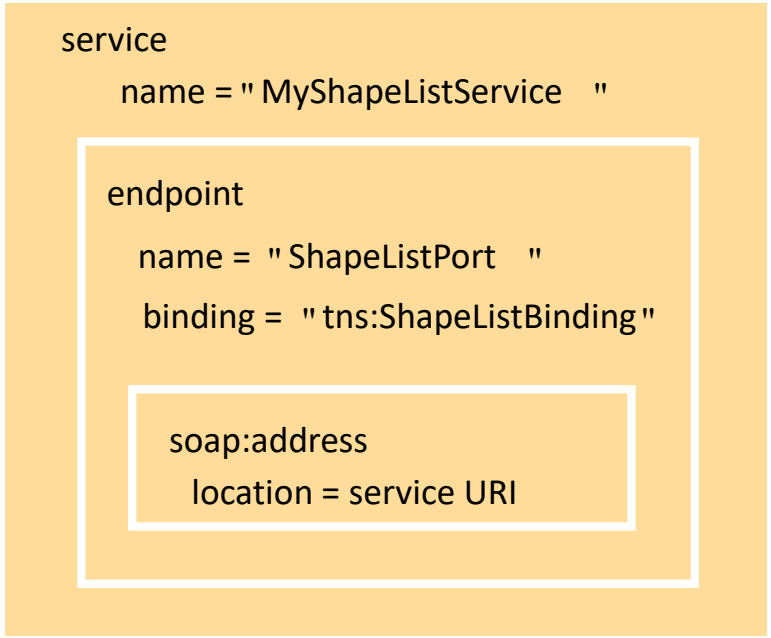
Name	Messages sent by			
	Client	Server	Delivery	Fault message
In-Out	Request	Reply		may replace Reply
In-Only	Request			no fault message
Robust In-Only	Request		guaranteed	may be sent
Out-In	Reply	Request		may replace Reply
Out-Only		Request		no fault message
Robust Out-Only		Request	guaranteed	may send fault

Message exchange patterns for WSDL operations

WSDL – CONCRETE PART

- Binding (choice of protocols) and Service (choice of endpoint or sever address):



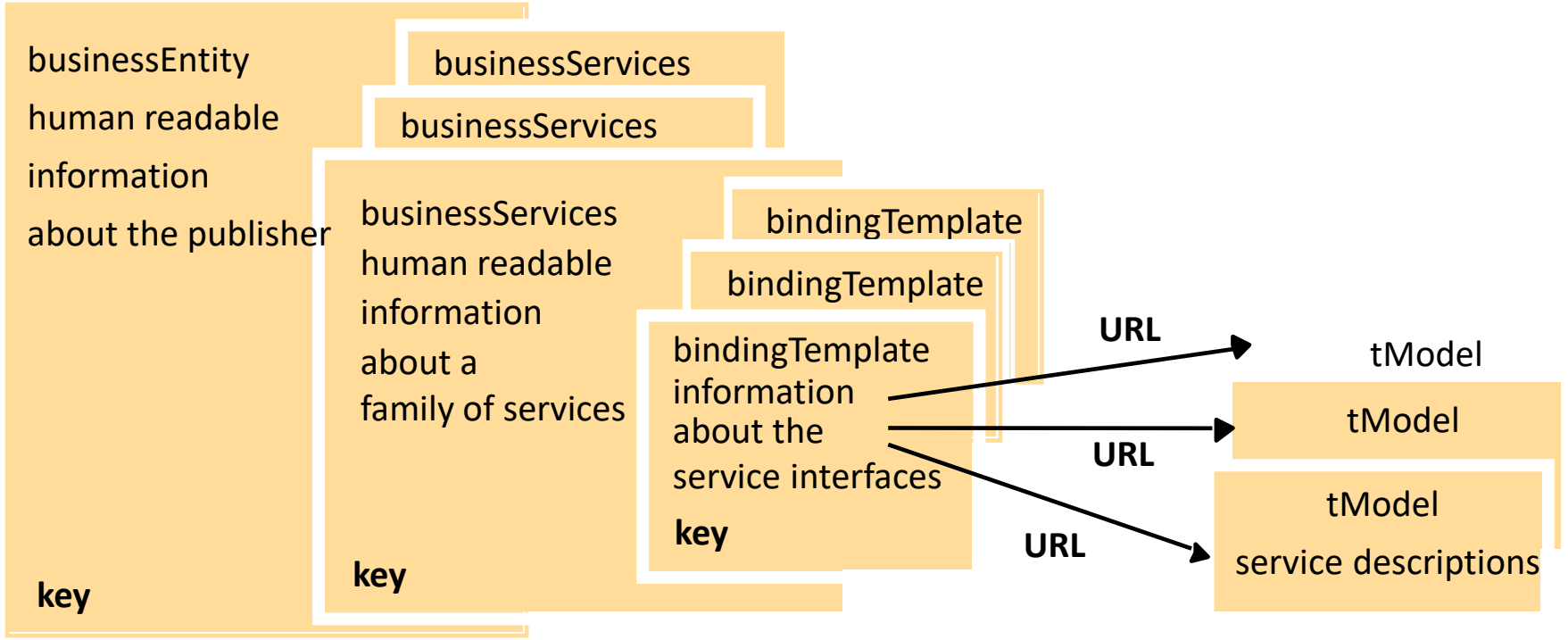


the service URI is:

“http://localhost:8080/ShapeList-jaxrpc/ShapeList”

A DIRECTORY SERVICE FOR USE WITH WEB SERVICES

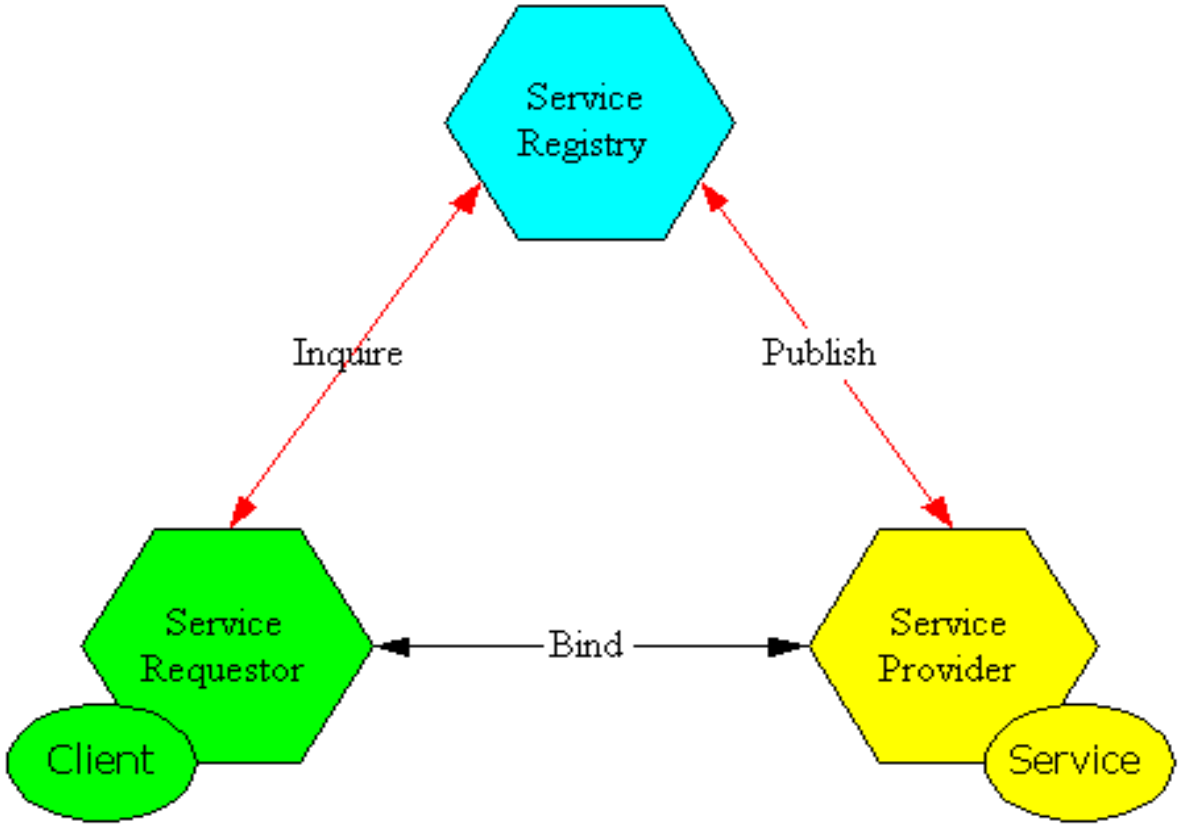
- UDDI – Universal Description, Discovery, and Integration Service
- Data structures allow human-readable information access



A DIRECTORY SERVICE FOR USE WITH WEB SERVICES

- Lookup
  - UDDI provides an API for looking up services based on 2 sets of query operation: *get_xxx, find_xxx*.
  - UDDI provides a notify/subscribe interface
- Publication
  - UDDI provides an interface for publishing and updating information about web services.
- Registries
  - UDDI service is based on replicated data stored in registries

UDDI



UDDI defines a way to publish and discover information about Web services

Types of Web Services

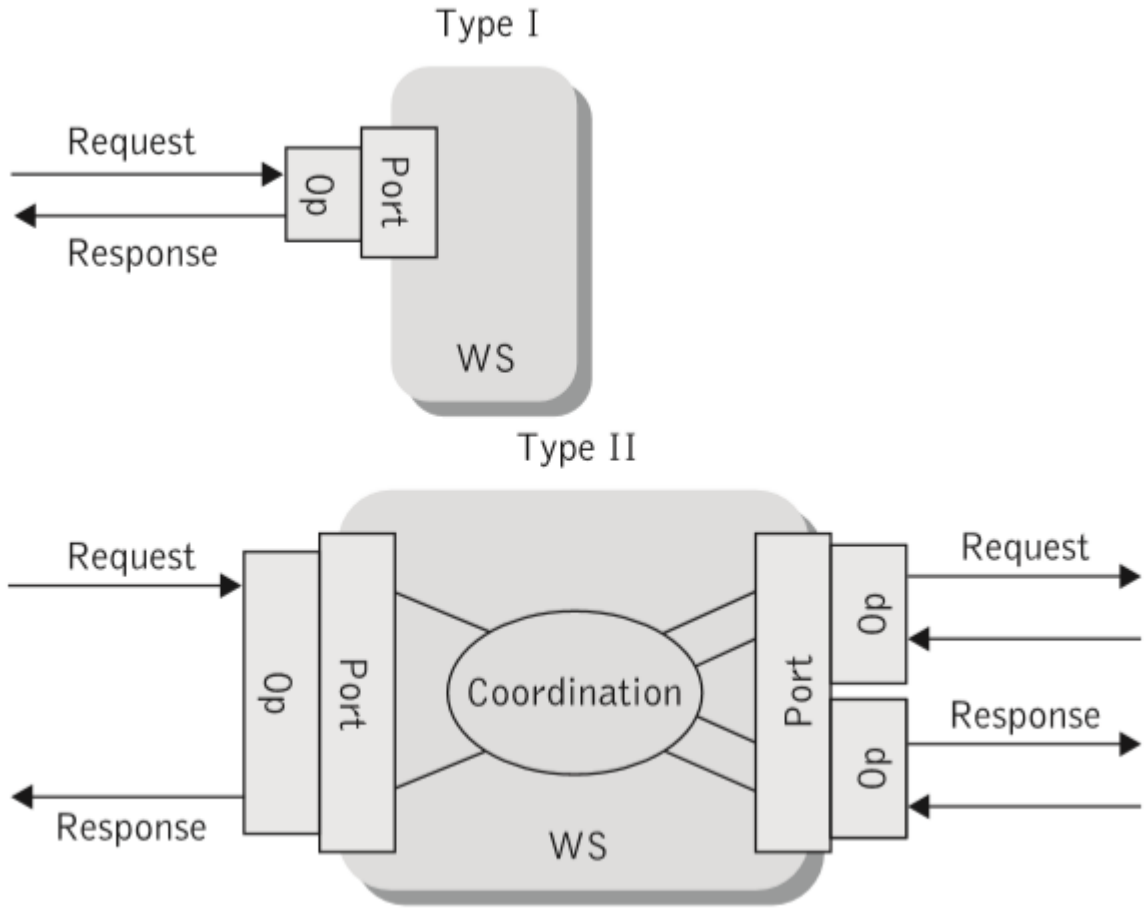
- 2 flavours simple/informational and complex

Informational services

- Simple request/response and wait for request
- Programmatic access to content and stateless
- Expose backend applications to other applications
- Access function call by executing a web service through WSDL
- Can be divided in 3 subcategories

1. Pure content services:-weather report, financial info, news,etc
2. Simple trading services:-complicated form of informational services seamless aggregation of information including backend eg;-logistics

3. Simple syndication services: value added information eg:-ecommerce webs



High-level view of informational and complex services

Complex services

- Can use an atomic service to accomplish a specific business task such as billing or credit checking
- Beyond informational services
- Compose several web services
- Typically involve assembly and invocation of many pre-existing services
- Use of diverse enterprises to complete a multi-step business interaction that requires coordination
- 2 types
- Complex services that compose programmatic web services
- Complex services that compose interactive web services