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Service Oriented Architecture - SOA

SOA evolved from component-based architectures. SOA is a collection services with a loose coupling and dynamic binding between services

[Characteristics](#)

[Layered Approach](#)

[Adopting Service Oriented Architecture \(SOA\)](#)

web services are an approach of building a SOA based on Web technologies

- encapsulation of application components in web services

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Web Services



Web services provide a standard means of communication among distributed software applications based on the Web technology. Standardization by the W3C community.

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Informal Definition



Web Services

- can live anywhere in the network

- are described using a service-description language which

 - is in formal XML notation

 - covers all the details necessary to interact with the service (message formats for operations, transport protocols and location)

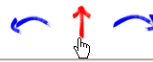
 - hides the implementation details of the service

- are published to a registry of services

- are available through its declared API and invocation mechanism

- provide an entry point accessing local/remote services

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A Web Service is a standardized way of integrating Web-based applications.

Informal Definition

Integration

allows integration of application functionality
within organizations

between business partners across organizational boundaries

Features of Web Services

Web Services - Distributed Objects

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specific features of Web Services

programmable: WS are accessed via a programmable interface

self descriptive: meta data describe the WS.

encapsulation: self contained application component.

loosely coupled: communication via message passing using platform-independent and language-neutral protocols.

location transparent: access to WS from different locations via network communication.

protocol transparent: WS is based on Internet protocol suite; operation may support several protocols, e.g. HTTP, SMTP.

composition: several WS may be combined into a new WS.

Web services are software components which enable loosely coupled, component-oriented, cross-technology application implementations.

Web Services are document-centric

communication is by sending documents from the server and back.

most properties are associated with the document itself, and not the service.

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Definition: A **Web service** (W3C) is a software system identified by a **URI**, whose public interfaces and bindings are defined and described using XML. Its definition can be discovered by other software systems. These systems may then interact with the Web service in a manner prescribed by its definition, using XML based messages conveyed by internet protocols.

A Web Service is a standardized way of integrating Web-based applications using XML, SOAP, WSDL and UDDI open standards over an Internet protocol backbone.

XML: tag the data

SOAP: transfer the data

WSDL: describe the available services

UDDI: list the available services.

simplified view : a web service is a remote procedure call over the internet using XML messages.

Web Services interoperability Stack

Basic Architecture

Roles

Operations of the Web Service Architecture

Basic Standard Technologies

Message Exchange Patterns

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Compositional	BPEL4WS, WS-Notification
Quality of Experience	WS-Security, WS-Transactions, ..
Description	WSDL, UDDI, WS-Policy, ..
Messaging	XML, SOAP, WS-Addressing
transport	HTTP, SMTP, ...



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defines an interaction between software components as an exchange of messages between service requesters and service providers.

Functions of the architecture

exchanging messages.

describing Web services.

publishing and discovering Web service descriptions.

The service: a Web service is an interface; implementation of it is the service.

The service description: details of the interface and the implementation of the service.

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The basic Web service architecture models the interactions between three roles

Service Provider

processes a Web service request.

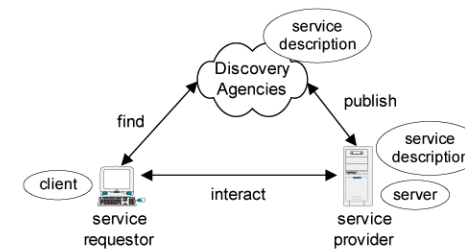
Service Discovery Agency

agency through which a Web service description is published and made discoverable.

Service Requestor

requests the execution of a Web service.

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Publish : a service needs to publish its description such that a requestor can subsequently find it.

Find : the requestor queries a registry for the required service and retrieves a service description.

Interact : a service needs to be invoked and the results are returned.

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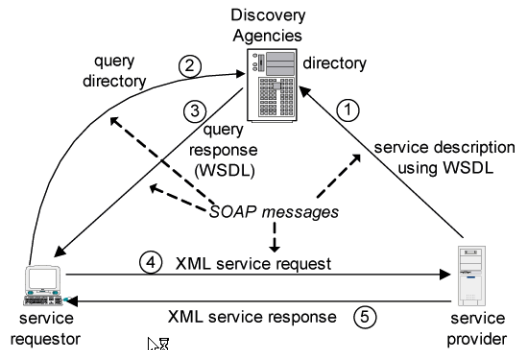


Web services are based on 3 basic standards

WSDL: Web Services Description Language.

UDDI: Universal Description, Discovery and Integration

SOAP: Simple Object Access Protocol



Steps involved in providing and consuming a service

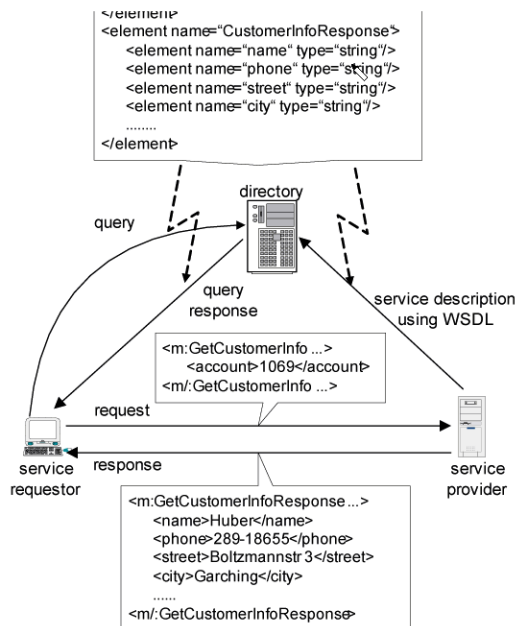
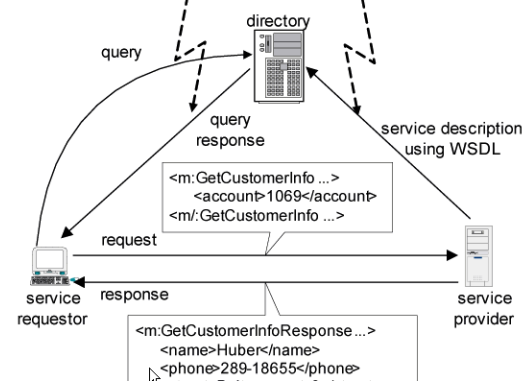
1. a service provider describes its service using WSDL.
2. a service requestor queries the directory to locate a service and determine how to communicate with that service.
3. directory sends service description to service requestor



WSDL uses XML to define messages.

```

<element name="CustomerInfoRequest">
  <element name="account" type="string">
    .....
  </element>
</element>
<element name="CustomerInfoResponse">
  <element name="name" type="string"/>
  <element name="phone" type="string"/>
  <element name="street" type="string"/>
  <element name="city" type="string"/>
  .....
</element>
  
```



define the sequence of one or more messages exchanged between service requestor and service provider.

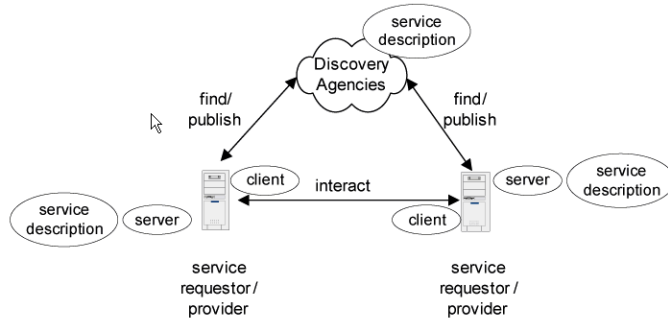
Examples are: one-way, request/response, broadcast.

The Web service architecture may support different interaction scenarios.

- [Peer-to-Peer](#)
- [Direct Interaction](#)
- [Intermediary](#)



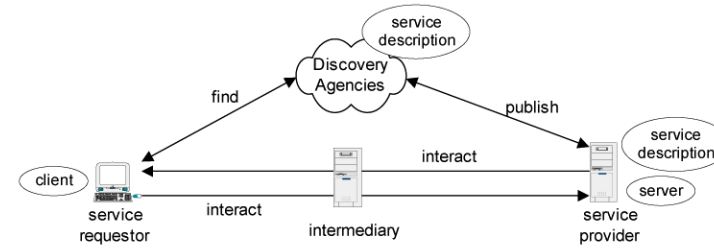
Peer-to-Peer



In the peer-to-peer scenario, each Web service instance serves in both the service requestor and service provider roles.

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Intermediary



Intermediaries may perform additional functions (besides the operations defined by the message exchange patterns) with a message such as routing, security, management.

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