Web Services in Oracle Fusion Middleware

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Agenda

• Oracle Fusion Middleware
• Enterprise Web Services
• Services to Business Process Orchestration
• Enterprise Service Bus
• Q & A
Oracle Fusion Middleware
Best Platform for Fusing Heterogeneous Applications

• Most Comprehensive SOA Platform
  • To Develop, Integrate, Orchestrate, Analyze, Deploy, Manage, Secure and Access Services and Events

• Best for Fusing Heterogeneous Systems
  • Heterogeneous Applications, Databases, Middleware
  • Best support for Standards

• Best-of-breed in Each Component Area of the Suite
  • J2EE, Web Services, Integration, BPM, Portals, Security, Identity Management, Business Intelligence and Grid
Components of Oracle Fusion Middleware

- **Collaborative Enterprise Portal**: Portals, Collaboration, Mobile, Desktop, Search
- **Development Tools**: Modeling, Development Tools, Frameworks
- **Composition & Process Orchestration**: BPM, ESB, B2B
- **Information Aggregation & Analysis**: ETL, Hubs, Content Mgmt., BI, BAM
- **Enterprise Application Server**: J2EE, WS-*+, Events, Metadata, Registry
- **Grid Computing**: Clusters, Resource Management, High Availability
- **Management**: Systems Management
- **Security**: Identity, Services Management
Enterprise Web Services

- Web Service Distributed Management
- Web Service Orchestration
- Web Service Transactions
- Web Service Policy
- Web Service Security
- Web Service Reliable Messaging
- JAX-*: JAX-B, JAX-P, JAX-RPC, …
- WS-I Basic Profile
- SOAP, WSDL, UDDI

SOA Tools

TPM, Mainframe, Legacy Sys

Applications

Databases

B2B Partners
## J2EE 1.4 Standards

<table>
<thead>
<tr>
<th>Java APIs for XML</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>JAXP</td>
<td>Java API for XML Parsing</td>
</tr>
<tr>
<td>JAXB</td>
<td>Java API for XML Data Binding</td>
</tr>
<tr>
<td>JAX-RPC</td>
<td>Java API for XML Remote Procedure Call</td>
</tr>
<tr>
<td>SAAJ</td>
<td>SOAP API for Attachments in Java</td>
</tr>
<tr>
<td>JAXR</td>
<td>Java API for XML Registries</td>
</tr>
<tr>
<td>EJB 2.1</td>
<td>Stateless Session EJB Endpoint Model</td>
</tr>
<tr>
<td>JSR 109</td>
<td>Web Services Deployment Model</td>
</tr>
</tbody>
</table>
JAX-RPC

- Core WS standard for Java
  - Enables portability across containers
    (different vendors implemented differently before JAX-RPC for J2EE 1.4)
- Standard class and interface structure for client and server
  - Various hook-points for custom serializers, custom handlers, attachments
- Tools must provide abstractions to handle service as set of classes
  - Navigator structure for quick location
  - Wizard support for declarative definition
Web Services Interoperability

- Web Services Interoperability
  - Develops profiles
  - Suggests best practices
  - Provides testing tools

- Tools support
  - WSA generates WS-I compliant services
  - JDeveloper integration with WS-I testing tools
Developing Web Services

Bottom Up

WSDL

Service Implementation

e.g. EJB/Java Class to WSDL

Top Down / Contract Driven

WSDL

Service Implementation

e.g. WSDL contract as the interface & message description
DEMONSTRATION

Simple Java Web Service
Contract Driven Approach

1. Create the WSDL
2. Associate a schema with a WSDL document
   i. Create types
   ii. Associate elements
   iii. Define targetNamespace
   iv. Associate types with the targetNamespace
3. Define the service interface
   i. Messages: the XML datatypes that are the in/out parameters of the operation
   ii. PortType: the equivalent of the method signature, including operations and the messages (parameters) that they use
   iii. Bindings: association of a PortType with a specific protocol and data format
4. Define the service implementation
   i. Create a service
   ii. Create a port for the service
   iii. Create a soap:address for the port
5. Validate the WSDL
6. Generate the web service from the WSDL contract document
7. Add implementation code to the resulting <wsName>Impl.java file
OracleAS Web Services Support

- J2EE Web Services
- SOAP 1.1 and 1.2
- WS-Security
- WS-Reliability
- Web Services Attachments
- REST Web Services
- Auditing and Logging
- Management: ASC and JMX
- JSR-110 Java2WSDL
- Annotations

- WSIF
- Ant
- EJB 3
- Enhanced Interoperability
- Top-Down and Bottom-Up
- DocLit support
- Provider APIs
- Custom Serialization API
- Integrated Logging Fwk
- Test Page
# Beyond J2EE 1.4

<table>
<thead>
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<tbody>
<tr>
<td>JSR-181: Web Services Metadata for the Java™ Platform</td>
</tr>
<tr>
<td>EJB 3.0: Simplifying EJB development</td>
</tr>
<tr>
<td>WSIF: Web Services Invocation Framework</td>
</tr>
<tr>
<td>REST: Plain Old XML Web Services</td>
</tr>
</tbody>
</table>
**JSR-181 Annotations**

- Support a code-driven version of the bottom up use case
  - Create web services implicitly by annotating the source code
- Example annotations
  - `@WebService`
  - `@WebMethod`
  - `@WebParam`
  - `@WebResult`
  - `@SOAPBinding`
  - ...
Web Services Invocation Framework (WSIF)

- Describe any artifact with WSDL, invoke with native protocols
  - No overhead from SOAP processing
  - Focus on performance and transactionality
- Used extensively by BPEL
## SOAP v REST

<table>
<thead>
<tr>
<th></th>
<th>SOAP</th>
<th>REST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amazon</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>EBay</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Yahoo!</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Google Maps</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Google Search</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Blogger (blogs)</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>PayPal</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Del.icio.us</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>MSN Search</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>MS Office</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>SalesForce</td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>
DEMONSTRATION

REST Web Service
Publishable Web Services in OracleAS

- Java
  - Java class
  - Stateful Java class
  - EJB 2.0
  - EJB 2.1
  - EJB 3.0
  - JMS Queue and Topic

- Corba

- Database
  - PL/SQL
  - SQL Query
  - DML
  - AQ
  - Java classes
EJB 3.0 as Web Service

- Annotate Remote Interface
  - @WebService exposes all public methods in the interface

- Annotate Bean class
  - @WebService only
    - exposes all public methods in the bean class
  - @WebService and @WebMethod:
    - restricts to specific public methods in the bean class
Database Web Services

Oracle AS

Decoding

OC4J Web services Servlet

Encoding

JPublisher Generated Java Classes

SOAP Libraries

XML Parser

SOAP

PL/SQL

Java

SQL/DML

XML

SQL/Query

AQ

JDBC

XML Parser

SOAP Libraries

SOAP
DEMONSTRATION

Database Web Service(s)
Building Web Services With JDeveloper

- Create JAX-RPC Web Services
- Annotate EJB 3.0 as a Web Service
- Create Web Service proxy (client) from WSDL / endpoint
- Create WSDL from business requirements
  - Generate implementation from WSDL
- Analyze WSDL for WS-I conformance
- Debug SOAP messages with HTTP Analyzer
Generate Implementation from WSDL

• Generate the web service from the WSDL contract document
• Add implementation code to the resulting `<wsName>Impl.java` file
Services to Business Process Orchestration
Orchestrate Services

Order Entry System

Financial System

Supply Chain System

Logistics B2B Partners

Manufacturing System

Application Server

Service Bus

BPEL

WSDL
Introduction to BPEL

- Markup language for composing a set of discrete services into an end-to-end process flow
- 10+ years of research and development from Microsoft (XLANG) and IBM (WSFL, FDML)
- The best integration solution for XML and Web services but also Java, JCA and JMS.
- Rich support for async interactions, parallel processing and exception management.
- Composability: A process flow is automatically a service.

“Gartner believes that BPEL will emerge as the leading industry standard for Web service orchestration and coordination of business processes.”
- David Smith, Research Vice President and fellow, Gartner

“BPEL is the future of the integration space in my view...Why? Because the value is so much higher when you provide not only a way to integrate applications, but also a way to create services from them and put them into business processes”
- John Rymer, Vice President, Forrester Research, Inc.
BPEL by Example

<variable>
Credit Rating

<partnerLink>
United Loan

<partnerLink>

<process>
start

<invoke>
Get Rating

<flow>

<invoke>
Send Loan Application

<receive>

<switch>
Select Lowest Offer

<flow>
end

<invoke>
Send Loan Application

<receive>
Receive Loan Offer

<partnerLink>Star Loan

<partnerLink>
Orchestrate Services
BPEL Process Manager – Process Modeling
Orchestrate Services
BPEL Process Manager – Transformation Mapping
Oracle BPEL Process Manager

Enterprise-strength infrastructure for designing, deploying and managing BPEL business processes.

- Comprehensive and native BPEL implementation
- Easy-to-use modeling tool
- Scalable and reliable engine
- Flexible binding framework
- Rich management and monitoring
- Support for Oracle AS, JBoss, WebLogic and WebSphere
- Get up and running in less than 15 minutes!
DEMONSTRATION

BPEL
### Integrate Services

**Enterprise Services Bus**

<table>
<thead>
<tr>
<th>Routing</th>
<th>QOS</th>
<th>BPEL</th>
<th>Transform</th>
<th>Rules</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Routing Icon" /></td>
<td><img src="image2.png" alt="QOS Icon" /></td>
<td><img src="image3.png" alt="BPEL Icon" /></td>
<td><img src="image4.png" alt="Transform Icon" /></td>
<td><img src="image5.png" alt="Rules Icon" /></td>
</tr>
</tbody>
</table>

**Enterprise Services Bus**

### Binding Services

<table>
<thead>
<tr>
<th>In Memory</th>
<th>REST</th>
<th>JCA</th>
<th>COM+</th>
<th>SOAP</th>
</tr>
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<tbody>
<tr>
<td><img src="image6.png" alt="In Memory Icon" /></td>
<td><img src="image7.png" alt="REST Icon" /></td>
<td><img src="image8.png" alt="JCA Icon" /></td>
<td><img src="image9.png" alt="COM+ Icon" /></td>
<td><img src="image10.png" alt="SOAP Icon" /></td>
</tr>
</tbody>
</table>

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*Image: COLLABORATE 06*
Traditional ESB Use Case

- Point of Sales Transactions are generated by the Retek Merchandising module.
- Does transactions need to be transformed and copied to the Oracle eBusiness Suite Financials.
- If there is any exception during the processing, an administrator will be asked to review the transaction and resubmit it or cancel it.
- Given that the Oracle and Retek systems are not owned by the same organizations, we cannot assume that their scheduled downtimes will be coordinated.
- Is it required that all transactions exported from Retek are imported in Oracle in less than 4 hours.
- It is required that the exception rate is less than 0.001%. An alert should be generated if this limit is passed.
Virtualize using An Enterprise Service Bus

**BEST PRACTICES**
- UDDI Registry
- JCA Adapters
- Integration with Policy Management Framework
- Service Virtualization Logical Naming
- Differed, Reliable Delivery (Configurable)

![Diagram](image-url)
Build Portfolio of Services

BEST PRACTICES

• Contract/Interface First
• Coarse Grain Documents
• Asynchronous Interactions
• Undo/Cancel Operations
• Versioning
• WS-I, Wrapped Document Style
• WSIF Binding to Java, JCA

Retek Merchandising
Oracle Financials

COLLABORATE06
Orchestrate into End-to-End Flow

BEST PRACTICES
- BPEL
- XSLT Transformation
- Human Workflow Service
- Rules Service
- Notification Service
- Error Hospital Service
- ESB Binding and Wiring
- Tracing and Debugging
- Iterative Development
- Unit Testing

Enterprise Service Bus

Error Hospital Service (Human Workflow)

Receive ➔ Transform ➔ Invoke

Retek Merchandising
Oracle Financials
Oracle ESB

- Visual XSLT Mapping tool
- Code Conversions/Lookups
- Dictionaries - “Smart” mapping
Oracle ESB - Routing Service

- Dynamic Routing Rules
- Configurable Filter Expressions
- XPath Content Based Routing
- JDev and Console support
- Includes Transformations
- Multiple conditions per service
- Optimized expression engine
Oracle ESB - ESB Control

- Service Hierarchy View
- Service Dependency View
- Routing Rules
- Service Management
- System Monitoring
- Exception Management
- Meta Data Driven
- Service Instance Tracking
Transforming Business Processes and Interactions

Today
- Hardcoded inside applications
- Mainly sequential
- Silo-ed (divisional and functional)
- One-size fit all
- Tactical point-to-point integration
- Black boxes

Tomorrow
- Mainly parallel
- Boundary-less
- Wired through events
- Modular
- Continuously optimized
- Highly personalized
- Continuously audited

Your Business is Only as Flexible as Your Technology…
SOA is Emerging as the Enabling Foundation

Requirements
- Business Savvy Developer
- Façade/Leverage Existing Core IT
- Build-to-change
- End-to-end Security
- Management and Monitoring

Why Now?
- Network Infrastructure is in place
- Standards (XML, WSDL, WS-*)
- Domain Specific Languages (BPEL, XSLT, Rules, BAML, CEPQ...)
- Support from Packaged Applications
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