

# INTRODUCTION TO WEB SERVICES

# Web Service

- ◆ A *Web Service* is a network accessible interface to application functionality, built using standard Internet protocols

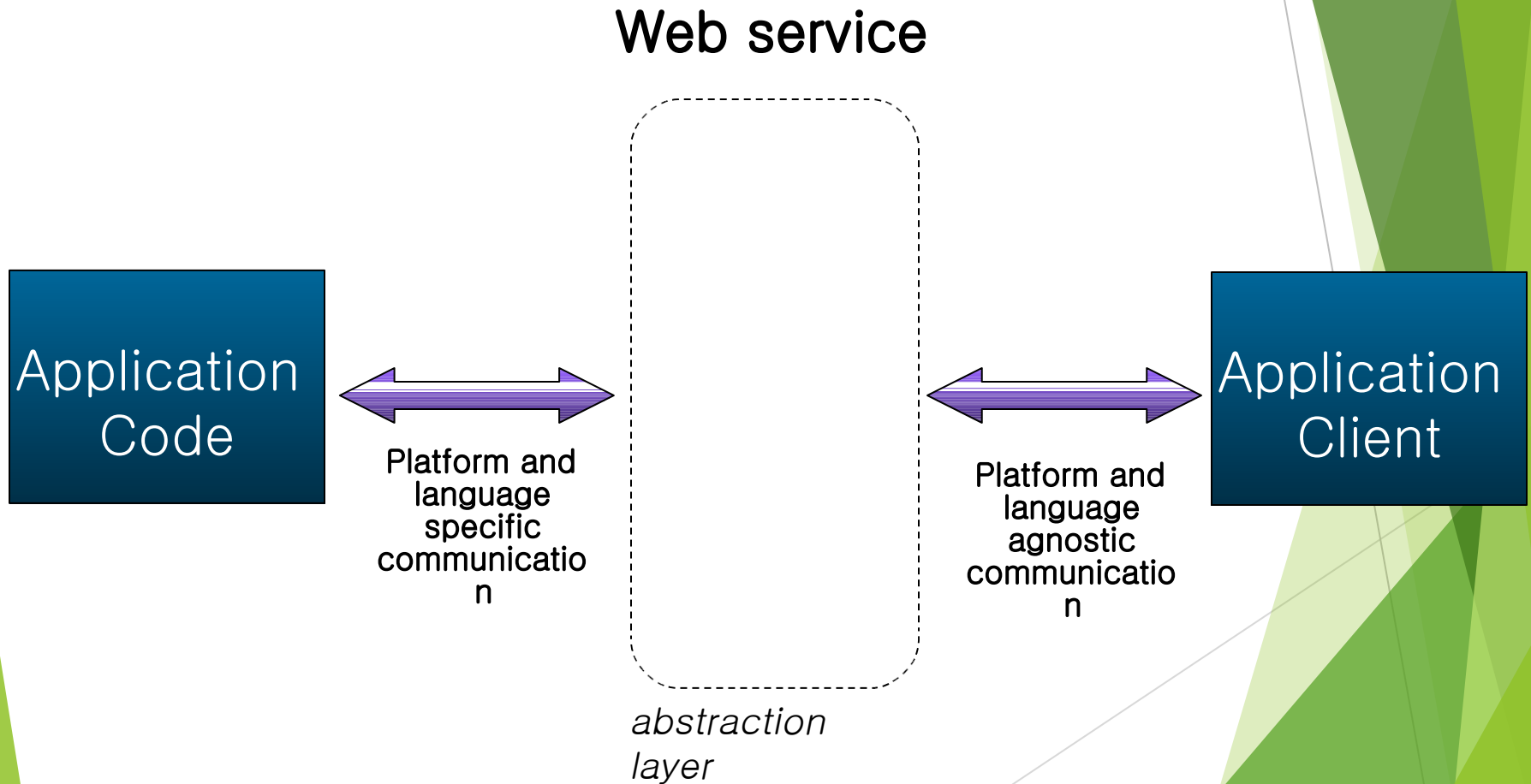


A Web Service exposes functionality to

- a consumer
- Over the Internet or
- intranet A programmable URL

Functions you can call over the Internet

# Web service simplified



# Web Service

Based on Web standards

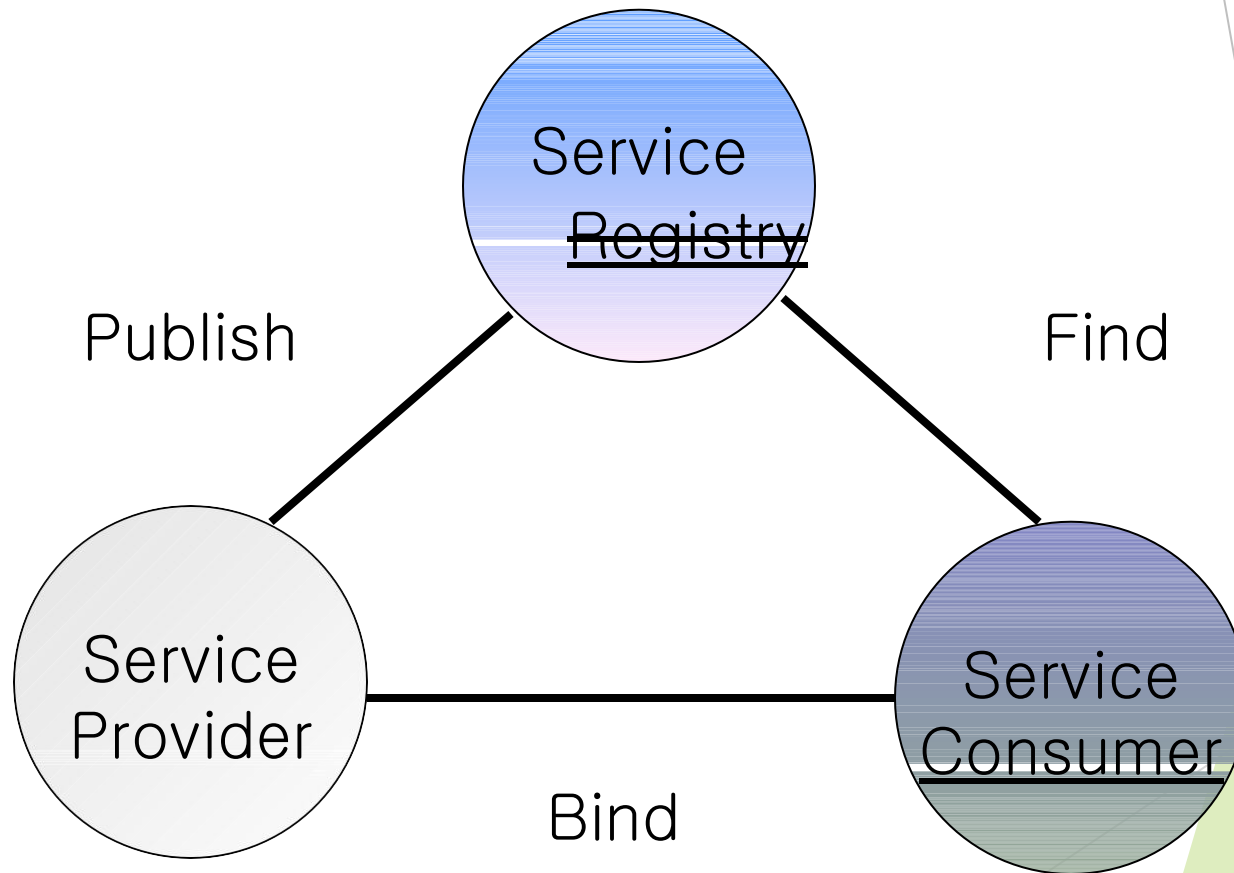
- ⌘ HTTP/(S), XML, SOAP, WSDL, UDDI
  - ⌘ Can be implemented in any language on any platform
  - ⌘ Component-like, reusable
- Not tied to any platform / languages

# Open, Standard Technologies of a Web

## Service

- A standard way for communication (**SOAP**)
- A uniform data representation and exchange mechanism (**XML**)
- A standard meta language to describe the services offered
- (**WSDL**)
- A mechanism to register and locate WS based applications

# The Web Service architecture



# Underlying Technology Web Service Stack

**Directory: Publish & Find Services: UDDI**

**Inspection: Find Services on server: DISCO**

**Description: Formal Service Descriptions: WSDL**

**Wire Format: Service Interactions: SOAP**

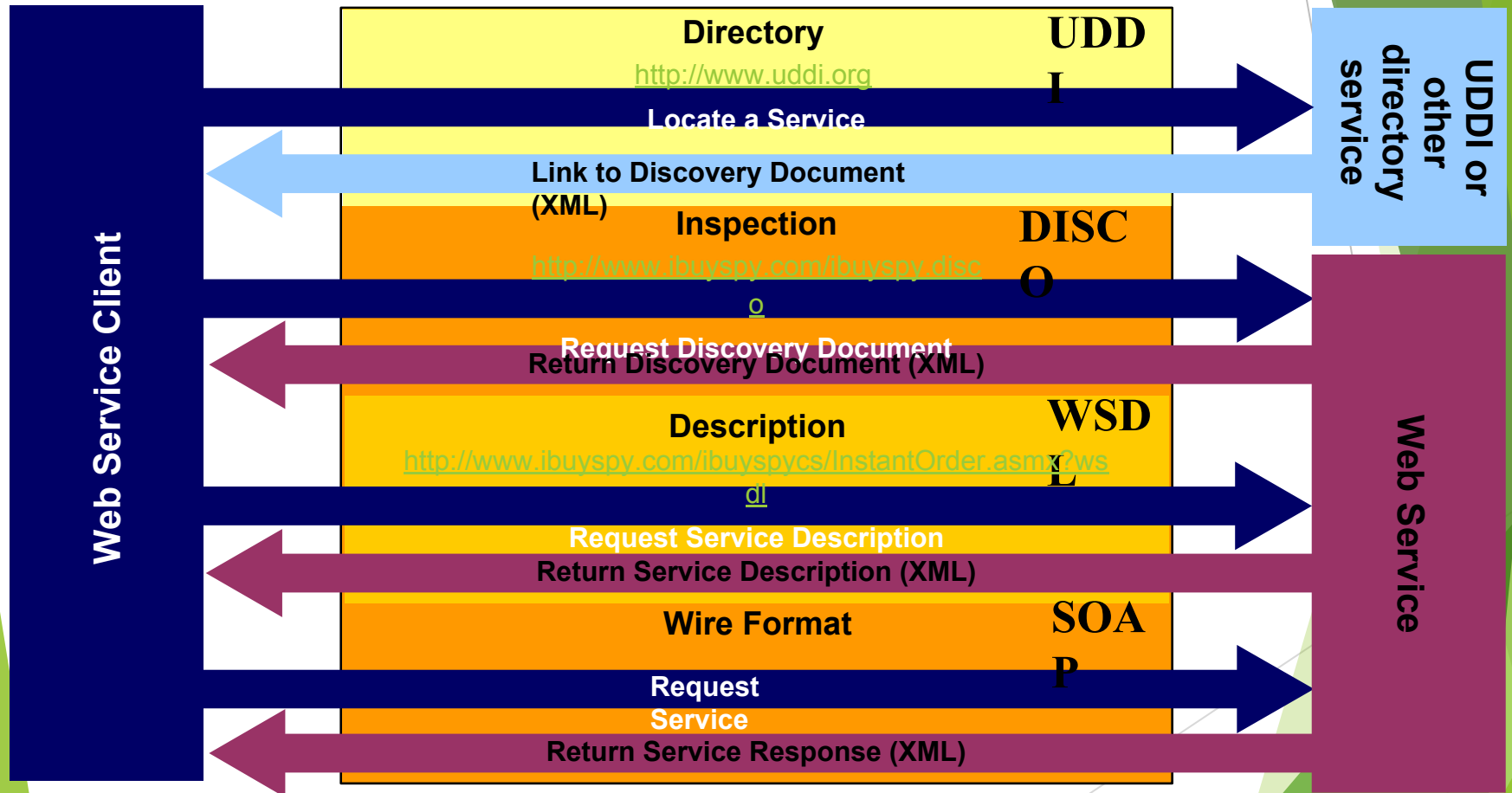
**Universal Data Format: XML**

**Ubiquitous Communications: Internet**

**Simple, Open, Broad Industry  
Support**

# Underlying Technology

## Web Service Stack





# Universal Description, Discovery and Integration (UDDI) Protocol

- ▶ Enables enterprises to quickly and dynamically discover and invoke Web Services both
- ▶ internally and externally

Yellow pages of Web services

## ■ Examples

■ [www.uddi.org](http://www.uddi.org)

■ [www.biomoby.org](http://www.biomoby.org)

[www.xmethods.co](http://www.xmethods.co)

[m](#)

# Simple Object Access Protocol (SOAP)

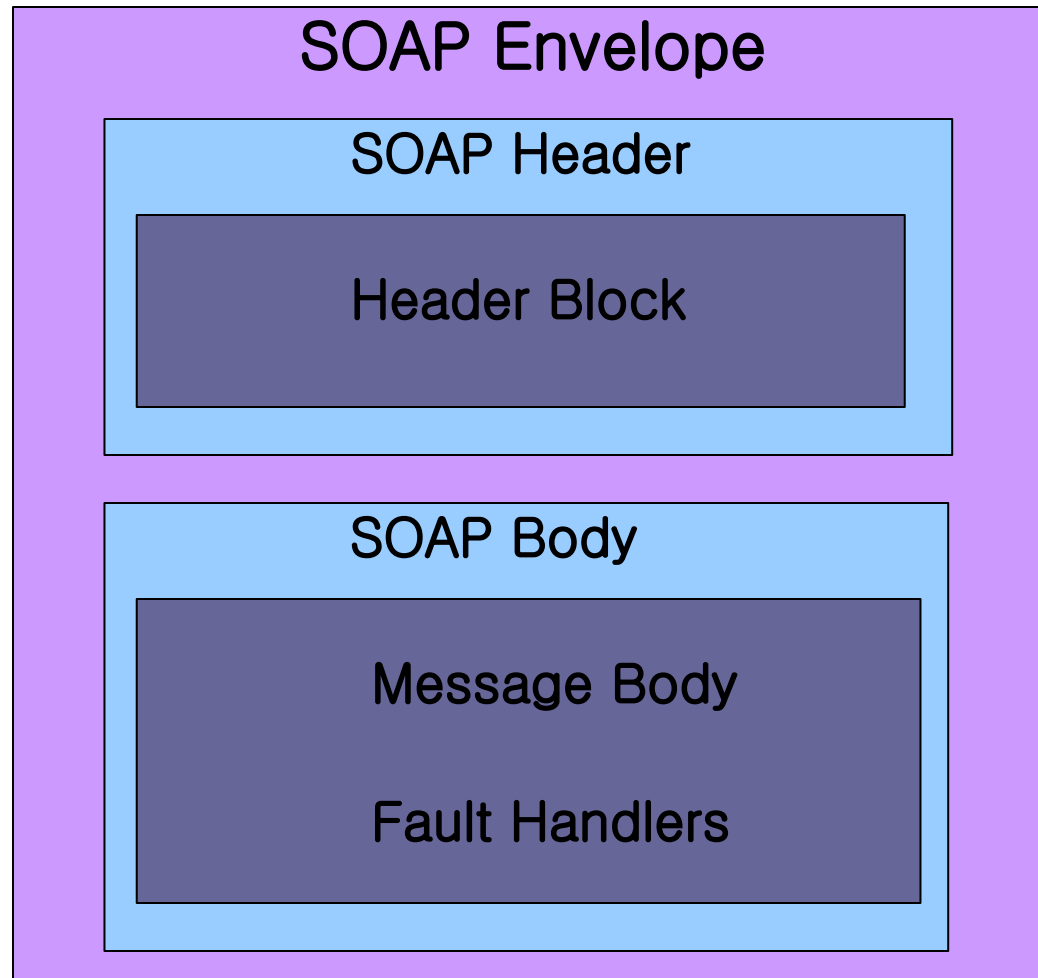
- SOAP is a lightweight (XML-based) protocol for exchange of information in a decentralized, distributed environment. It consists of mainly of:

- ▣ an envelope that defines a framework for describing what is in a message and how to process it

- ▣

relies heavily on XML standards (schemas & name spaces)

# The SOAP message structure



# Web Service Definition Language (WSDL)

- ▶ WSDL is an XML format for describing network services operating on messages containing either document-oriented or procedure-oriented information.
- ▶ It defines Web Service as collection of network endpoints or ports.

- The following is a list of Web service markup languages.
- BEEP - Blocks Extensible Exchange Protocol
- BPEL - Business Process Execution Language
- E-Business XML
- REST - Representational State Transfer
- SOAP - outgrowth of XML-RPC, originally an acronym for Simple Object Access Protocol
- UDDI - Universal Description, Discovery, and Integration
- WSDL - Web Services Description Language
- WSFL - Web Services Flow Language (superseded by BPEL)
- WSCL
- XML-RPC - XML Remote Procedure Call

# XML

- Stands for “Extensible Markup Language”
- Language specification for describing data
  - Syntax rules
  - Syntax & Grammar for creating Document Type Definitions
- Widely used and open standard
  - Defined by the World Wide Web Consortium (W3C)
  - <http://www.w3.org/TR/2000/REC-xml-20001006>

# Advantages of WebServices

- ◆ Allow programs written in different languages on different platforms to distribute an application in a standards-based manner.
- ◆ Adapt the loosely coupled Web programming model for use in applications that are not browser based.
- ◆ The goal is to provide a platform for building distributed applications using software
  - running on different operating systems and devices,
  - written using different programming languages and tools from multiple vendors,
  - all potentially developed and deployed independently.

- Web Service security
  - Web Service Security Model Principles
    - WS-Security
    - WS-Policy
    - WS-Trust
    - WS-Privacy
    - *WS-SecureConversation*
    - *WS-Federation*
    - *WS-Authorization*

**Microsoft Passport Service – Single click sign-on!**



# Future...

- - Semantic Web Services
    - Extension of the current web – information is given well-defined meaning
    - Contains machine readable instructions and metadata expressed in RDF.

Leads to intelligent web.