Web Services

Agenda

- What are Web Services
  - Web Services Definitions
- Comparison of Component & Web Services
- Web Services Building Blocks
  - XML
  - SOAP
  - WSDL
  - UDDI
- Web Services Architecture
- Types of Web Services
- Web Services Development options
  - Top Down approach
  - Bottom up approach

Learning Goals

- At the end of the session you will be familiar with
  - Web Services
  - Web Services Building blocks
    - SOAP,UDDI,WSDL
  - Web Services Architecture
  - Web Services development Options

Web Services

- Web Services are:
  - Services representing all or part of a business process
  - Designed to be invoked via a network
  - Typically invoked using SOAP over HTTP
    (the same standard that enables the Web)
- Web Services are self-contained and self-describing
- Web Services can be used by any Service Consumer residing on any platform with web connectivity

Web Service definition

- *“A Web service is a software application identified by a URI, whose interfaces and binding are capable of being defined, described and discovered by XML artifacts and supports direct interactions with other software applications using XML based messages via internet-based protocols” (W3C)*

- *“ … a piece of business logic accessible via the Internet using open standards .. “ (Microsoft)*

Component & Web Services Compared

Component-Based Model

- Mainly designed for processes within the enterprise
- Different protocols and technologies (e.g.EJBs, DCOM, CORBA)
- Typically, programming language dependent
- Usually bound to a particular transport

Web Service Model

- Mainly designed for processes **across enterprises**
- Uses common protocol and technologies (e.g XML, SOAP, WSDL, …)
- Programming language independent (??)
- Easily bound to different transport

Building Blocks

- XML
- UDDI
- SOAP
- WSDL
- ebXML

Web Services Building Blocks --SOAP

- Simple Object Access Protocol (SOAP)
  - Is platform and language independent
  - SOAP message is HTTP payload

- A SOAP message is an XML document containing the following elements:
  - Envelope element - identifies itself as a SOAP message
  - Header element (optional) - header information might include security checks
  - Body element – contains call/response information
  - Fault element (optional) – holds error information regarding message processing

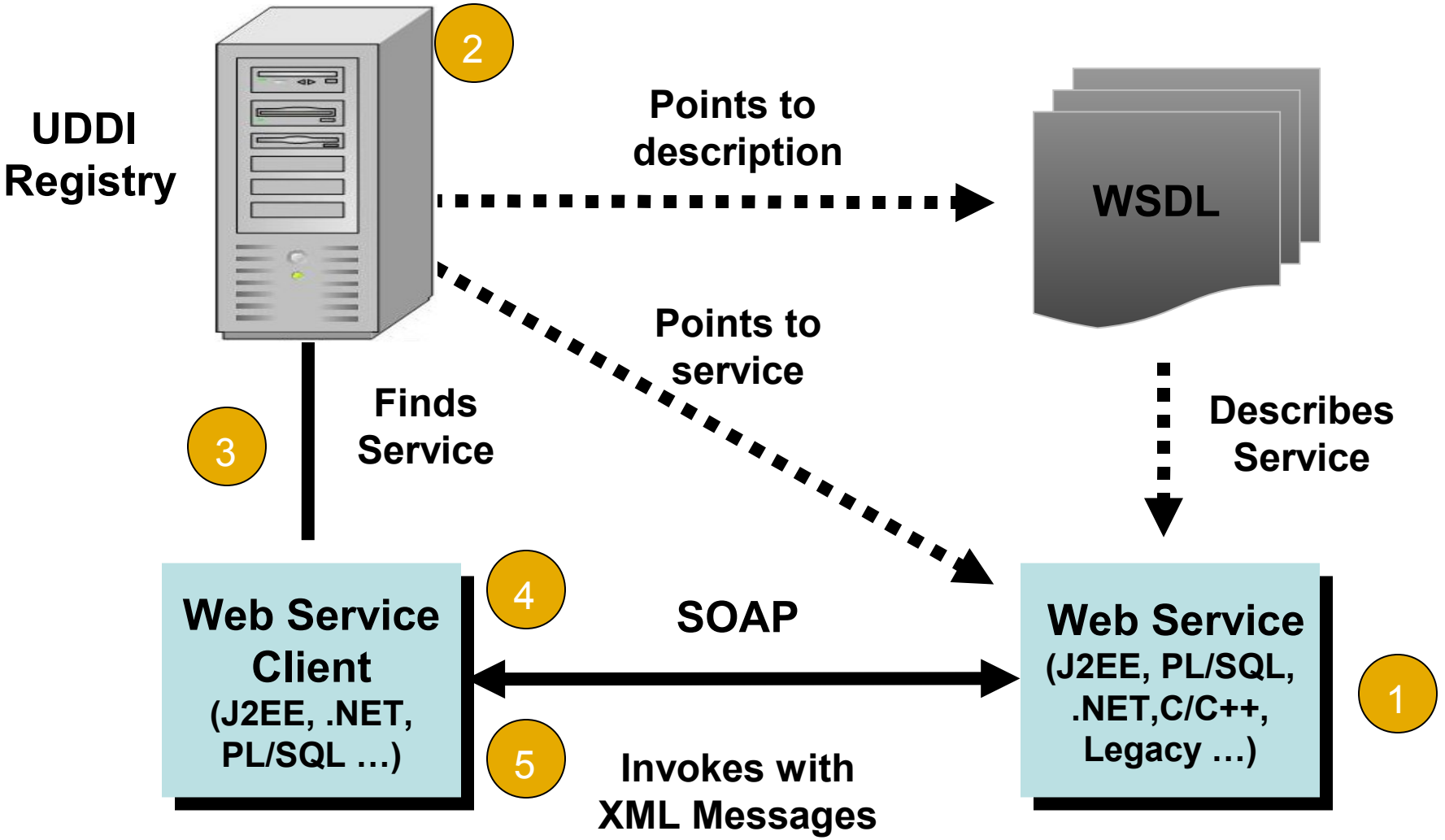
Web Services Building Blocks --WSDL

- Web Services Description Language (WSDL)
  - Describes the interface, protocol bindings and deployment details of Web services with XML
  - Contains elements that describe the Web service
    - types (types of data available)
    - messages/operations (methods available for use)
    - port types (groupings of these methods – the interface)
    - binding (specs for accessing interface)
    - Service element (port, port type, binding: where service is made available)

Web Services Building Blocks --UDDI

- Universal Description, Discovery and Integration (UDDI)
  - UDDI is a mechanism for finding Web services via queries against a published set of metadata
  - Acts as a directory for storing information about Web Services
    - Service providers and WSDLs are mapped to UDDI structures
  - Provides detailed service access information using WSDL
  - Used extensively in SOA implementations, but not widely used for B2B
  - www.uddi.org

Web Services Architecture



Web Services Types

- Synchronous or Asynchronous Services
  - Refers to web services model – can be independent of transport
  - Request/Response, Asynchronous Request/Response, Pub/Sub
- Synchronous
  - Request/Response model, best used with synchronous transports
- Asynchronous
  - Implementation of a callback or polling mechanism with Request/Response
  - Leverage Pub/Sub messaging scheme

Web Services Development

Web Services Development

Development Option 1:

Java Web Services Development Pack

- JAX-RPC – Java API for XML-based RPC (J2EE 1.4)
  - Supports component-based Web-service development
- JAX-WS
  - Supports document based Web Services
  - Included in JavaEE5 specification
  - Tools included in Jdk 1.6
- JAXP – Java API for XML Processing
  - framework for parsing and transforming XML docs
- JAXB – Java Architecture for XML Binding
  - Mechanism for creating Java objects corresponding to XML Schema elements and attributes
- SAAJ – SOAP with Attachments API for JAVA
  - Simple object model for managing SOAP message content
- …and so on

Web Services Development

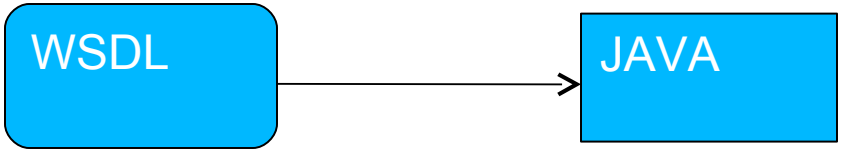
Development Option 2:

Use web service generation tools and built-in SOAP client processors

- WLS, WSAS, Oracle 9iAS, ColdFusion MX, .NET, Apache Axis, etc.
- Based on JAX* or related specs
- *Note: don't let a WSDL generation tool design your interfaces for you*

Two approaches to Develop Web Service

- Top down approach
  - First develop the WSDL and then generate the implementations (i.e java classes and interface)



- Bottom up approach
  - Develop java artifacts first and then generate the corresponding WSDL using a tool

Session Summery

- In this session, we learned
  - What are web services
  - Web services Building blocks
    - SOAP
    - WSDL
    - UDDI
  - Web Services Architecture
  - How Web Services are developed
    - Top down approach
    - Bottom up approach