Web Services

CSE 487/587
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References:
Vijay Arthanari's presentation on Web Services
Sotomayor's tutorial on Grid Services

Introduction

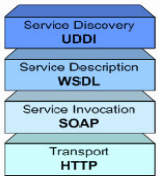
- Web Services is a technology that allows applications to communicate with each other in a platform-independent and language-independent way.
- It is a very loosely-coupled technology
- Web Services is a software interface that describes a collection of operations that can be accessed over the network through standardized XML messaging

Web Services

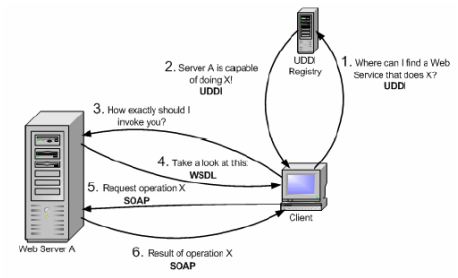
- Tackle issues of data and application integration
- Allow businesses to communicate on a process or application level with their partners
- A group of Web services interacting together defines a particular Web service application in a Service-Oriented Architecture (SOA).
- What websites are for humans, Web Services are for software.

Architecture

- UDDI : Universal Description, Discovery and Integration
- WSDL: Web Services Description Language
- SOAP: Simple Object Access Protocol
- HTTP: Hyper Text Transfer Protocol



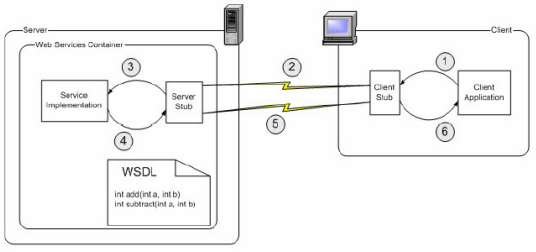
Mechanism



Mechanism

- Service Discovery: To find Web Services which meet certain requirements (usually handled by UDDI)
- Service Description: Web Services are self-describing. WSDL describes what operations it supports and how to invoke it.
- Service Invocation: Invoking a Web Service involves passing messages between the client and the server. SOAP specifies request and response formats.
- Transport: SOAP Messages are to be transmitted between the server and the client . The protocol of choice for this part of the architecture is HTTP

Mechanism



Mechanism

- Client application calls the client stub to invoke the Web Service which converts 'local invocation' into a proper SOAP request (Marshalling)
- The SOAP request is sent to Web Services container (using HTTP) which is then forwarded to the server stub. The server stub converts the SOAP request into appropriate format for the service implementation to understand (unmarshalling) and passes the request to the implementation.
- Service implementation carries out the work it has been asked to do.
- The result of the requested operation is handed to the server stub, which will turn it into a SOAP response.
- The SOAP response is sent to the client (using HTTP). Client stub receives the SOAP response and converts it into appropriate format for the client application to understand.
- Client application receives the result of the Web Service invocation and uses it.

Limitations

- Overhead
  - Transmitting all data in XML is not as efficient as using a proprietary binary code. What you win in portability, you lose in efficiency.
- Lack of versatility
  - Currently, Web Services are not very versatile, since they only allow for some very basic forms of service invocation. CORBA, for example, offers a lot of supporting services (such as persistency, notifications, lifecycle management, transactions, etc.)
  - Grid Services actually make up for this lack of versatility.