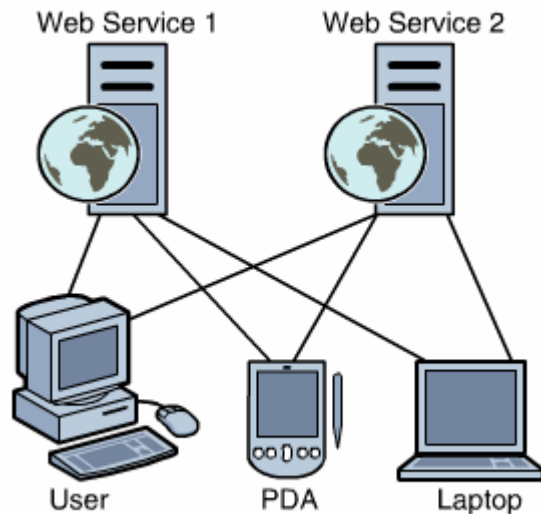# XML Web Services

אוהד ברזילי

פיתוח מערכות תוכנה מבוססות Java
בית הספר למדעי המחשב, אוניברסיטת תל אביב

Web services

☐ Web services help applications to interact directly with one another and execute instructions automatically **without manual interference**

☐ Web services also enable **program-to-program communication** and can combine applications from various locations
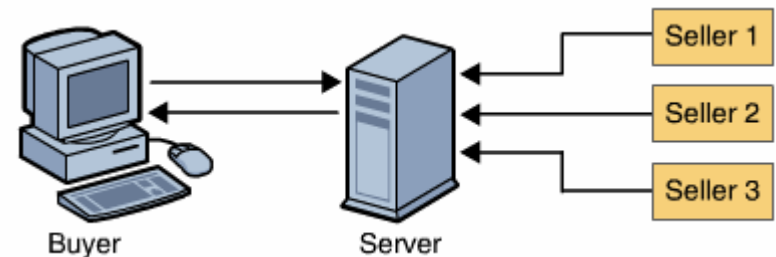
תהליכים עסקיים הם מורכבים

☐ תהליכים עיסקיים רבים מערבים כמה בעלי עניין כגון: לקוחות, ספקים (אולי מתחרים), בנקים, חברות כרטיסי אשראי

☐ דוגמאות לשרותים מורכבים:

■ קניית בית באינטרנט

■ הרכבת טיול באירופה

פיתוח מערכות תוכנה מבוססות Java
**בית הספר למדעי המחשב אוניברסיטת תל אביב**

XML Web Services

- **XML-based** – By transporting data, XML eliminates all network, operating system, and platform dependencies
- **Loosely coupled** – Web services enable a consumer to access other web services. In addition, a web service interface can change over time
- **Coarse-grained** – XML web services offer a set of related business functions
- **Synchronicity** – XML web services are both synchronous and asynchronous
- **Remote procedure calls (RPCs) support** – XML web services enable clients to access procedures, functions, and methods on remote objects through an XML-based protocol
- **Document exchange support** – XML can also be used to represent complex documents

Entities Used in Web Services Infrastructure

☐ **Service providers** – Offer services on the web and publish the APIs to provide access to the service

☐ **Service registries** – Register and categorize the services offered by the service providers.

☐ **Service requesters** – Use the service registries to access the services provided by the service providers

Service Registry

Service Requester   Service Provider
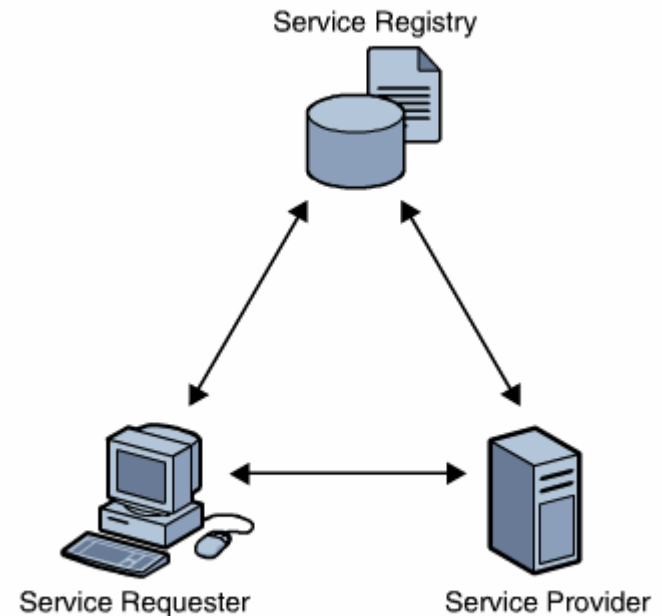
# Functional Components of Web Services Infrastructure
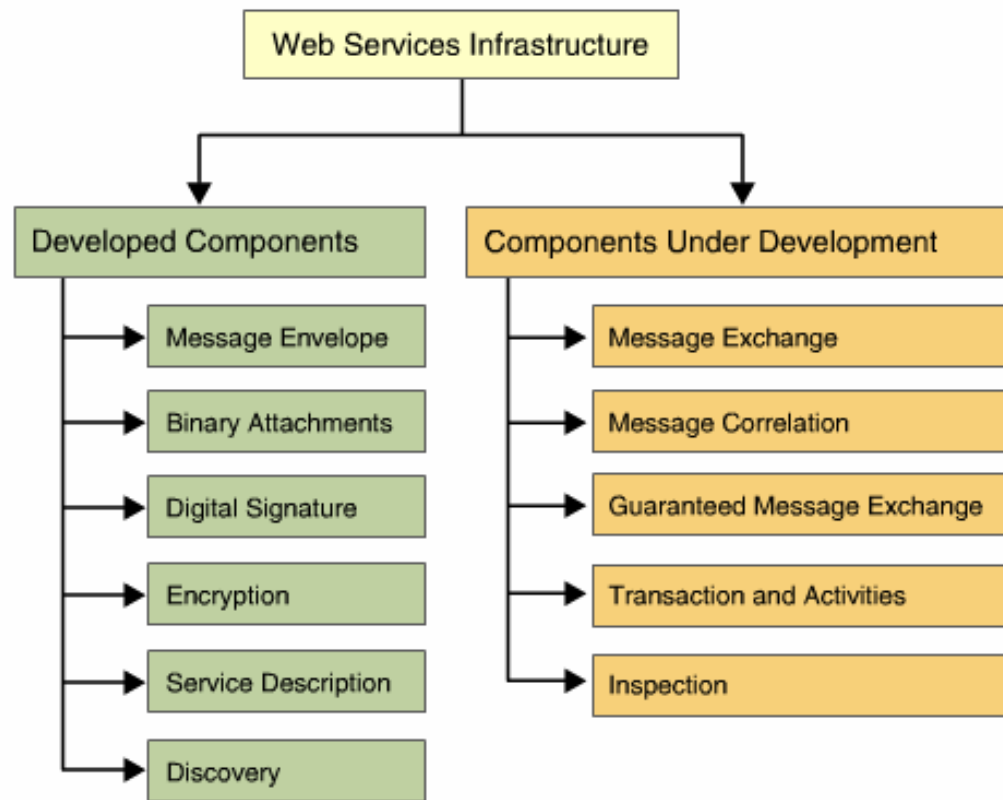
Specifications in the WS Model

- ☐ Simple Object Access Protocol (SOAP)

- ☐ Web Service Definition Language (WSDL)

- ☐ Description, Discovery, and Integration (UDDI)
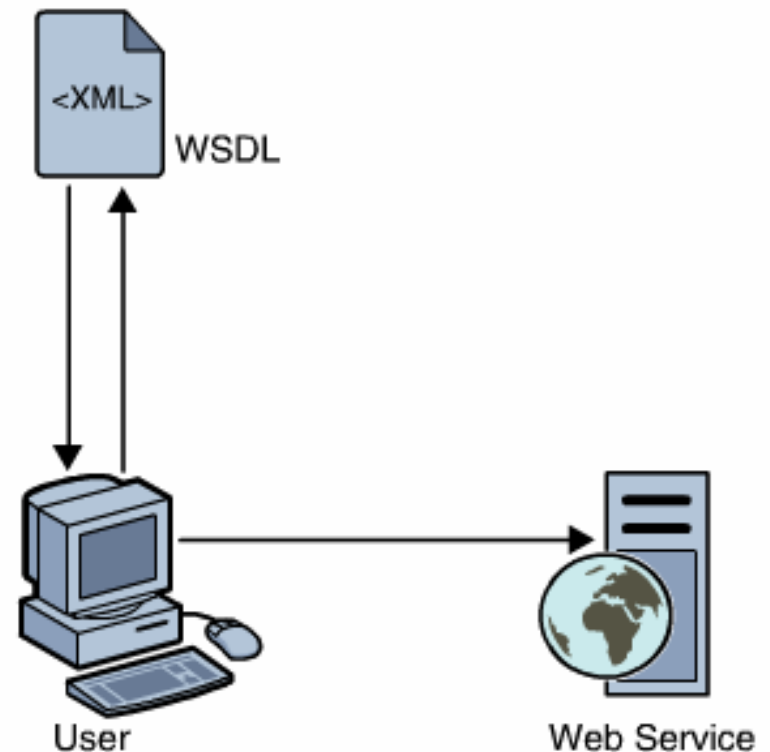

Web Service

SOAP

WSDL

UDDI
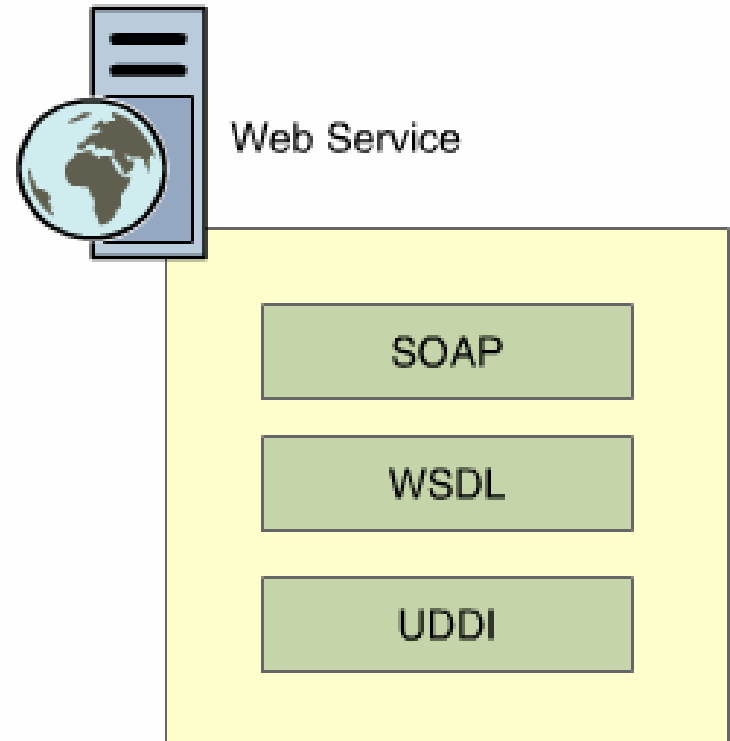
SOAP

- ☐ SOAP was developed in 1999 as an extension of the XML-RPC specification

- ☐ SOAP is a **message layout specification** that uses XML for exchanging information in a decentralized and distributed environment

- ☐ SOAP is a platform- and language-independent protocol that allows **applications to communicate** with each other over the Internet
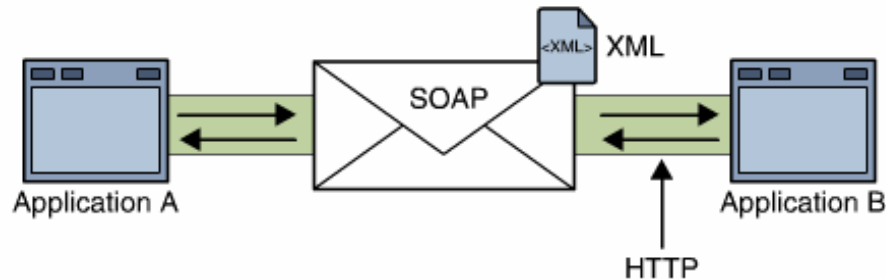
WSDL

- ☐ **WSDL** provides a standard for describing the interface of a web service using XML

- ☐ WSDL standarizes:
  - ■ Representation of the input and output parameters of an external invocation
  - ■ Structure of the function
  - ■ Nature of the invocation
 - ■ The service's protocol binding

UDDI

- ☐ UDDI is a set of standards that provides a mechanism for deploying and locating web services
- ☐ It helps organizations and individuals to dynamically look up and discover services provided by external business organizations
- ☐ A UDDI registry has two types of clients:
  - ■ Clients who want to deploy and publish service descriptions
  - ■ Clients who want to obtain these service descriptions deployed and published by other clients
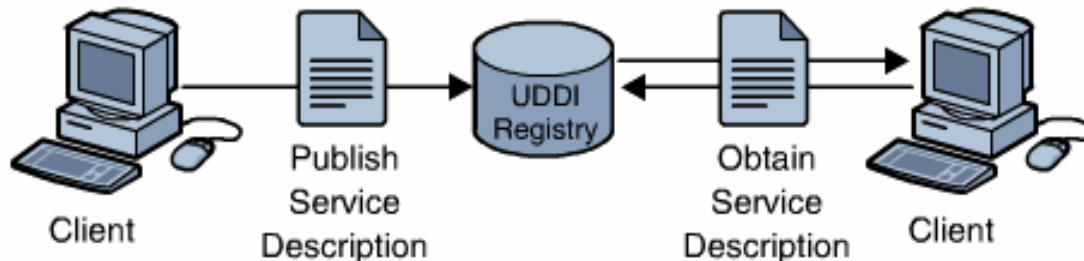
JAX-WS

- ☐ JAX-WS is an integrated stack of JAX-WS 2.0, JAXB 2.0, and SAAJ 1.3

- ☐ JAX-WS is:
  - ■ An open-source project and is a part of JCP
  - ■ Used to build web applications and web services on the basis of new XML-based web services functionality
  - ■ Designed to replace JAX-RPC in web services and web applications

JAX-WS 2.0

JAXB 2.0

SAAJ 1.3

JAX-WS
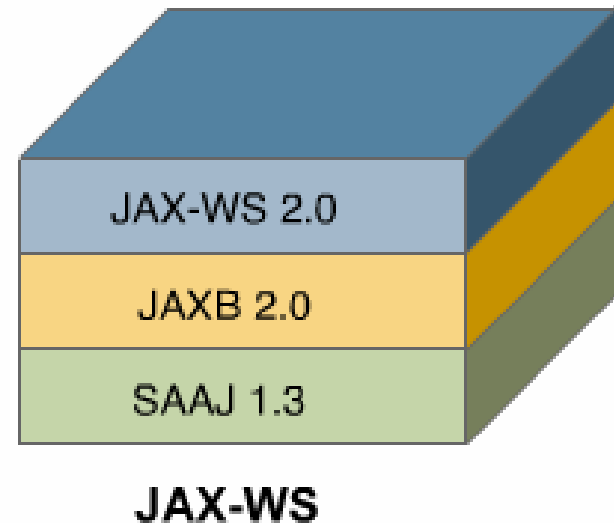
JAXB

- ☐ **J**ava **A**rchitecture for **X**ML **B**inding
- ☐ JAXB provides:
  - ■ A **convenient** way for binding XML to Java data
  - ■ All the data binding functionality in a **single package**
  - ■ A **standard way to customize** the binding of existing schema components to Java technology representations.
  - ■ **Portability** to applications implementing JAXB
  - ■ Support for **validation** on demand.
  - ■ Support for clean *round-tripping*.
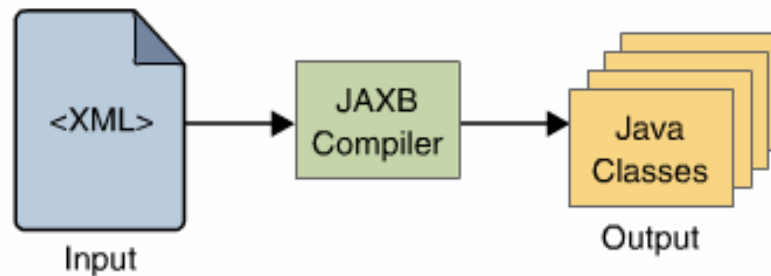
XWSS

- ☐ **X**ML and **W**eb**S**ervices **S**ecurity
- ☐ XWSS helps to secure applications in the following ways:
  - ■ Uses the XML **Digital Signature** (Dsig) option to sign and verify parts of the SOAP messages or attachments
  - ■ Uses **encryption and decryption** for SOAP messages and attachments
  - ■ Sends UserName tokens, X509 certificate tokens, and Security Assertion Markup Language (SAML) tokens, which bind the identity of the token to the message containing that token, along with the message
  - ■ Secures standalone web services applications
  - ■ Implements **interoperable web services security** applications

SAAJ

- ☐ **S**OAP with **A**ttachments **A**PI for **J**ava
- ☐ Provides a library to construct and read SOAP messages
- ☐ Allows you to send and receive SOAP messages across the network
- ☐ Provides the SOAPMessage class to represent a SOAP message
- ☐ Provides the AttachmentPart class to represent the attachment part of a SOAP message

ebXML

- **E**lectronic **B**usiness using e**X**tensible **M**arkup **L**anguage
- Competing (complementary?) technology

- Completed specifications:
  - ISO 15000-1: ebXML Collaborative Partner Profile Agreement
  - ISO 15000-2: ebXML Messaging Service Specification
  - ISO 15000-3: ebXML Registry Information Model
  - ISO 15000-4: ebXML Registry Services Specification
  - ISO 15000-5: ebXML Core Components Technical Specification, Version 2.01.

- Work in progress:
  - Messaging (ebMS)
  - Business Process & Collaboration (ebBP)
  - Collaboration Protocol Profile and Agreement (CPPA)
  - Registry and Repository
  - Core Components (CCTS)