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www.eu-egee.org

3 – 4 June 2004

Introduction to Web Services

EGEE is a project funded by the European Union under contract IST-2003-508833

Objectives

- Architecture
- Standards
  - SOAP
  - WSDL
  - UDDI
- Context for Web Services

The concept of web services

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- Web services is a messaging system which allows communication between objects.
- Messages can be synchronous or asynchronous.
- This system is loosely coupled
  (ie. Services should not be dependent on each other).

W3C view of Web Services

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- *The World Wide Web is more and more used for application to application communication.*
- *The programmatic interfaces made available are referred to as **Web services**.*
- http://www.w3.org/2002/ws/

Web Services

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- Web services are
  - Applications that enable remote procedure calls over a network or the Internet often using XML and HTTP
- Benefits
  - This allows us to hide the details of how a service is implemented; only URL and data types are required
  - It is largely irrelevant to the client whether the service is developed with Java or ASP.NET or if it is running on Windows, Linux or any other platform

W3C Web Services glossary

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- http://www.w3.org/TR/2004/NOTE-ws-gloss-20040211/

Web services architecture overview

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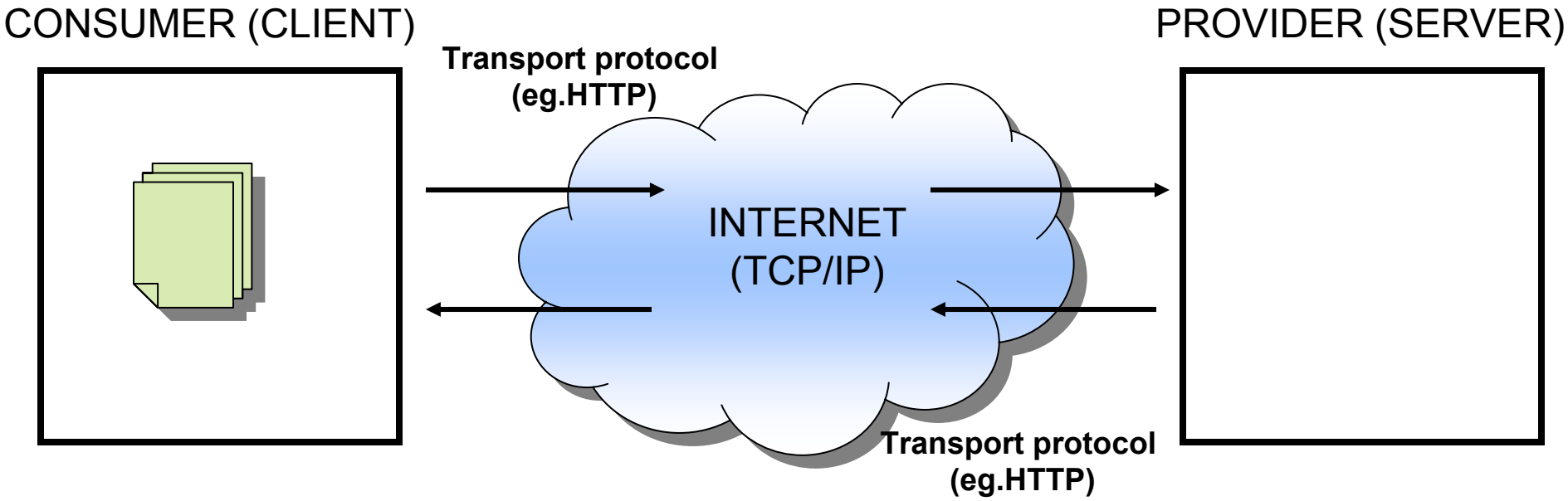
Consumer (1)



Web services architecture overview

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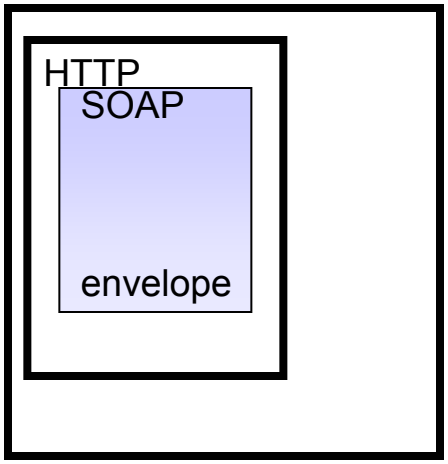
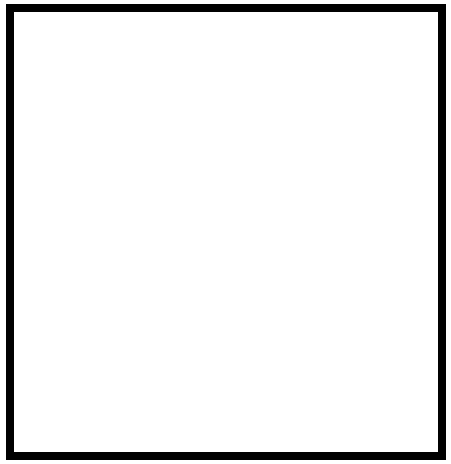
Consumer (2)

CONSUMER (CLIENT)



PROVIDER (SERVER)



Web services architecture overview

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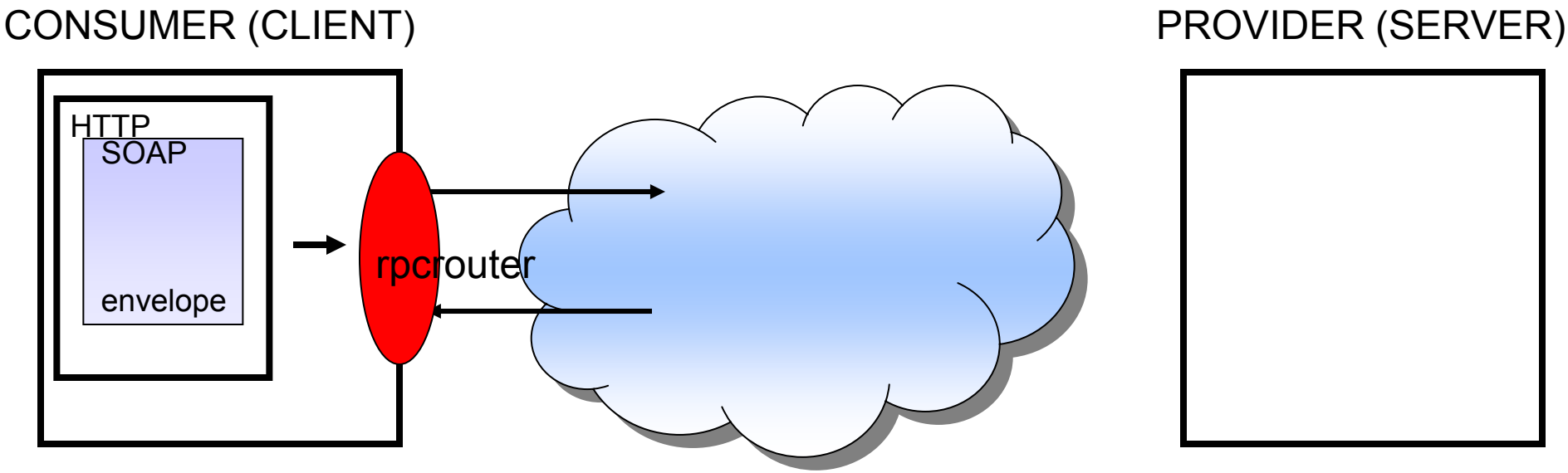
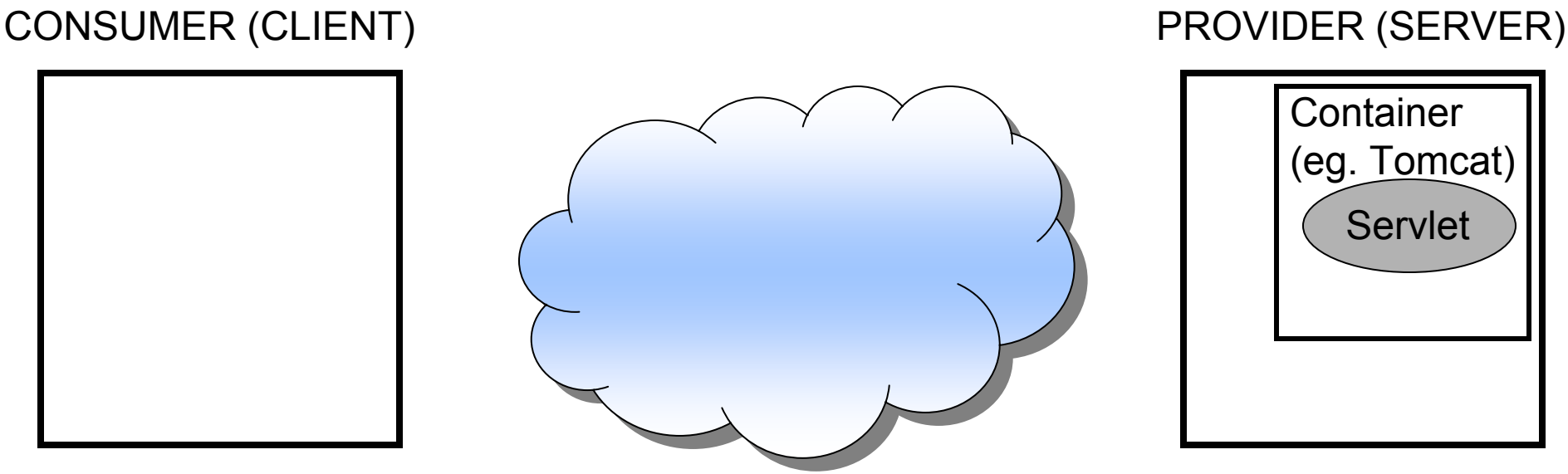
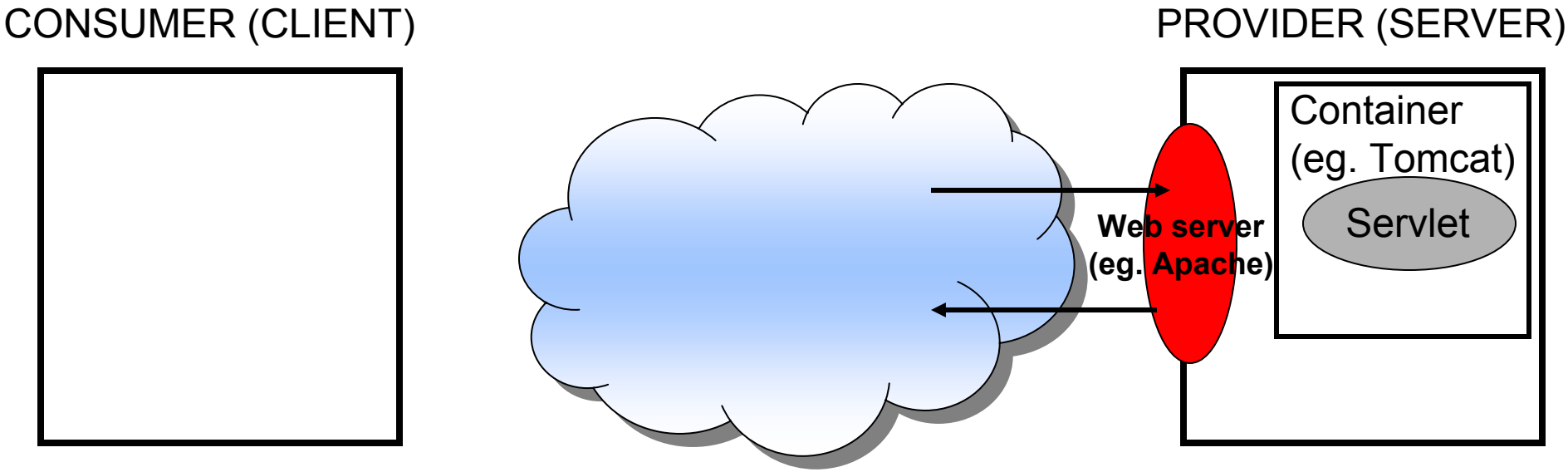
Consumer (3)



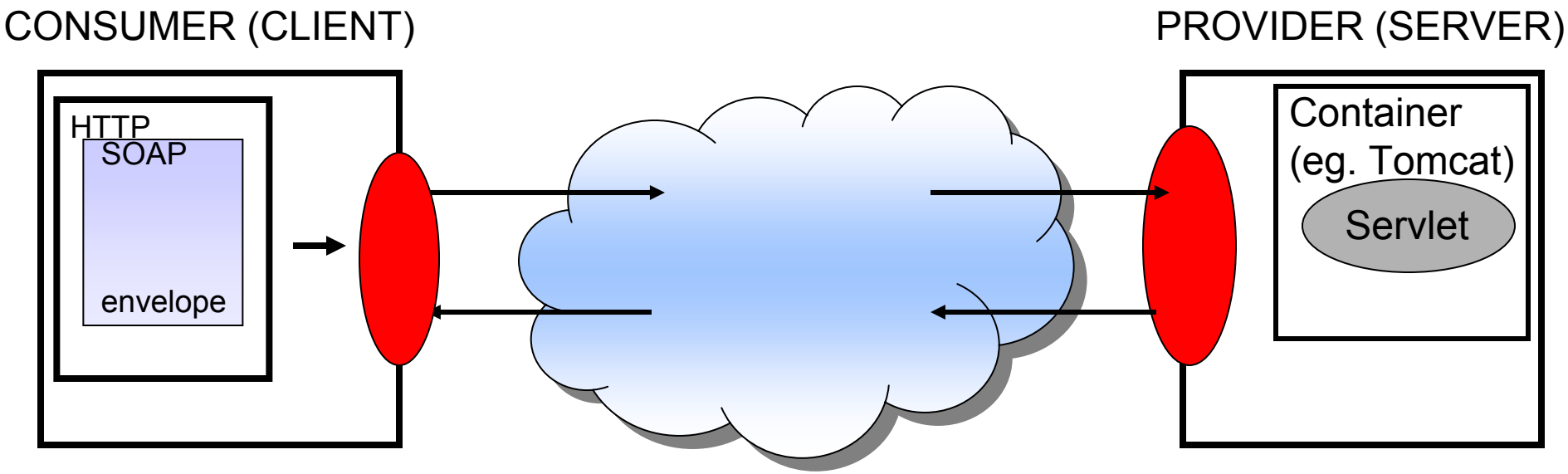
Web services architecture overview
Provider (1)



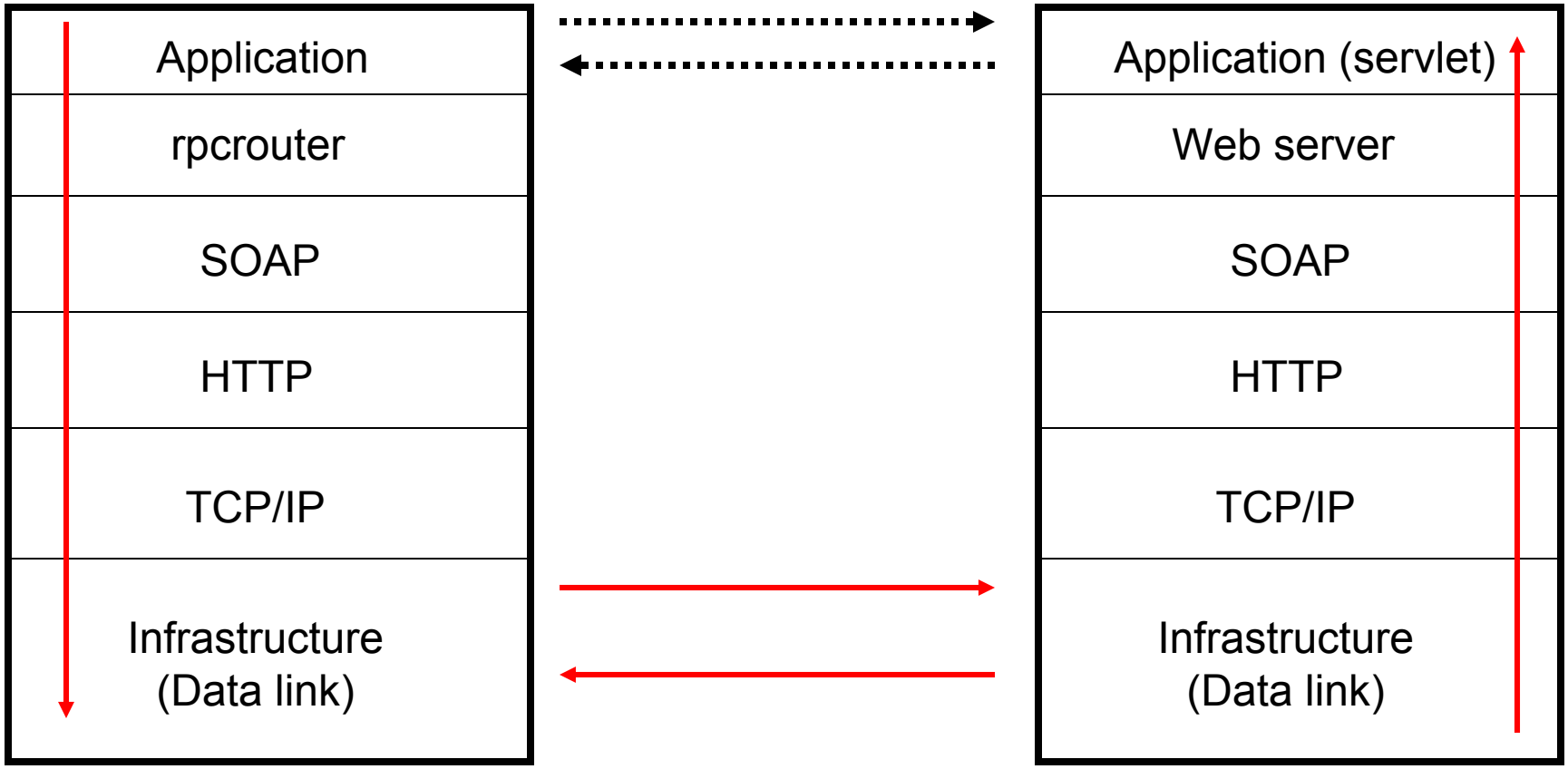
Web services architecture overview
Provider (2)



Web services architecture overview
Message transport (1)



Web services stack

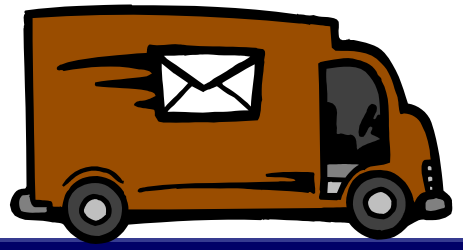


Business mail analogy

- The SOAP envelope is analogous to a business letter with an address within a distant organisation. This gives the information needed to get it from the sender's building to the recipient's building.

- The transport protocol is analogous to the carrier used for transport between buildings. (eg. FedEx.)

- The web server and container act like the local servicesfor the recipient which place the message in his/her pigeon-hole.



Communication and standards

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- Efficient (or indeed any) communication is dependent on a shared vocabulary and grammar.
- Because web services deals with inter-organisation communication these must be universal standards.

Underlying standards

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- The basic standards for web services are:
- SOAP (simple object access protocol)
- WSDL (web services description language)
- UDDI (universal description, discovery and integration)

The state of standards

- XML 1.0 fairly stable, although Schema are in the process of replacing DTDs (currently Schema 1.1 being worked on).
- SOAP 1.2
- WSDL 2.0 (coming out, 1.2 current)
- UDDI version 3 (Aug 2003)
- BPEL 1.1
- choreography description language (web services work flows)
  started January 2003.

Standards are still volatile and in the process of development.

Web Services Architecture

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- Web Services involve three major roles
  - Service Provider
  - Service Registry
  - Service Consumer
- Three major operations surround web services
  - Publishing – making a service available
  - Finding – locating web services
  - Binding – using web services

Making a service available (1)

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- In order for someone to use your service they have to know about it.
- To allow users to discover a service it is published to a registry (UDDI).
- To allow users to interact with a service you must publish a description of it's interface (methods & arguments).
- This is done using WSDL.

Making a service available (2)

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- Once you have published a description of your service you must have a host set up to serve it.
- A web server is often used to deliver services (although custom application – application communication is also possible).
- This is functionality which has to be added to the web server. In the case of the apache web server a ‘container’ application (Tomcat) can be used to make the application (servlet) available to apache (deploying).

The old transfer protocols are still there.

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- Like the grid architecture web services is layered on top of existing, mature transfer protocols.
- HTTP, SMTP are still used over TCP/IP to pass the messages.
- Web services, like grids, can be seen as a functionality enhancement to the existing technologies.

SOAP

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- Actually used to communicate with the Web Service
- Both the request and the response are SOAP messages
- The body of the message (whose grammar is defined by the WSDL) is contained within a SOAP “envelope”
- “Binds” the client to the web service

WSDL

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- Describes the Web Service and defines the functions that are exposed in the Web Service
- Defines the XML grammar to be used in the messages
  - Uses the W3C Schema language

UDDI

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- UDDI is used to register and look up services with a central registry
- Service Providers can publish information about their business and the services that they offer
- Service consumers can look up services that are available by
  - Business
  - Service category
  - Specific service

Request Response Web Services

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- Currently the most common implementation of Web Services
- Work in a very simple ‘request – response’ paradigm
- For Example:
  - A Weather Service– simple request for weather in an area, simple response with the weather report
  - An Airline special offers service – travel agents would simply make requests for latest offers and would receive the offers as a response

Web services being used.

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- Amazon currently use web services to communicate B2B with their ‘associates’.
- IBM database federation middleware (Web Sphere, used to be Discovery link).
- MS .NET
- EBI is implementing web services (using perl – SOAP:Lite, bringing in java based clients)