Web services Composition: A pragmatic view of the present and the future.

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Outlines

- Explosion of services available electronically
- Web services can harness the real power of the Internet
- Composition: the breakthrough for Web Services?
- Static composition: Old wine in new bottle?
- Dynamic composition, the future of the Semantic web

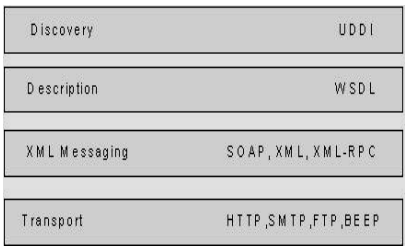
E-Services

- E-commerce and e-bots are resurrecting **.com**
- Abundance of services available electronically, but exposure to outside world is problematic:
  - Propriety interfaces
  - Security
- Traditional distributed computing middleware (CORBA, RMI) solves the problem partially
- Lack of standardization deprives *clever* solutions from reusability

Advantages of Web Services

- Web based
  - Server-side programming only required
  - Standardized
- Language and platform independent
  - Implementation in any language
  - Communication encoding is neutral
  - Communication is transparent for users

Web Services protocol stack

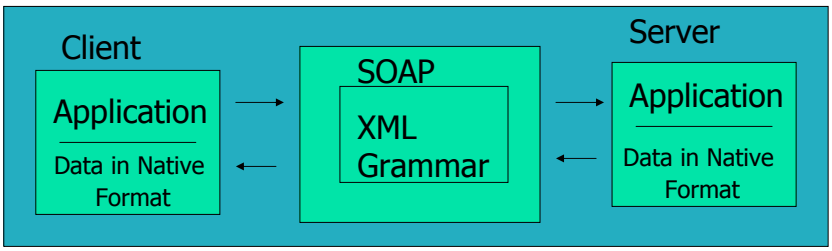


Web Services protocol stack

As transport layer options are available, but in current form Web Services use ubiquitous HTTP for the transport protocol. HTTP is considered as a secure protocol thus it allows Web Services to be exposed beyond the firewall.

XML + SOAP(Simple Object Access Protocol)

- The main advantage XML offers Web services is data independence so that data types and structures are not tied to the underlying implementations of the services.
- To take advantage of the data independence, applications must convert data into XML and transform data out of XML into native format. This serialization refers to SOAP.

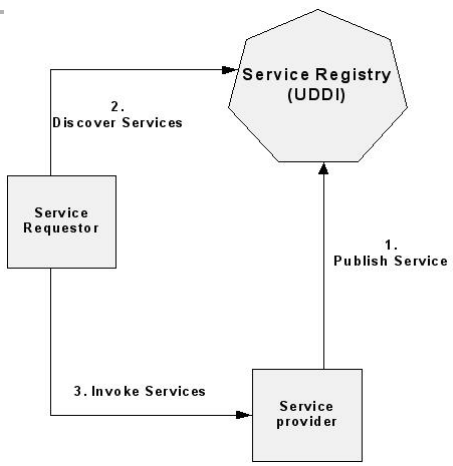


WSDL(Web Services Description Language)

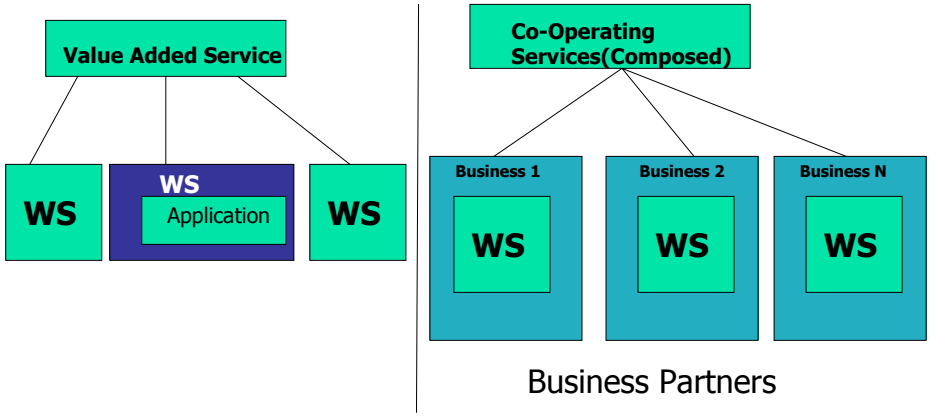
- The Web Services expose a business function, a service to the outside world for the seamless use, for this purpose they need to be described in some form.
- WSDL is the XML grammar for the same purpose.
- WSDL document provides all the information related to the web service including name of service, types of method provided, messages input and output required for invoking these operations, the data types of messages, transport protocol and the connection information.

UDDI (Universal Description Discovery and Integration)

- Services can be Published using UDDI, with WSDL based description, searched called and bind at run time.



Composition



Logic for composition

1. Selecting Services that will fulfil the requirement in accumulation

2. Order in which the web services operations are invoked. [control flow]

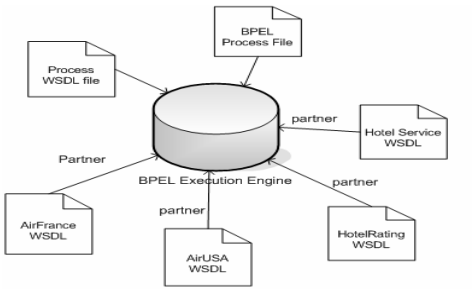
3. The order in which data is passed between web services operations. [dataflow]

Categories:

1. Static
2. Semi-automatic
3. Automatic/Dynamic

Static Composition

- Here the selection of services, Flow Management done priori, by human developer making BPEL static composition technique.



- WS-BPEL(Web Service Business Process Execution Language).
- From Microsoft, IBM.

Application of Static Composition

BPEL is good solution for EAI (inter-organization).

- possible to fulfil the requirement for BPELe in same business domain(developer should have knowledge of everything regarding services.)

BPEL poor candidate for B2B (intra-organization).

- Presumed knowledge of the partner's (web-service interface.

Dynamic composition

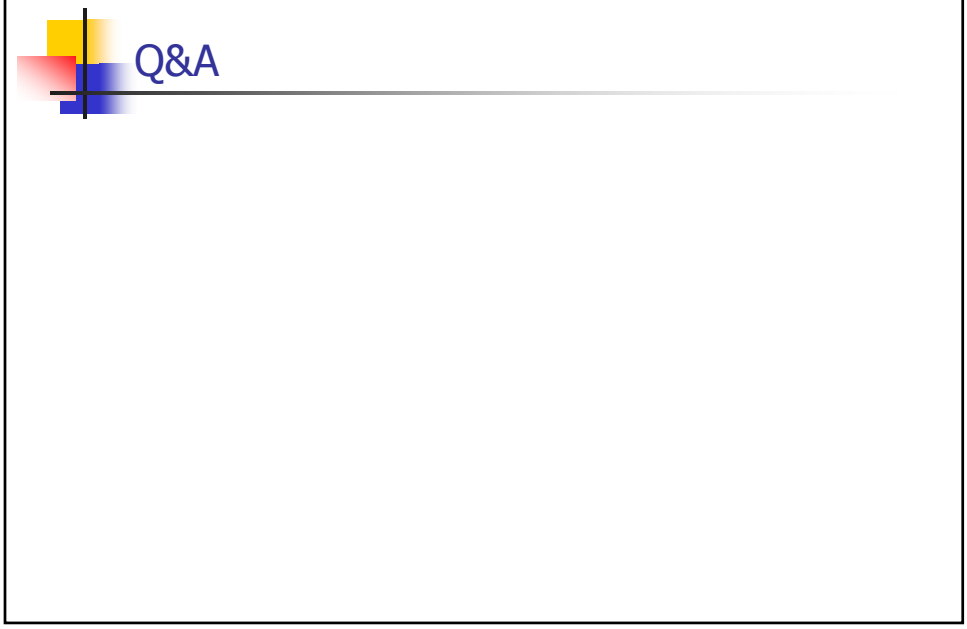
Dynamic composition:

- Services can be from inter/intra organizational domain, public, external.
- User specifies parameters for successful composition.
- Composition performed at runtime.
- The solution address the problems of identifying candidate services, composing them and how closely they satisfy the request.

Requirements

- A **semantic** language specifying the capability of services
  - What? – profile model
  - How? – process model
  - Where? – grounding model
- **ONTOLOGY**
- A layer top on the semantic language to reason about the services:
  - interpreting semantic web services capability
  - Select (match-make) suitable services
  - automating flow management

1. OWL-S
2. AI planning,workflow management, intelligent Agents.


Q&A