

How To Get Donald And Martha To Communicate

Employ A **Service-Oriented** Apprentice
(I mean, **Architecture**)

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Topics

- What Is An SOA?
- Start with PL/SQL
- End with a Web Service
 - Create and Publish
 - Use JDeveloper

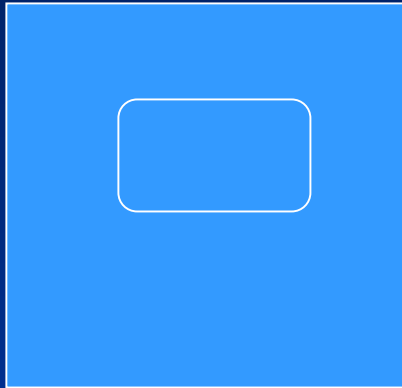
Terms We'll Cover

- Service
- SOAP
- WSDL
- Exposing
- Document Style Service
- Validation
- UDDI

What Is An SOA?

- ***At its most basic:***
 - ***a collection of services in an organization.***
- ***Goals***
 - ***Loose Coupling***
 - ***Reuse***

SOA Goals

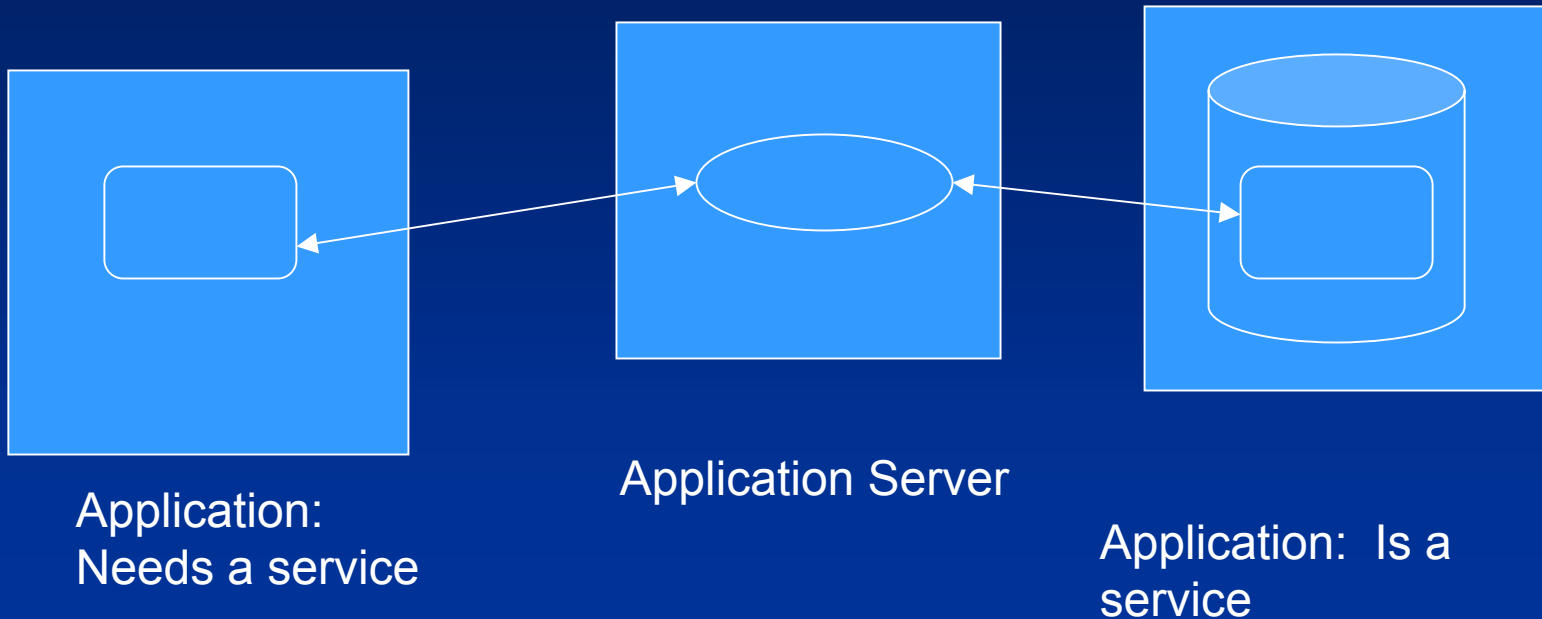


Application:
Needs a service

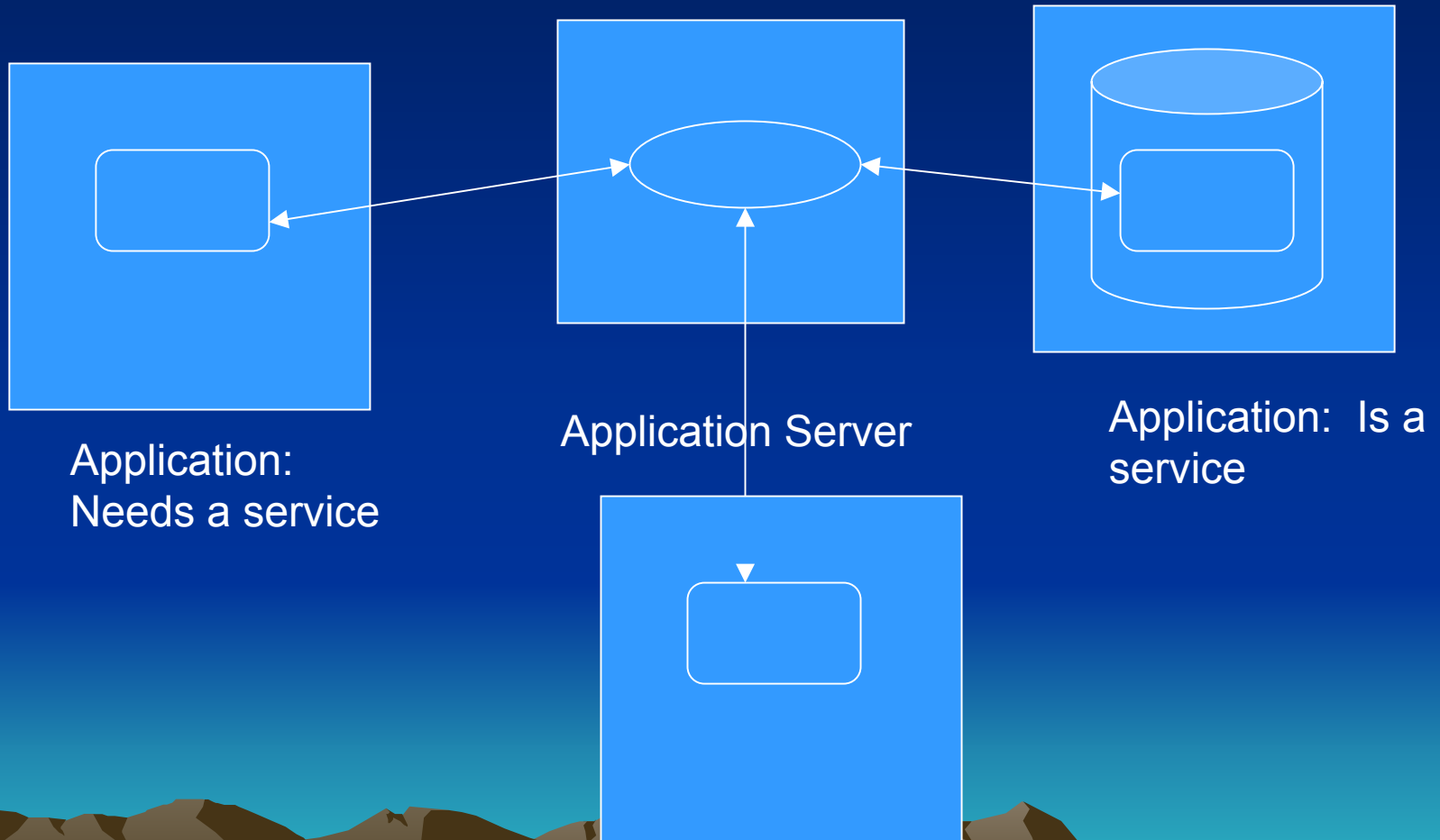


Application: Is a
service

SOA Goals



SOA Goals



What is a Service?

- *Computer Program*
- *Accessible by external applications*
- *Well-defined*
- *Self-contained*
- *Does not depend on the context or state of other services*

Evolution

- Start with a PL/SQL program



- End with a web service

Example PL/SQL Function

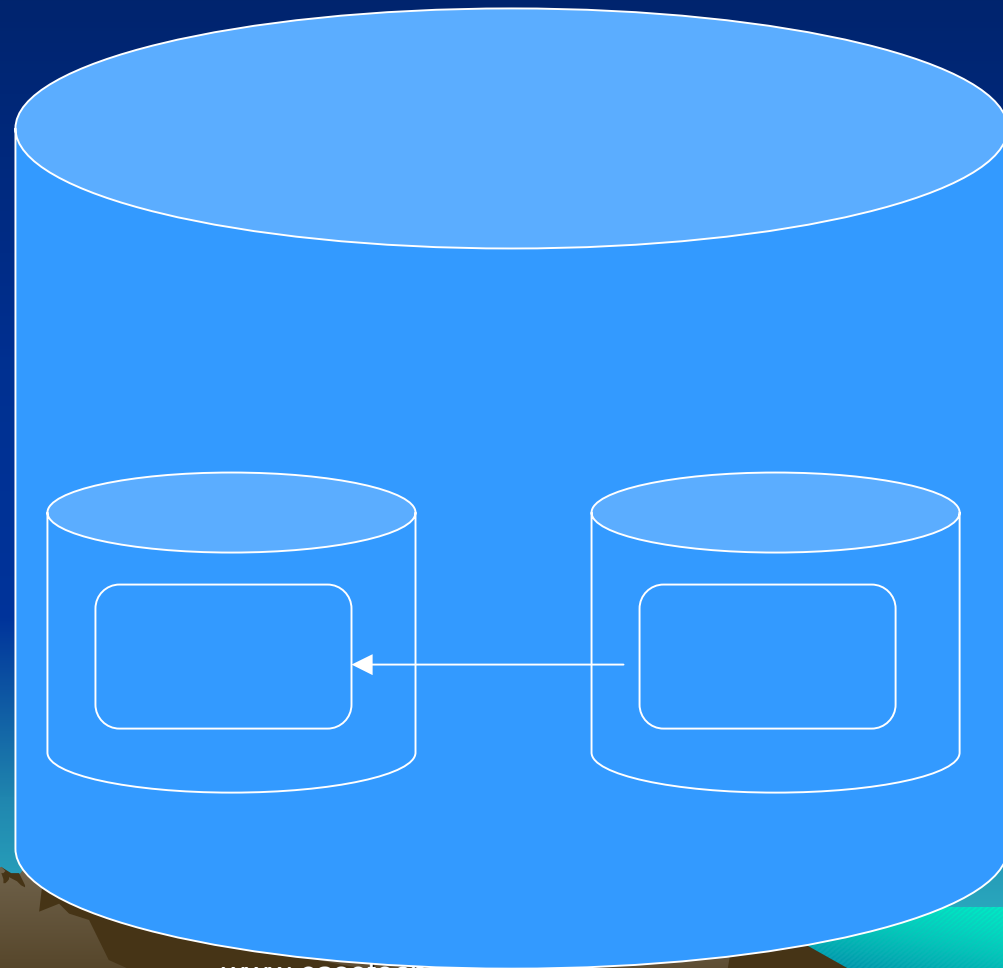
- *Provides phone number of employee
Code*

```
Get_employee_phone (  
    'ERIC',  
    'COHEN'  
)
```

Example PL/SQL Function

```
Declare  
  phone_number varchar2(30);  
Begin  
  phone_number :=  
  Get_employee_phone('ERIC', 'COHE  
N');  
End;
```

Access it from another PL/SQL block in another schema



Access it from another PL/SQL block in another schema

- *Increase reuse*

```
Declare  
phone_number varchar2(30);  
Begin  
phone_number :=  
orgapp.Get_employee_phone(  
    'ERIC', 'COHEN');  
End;
```

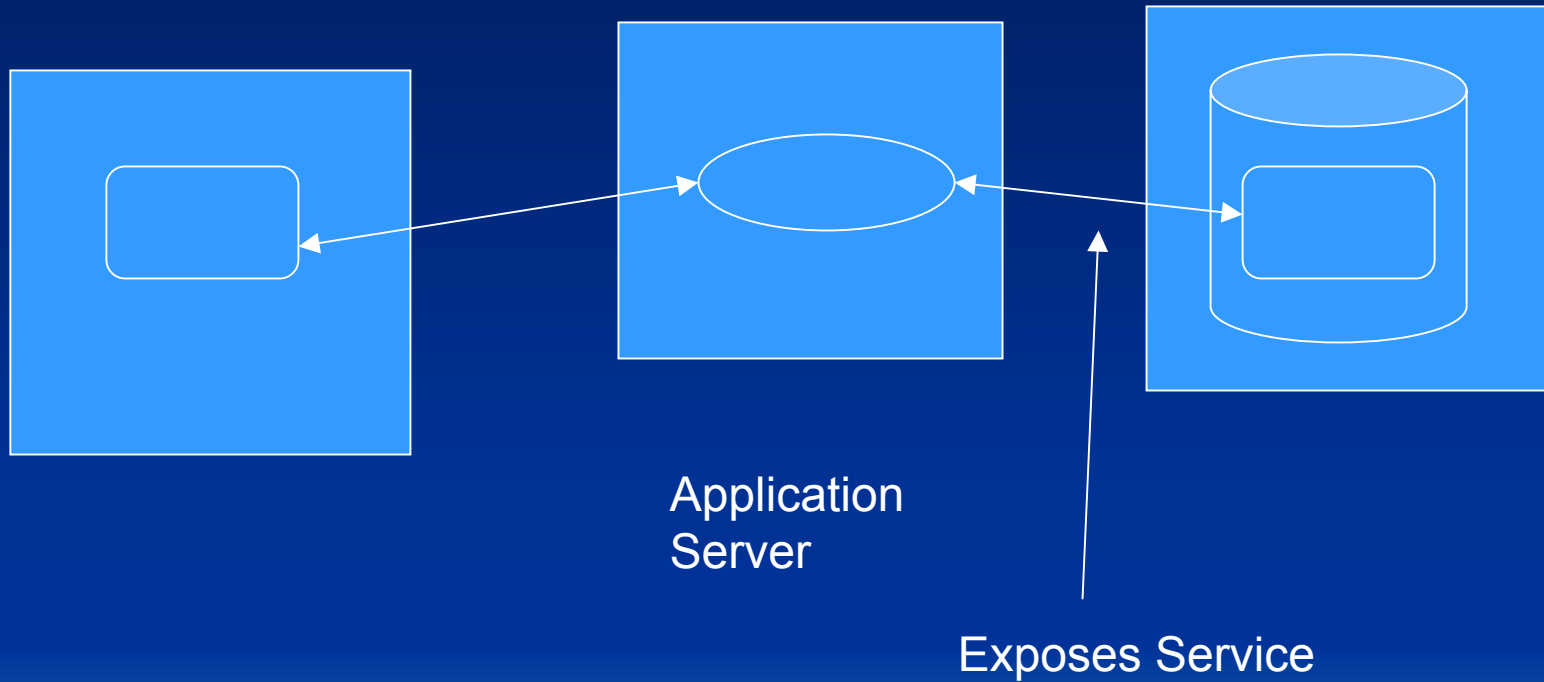
Access it from another Program outside your organization



Access it from another Program outside your organization

- *Communication Options*
 - *SQL*Net*
 - *HTTP*
 - *Need an application server*
 - *loose coupling*

Accessing Your Service

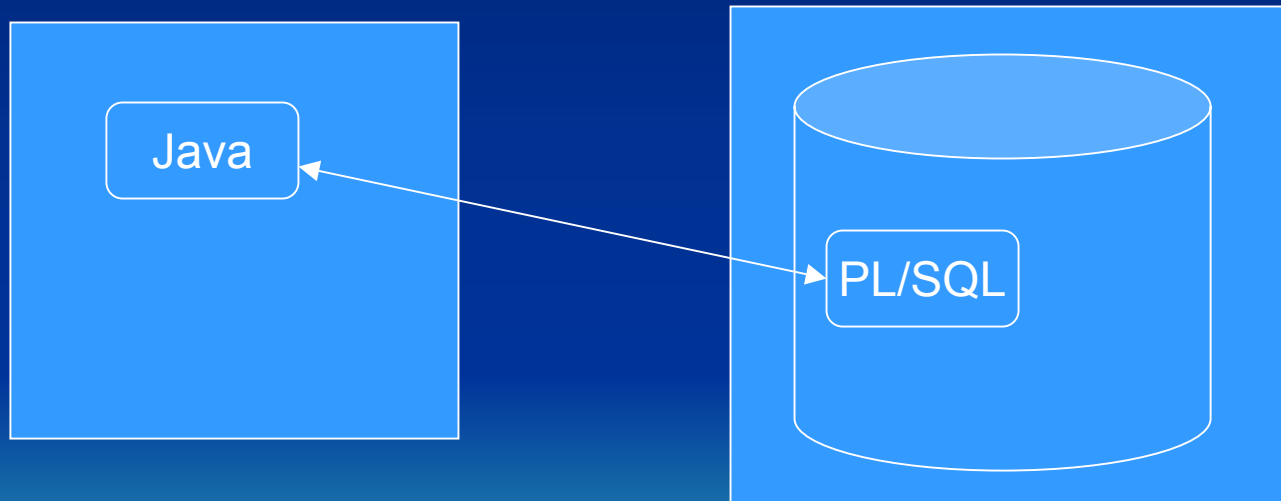


Expose

- *PL/SQL publishing using OC4J*
- *Axis*
 - *Java*
- *Code “by hand”*
 - *Java Servlet*
 - *PL/SQL Web Toolkit*
- *Communicate via SOAP*
 - *Simple Object Access Protocol*

Java Wrapper

- Use Java to access our function



Java Wrapper

```
Public class PhoneNumberGetter {

String getPhoneNumber(
    String inputFirstName, String inputLastName)
    throws SQLException {
    Connection conn = new OracleDriver().defaultConnection();
    String sql = "?:=
orgapp.Get_employee_phone(inputFirstName,inputLastName)";

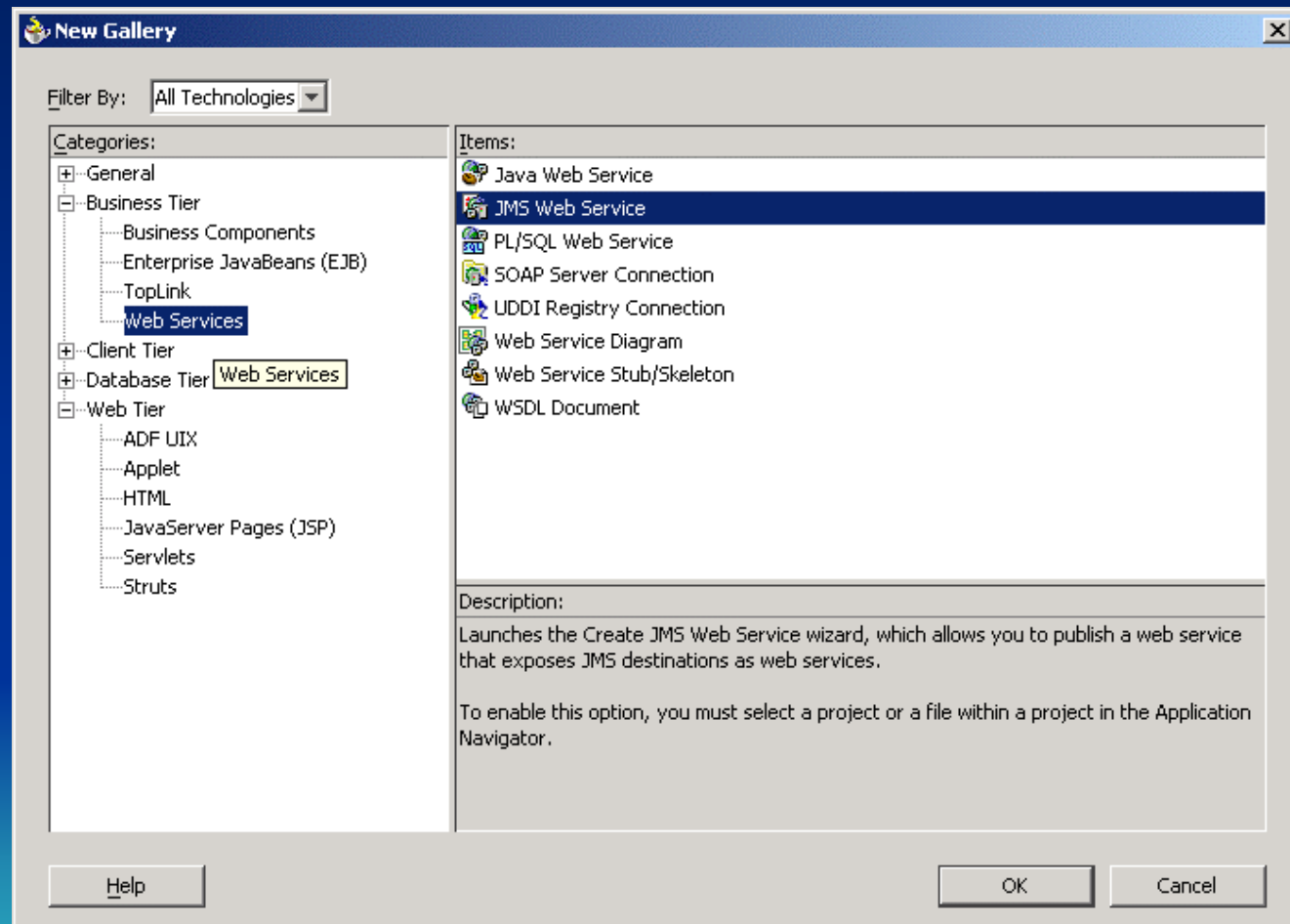
    try {
        PreparedStatement pstmt = conn.prepareStatement(sql);
        pstmt.execute ();
        String phone = pstmt.getString(1);
        pstmt.close();
    } catch (SQLException e) {System.err.println(e.getMessage());}

}
}
```

Next Step

- Copy to our Axis Server
- Create a Java Servlet
- Deploy to OC4J using JDeveloper

Add Webservice



Pick Class

Create Java Web Service - Step 1 of 3: Class


Select the Java class you want to publish, a unique name for the webservice and the platform on which you want to deploy.

Java Class: Browse...

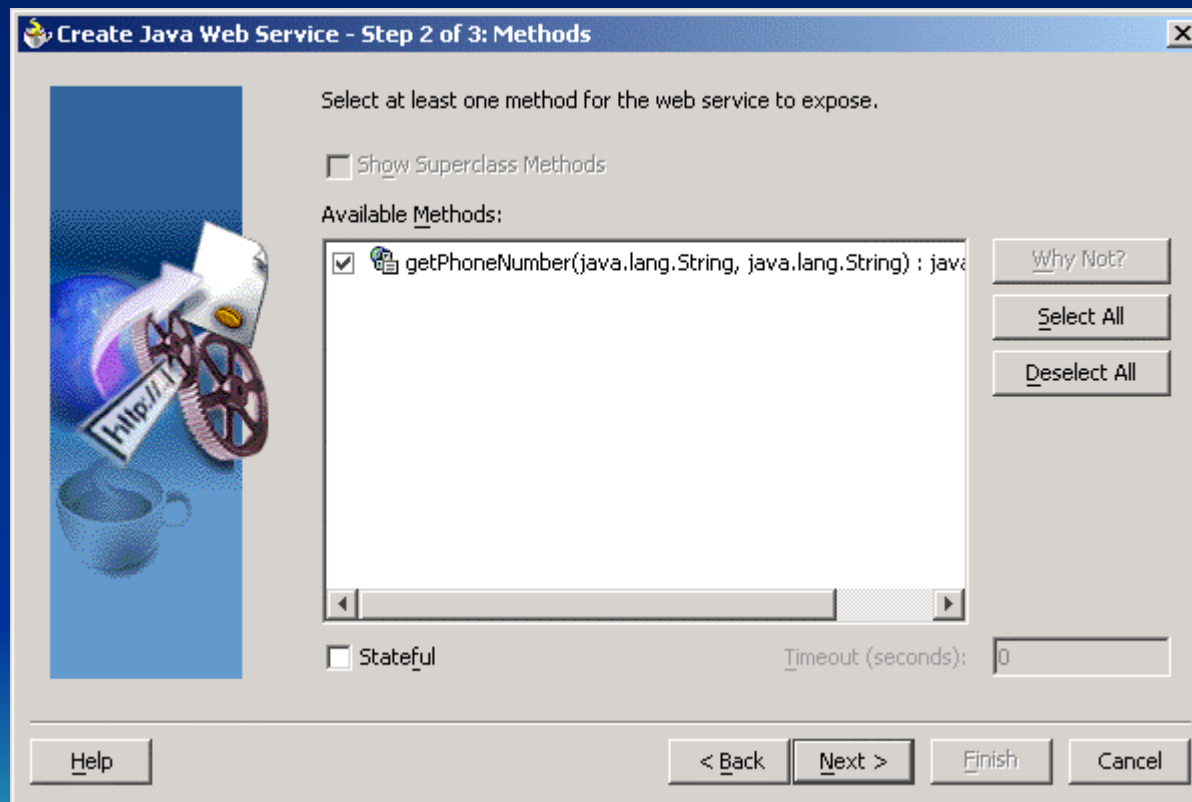
Web Service Name:

Deployment Platform:

Help < Back Next > Finish Cancel



Pick Method



Creating In JDeveloper

Oracle JDeveloper 10g - ActionData.jws : MAOP.jpr

File Edit View Search Navigate Run Debug Versioning Tools Window Help

System - Navigator

Workspaces

- ActionData.jws
 - MAOP.jpr
 - MyWebService1
 - MyWebService1Stub.java

```
1 import oracle.soap.transport.http.OracleSOAPHTTPConnection;
2 import org.apache.soap.encoding.SOAPMappingRegistry;
3 import java.net.URL;
4 import org.apache.soap.rpc.Call;
5
6 import java.util.Vector;
7 import org.apache.soap.rpc.Parameter;
8 import org.apache.soap.rpc.Response;
9 import org.apache.soap.Fault;
10 import org.apache.soap.SOAPException;
11 import java.util.Properties;
12
13 Generated by the Oracle JDeveloper 10g Web Services Stub/Skeleton Generator.
14 Date Created: Tue Nov 15 15:55:41 EST 2005
15 WSDL URL: file:/D:/jdeveloper9052/jdev/mywork/ActionData/MAOP/src/IMyWebService1.wsdl
16
17
18 public class MyWebService1Stub
19
20 public MyWebService1Stub()
21
22     m_httpConnection = new OracleSOAPHTTPConnection();
23     m_smr = new SOAPMappingRegistry();
24
```

Connections System Run Manager

MyWebService1Stub.java - Structure

Imports

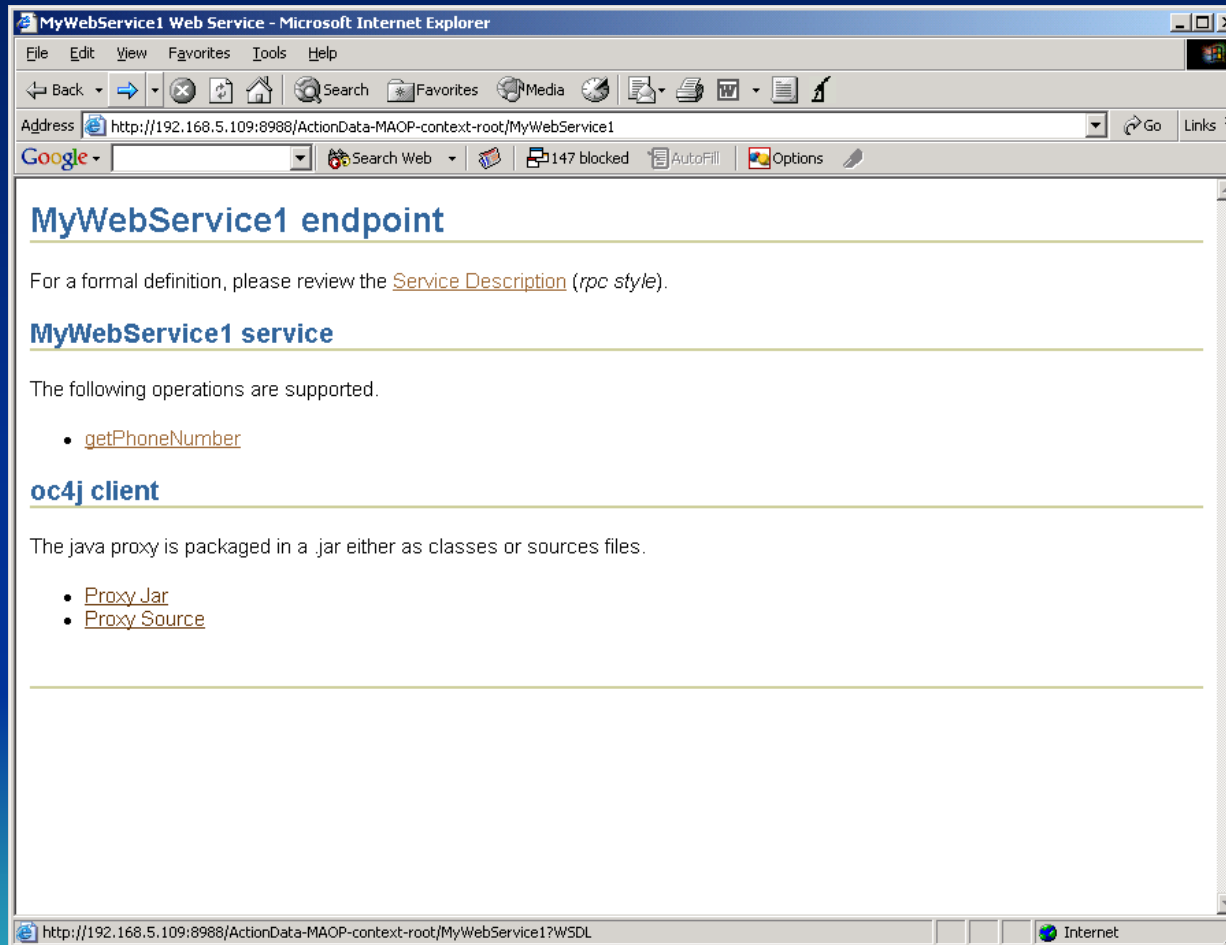
- MyWebService1Stub
 - endpoint : String
 - getEndpoint() : String
 - getMaintainSession() : boolean
 - getPhoneNumber(String, String) : String
 - getTransportProperties() : Properties
 - m_httpConnection : OracleSOAPHTTPConn
 - m_smr : SOAPMappingRegistry

Messages Web Services MAOP.jpr Embedded OC4J Server

```
D:\jdeveloper9052\jdk\bin\javaw.exe -o:vm -classpath
D:\jdeveloper9052\jdev\mywork\ActionData\MAOP\classes;D:\jdeveloper9052\jdev\lib\jdev-rt.jar;D:\jdev
eveloper9052\soap\lib\soap.jar;D:\jdeveloper9052\lib\xmlparserv2.jar;D:\jdeveloper9052\lib\javax-
ssl-1_2.jar;D:\jdeveloper9052\lib\jssl-1_2.jar;D:\jdeveloper9052\j2ee\home\lib\activation.jar;D:\
jdeveloper9052\j2ee\home\lib\mail.jar;D:\jdeveloper9052\j2ee\home\lib\http_client.jar
MyWebService1Stub
555-1212
Running: MAOP.jpr - Log
Process exited with exit code 0.
```

Starting MAOP.jpr. Editing

Viewing Webservice



WSDL

- Web Service Definition Language
- Specifies Inputs and Outputs of Web Service, and where it is Located.
- Used by tools to generate Web Service Clients
- Can be generate by tools (JDeveloper)

WSDL Example

```
<?xml version="1.0" encoding="UTF-8"?>
<definitions name="GetPhoneNumberService"
targetNamespace=
    "http://tempuri.org/GetPhoneNumberService.wsdl"
xmlns="http://schemas.xmlsoap.org/wsdl/"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:tns=
    "http://tempuri.org/DNCReceiveComplaintsService.wsdl"
xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/" >

<documentation>
    WSDL for Service: GetPhoneNumberService, generated by Oracle
    WSDL toolkit (version: 1.1)
</documentation>

<types>
    <schema
targetNamespace="http://tempuri.org/GetPhoneNumberService.xsd"
xmlns:tns="http://tempuri.org/GetPhoneNumberService.xsd"
xmlns="http://www.w3.org/2001/XMLSchema"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"/>
</types>
```

WSDL Example (cont.)

```
<message name="getOutput">
  <part name="output" type="xsd:string"/>
</message>
<message name="getInput">
  <part name="param0" type="xsd:string"/>
  <part name="param1" type="xsd:string"/>
</message>

<portType name="GetPhoneNumberServicePortType">
  <operation name="get">
    <input message="tns:getInput"/>
    <output message="tns:getOutput"/>
  </operation>
</portType>
```

WSDL Example (cont.)

```
<binding name="GetPhoneNumberServiceBinding"
type="tns:GetPhoneNumberServicePortType">
  <soap:binding transport=
    "http://schemas.xmlsoap.org/soap/http" style="rpc"/>
  <operation name="get">
    <soap:operation soapAction="urn:GetPhoneNumberServiceService/get"/>
    <input>
      <soap:body use="encoded"
        encodingStyle="http://schemas.xmlsoap.org/soap/encoding/"
        namespace="urn:GetPhoneNumberService"/></input>
    <output>
      <soap:body use="encoded"
        encodingStyle="http://schemas.xmlsoap.org/soap/encoding/"
        namespace="urn:GetPhoneNumberService"/> </output>
    </operation>
</binding>
<service name="GetPhoneNumberService">
  <port name="GetPhoneNumberServicePort"
    binding="tns:GetPhoneNumberServiceBinding">
    <soap:address location=
      "http://myserver:8888/webquery1/servlet/GetPhoneNumberService"/>
    </port> </service> </definitions>
```

SOAP Call - Consumer

```
<?xml version='1.0' encoding='UTF-8'?>
<SOAP-ENV:Envelope
  xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<SOAP-ENV:Body>

  <ns1:get xmlns:ns1="urn:GetPhoneNumberService"
    SOAP-ENV:encodingStyle=
      "http://schemas.xmlsoap.org/soap/encoding/">
    <param0 xsi:type="xsd:string">Eric</param0>
    <param1 xsi:type="xsd:string">Cohen</param1>
  </ns1:get>

</SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

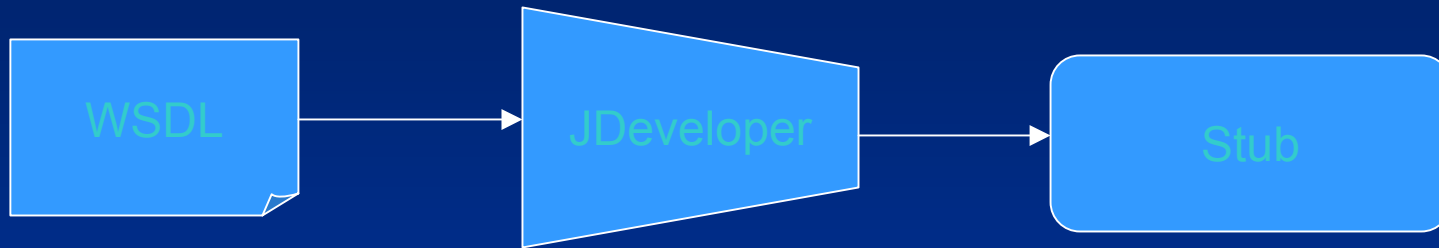
SOAP Call - Service

```
<?xml version = '1.0' encoding = 'UTF-8'?>
<SOAP-ENV:Envelope
  xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<SOAP-ENV:Body>

<ns1:getResponse
  xmlns:ns1="urn:GetPhoneNumberService" SOAP-
  ENV:encodingStyle="http://schemas.xmlsoap.org/soap
  /encoding/">
  <return xsi:type="xsd:string">
    555-1212</return>
</ns1:receiveResponse>

</SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

Communicating with your service



...

```
String phone =  
    GetPhoneNUmberServiceStub.get (  
        "Eric", "Cohen");
```

...

Running Client

```
D:\jdeveloper9052\jdk\bin\javaw.exe -ojvm -classpath
D:\jdeveloper9052\jdev\mywork\ActionData\MAOP\classes;D:\jdeveloper9052\jdev\lib\jdev-
rt.jar;D:\jdeveloper9052\soap\lib\soap.jar;D:\jdev
eloper9052\lib\xmlparserv2.jar;D:\jdeveloper9052\j
lib\javax-ssl-1_2.jar;D:\jdeveloper9052\jlib\jssl-
1_2.jar;D:\jdeveloper9052\j2ee\home\lib\activation
.jar;D:\jdeveloper9052\j2ee\home\lib\mail.jar;D:\j
developer9052\j2ee\home\lib\http_client.jar
GetPhoneNumberServiceStub
```

555-1212

Process exited with exit code 0.

Accessing From Web

MyWebService1 Web Service - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address <http://192.168.5.109:8988/ActionData-MAOP-context-root/MyWebService1?operation=getPhoneNumber>

Click [here](#) for a complete list of operations.

getPhoneNumber

Test

To test the operation using the HTTP GET protocol, click the 'Invoke' button.

Parameter	Type	Value
inputFirstName	string	Eric
inputLastName	string	Cohen

Invoke

Access it from a different technology (technologies)

- *Java*
- *.NET*
- *PL/SQL*
- *Perl*

Change The Parameters

- Types of SOAP Web Services
 - RPC Style Web Services
 - Remote Procedure Call
 - Passing Parameters
 - Document Style Web Services
 - Passing XML
 - Can change parameters
 - Can validate XML

Passing XML

```
<GetPhoneNumberService>  
<FirstName>Eric</FirstName>  
<LastName>Cohen</LastName>  
</GetPhoneNumberService>
```

Flexible

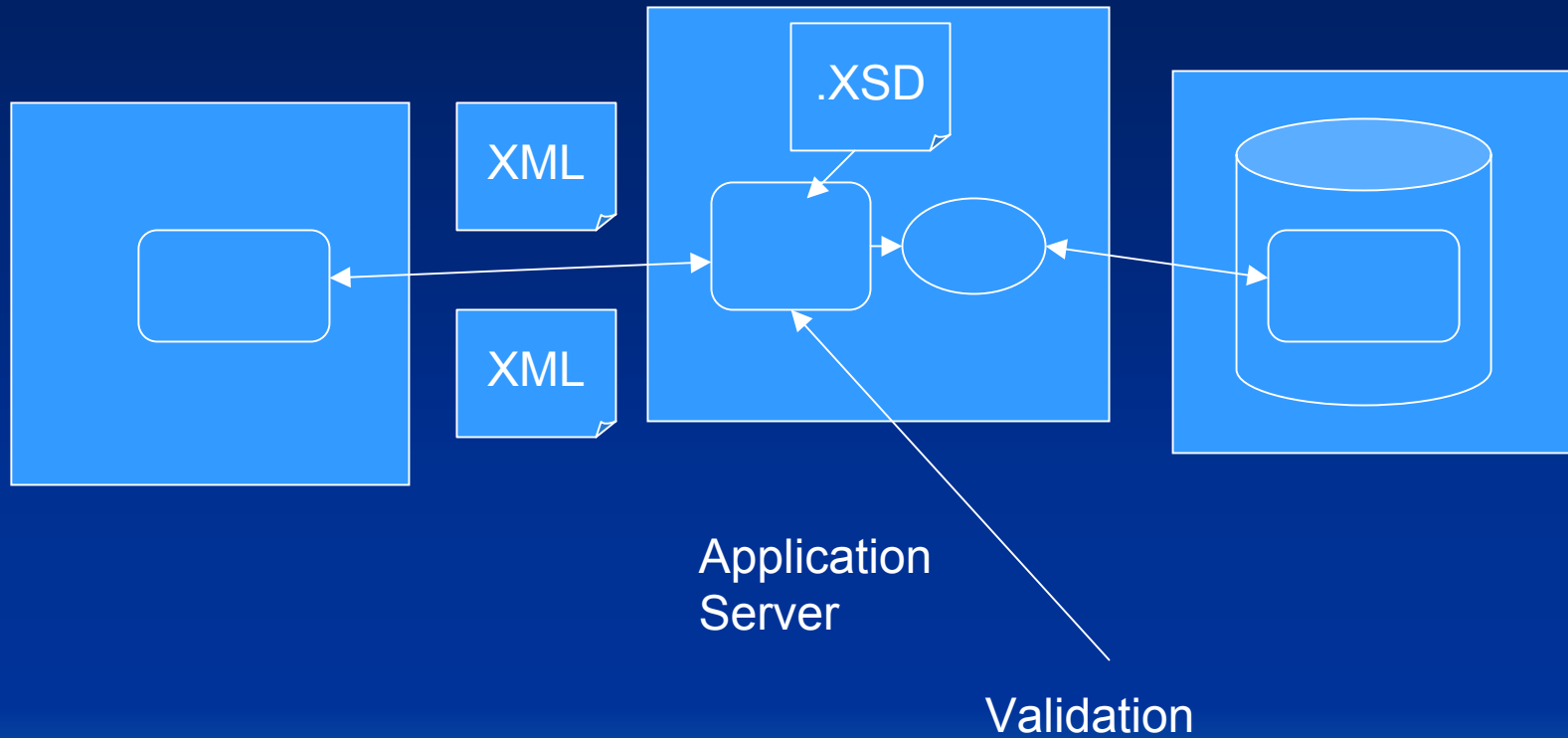
- Allows for changes in parameters.

```
<GetPhoneNumberService>  
<FirstName>Eric</FirstName>  
<LastName>Cohen</LastName>  
<Email>eric.cohen@casetech.net  
  </Email>  
</GetPhoneNumberService>
```

Parameters Can Be Validated

- Validation outside of code
- Process can be fast
- Clients can verify their own parameters

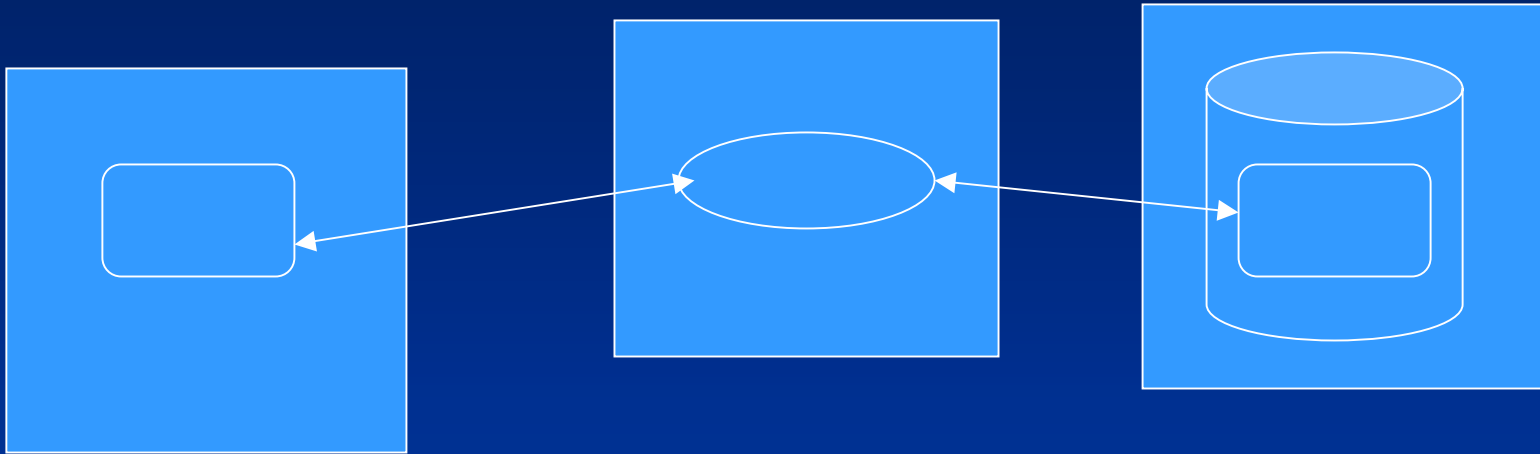
XML Validation



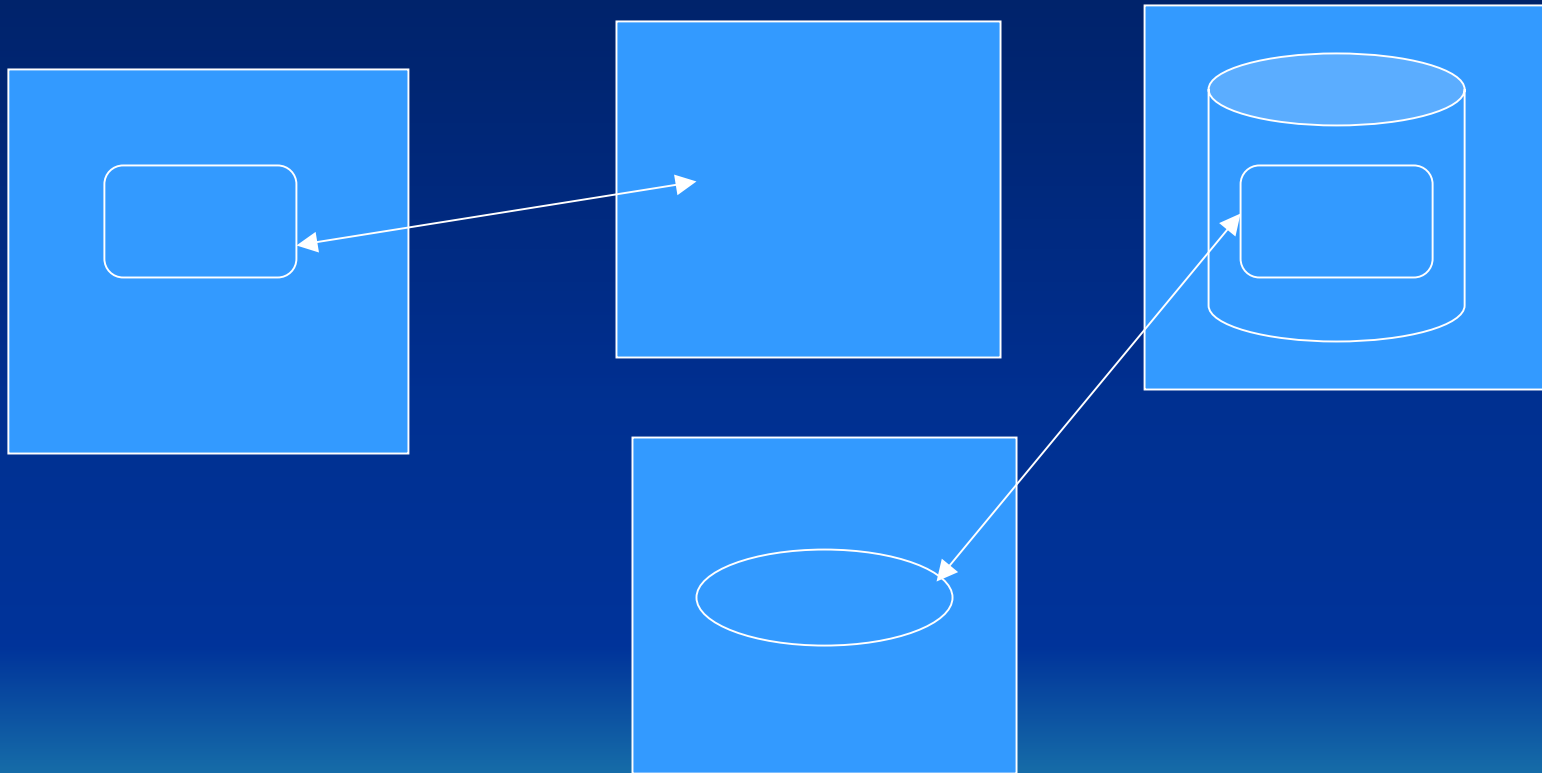
Validate the XML

- Ensures XML has proper data elements and formats.
- Can be done through software or hardware
- Can be done at the web service level
- Validate with .xsd file (XML Schema)

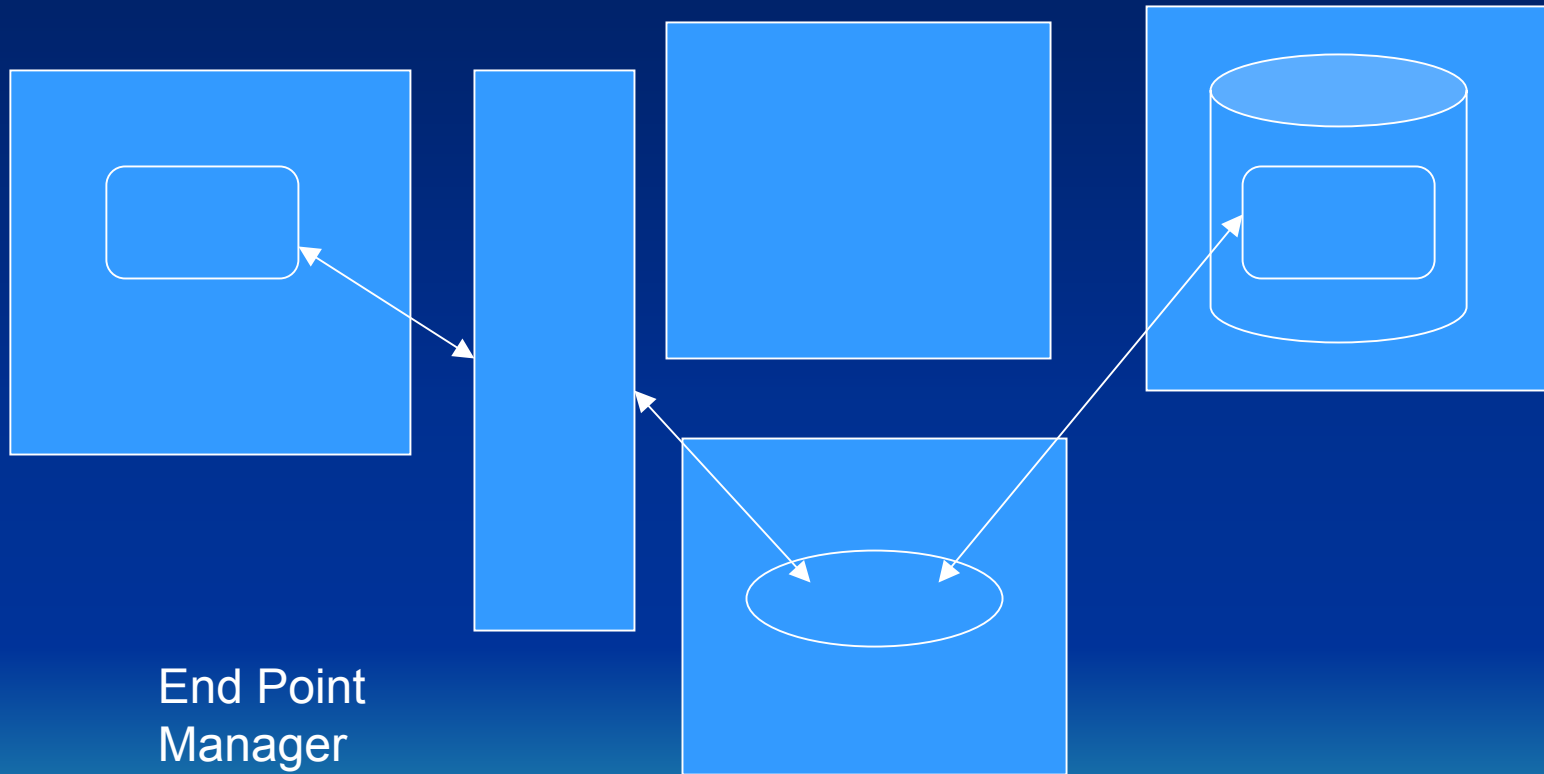
Managing End Points



Managing End Points



Managing End Points



Create a manager to point to your service

- *Hide the location of the web service*
- *Create a central repository of services*
- *XML Appliance*

Create a UDDI Registry

- Universal Description, Discovery and Integration (UDDI)
- Basic Information
 - Address, Points of Contact, and other Information about a company and its services.
- Technical Information
 - Which web services you can access
 - Information describing how to execute services
 - Also allows searching on these services

UDDI Registry


GBIF UDDI Registry - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Media Print TV

Address <http://registry.gbif.net/uddi/web> Go

GBIF UDDI Registry Welcome, Guest: [Login](#)



Global Biodiversity Information-Facility

Main

- Home
- Find business
- Find service
- Find binding
- Find tModel
- Direct get
- Publish

User

- Login

Taxonomies

- Browse
- Validate

Information

- Help
- Documentation
- Contact us

Resources

- [oasis-open.org](#)
- [uddi.org](#)

[Configuration](#)

Global Biodiversity Information Facility UDDI Registry

UDDI Registry

The UDDI (Universal Description, Discovery and Integration) registry enables businesses to quickly, easily and dynamically find and transact business with one another using their preferred applications.

GBIF UDDI Registry

If you have a data provider up and running, it is not very useful unless users know about it. Therefore, GBIF offers a registry where you can advertise your data and services. Think of it as the one global marketplace of shared biodiversity information that integrates data within and across domains.

GBIF UDDI registry service is available for GBIF Nodes. All DiGIR providers installed using GBIF software distributions can be registered automatically here so that they can be located by portals. Providers can also be registered on-line using the registration tool available at: <http://www.gbif.org/DataProviders/registerme>. If you have already registered a provider and you want to update the information that is stored in the registry, for example: name of the host institution, contacts details, etc. you can use the "update information" tool accessing the URL <http://www.gbif.org/DataProviders/updatesme>.

After the registration your provider and the resource(s) served by it should be listed in the [GBIF advanced search portal](#). Contact [GBIF Helpdesk](#) for questions about registration.

GBIF UDDI is powered by Systinet (c) WASP 4.6 UDDI engine.

Helpful hints:

Done Internet

In Conclusion...

- From PL/SQL to a Web Service you need...
 - Java Wrapper
 - Application Server
 - Mechanism to Expose your service
 - Document Style Service
 - Validation
 - End Point Manager
 - UDDI Registry

Questions?

