DISTRIBUTED SYSTEMS

A4: Service Oriented Distributed Systems

SOA web services

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1. Project requirements

Design, implement and test a distributed system that uses web services to expose the server functionalities to its clients.

Functional requirements:

Consider a distributed application called “Online Tracking System” that has a GUI which exposes the following functionalities to its users:

- The application has two types of users: administrators and clients.
- After the login, the user is redirected to its corresponding page.
- If the user does not have an account, it can register and become a simple user (client)
- The Administrator can:
  - Add/remove package. The package has the following characteristics:
    - Sender – Client
    - Receiver – Client
    - Name
    - Description
    - Sender City
    - Destination City
    - Tracking – Boolean – initially false
  - Register package for tracking
    - The package becomes tracked, and a route is associated to it. This route represents the path of the package to the destination, as pairs of (City,Time).
  - Package status updating
    - A new entry (City, Time) is introduced to the route
- The Client can:
  - List all its packages
  - Search packages
  - Package status checking

Implementation technologies:

These functionalities will be exposed as 2 web services:

- WS1 – SOAP Web Service: Client Login and Register and Simple Client Operations
- WS2 – SOAP Web Service: Administrator Operations

2. Implementation details

SOAP is an acronym for Simple Object Access Protocol. It is an XML-based messaging protocol for exchanging information among computers. SOAP is an application of the XML specification.

- SOAP is a communication protocol designed to communicate via Internet.
- SOAP can extend HTTP for XML messaging.
- SOAP provides data transport for Web services.
- SOAP can exchange complete documents or call a remote procedure.
- SOAP can be used for broadcasting a message.
- SOAP is platform- and language-independent.
- SOAP is the XML way of defining what information is sent and how.
- SOAP enables client applications to easily connect to remote services and invoke remote methods.

Although SOAP can be used in a variety of messaging systems and can be delivered via a variety of transport protocols, the initial focus of SOAP is remote procedure calls transported via HTTP.

SOAP has three major characteristics:

- extensibility (security and WS-Addressing are among the extensions under development)
- neutrality (SOAP can operate over any protocol such as HTTP, SMTP, TCP, UDP, or JMS)
- independence (SOAP allows for any programming model)

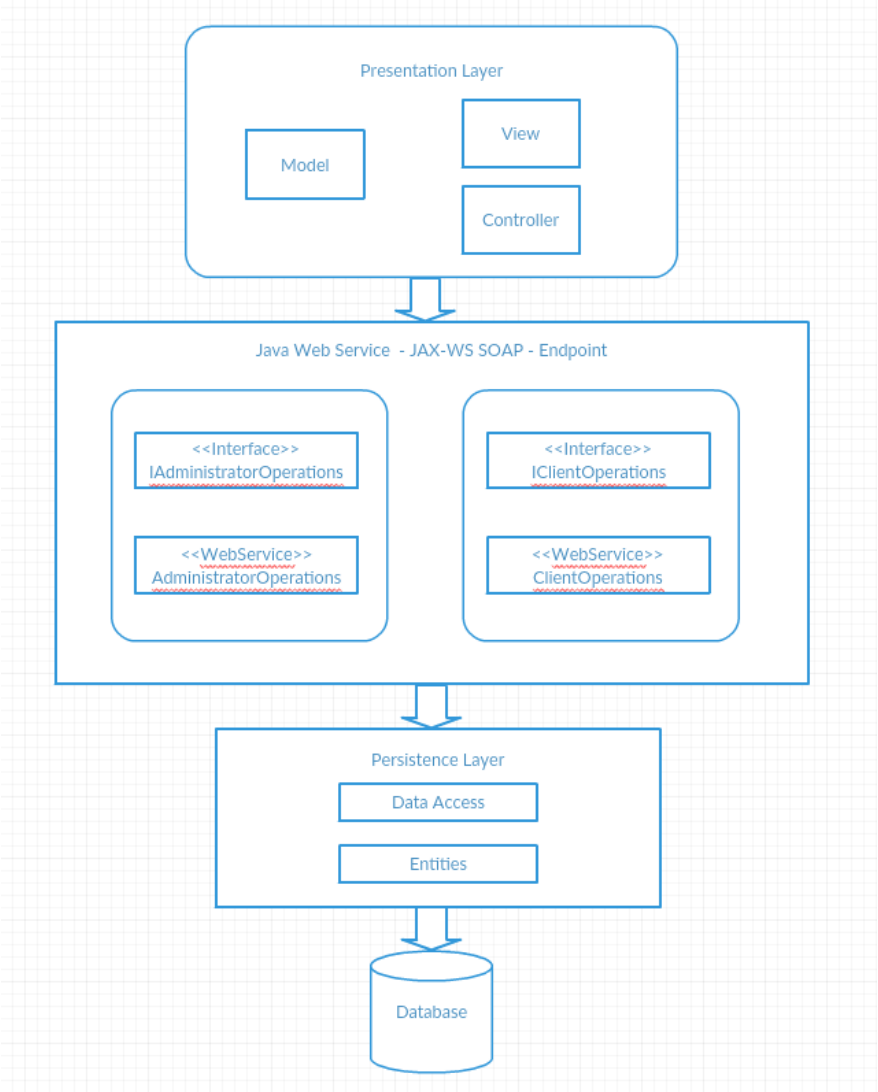
As an example of what SOAP procedures can do, an application can send a SOAP request to a server that has web services enabled—such as a real-estate price database—with the parameters for a search. The server then returns a SOAP response (an XML-formatted document with the resulting data), e.g., prices, location, features. Since the generated data comes in a standardized machine-parsable format, the requesting application can then integrate it directly.

The SOAP architecture consists of several layers of specifications for:

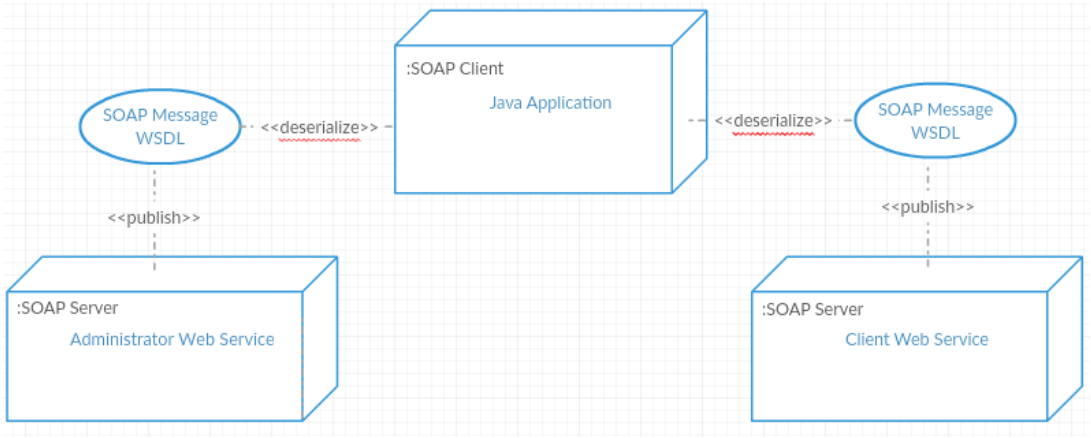
- message format
- Message Exchange Patterns (MEP)
- underlying transport protocol bindings
- message processing models
- protocol extensibility

3. Conceptual architecture

Conceptual architecture is a form of architecture that utilizes conceptualism, characterized by an introduction of ideas or concepts from outside of architecture often as a means of expanding the discipline of architecture. This produces an essentially different kind of building than one produced by the widely held 'architect as a master-builder' model, in which craft and construction are the guiding principles



4. Deployment diagram



5. Database design