

# Introduction to Web Services (SOAP & REST)

Introduction to Web Services

# Lesson Objectives

- What are Web services
  - Web service Components and Architecture
  - How do web services work ?
- HTTP and SOAP messages
- Overview of JAX – WS and JAX - RS



# Web Services - Overview

- Web Service is a piece of business logic located somewhere on the internet, that is accessible through HTTP, with following features:
  - Web services use an XML messaging system
  - Are not tied to any one operating system or programming language
  - Support applications that require interoperability across heterogeneous systems
- Official definition of Web Service is:
  - A software system designed to support interoperable machine-to-machine interaction over a network
- Web Services are actively used in following application areas:
  - In any e-commerce application during payment transactions
  - In any order processing system to place an order via different platforms( example - web, mobile)

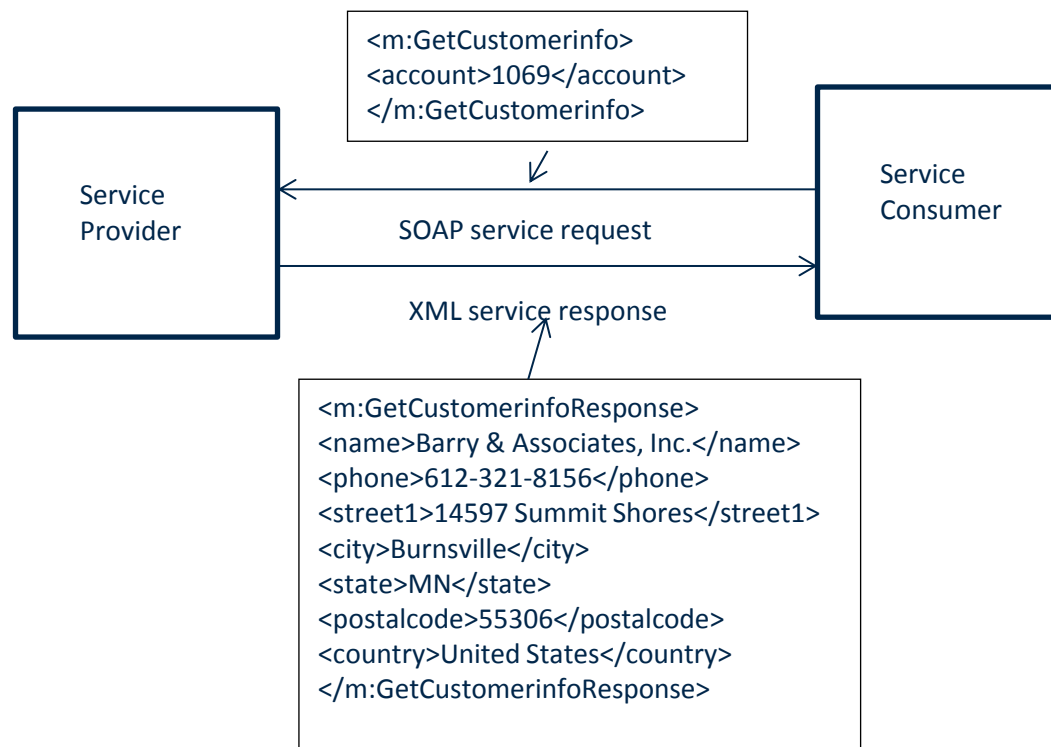
# Web service – Components

## ■ SOAP

- SOAP is an XML based messaging protocol (format) for inter-service/application communication
- Defines a set of rules for structuring messages
- SOAP is XML based, so it is platform independent and language independent. In other words, it can be used with Java, .Net or PHP language on any platform

# Web service - Components

- A SOAP message looks as follows:



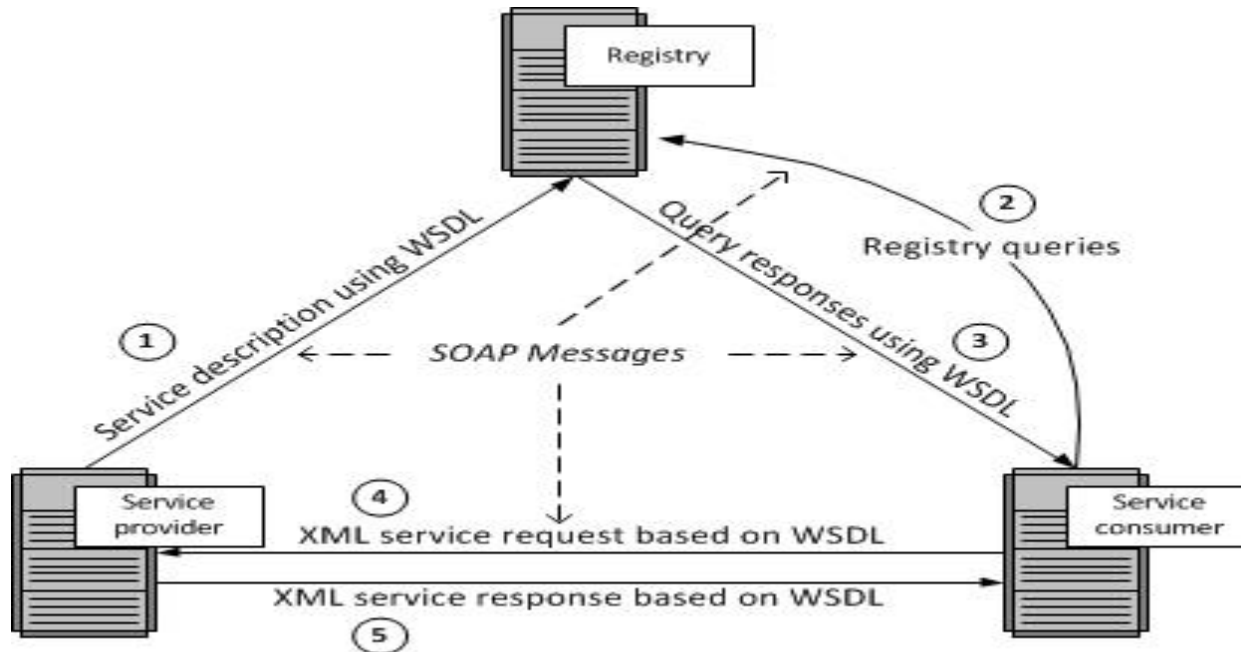
# Web Services - Components

- Components of Web Services
  - SOAP (Simple Object Access Protocol)
    - Deals with formatting XML documents for transmission between applications
  - WSDL (Web Services Description Language)
    - Defines all the details about a service
  - UDDI (Universal Description, Discovery and Integration)
    - Mechanism to advertise and discover services

# Web service - Components

## ■ WSDL

- WSDL is an implementation of XML and supplies a standard language for describing the interfaces to Web services
- The following figure demonstrates the use of WSDL



# Web service - Components

## ■ WSDL

- Standardizes how a web service represents input and output parameters of an invocation
- Defines the function structures
- Nature of the invocation (in, out parameter passing)
- Services protocol binding

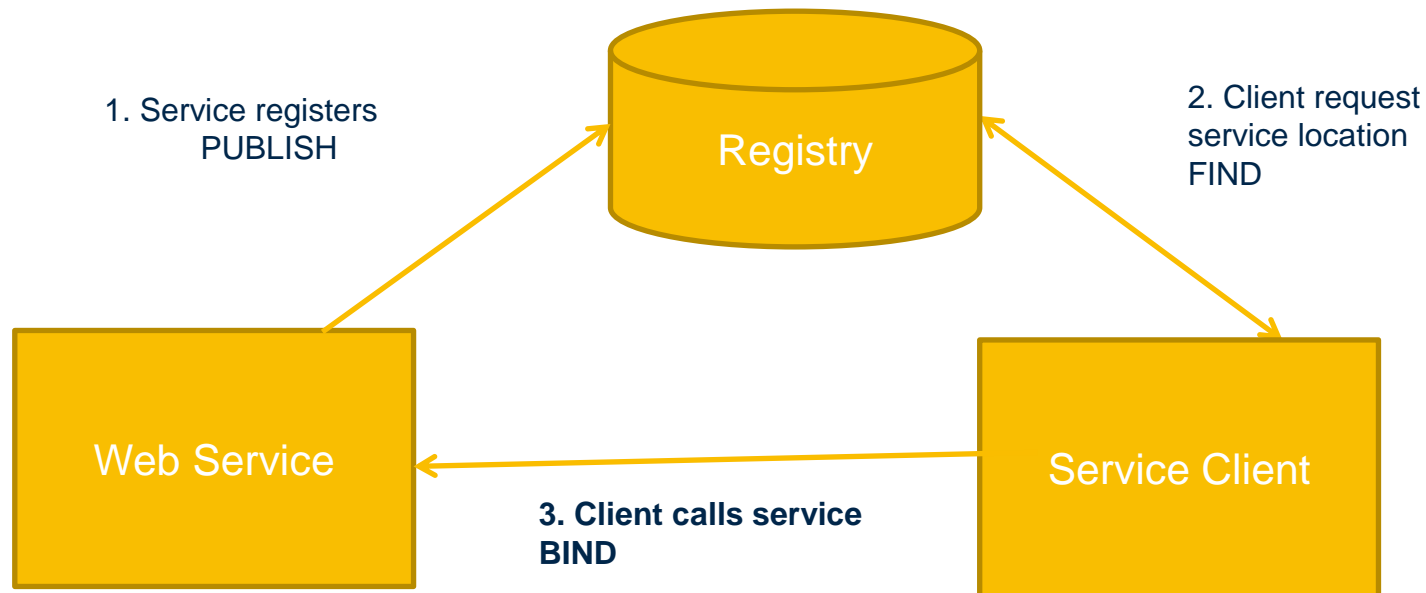


# Web service : Components and architecture

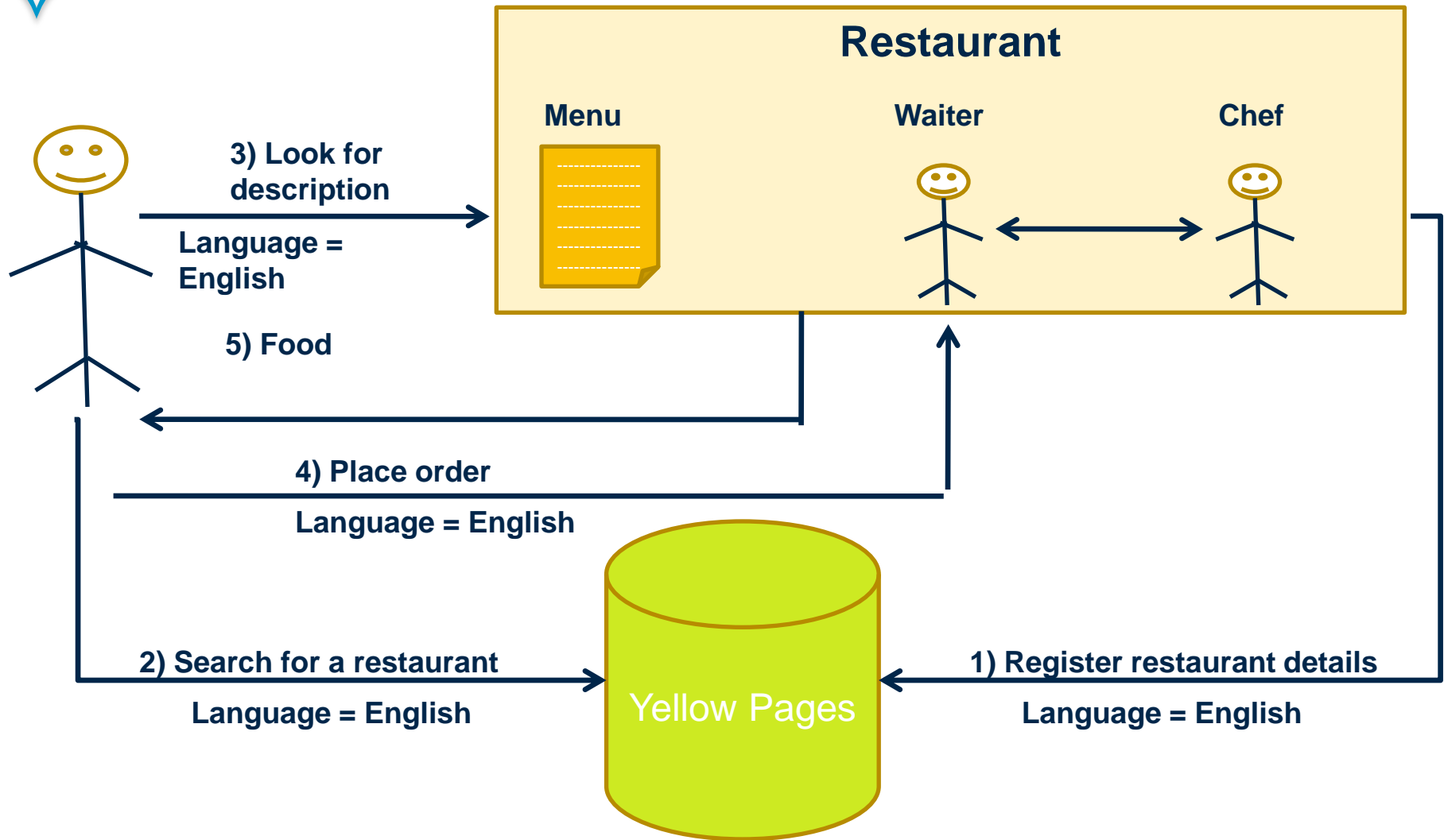
## ■ UDDI

- provides a standard mechanism for dynamic description, discovery and integration of web services
- Gives a world wide registry of Web services

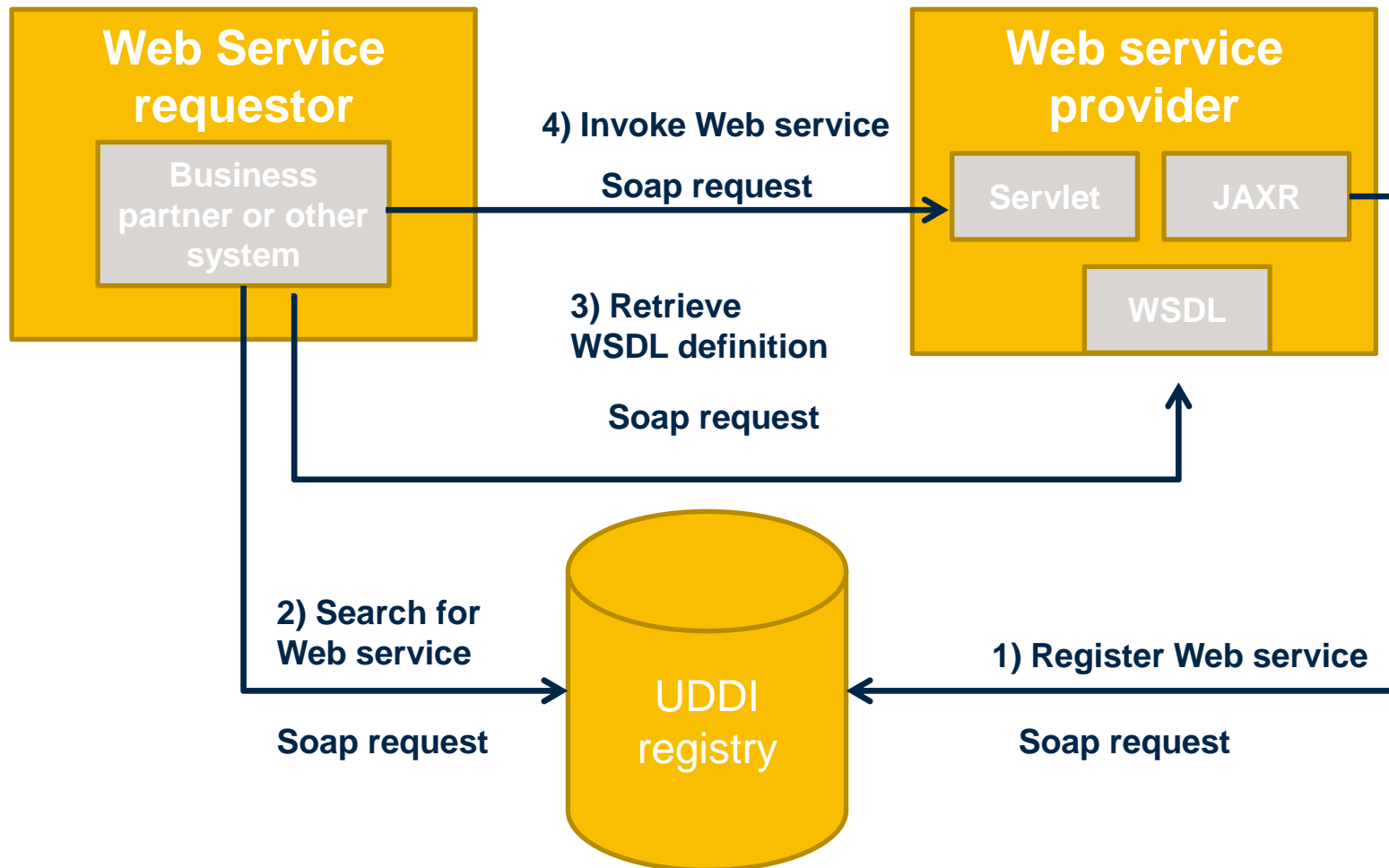
## ■ Web service architecture



# How do Web services work [Ordering in restaurant]



# How do Web services work



# HTTP and SOAP Messages

- HTTP is a request / response protocol
- SOAP sends messages over HTTP
- A valid SOAP message is a well-formed XML document
- HTTP + XML = SOAP
- The content -Type header for a SOAP request and response defines the MIME type for the message and the character encoding (optional) used for XML body of the request or response
- SOAP messages sent over HTTP are placed in the payload of an HTTP request or response
  - An area that is normally occupied by form data and HTML

# JAX- WS - Overview

- The Java API for XML Web Services (JAX-WS) is a Java programming language API for creating web services
- In JAX-WS, a web service operation invocation is represented by an XML-based protocol, such as SOAP.
  - The SOAP specification defines the envelope structure, rules for representing web service invocations and responses
  - These calls and responses are transmitted as SOAP messages over HTTP
- With JAX-WS, clients and web services have a big advantage: the platform independence of the Java programming language.
- In addition, JAX-WS is not restrictive: A JAX-WS client can access a web service that is not running on the Java platform, and vice versa.

# JAX- RS - Overview

- Java API for RESTful Web Services (JAX-RS) uses the REST architecture
- Representational State Transfer (REST) is an architectural style for web services to improve the performance and scalability
  - REST enables services to work best on the web
- In REST style, data and functionality are considered resources and accessed using URI (Uniform resource Identifiers), typically links on the web
- REST is designed to use a state less communication protocol, like HTTP
- Using REST producers and consumers exchange representations of resources by using a standardized interface

# Summary

- What we have seen so far:
  - What is a web service
  - Overview of Web service components
  - How do web service work
  - HTTP and SOAP messages
  - Overview of JAX- WS and JAX – RS



# Review Question

- Question 1: Which of the following is not true about a web service ?
  - Web service is a piece of business software accessible over the internet
  - Web service is programming language dependent
  - Web services use standard XML messaging system
  - Web services consists of service producer, consumer and registry
- Question 2: State whether true or false ?
  - UDDI is a directory of web service interfaces described by WSDL, containing information about web services
- Question 3: Fill in the Blank
  - The communication between service producers and consumers happen via \_\_\_\_\_





# Review Question: Match the Following

1. SOAP	a. Web services description language
2. UDDI	b. Publish
3. WSDL	c. Universal definition, Discovery and Integration
4. Web service provider _____ calls to registry	d. Java API for RESTful Web services
5. JAX - WS	e. Java API for XML web services
6. JAX- RS	f. Simple Object Access Protocol

