



Enabling Grids for E-scienceE

Web Services

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- This presentation can be re-used for academic purposes.
- However if you do so then please let training-support@nesc.ac.uk know. We need to gather statistics of re-use: no. of events, number of people trained. Thank you!!

- **An orientation to Web Services**
- **No prior knowledge assumed**

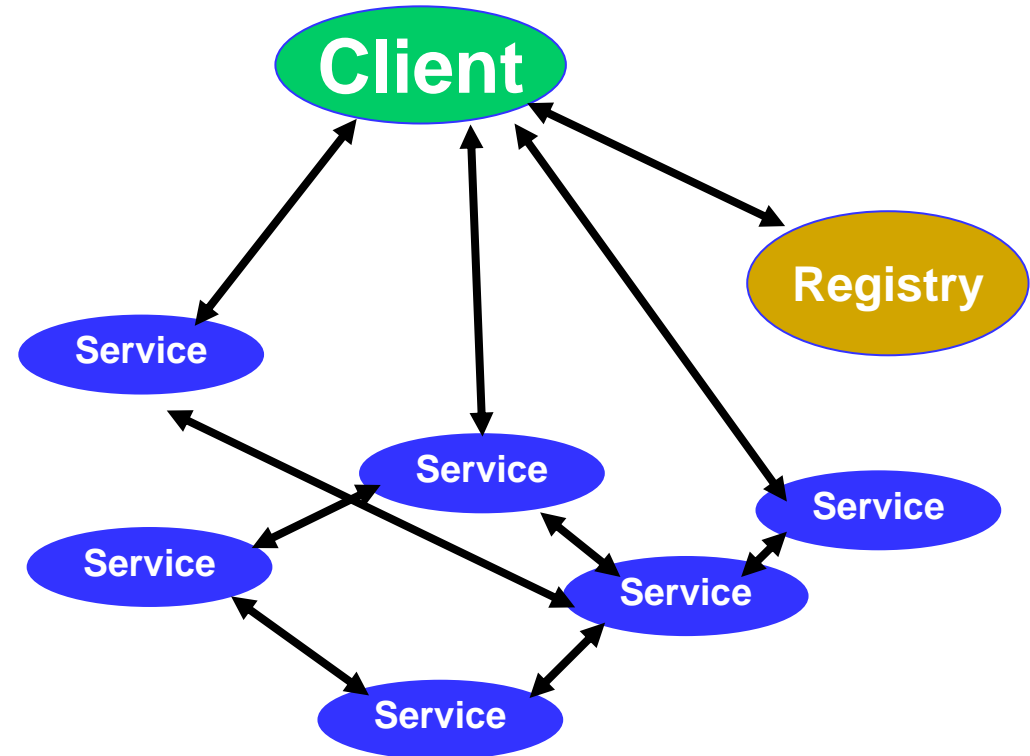
- **Web Service (WS) concepts**
- **WS standards and consequences**
- **Creating a WS using Java**
- **Practical**
- **Next talk: WS and Grids**

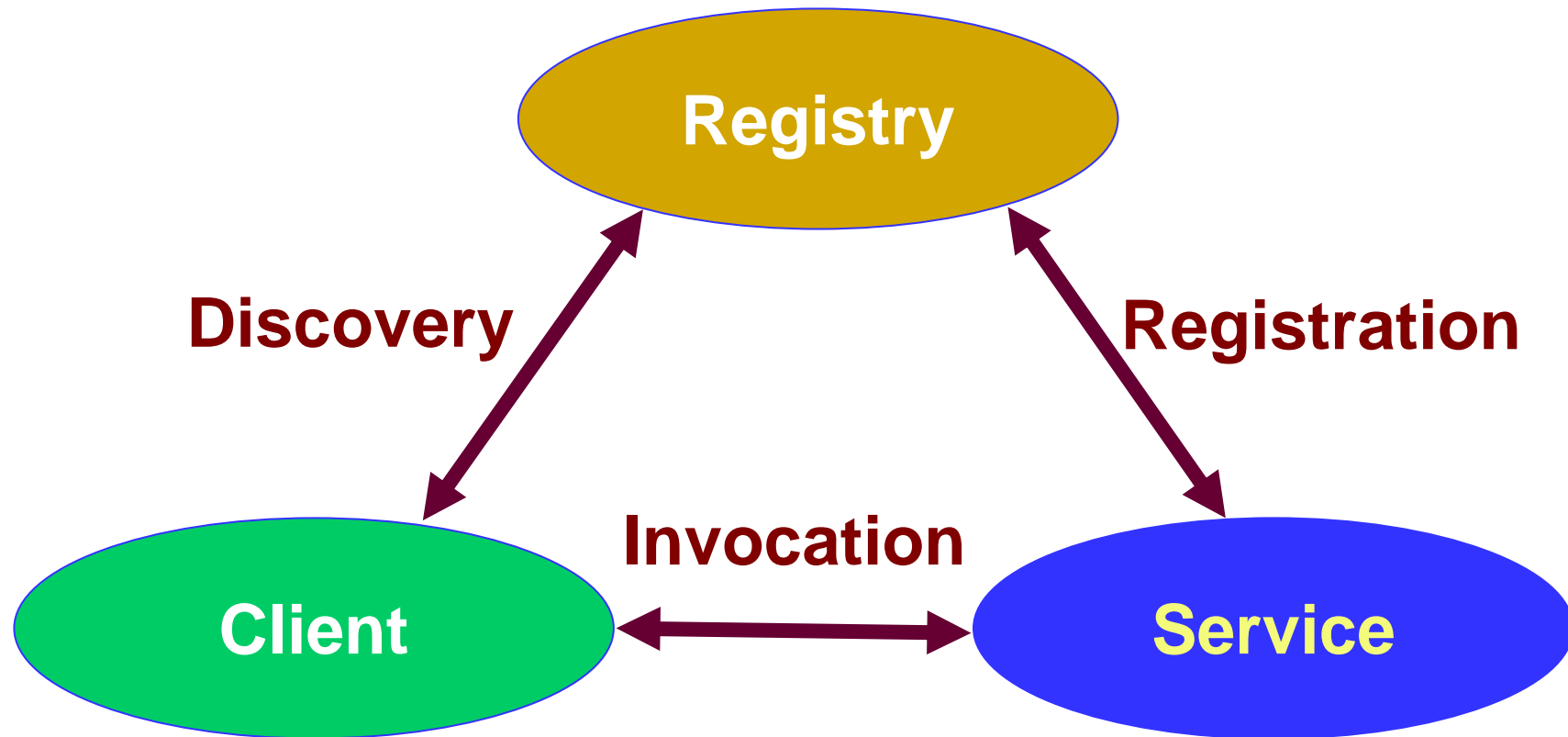
- **History**
 1. Web browsing
 2. Web pages with content from applications
 3. Applications that are useable by software clients

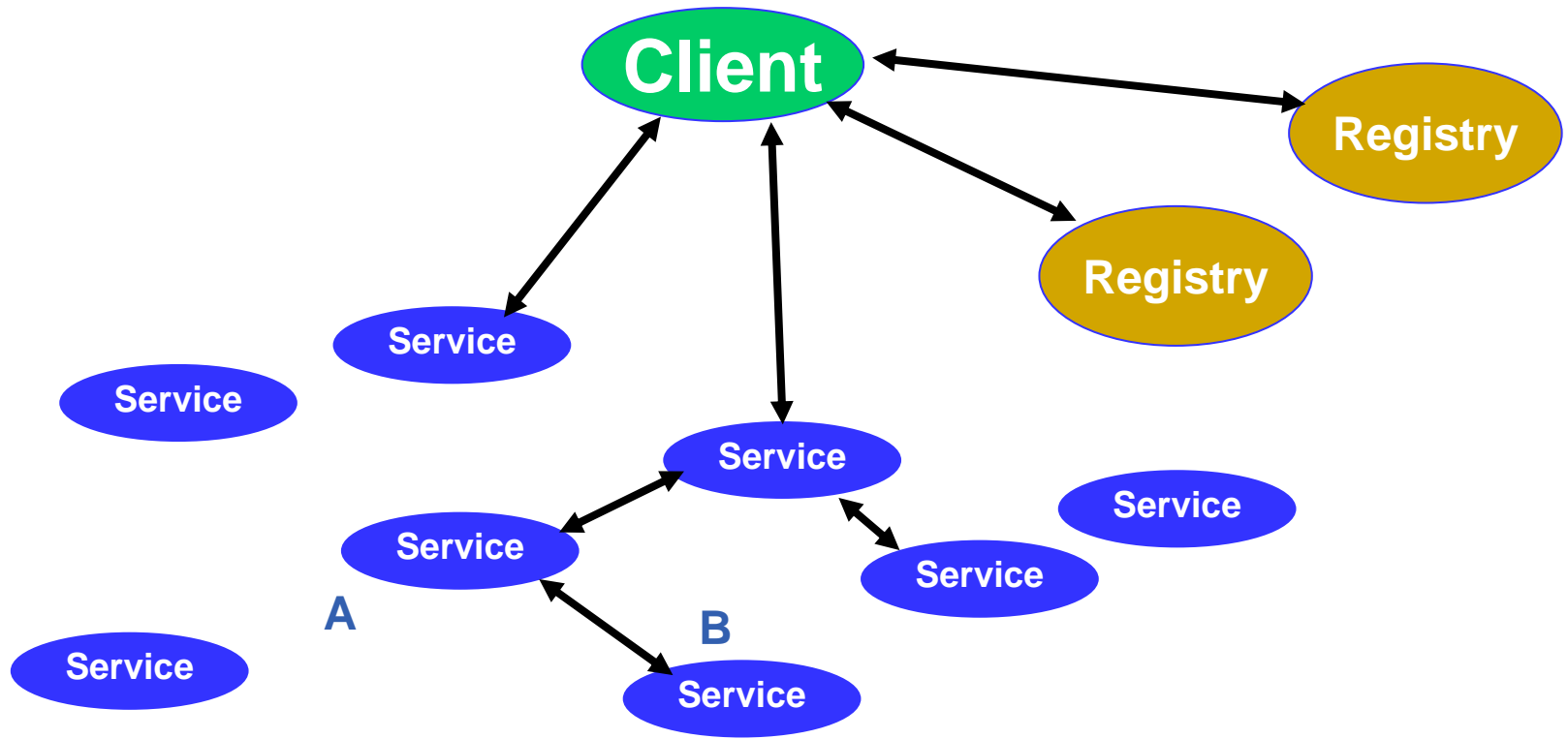
- **Web Services are software components that are..**
 - Accessible across a network
 - Loosely coupled
 - Defined by the messages they receive / send
 - Modular and self-contained
 - So can change service implementation without changing interfaces
 - Interoperable: each service has a description that is accessible and can be used to create software to invoke that service

- **... and based on standards**
 - Usually built on (extensions of) standards made ubiquitous by the Web: http(s), XML, ... and for which tools are already built.
 - Developed in anticipation of new uses – e.g. can compose workflow
 - Encouraging adoption and new tools

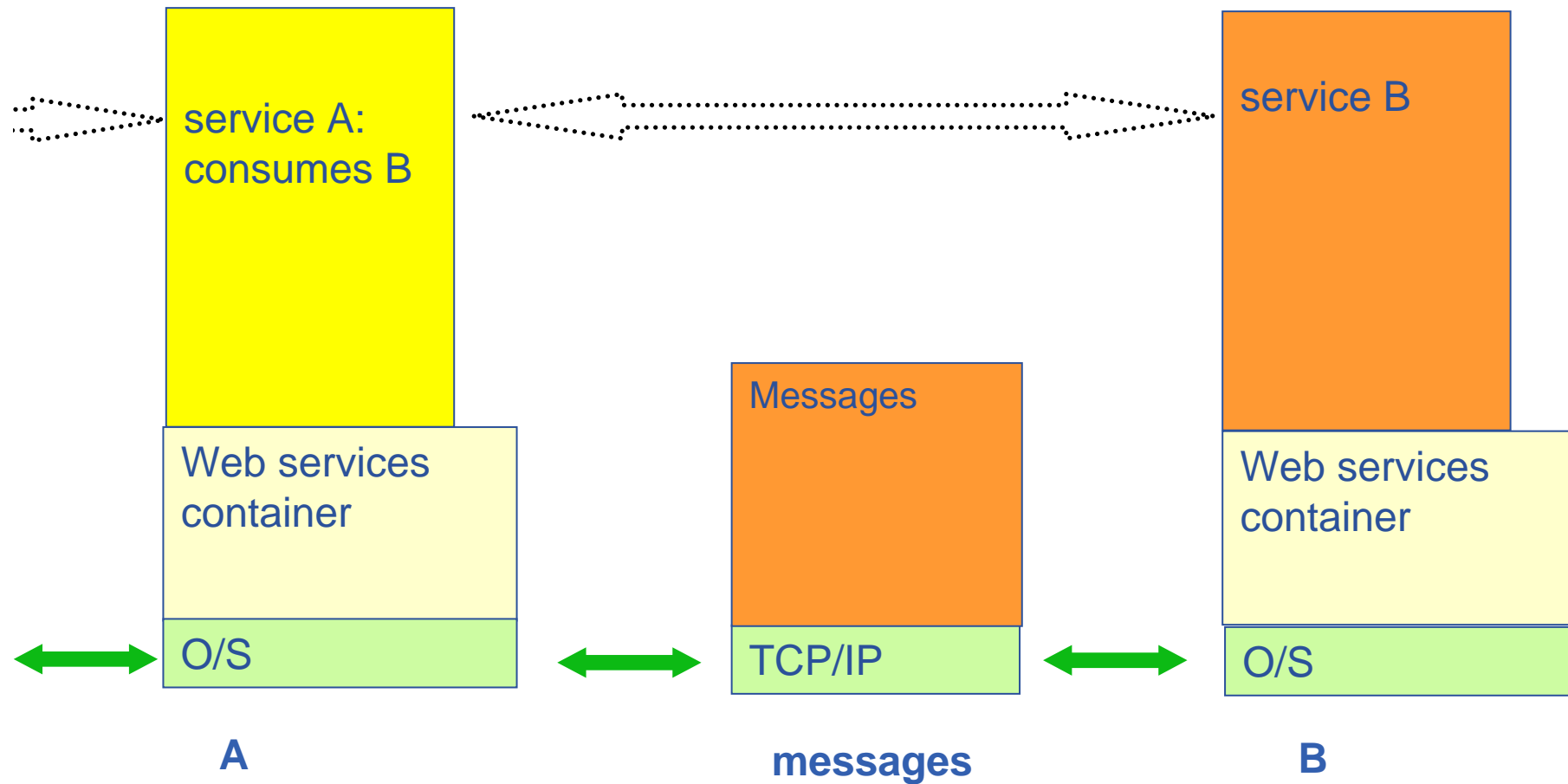
- Accessible across a network
- Loosely coupled, defined by the messages they receive / send
- Interoperable: each service has a description that is accessible and can be used to create software to invoke that service
- Based on standards (for which tools do / could exist)
- Developed in anticipation of new uses





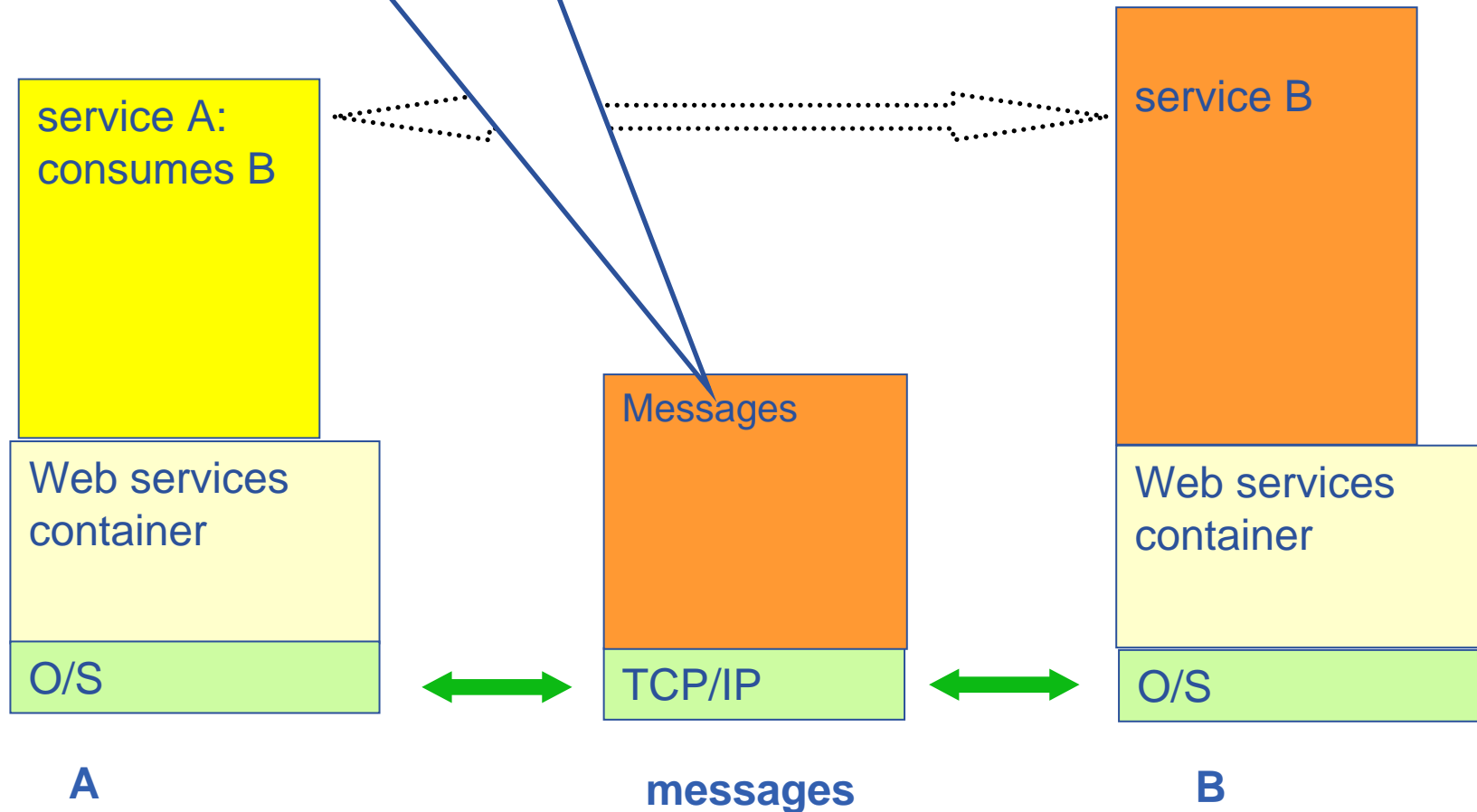


Using service B from service A

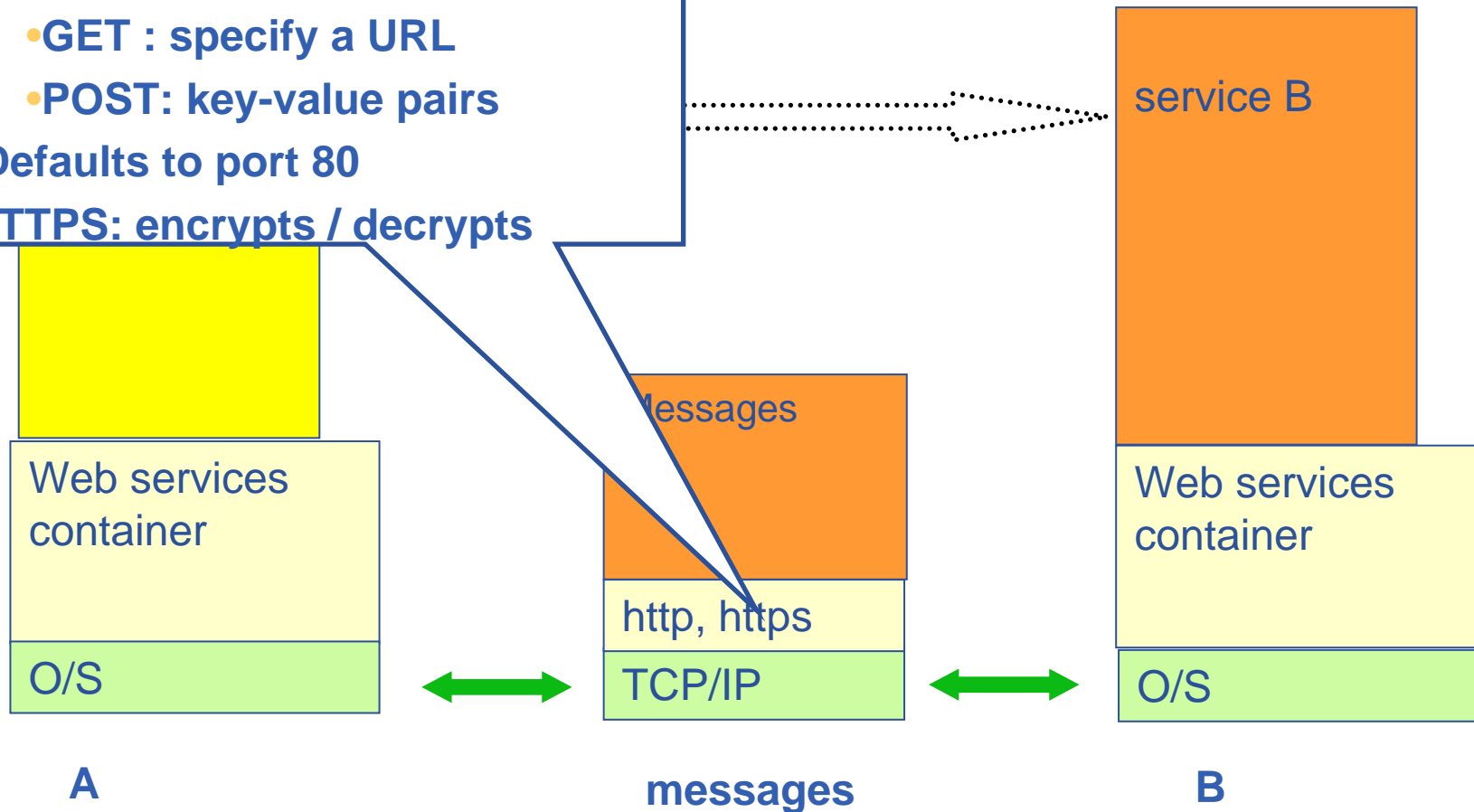


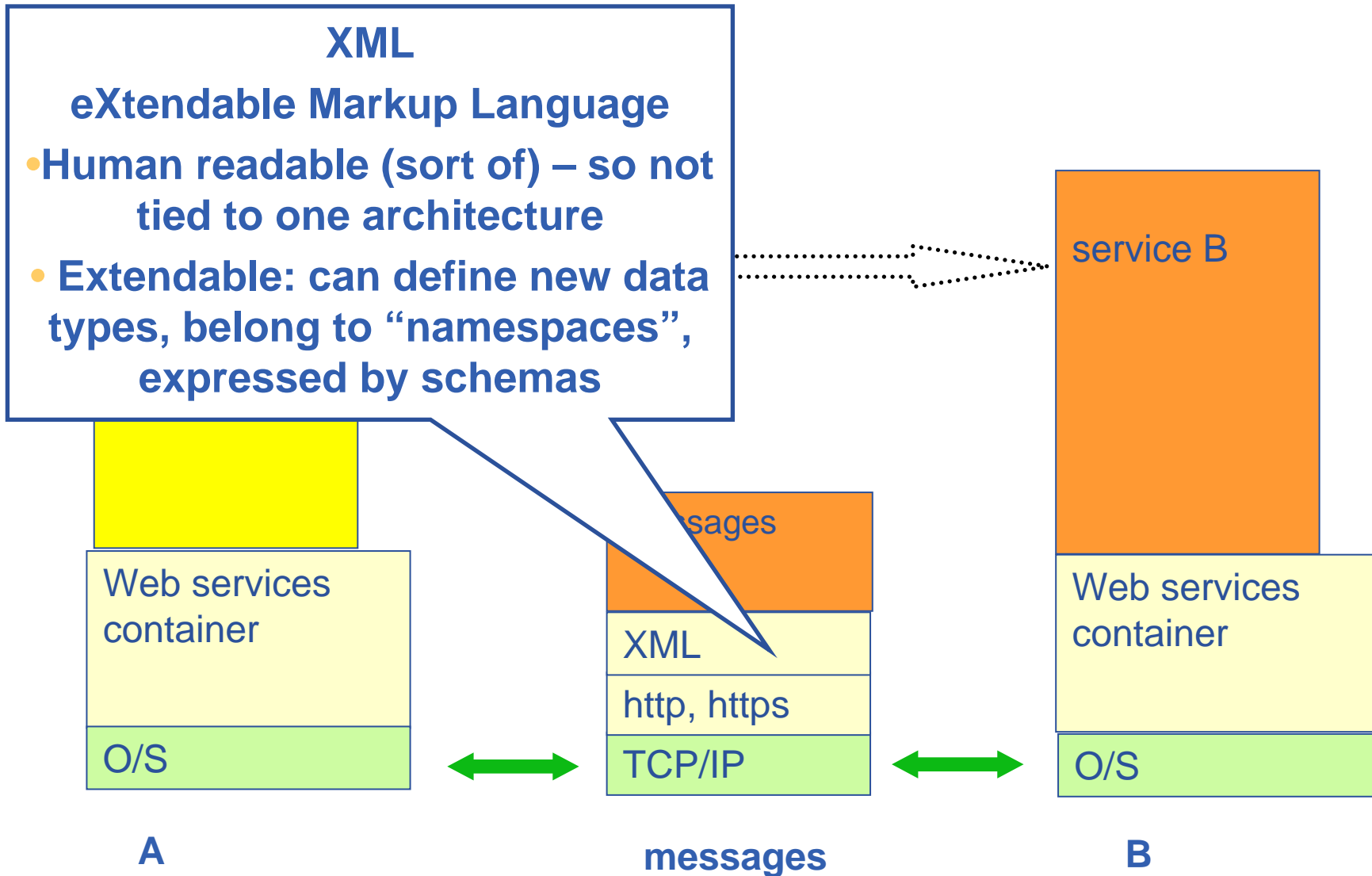
Using service B from service A

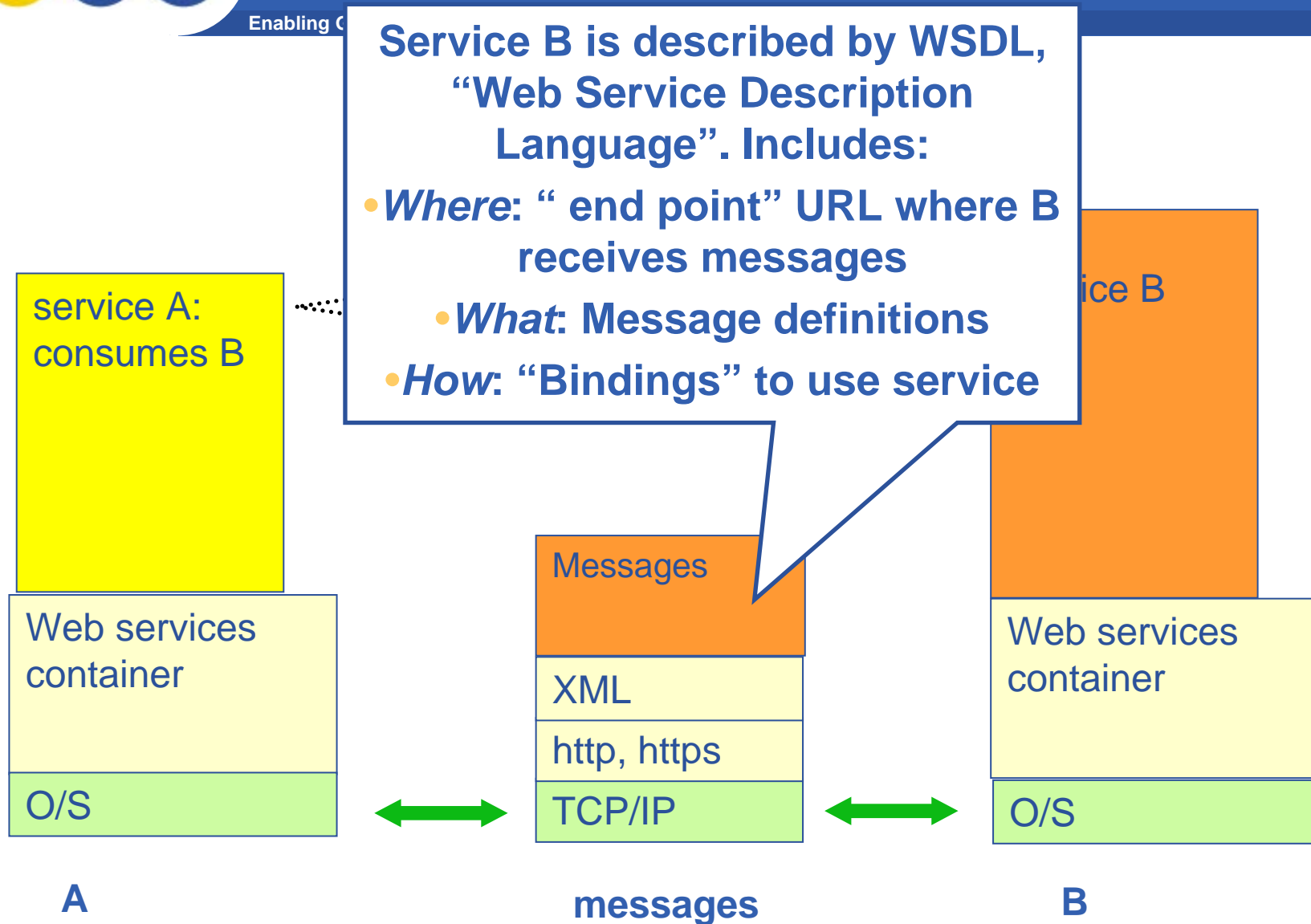
These messages define service B



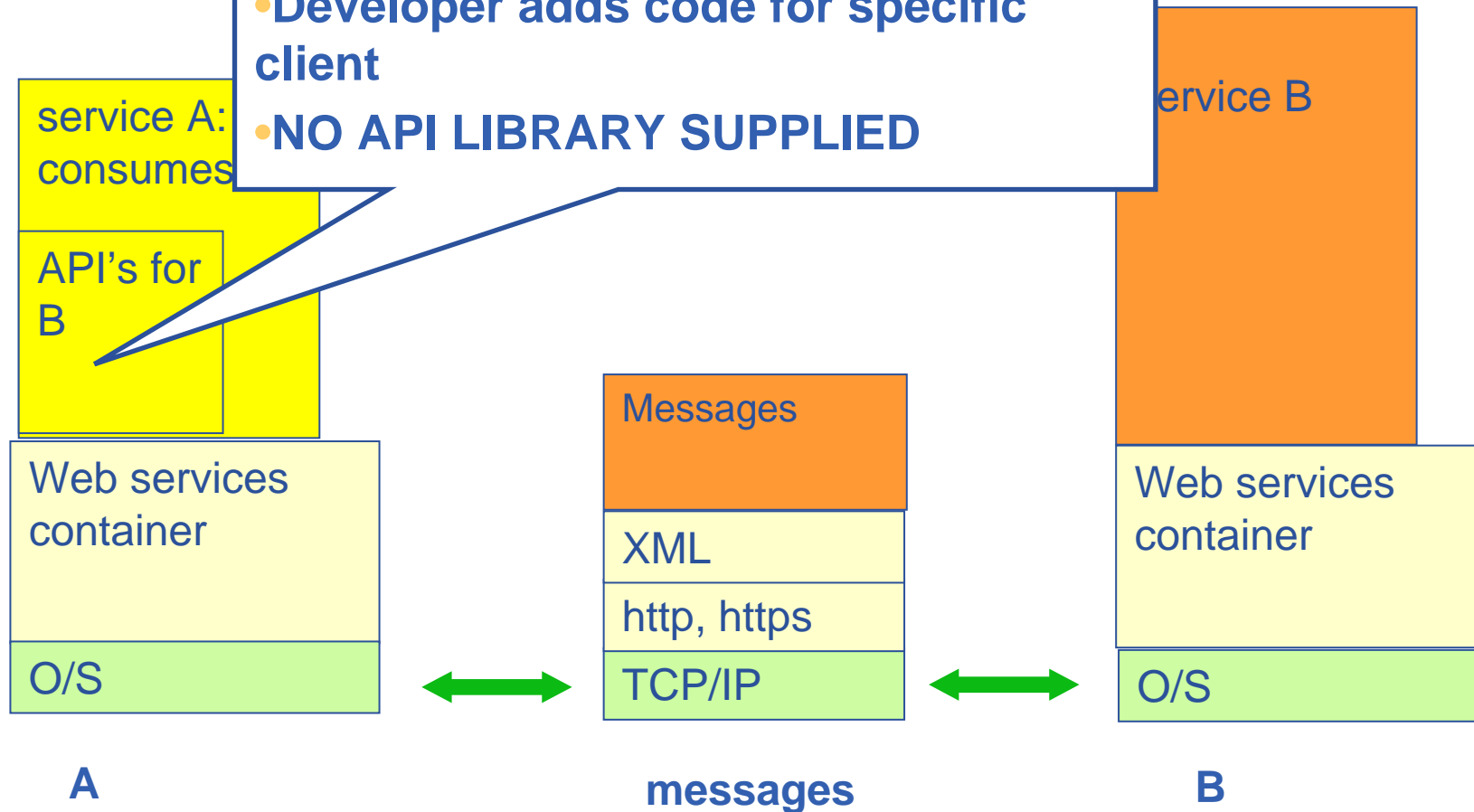
- Commonly used for WS - original purpose: carry HTML
- HTTP request methods
 - GET : specify a URL
 - POST: key-value pairs
- Defaults to port 80
- HTTPS: encrypts / decrypts



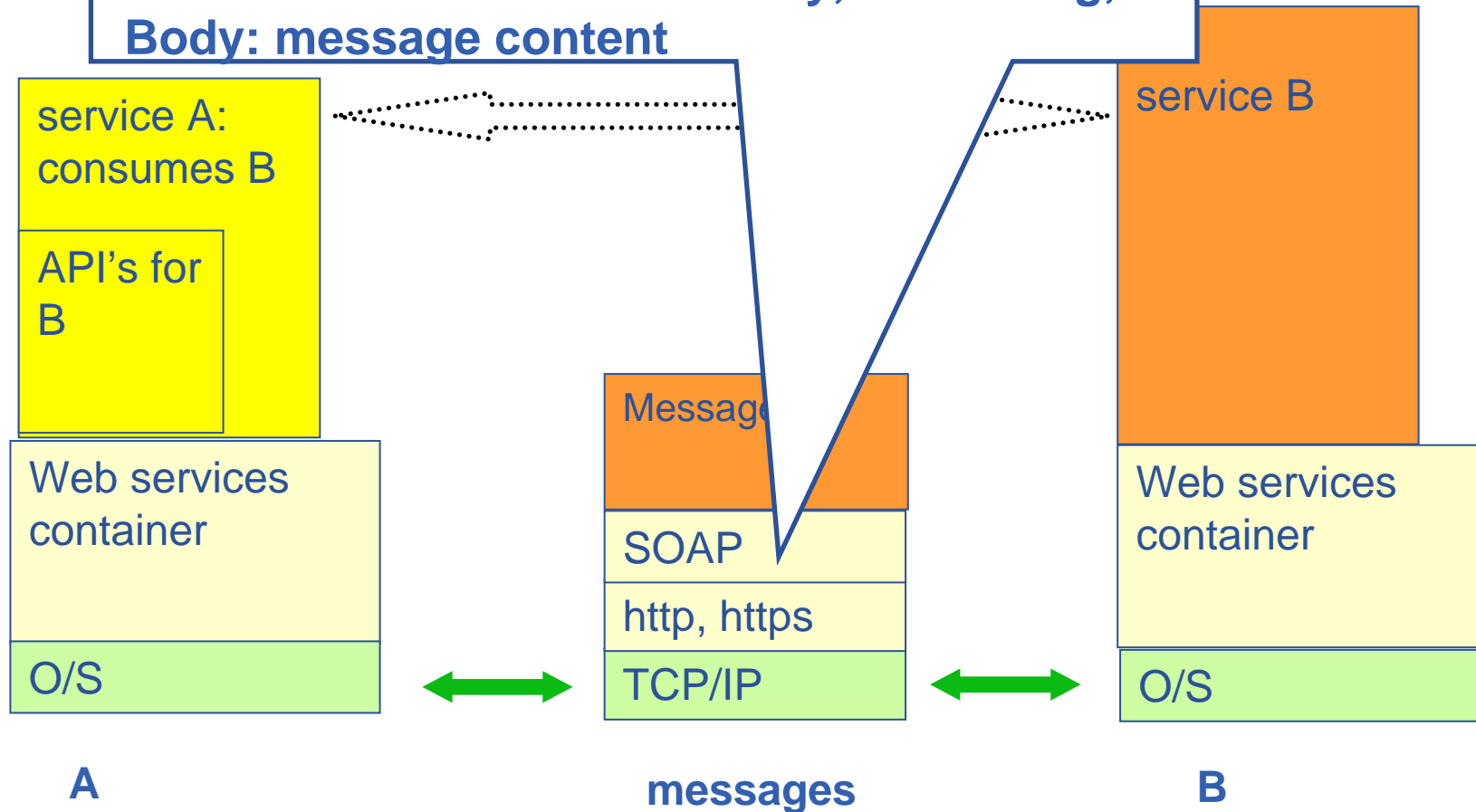


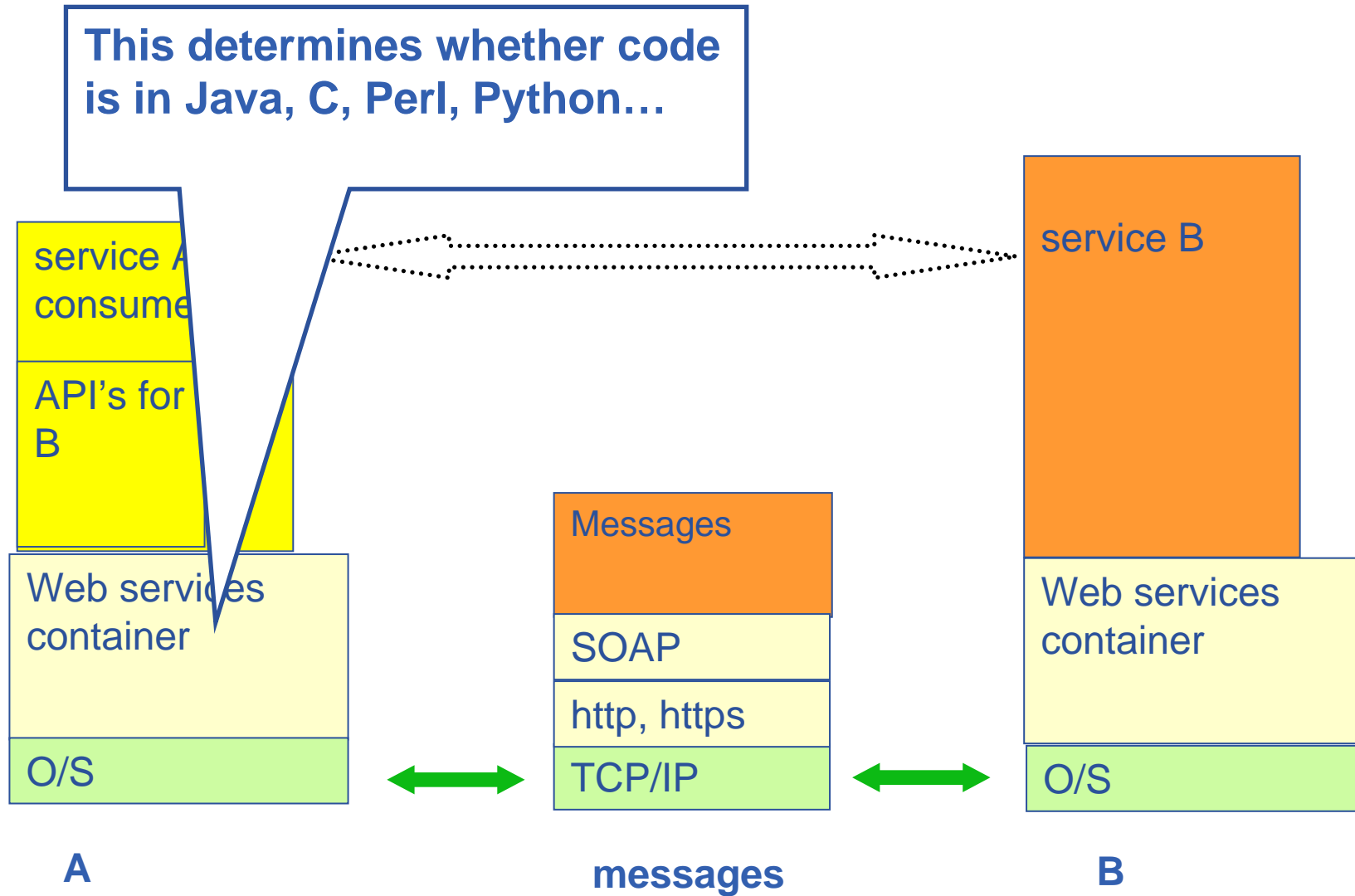


- API's are derived from the WSDL by tools
- Developer adds code for specific client
- NO API LIBRARY SUPPLIED



Commonly used XML-based messaging protocol
 Header: extendable for security, accounting,
 Body: message content

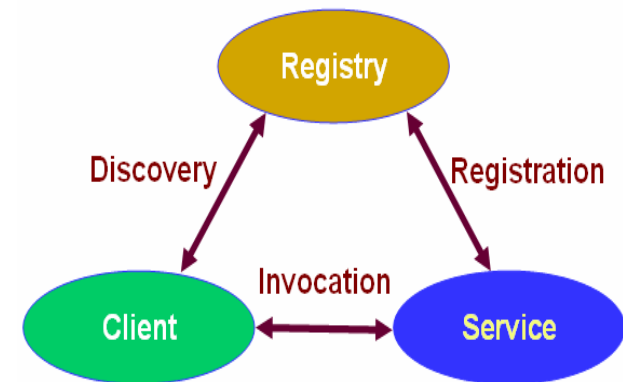




- **WS-I (Interoperability) delivers practical guidance, best practices and resources for developing interoperable Web services solutions.**
- **<http://www.ws-i.org/>**

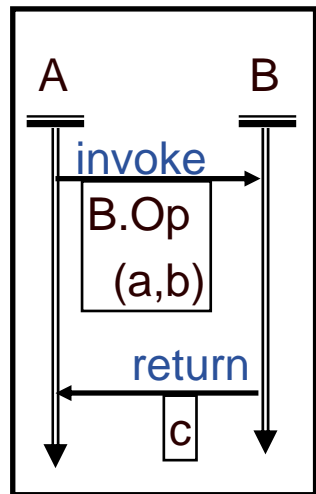
Open standards:

- **SOAP: protocol for message passing**
- **Web Service Description Language: to describe services**
- **UDDI: Universal Description, Discovery and Integration**
- **WS-Security: incorporates security**

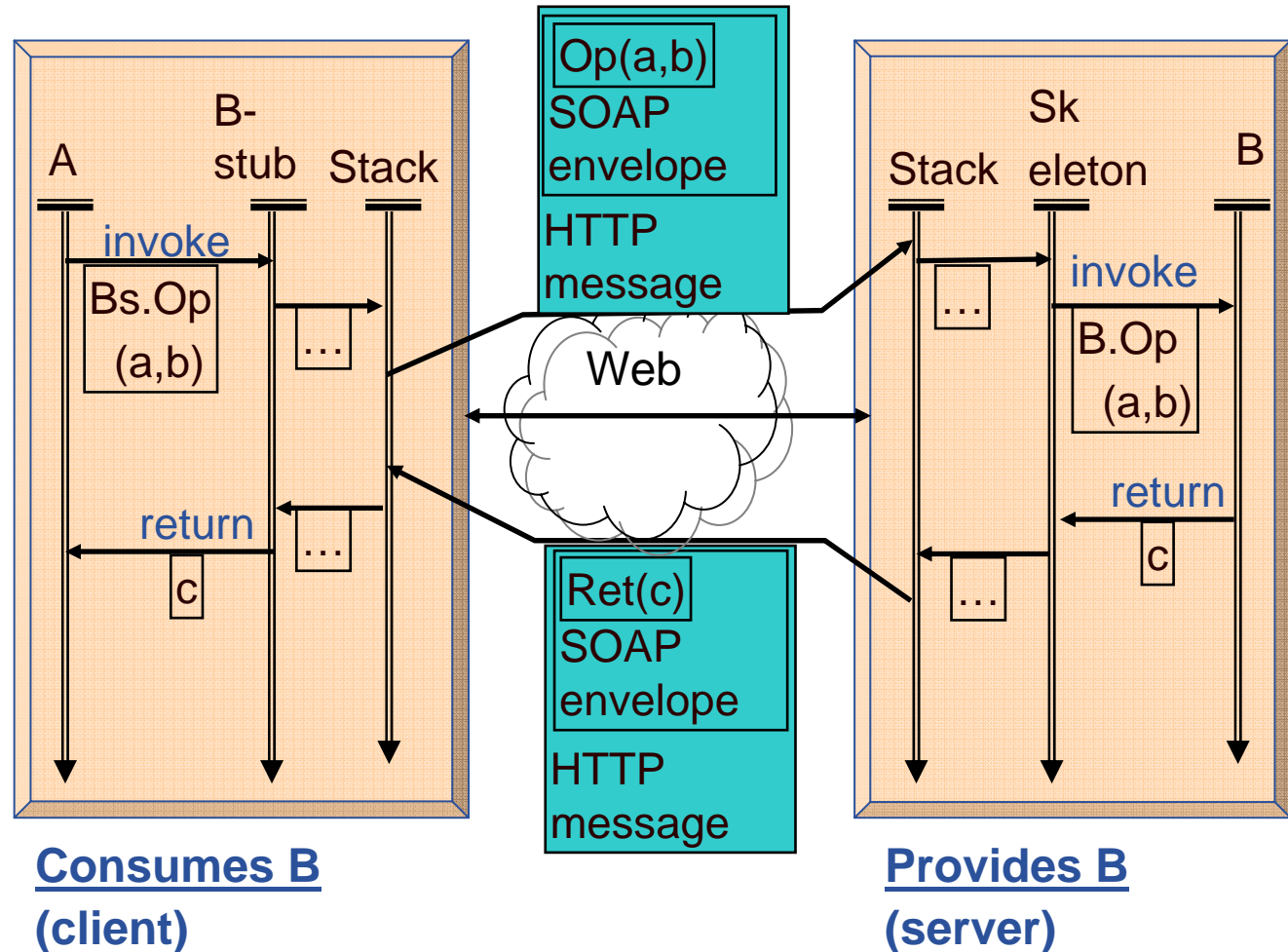


- **WS standards and consequences**
 - Standards justify investment in tools
 - Feedback into easier development of services and clients
- **The Apache Software Foundation (ASF) is a non-profit organization**
 - <http://www.apache.org/foundation/how-it-works.html>
- **We will be using:**
 - Apache Tomcat : servlet container
 - Apache Axis: implements SOAP

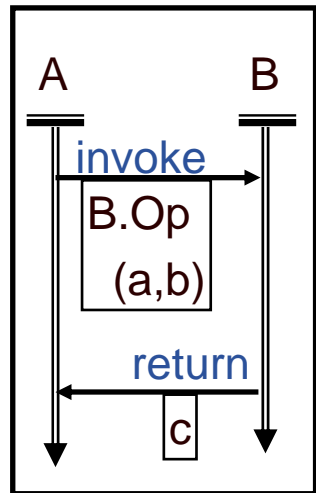
Insert the internet into the
invoke
and into the return



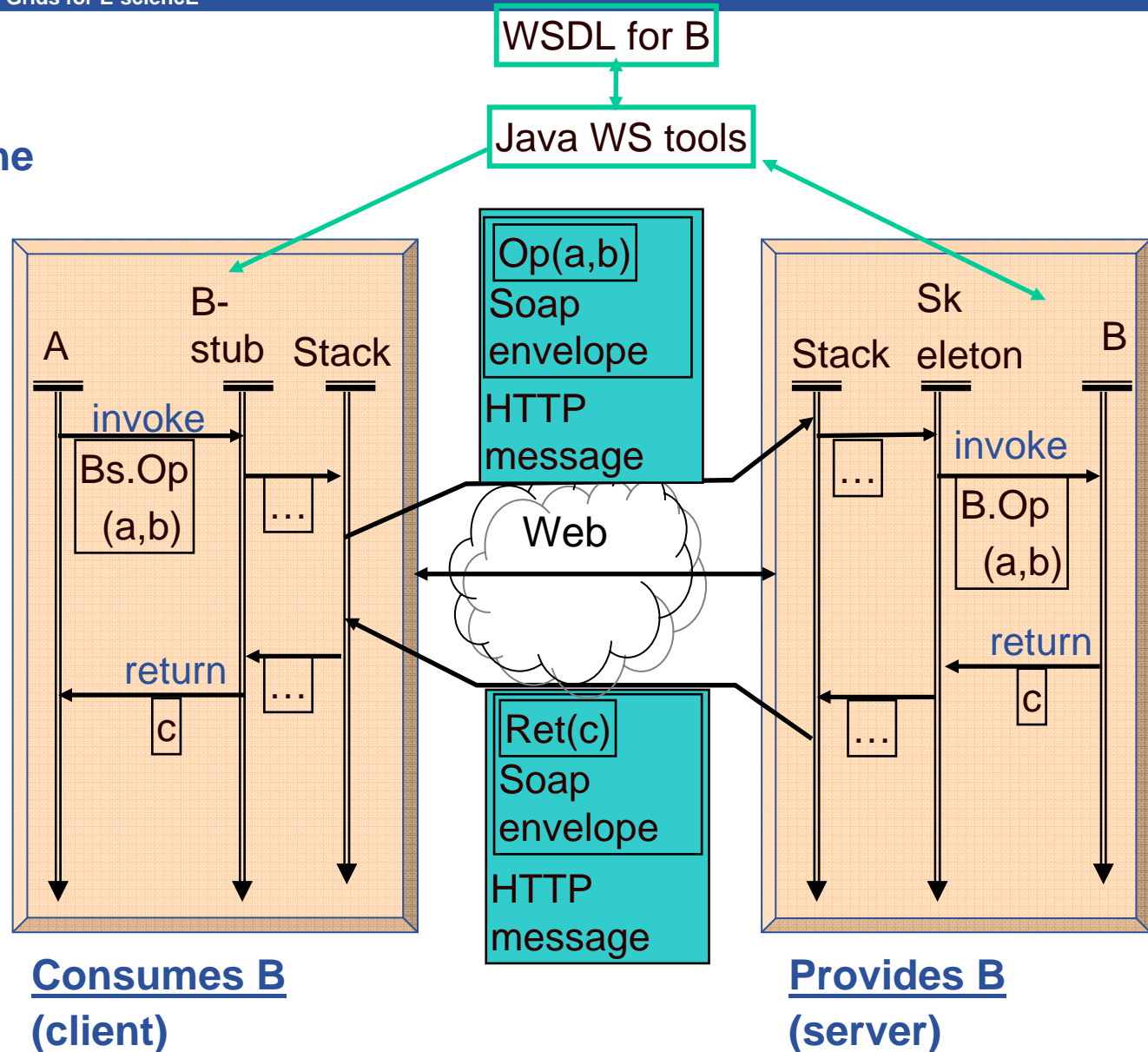
Java
program
with 2
classes



Insert the internet into the invoke and into the return



Java program with 2 classes



- **Intranet: within secure closed environment**
 - Behind firewall
 - Benefits of Service Orientation within an enterprise
- **Services in the public domain – google, amazon,....**
- **To extend use:**
 - Need to add authorisation and authentication
 - Including in workflow
 - WS-Security standard is a response

- **The Apache Software Foundation (ASF)**
<http://www.apache.org/>
- **WS-I**
- <http://java.sun.com/xml/webservices.pdf>

- **Service Oriented Architectures**
- **Web services**
- **Impact of having standards**
 - Stimulating confidence, uptake and tool creation
- **Note also: Higher languages definable – based on XML**
 - SOAP for message exchange and WS invocation
 - Application specific
 - GML for geographical data
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