From middleware to web services

1 Middleware for system integration

RPC, Java RMI and Python PYRO

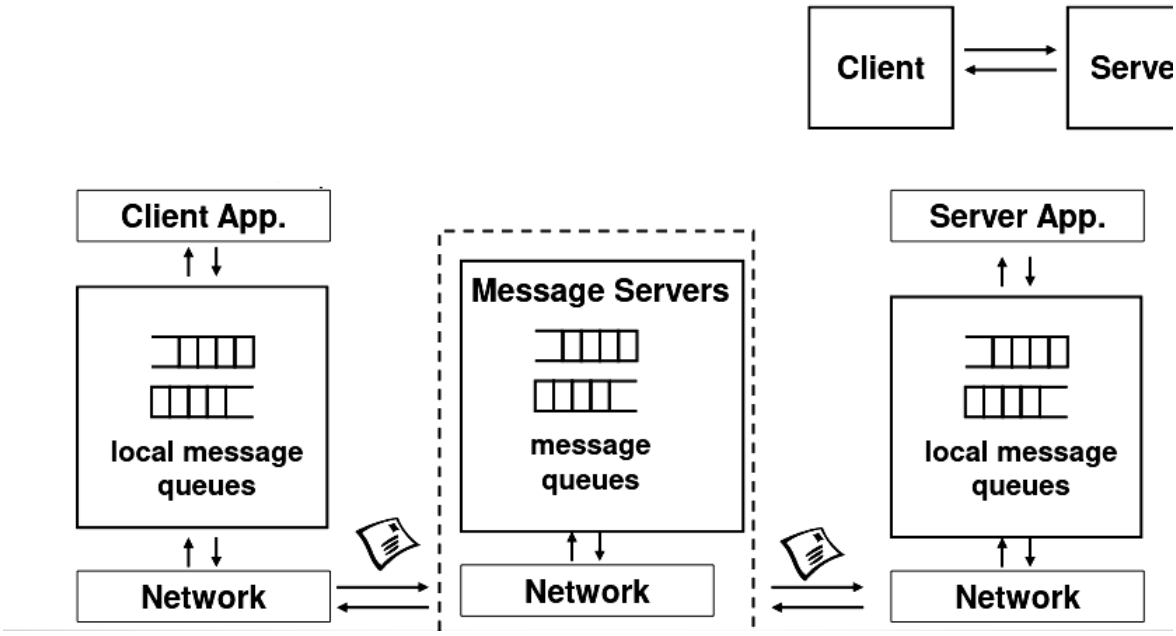
- Closely follow the traditional program development process that creased an application based on
  1. Program libraries integration
  2. Parameter passing
- Do not require developers to deal with socket programming when implementing programs that support remote communication
- Have a performance issue due to synchronous communication

CORBA

- Still follow the programming library approach
- Similar to Java RMI: provide object request broker (ORB) define the interface definition language (IDL)
- Integrate components developer by different programming languages

2 Message-Oriented Middleware (MOM)

- We need something more loosely coupled
- Communication using messages
- Messages stored in message queues
- Message servers decouple client and server
- Various assumptions about message content
- Provides data persistence, if server goes down, when it comes back up it will send the info again



2.1 Properties of MOM

Asynchronous interaction

- Client and server are only loosely coupled
- Messages are queued
- Good for application integration

Support for reliable delivery service

- Keep queues in persistent storage

Processing of messages by intermediate message server(s)

- May do filtering, transforming, logging
- Networks of message servers

Natural for database integration

Choose which requests get processed and combine duplicate requests into one request (in a similar way to multicasting)

3 Java Message Service (JMS)

- API specification to access MOM implementations
- Two modes of operations
- Point to point
  - One to one communication
- Publish/subscribe
  - One to many communication
- JMS server implements JMS API
- JMS clients connect to JMS servers
- Java objects can be serialised to JMS messages

4 Web services

Use well known web standards for distributed computing
Communication

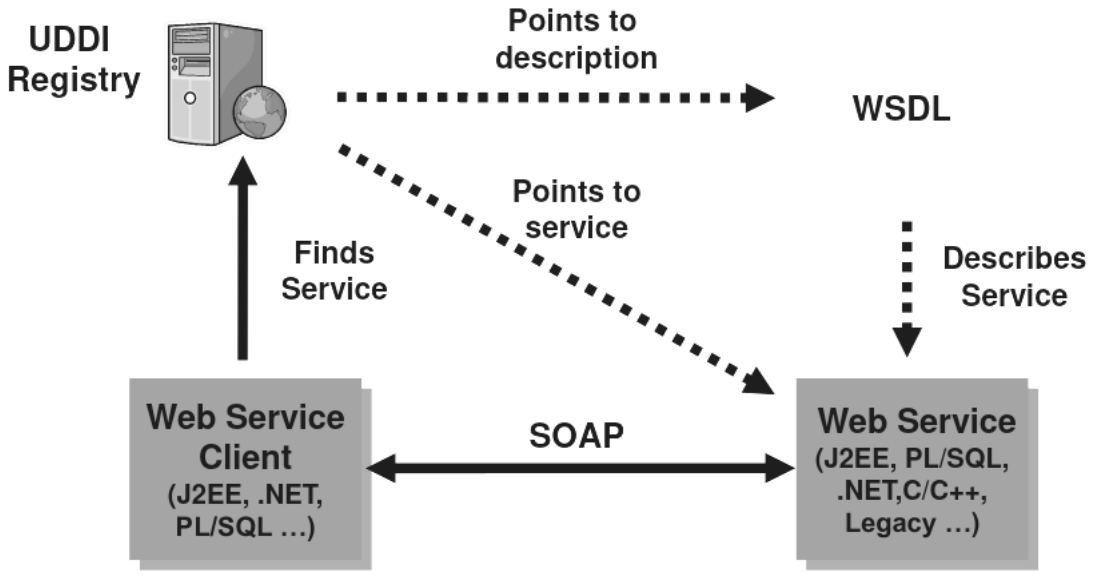
- Message content expressed in XML
- Simple Object Access Protocol (SOAP) - lightweight protocol for sync/async communication

Service description

- Web Services Description Language (WSDL) - interface description for web services

Service Discovery

- Universal Description Discovery and Integration (UDDI) - directory with web service description in WSDL



4.1 Attributed of Web-Services

Web based protocols - Web services based on HTTP are designed to work over the public internet. The use of HTTP for transport means these protocols can traverse firewalls, and can work in a heterogeneous environment

Interoperability - SOAP defines a common standard that allows differing systems to interoperate

XML based - The Extensible Markup Language is a standard framework for creating machine readable documents

5 REST and JSON

REST

- An architectural style, treating the web as a resource centric application
- Each URL in a RESTful application represents a resource

JSON

- An open standard format that uses human readable text to transmit data objects consisting of attribute-value pairs
- Provide lightweight communication