Oracle® Fusion Middleware
Introducing WebLogic Web Services for Oracle WebLogic Server
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Documentation for software developers that introduces Web services for Oracle WebLogic Server, including interoperability and standards information.
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Preface

This preface describes the document accessibility features and conventions used in this guide—Introducing WebLogic Web Services for Oracle WebLogic Server.

Documentation Accessibility

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at http://www.oracle.com/pls/topic/lookup?ctx=acc&id=docacc.

Access to Oracle Support

Oracle customers have access to electronic support through My Oracle Support. For information, visit http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info or visit http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs if you are hearing impaired.

Conventions

The following text conventions are used in this document:

<table>
<thead>
<tr>
<th>Convention</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>boldface</strong></td>
<td>Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.</td>
</tr>
<tr>
<td><em>italic</em></td>
<td>Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.</td>
</tr>
<tr>
<td><code>monospace</code></td>
<td>Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.</td>
</tr>
</tbody>
</table>
Overview of WebLogic Web Services

This chapter provides an overview of WebLogic Web services.

This chapter includes the following sections:

- Section 1.1, "What Are Web Services?"
- Section 1.2, "Why Use Web Services?"
- Section 1.3, "Web Service Types"
- Section 1.4, "How Do I Choose Between JAX-WS and JAX-RS?"
- Section 1.5, "Roadmap for Implementing WebLogic Web Services"
- Section 1.6, "New and Changed Features in this Release"

1.1 What Are Web Services?

A Web service is a set of functions packaged into a single application that is available to other systems on a network. The network can be a corporate intranet or the Internet. Because Web services rely on basic, standard technologies which most systems provide, they are an excellent means for connecting distributed systems together. They can be shared by and used as a component of distributed Web-based applications. Other systems, such as customer relationship management systems, order-processing systems, and other existing back-end applications, can call a Web service function to request data or perform an operation.

Traditionally, software application architecture tended to fall into two categories: monolithic systems such as those that ran on mainframes or client-server applications running on desktops. Although these architectures worked well for the purpose the applications were built to address, they were closed and their functionality could not be incorporated easily into new applications.

As a result, the software industry has evolved toward loosely coupled service-oriented applications that interact dynamically over the Web. The applications break down the larger software system into smaller modular components, or shared services. These services can reside on different computers and can be implemented by vastly different technologies, but they are packaged and accessible using standard Web protocols, such as XML and HTTP, thus making them easily accessible by any user on the Web.

This concept of services is not new—RMI, COM, and CORBA are all service-oriented technologies. However, applications based on these technologies required them to use that particular technology, often from a particular vendor. This requirement typically hinders widespread integration of the application's functionality into other services on the network. To solve this problem, Web services are defined to share the following properties that make them easily accessible from heterogeneous environments:
1.2 Why Use Web Services?

Major benefits of Web services include:

- Interoperability among distributed applications that span diverse hardware and software platforms
- Easy, widespread access to applications through firewalls using Web protocols
- A cross-platform, cross-language data model (XML) that facilitates developing heterogeneous distributed applications

Because you access Web services using standard Web protocols such as XML and HTTP, the diverse and heterogeneous applications on the Web (which typically already understand XML and HTTP) can automatically access Web services and communicate with each other.

These different systems can be Microsoft SOAP ToolKit clients, Java Platform, Enterprise Edition (Java EE) Version 5 applications, legacy applications, and so on. They are written in Java, C++, Perl, and other programming languages. Application interoperability is the goal of Web services and depends upon the service provider’s adherence to published industry standards.

1.3 Web Service Types

This release of WebLogic Server supports the following Web service types:

- Java API for XML-Based Web services (JAX-WS) 2.2 Web services, described at http://jcp.org/aboutJava/communityprocess/mrel/jar224/index2.html. The JAX-WS implementation in Oracle WebLogic Server is extended from the JAX-WS Reference Implementation (RI) developed by the Glassfish Community (see https://jax-ws.dev.java.net/)

- Java API for RESTful Web Services (JAX-RS) 1.1 Web services. WebLogic Server supports Jersey 1.9 JAX-RS Reference Implementation (RI), which is a production quality implementation of the JSR-311 JAX-RS 1.1 specification, defined at: http://jcp.org/en/jsr/summary?id=311.

- Java API for XML-Based RPC 1.1 (JAX-RPC) Web services, described at https://jax-rpc.dev.java.net/. JAX-RPC is considered legacy and the specification is no longer evolving. JAX-RPC defines APIs and conventions for supporting XML Web services in the Java Platform as well support for the WS-I Basic Profile to improve interoperability between JAX-RPC implementations.

JAX-WS and JAX-RS are the preferred Web service types. For more information about deciding which type to develop, see Section 1.4, "How Do I Choose Between JAX-WS and JAX-RS?"

1.4 How Do I Choose Between JAX-WS and JAX-RS?

The following table provides guidelines to consider when choosing between JAX-WS and JAX-RS. See also Chapter 4, "Features and Standards Supported by WebLogic Web..."
Overview of WebLogic Web Services

1.5 Roadmap for Implementing WebLogic Web Services

The following table provides a roadmap of common tasks for creating, deploying, and invoking WebLogic Web services.

<table>
<thead>
<tr>
<th>Task</th>
<th>More Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review supported standards</td>
<td>Chapter 4, &quot;Features and Standards Supported by WebLogic Web Services&quot;</td>
</tr>
<tr>
<td>Run samples</td>
<td>§ Section 2.1, &quot;Samples for WebLogic Web Service Developers&quot;</td>
</tr>
<tr>
<td></td>
<td>§ JAX-WS Web services and clients</td>
</tr>
<tr>
<td></td>
<td>§ RESTful Web service</td>
</tr>
<tr>
<td></td>
<td>§ RESTful Web service client</td>
</tr>
<tr>
<td></td>
<td>§ JAX-RPC Web services and clients</td>
</tr>
<tr>
<td>Develop and administer Web services using JAX-WS</td>
<td>§ Getting Started With JAX-WS Web Services for Oracle WebLogic Server</td>
</tr>
<tr>
<td></td>
<td>§ Programming Advanced Features of JAX-WS Web Services for Oracle WebLogic Server</td>
</tr>
<tr>
<td>Develop and administer RESTful Web services using JAX-RS</td>
<td>Developing RESTful Web Services</td>
</tr>
</tbody>
</table>


**New and Changed Features in this Release**

For a comprehensive listing of the new WebLogic Server Web service features introduced in this release, see "Web Services" in *What’s New in Oracle WebLogic Server*.

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**Table 1–2 (Cont.) Roadmap for Implementing WebLogic Web Services**

<table>
<thead>
<tr>
<th>Task</th>
<th>More Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop and administer Web services using JAX-RPC</td>
<td>- Getting Started With JAX-RPC Web Services for Oracle WebLogic Server</td>
</tr>
<tr>
<td></td>
<td>- Programming Advanced Features of JAX-RPC Web Services for Oracle WebLogic Server</td>
</tr>
<tr>
<td>Secure the Web Service</td>
<td>- Configuring Message-Level Security</td>
</tr>
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<td></td>
<td>- Configuring Transport-Level Security</td>
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<tr>
<td></td>
<td>- Configuring Access Control Security (JAX-RPC Only)</td>
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<tr>
<td>Upgrade</td>
<td>&quot;Upgrading WebLogic Web Services&quot; in Upgrade Guide for Oracle WebLogic Server</td>
</tr>
</tbody>
</table>

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Samples and Related Information

This chapter describes the samples and related information that is available to assist you in learning more about WebLogic Web services.

This chapter includes the following sections:

- Section 2.1, “Samples for WebLogic Web Service Developers”
- Section 2.2, “WebLogic Web Services Documentation Set”
- Section 2.3, “Related Documentation—WebLogic Server Application Development”

2.1 Samples for WebLogic Web Service Developers

In addition to this document, Oracle provides a variety of code samples for Web services developers. The samples and tutorials illustrate WebLogic Web services in action, and provide practical instructions on how to perform key Web service development tasks.

Oracle recommends that you run the Web service samples before programming your own application that use Web services.

2.1.1 Web Services Samples in the WebLogic Server Distribution

WebLogic Server optionally installs API code samples in WL_HOME\samples\server\examples\src\examples\webservices, where WL_HOME is the top-level directory of your WebLogic Server installation. You can start the samples server, and obtain information about the samples and how to run them from the WebLogic Server Start menu.

2.1.2 Avitek Medical Records Application (MedRec) and Tutorials

MedRec is an end-to-end sample Java EE application shipped with WebLogic Server that simulates an independent, centralized medical record management system. The MedRec application provides a framework for patients, doctors, and administrators to manage patient data using a variety of different clients.

MedRec demonstrates WebLogic Server and Java EE features, and highlights Oracle-recommended best practices. MedRec is included in the WebLogic Server distribution, and can be accessed from the Start menu on Windows machines. For Linux and other platforms, you can start MedRec from the WL_HOME\samples\domains\medrec directory, where WL_HOME is the top-level installation directory for WebLogic Server. A Spring version of the application is accessible from the WL_HOME\samples\domains\medrec-spring directory.
2.1.3 Additional Web Services Samples Available for Download

Additional API samples for download can be found at [http://www.oracle.com/technetwork/indexes/samplecode/index.html](http://www.oracle.com/technetwork/indexes/samplecode/index.html). These samples include Oracle-certified ones, as well as samples submitted by fellow developers.

2.2 WebLogic Web Services Documentation Set

This document is part of a larger WebLogic Web services documentation set that covers a comprehensive list of Web services topics. The full documentation set includes the documents summarized in the following table.

| Table 2–1  WebLogic Web Services Documentation Set |
|-----------------|------------------|
| This document . . . | Describes . . . |
| Introducing WebLogic Web Services for Oracle WebLogic Server (This Document) | An introduction to WebLogic Web services, the standards that are supported, interoperability information, and relevant samples and documentation. |
| Getting Started With JAX-WS Web Services for Oracle WebLogic Server | The basic knowledge and tasks required to program a simple WebLogic Web service using JAX-WS. The guide includes use cases and examples, iterative development procedures, typical JWS programming steps, data type information, and how to invoke a Web service. |
| Programming Advanced Features of JAX-WS Web Services for Oracle WebLogic Server | How to program more advanced features using JAX-WS, such as callbacks, XML Catalog, and SOAP message handlers. |
| Developing RESTful Web Services | How to develop WebLogic Web services that conform to the Representational State Transfer (REST) architectural style using Java API for RESTful Web Services (JAX-RS). |
| Getting Started With JAX-RPC Web Services for Oracle WebLogic Server | The basic knowledge and tasks required to program a simple WebLogic Web service using JAX-RPC. The guide includes use cases and examples, iterative development procedures, typical JWS programming steps, data type information, and how to invoke a Web service. |
| Programming Advanced Features of JAX-RPC Web Services for Oracle WebLogic Server | How to program more advanced features using JAX-RPC, such as Web service reliable messaging, callbacks, conversational Web services, use of JMS transport to invoke a Web service, and SOAP message handlers. |
| Securing WebLogic Web Services for Oracle WebLogic Server | How to program and configure message-level (digital signatures and encryption), transport-level, and access control security for a Web service. |
| WebLogic Web Services Reference for Oracle WebLogic Server | Reference information on JWS annotations, Ant tasks, reliable messaging WS-Policy assertions, security WS-Policy assertions, and deployment descriptors. |

2.3 Related Documentation—WebLogic Server Application Development

For comprehensive guidelines for developing, deploying, and monitoring WebLogic Server applications, refer to the documents summarized in the following table.

<p>| Table 2–2  Related Documentation—WebLogic Server Application Development |
|-----------------|------------------|
| Review this document . . . | To learn how to . . . |
| Developing Applications for Oracle WebLogic Server | Develop WebLogic Server components (such as Web applications and EJBs) and applications. |</p>
<table>
<thead>
<tr>
<th>Table 2–2 (Cont.) Related Documentation—WebLogic Server Application Development</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Review this document . . .</strong></td>
</tr>
<tr>
<td><strong>Developing Web Applications, Servlets, and JSPs for Oracle WebLogic Server</strong></td>
</tr>
<tr>
<td><strong>Programming Enterprise JavaBeans, Version 2.1, for Oracle WebLogic Server</strong></td>
</tr>
<tr>
<td><strong>Programming XML for Oracle WebLogic Server</strong></td>
</tr>
<tr>
<td><strong>Deploying Applications to Oracle WebLogic Server</strong></td>
</tr>
<tr>
<td>“Configuring Applications for Production Deployment” in Deploying Applications to Oracle WebLogic Server</td>
</tr>
<tr>
<td><strong>Performance and Tuning for Oracle WebLogic Server</strong></td>
</tr>
<tr>
<td>“System Administration” in Understanding Oracle WebLogic Server</td>
</tr>
</tbody>
</table>
This chapter describes the interoperability testing performed, in conjunction with Microsoft, to ensure that WebLogic Web services can access and consume Web services created using Microsoft Windows Communication Foundation (WCF)/.NET 3.0, 3.5, and Framework 4.0 and vice versa. For more information, see http://msdn2.microsoft.com/en-us/netframework/default.aspx.

Table 3–1 describes the interoperability tests that were completed on JAX-WS and JAX-RPC Web services.

<table>
<thead>
<tr>
<th>Area</th>
<th>Interoperability Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic and complex data types</td>
<td>Section 3.1, “Basic Data Types Interoperability Guidelines”</td>
</tr>
<tr>
<td>WS-I Basic Profile 2.0, 1.2, and 1.1</td>
<td>Section 3.2, “Basic Profile Interoperability Guidelines”</td>
</tr>
<tr>
<td></td>
<td>Note: WS-I Basic Profile 2.0 and 1.2 applies to JAX-WS only. WS-I Basic Profile 1.1 applies to both JAX-WS and JAX-RPC Web services.</td>
</tr>
<tr>
<td>Web Services Reliable Secure Profile (WS-RSP) 1.0</td>
<td>Section 3.3, “Web Services Reliable Secure Profile Interoperability Guidelines”</td>
</tr>
<tr>
<td>Web Services Security (WS-Security) 1.0 and 1.1</td>
<td>Section 3.4, “WS-Security Interoperability Guidelines”</td>
</tr>
<tr>
<td>Web Services Secure Conversation Language (WS-SecureConversation) 1.3</td>
<td>Section 3.6, “WS-SecureConversation Interoperability Guidelines”</td>
</tr>
<tr>
<td>Web Services Policy Framework (WS-Policy) 1.5</td>
<td>No interoperability restrictions.</td>
</tr>
<tr>
<td>Web Services Addressing (WS-Addressing) 0.9 and 1.0</td>
<td>N/A</td>
</tr>
<tr>
<td>Message Transmission Optimization Mechanism (MTOM)</td>
<td>N/A</td>
</tr>
<tr>
<td>SAML Assertions</td>
<td>Section 3.7, “Using SAML Assertions Referenced from SignedInfo”</td>
</tr>
</tbody>
</table>

In addition, the following combined features were tested:

- MTOM and WS-Security
- WS-ReliableMessaging and MTOM
WS-ReliableMessaging 1.2 and WS-Addressing 1.0 (JAX-WS)
WS-ReliableMessaging 1.1 and WS-Addressing 1.0 (JAX-WS)
WS-ReliableMessaging 1.1 and WS-Addressing 0.9 and 1.0 (JAX-RPC)
WS-ReliableMessaging 1.0 and WS-Addressing 0.9 and 1.0 (JAX-RPC)
WS-ReliableMessaging 1.2 and WS-SecureConversation 1.4
WS-ReliableMessaging 1.1 and WS-SecureConversation 1.3
WS-ReliableMessaging 1.0 and WS-SecureConversation 1.3
WS-Policy 1.5 and WS-SecurityPolicy 1.2

The following sections describe the interoperability issues and guidelines that were identified during the testing.

3.1 Basic Data Types Interoperability Guidelines

When using the `anyType` class with Microsoft .NET 3.0/3.5 the Java data type returned cannot be guaranteed. If a specific Java data type is required, avoid using `anyType`.

3.2 Basic Profile Interoperability Guidelines

The WS-I Basic Profile 1.2 and 2.0 profiles were tested between WebLogic Web services JAX-WS and the Microsoft .NET Framework 4.0. No interoperability restrictions were found.

WS-I Basic Profile 1.1 was tested between WLS JAX-RPC and the Microsoft .NET 3.0/3.5 framework. This testing found that Microsoft .NET 3.0/3.5 does not enforce string Basic Profile 1.1 semantics for the use case described on the Java Web site at: http://download.oracle.com/docs/cd/E17802_01/webservices/webservices/reference/tutorials/wsit/doc/DataBinding7.html

3.3 Web Services Reliable Secure Profile Interoperability Guidelines

The Web Services Reliable Secure Profile implementations for WebLogic Web services and Microsoft .NET Web are compatible, with the following caveats:

- For WS-ReliableMessaging security, you must use WS-SecureConversation as per the guidelines in the WS-I Reliable Secure Profile Version 1.0 Working Group Draft specification at http://www.ws-i.org/Profiles/ReliableSecureProfile-1.0.html.
- Asynchronous reliable messaging plus WS-SecureConversation or WS-Trust is only supported for WebLogic Web service JAX-WS clients and Microsoft .NET services. In is not supported for JAX-RPC clients.

3.4 WS-Security Interoperability Guidelines

The following lists interoperability guidelines for WS-Security:

- Use of `<sp:Strict>` layout assertions (shown below) cannot be guaranteed.

```xml
<sp:Layout>
  <wsp:Policy>
    <sp:Strict/>
  </wsp:Policy>
</sp:Layout>
```
Instead, you should define your policy as follows:

```
<wsp:Policy>
  <sp:Lax/>
</wsp:Policy>
```

- The following assertions are not supported by Microsoft .NET 3.0/3.5:
  - Digest password in UsernameToken
  - `<sp:EncryptedSupportingTokens>`
  - Element-level signature
  - Element-level encryption
- Support of asymmetric binding for WS-Security 1.1 cannot be guaranteed on Microsoft .NET 3.0/3.5.

3.5 WS-SecurityPolicy Interoperability Guidelines


In the December 2005 draft version of the specification, the `<sp:SignedEncryptedSupportingTokens>` policy assertion is not supported. As a result, Microsoft .NET 3.0 encrypts the UsernameToken in the `<sp:SignedSupportingTokens>` policy assertion. If you use the `<sp:SignedSupportingTokens>` policy assertion without encrypting the UsernameToken, the WebLogic Server and Microsoft .NET Web services will not interoperate.

3.6 WS-SecureConversation Interoperability Guidelines

The following lists interoperability guidelines for WS-SecureConversation:

- Oracle recommends that you do not use `<sp:EncryptBeforeSigning/>` unless there is a security requirement. Instead, use `<sp:SignBeforeEncrypt>` (the default).
- Although WebLogic Server Web services support cookie mode conversations, this feature is a Microsoft proprietary implementation, and may not be supported by other vendors.
- When using `<sp:BootstrapPolicy>` policy assertion, you should refer to the guidelines defined in Section 3.4, "WS-Security Interoperability Guidelines."
- There is no standard method of supporting cancel and renew of WS-SecureConversation defined in the WS-SecurityPolicy or WS-SecureConversation specifications. The method used by Microsoft .NET to support cancel and renew of WS-SecureConversation is not compatible with WebLogic Server 10.x. As a result:
  - For a Microsoft .NET client to interoperate with a WebLogic Server Web service, the Compatibility flag must be set on the server side via the Web
service Security MBean using the
setCompatibilityPreference("msft") method.

For a WebLogic Server Web service client to interoperate with a WebLogic
Server Web service that has the Compatibility flag set, the client must set
this flag as well, as follows:

stub._setProperty(WLStub.POLICY_COMPATIBILITY_PREFERENCE,"msft");

For examples, see Example 3–1, "Setting the Microsoft .NET Compatibility Flag in
a JAX-WS Web Service Client" and Example 3–2, "Setting the Microsoft .NET
Compatibility Flag in a JAX-RPC Web Service Client".

3.7 Using SAML Assertions Referenced from SignedInfo

When the SAML assertion is referenced in the <ds:SignedInfo> element of a
<ds:Signature> element in a <wsee:Security> header, Microsoft .NET does not
support a SAML assertion that is referenced from
<wse:SecurityTokenReference>. Use of <wsse:SecurityTokenReference> is
defined as a best practice in the WS-Security specification, described at
http://www.oasis-open.org/committees/download.php/16768/wss-v1.1
-spec-os-SAMLTokenProfile.pdf.

For compatibility with Microsoft .NET, you must set the WLStub.POLICY-
COMPATIBILITY_PREFERENCE flag to WLStub.POLICY_COMPATIBILITY_MSFT
flag in Web service client code. When the flag is set, the SAML assertion will be signed

The following provides an example of how to set the Microsoft .NET compatibility flag
for a JAX-WS Web service client:

Example 3–1 Setting the Microsoft .NET Compatibility Flag in a JAX-WS Web Service Client

```java
import weblogic.wsee.jaxrpc.WLStub;

public String test(String hello) throws Exception {
    BindingProvider provider = (BindingProvider)port;
    Map context = provider.getRequestContext();

    context.put(WLStub.POLICY_COMPATIBILITY_PREFERENCE, WLStub.POLICY_COMPATIBILITY_MSFT);
    try {
        String result = port.getName(hello);
        System.out.println("MSFT Result was: " + result);
        return result;
    } catch (Exception e) {
        throw new RuntimeException (e);
    }
}
```

The following provides an example of how to set the Microsoft .NET compatibility flag
for a JAX-RPC Web service client:

Example 3–2 Setting the Microsoft .NET Compatibility Flag in a JAX-RPC Web Service Client

```java
import weblogic.wsee.jaxrpc.WLStub;
```
@WebMethod()
public String callSamlHelloSV_WSS10_MSFT(String input) {
    try {
        System.out.println("Calling sayHello(" + input + ") with MSFT Ways");
        ((Stub)port)._setProperty(WLStub.POLICY_COMPATIBILITY_PREFERENCE,
         WLStub.POLICY_COMPATIBILITY_MSFT);
        String result = port.sayHelloSV_WSS10(input);
        System.out.println("MSFT Result was: " + result);
        return result;
    }
    catch (RemoteException e) {
        throw new RuntimeException(e);
    }
}

Features and Standards Supported by WebLogic Web Services

This chapter describes the features and standards supported by WebLogic Web services. Many specifications that define Web service standards are written so as to allow for broad use of the specification throughout the industry. The Oracle implementation of a particular specification might not cover all possible usage scenarios covered by the specification.

Oracle considers interoperability of Web service platforms to be more important than providing support for all possible edge cases of the Web service specifications. Oracle complies with the following specifications from the Web Services Interoperability Organization and considers them to be the baseline for Web services interoperability:

- **Basic Profile 2.0** (JAX-WS only):
  http://www.ws-i.org/Profiles/BasicProfile-2_0(WGD).html

- **Basic Profile 1.2** (JAX-WS only):
  http://www.ws-i.org/Profiles/BasicProfile-1_2(WGAD).html

- **Basic Profile 1.1** (JAX-WS and JAX-RPC):
  http://www.ws-i.org/Profiles/BasicProfile-1.1-2004-08-24.html

- **Basic Security Profile 1.1** (JAX-WS and JAX-RPC):
  http://www.ws-i.org/Profiles/BasicSecurityProfile-1.1.html

- **Reliable Secure Profile 1.0** (JAX-WS only):
  http://www.ws-i.org/Profiles/ReliableSecureProfile-1.0.html

This guide does not necessarily document all of the specification requirements. This guide does, however, document features that are beyond the requirements of these specifications.

The following table summarizes the features and specifications supported by WebLogic Web services.
<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
<th>JAX-WS</th>
<th>JAX-RPC</th>
<th>JAX-RS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Programming model</strong>&lt;br&gt; (based on metadata annotations) and runtime architecture</td>
<td><strong>JSR 109: Implementing Enterprise Web Services</strong> — Programming model and runtime architecture for implementing Web services in Java that run on a Java EE application server, such as WebLogic Server. See Section 4.8, &quot;JSR 109: Implementing Enterprise Web Services 1.3.&quot;</td>
<td>Version 1.3</td>
<td>Version 1.3</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Programming model</strong>&lt;br&gt; (based on metadata annotations) and runtime architecture</td>
<td><strong>Web Services Metadata for the Java Platform 2.0 (JSR-181)</strong> — Standard annotations that you can use in your Java Web service (JWS) file to facilitate the programming of Web services. See Section 4.19, &quot;Web Services Metadata for the Java Platform 2.0 (JSR-181).&quot;</td>
<td>Supports</td>
<td>Supports</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Programming APIs</strong></td>
<td><strong>Java API for XML-based Web Services (JAX-WS)</strong> — Standards-based API for coding, assembling, and deploying Java Web services. The integrated stack includes JAX-WS 2.1, JAXB 2.1, and SAAJ 1.3. See Section 4.6, &quot;Java API for XML-based Web Services (JAX-WS) 2.2.&quot;&lt;br&gt;See also:&lt;br&gt; - Getting Started With JAX-WS Web Services for Oracle WebLogic Server&lt;br&gt; - Programming Advanced Features of JAX-WS Web Services for Oracle WebLogic Server</td>
<td>Version 2.2</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Programming APIs</strong></td>
<td><strong>Java API for RESTful Web Services (JAX-RS)</strong> — Provides a standard JAVA API for developing Web services based on the Representational State Transfer (REST) architectural style. See Section 4.3, &quot;Java API for RESTful Web Services (JAX-RS) 1.1.&quot;&lt;br&gt;See also Developing RESTful Web Services.</td>
<td>N/A</td>
<td>N/A</td>
<td>1.1 (Jersey 1.9 JAX-RS RI)</td>
</tr>
<tr>
<td><strong>Programming APIs</strong></td>
<td><strong>Java API for XML-based RPC (JAX-RPC)</strong> — Java APIs for making XML-based remote procedure calls (RPC). See Section 4.5, &quot;Java API for XML-based RPC (JAX-RPC) 1.1.&quot;&lt;br&gt;See also:&lt;br&gt; - Getting Started With JAX-RPC Web Services for Oracle WebLogic Server&lt;br&gt; - Programming Advanced Features of JAX-RPC Web Services for Oracle WebLogic Server</td>
<td>N/A</td>
<td>Version 1.1</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Data binding</strong></td>
<td><strong>Java Architecture for XML Binding (JAXB)</strong> — Implementation used to bind an XML schema to a representation in Java code. JAXB is supported by JAX-WS Web services only. See Section 4.7, &quot;Java Architecture for XML Binding (JAXB) 2.2.&quot;&lt;br&gt;See also &quot;Using JAXB Data Binding&quot; in Getting Started With JAX-WS Web Services for Oracle WebLogic Server.</td>
<td>Version 2.2</td>
<td>N/A</td>
<td>Version 2.2</td>
</tr>
</tbody>
</table>
### Table 4–1 (Cont.) Features and Standards Supported by WebLogic Web Services

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
<th>JAX-WS</th>
<th>JAX-RPC</th>
<th>JAX-RS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data binding</td>
<td>Apache XMLBeans—A technology for binding XML schema to Java types and for accessing XML data in a variety of ways. XMLBeans is the default binding technology for JAX-RPC Web services. See Section 4.2, &quot;Apache XMLBeans 2.0.” See also &quot;Understanding Data Binding&quot; in Getting Started With JAX-RPC Web Services for Oracle WebLogic Server.</td>
<td>N/A</td>
<td>2.0</td>
<td>N/A</td>
</tr>
</tbody>
</table>
| Web service description                      | Web Services Description Language (WSDL)—XML-based specification that describes a Web service. See Section 4.17, "Web Services Description Language (WSDL) 1.1.” See also:  
  - JAX-RPC: “Developing WebLogic Web Services Starting from a WSDL File: Main Steps” in Getting Started With JAX-RPC Web Services for Oracle WebLogic Server. | Version 1.1 | Version 1.1 | N/A   |
| Web service description                      | Web Application Description Language (WADL)—XML-based specification that provides a machine-readable description of HTTP-based Web applications. See Section 4.13, “Web Application Description Language (WSDL) 2009 Membership Submission.” | N/A    | N/A    | 2009 Member Submission |
| Web service description                      | Web Services Policy Framework (WS-Policy)—General purpose model and corresponding syntax to describe and communicate the policies of a Web service. See Section 4.21, "Web Services Policy Framework (WS-Policy) 1.5 and 1.2.” | Versions 1.5 and 1.2 | Versions 1.5 and 1.2 | N/A   |
| Web service description                      | Web Services Policy Attachment (WS-PolicyAttachment)—Abstract model and an XML-based expression grammar for policies. See Section 4.20, "Web Services Policy Attachment (WS-Policy Attachment) 1.5 and 1.2.” | Versions 1.5 and 1.2 | Versions 1.5 and 1.2 | N/A   |
| Data exchange between Web service and requesting client | Simple Object Access Protocol (SOAP)—Lightweight XML-based protocol used to exchange information in a decentralized, distributed environment. See Section 4.11, "Simple Object Access Protocol (SOAP) 1.1 and 1.2.” | Versions 1.2 and 1.1 | Versions 1.2 and 1.1 | N/A   |
### Table 4–1 (Cont.) Features and Standards Supported by WebLogic Web Services

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
<th>JAX-WS</th>
<th>JAX-RPC</th>
<th>JAX-RS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Data exchange between Web service and requesting client</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SOAP with Attachments API for Java (SAAJ) 1.3—Implementation that developers can use to produce and consume messages conforming to the SOAP 1.1 specification and SOAP with Attachments notes. See Section 4.12, &quot;SOAP with Attachments API for Java (SAAJ) 1.3.”</td>
<td>Version 1.3</td>
<td>Version 1.3</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td><strong>Security</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Web Services Security (WS-Security)—Standard set of SOAP [SOAP11, SOAP12] extensions that can be used when building secure Web services to implement message content integrity and confidentiality. See Section 4.25, &quot;Web Services Security (WS-Security) 1.1 and 1.0.”</td>
<td>Versions 1.1</td>
<td>Versions 1.1</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>See also Securing WebLogic Web Services for Oracle WebLogic Server.</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td><strong>Security</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>See also Securing WebLogic Web Services for Oracle WebLogic Server.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Security</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Security Assertion Markup Language (SAML)—XML standard for exchanging authentication and authorization data between security domains. See Section 4.9, “Security Assertion Markup Language (SAML) 2.0 and 1.1.”</td>
<td>Versions 2.0</td>
<td>Versions 2.0</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>See also Securing WebLogic Web Services for Oracle WebLogic Server.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Security</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Security Assertion Markup Language (SAML) Token Profile—Set of WS-Security SOAP extensions that implement SOAP message authentication and encryption. See Section 4.10, “Security Assertion Markup Language (SAML) Token Profile 1.1 and 1.0.”</td>
<td>Versions 1.1</td>
<td>Versions 1.1</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>See also Securing WebLogic Web Services for Oracle WebLogic Server.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Reliable communication</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Web Services Addressing (WS-Addressing)—Transport-neutral mechanisms to address Web services and messages. See Section 4.14, &quot;Web Services Addressing (WS-Addressing) 1.0 and 2004/08 Member Submission.”</td>
<td>Version 1.0</td>
<td>Version 1.0</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
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</tr>
</tbody>
</table>

4-4 Introducing WebLogic Web Services for Oracle WebLogic Server
### Table 4–1 (Cont.) Features and Standards Supported by WebLogic Web Services

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
<th>JAX-WS</th>
<th>JAX-RPC</th>
<th>JAX-RS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reliable communication</td>
<td><strong>Web Services Reliable Messaging (WS-ReliableMessaging)</strong>—Implementation that enables two endpoints (Web service and client) running on different WebLogic Server instances to communicate reliably in the presence of failures in software components, systems, or networks. See Section 4.22, “Web Services Reliable Messaging (WS-ReliableMessaging).”</td>
<td>Versions 1.2, 1.1</td>
<td>Version 1.1 and 1.0</td>
<td>N/A</td>
</tr>
</tbody>
</table>

See also:
- JAX-WS: "Using Web Services Reliable Messaging” in *Programming Advanced Features of JAX-WS Web Services for Oracle WebLogic Server*
- JAX-RPC: “Using Web Services Reliable Messaging” in *Programming Advanced Features of JAX-RPC Web Services for Oracle WebLogic Server*


See also:
- JAX-WS: "Pre-packaged WS-Policy Files for Reliable Messaging and MakeConnection” in *Programming Advanced Features of JAX-WS Web Services for Oracle WebLogic Server*
- JAX-RPC: “Pre-packaged WS-Policy Files for Reliable Messaging” in *Programming Advanced Features of JAX-RPC Web Services for Oracle WebLogic Server*

| Reliable communication | **Web Services Trust Language (WS-Trust)**—Extensions that build on Web Services Security (WS-Security) to secure asynchronous communication. See Section 4.27, “Web Services Trust Language (WS-Trust).” | Version 1.4 and 1.3 | Version 1.3 | N/A |

See also "Configuring Message-Level Security” in *Securing WebLogic Web Services for Oracle WebLogic Server.*
Table 4–1  (Cont.) Features and Standards Supported by WebLogic Web Services

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
<th>JAX-WS</th>
<th>JAX-RPC</th>
<th>JAX-RS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reliable communication</td>
<td>Web Services Secure Conversation Language (WS-SecureConversation)—Extensions that build on Web Services Security (WS-Security) and Web Services Trust Language (WS-Trust) to secure asynchronous communication. See Section 4.24, &quot;Web Services Secure Conversation Language (WS-SecureConversation).” See also &quot;Configuring Message-Level Security&quot; in Securing WebLogic Web Services for Oracle WebLogic Server.</td>
<td>Version 1.4</td>
<td>Version 1.3</td>
<td>N/A</td>
</tr>
</tbody>
</table>
| Asynchronous communication     | Asynchronous Request Response—When you invoke a Web service synchronously, the invoking client application waits for the response to return before it can continue with its work. In cases where the response returns immediately, this method of invoking the Web service is common. However, because request processing can be delayed, it is often useful for the client application to continue its work and handle the response later on. This can be accomplished using asynchronous Web service invocation. For example, see:  
- JAX-WS: "Invoking a Web Service Asynchronously" in Programming Advanced Features of JAX-WS Web Services for Oracle WebLogic Server  
- JAX-RPC: "Invoking a Web Service Using Asynchronous Request-Response” in Programming Advanced Features of JAX-RPC Web Services for Oracle WebLogic Server | Supported | Supported | Supported |
| Asynchronous communication     | WS-MakeConnection—Provides a mechanism for the transfer of messages between two endpoints when the sending endpoint is unable to initiate a new connection to the receiving endpoint. See Section 4.18, "Web Services MakeConnection 1.1.” See also "Invoking a Web Service Asynchronously” in Programming Advanced Features of JAX-WS Web Services for Oracle WebLogic Server. | Version 1.1 | N/A      | N/A    |
### Table 4–1 (Cont.) Features and Standards Supported by WebLogic Web Services

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
<th>JAX-WS</th>
<th>JAX-RPC</th>
<th>JAX-RS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Atomic transactions</strong></td>
<td><strong>Web Services Atomic Transaction</strong>—Defines the Atomic Transaction coordination type that is to be used with the extensible coordination framework described in the Web Services Coordination specification. The WS-AtomicTransaction and WS-Coordination specifications define an extensible framework for coordinating distributed activities among a set of participants. See Section 4.15, &quot;Web Services Atomic Transaction (WS-AtomicTransaction) Version 1.2, 1.1, and 1.0&quot;. See also &quot;Using Web Services Atomic Transactions&quot; in Programming Advanced Features of JAX-WS Web Services for Oracle WebLogic Server. <strong>Note</strong>: For JAX-RPC similar functionality can be accomplished using @WebMethod inside a transaction (@weblogic.jws.Transactional). For more information, see &quot;weblogic.jws.Transaction&quot; in WebLogic Web Services Reference for Oracle WebLogic Server.</td>
<td>Versions 1.2, 1.1, and 1.0 N/A (see Note in description)</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Atomic transactions</strong></td>
<td><strong>Web Services Coordination</strong>—Defines an extensible framework for providing protocols that coordinate the actions of distributed applications. The WS-AtomicTransaction and WS-Coordination specifications define an extensible framework for coordinating distributed activities among a set of participants. See Section 4.16, &quot;Web Services Coordination (WS-Coordination) Version 1.2, 1.1, and 1.0&quot;. See also &quot;Using Web Services Atomic Transactions&quot; in Programming Advanced Features of JAX-WS Web Services for Oracle WebLogic Server.</td>
<td>Versions 1.2, 1.1, and 1.0 N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>
| **Client event notification** | **Web service callbacks**—Callbacks notify a client of your Web service that some event has occurred. For example, you can notify a client when the results of that client’s request are ready, or when the client’s request cannot be fulfilled. For more information, see:  
  - JAX-RPC: “Using Callbacks to Notify Clients of Events” in Programming Advanced Features of JAX-RPC Web Services for Oracle WebLogic Server | Supported | Supported | Not supported |
The following sections describe the specifications in more detail. Specifications are listed in alphabetical order. Additional specifications that WebLogic Web services
support are listed in Section 4.28, "Additional Specifications Supported by WebLogic Web Services."

### 4.1 A Note About JAX-WS 2.2 RI/JDK 7.0 Extensions

A subset of the APIs described in this document (such as com.sun.xml.ws.developer APIs) are supported as an extension to the JDK 7.0 or JAX-WS 2.2 Reference Implementation (RI). Because the APIs are not provided as part of the JDK 7.0 or WebLogic Server software, they are subject to change. The APIs include, but are not limited to:

- com.sun.xml.ws.api.server.AsyncProvider
- com.sun.xml.ws.client.BindingProviderProperties
- com.sun.xml.ws.developer.JAXWSProperties
- com.sun.xml.ws.developer.SchemaValidation
- com.sun.xml.ws.developer.SchemaValidationFeature
- com.sun.xml.ws.developer.StreamingAttachment
- com.sun.xml.ws.developer.StreamingAttachmentFeature
- com.sun.xml.ws.developer.StreamingDataHandler

### 4.2 Apache XMLBeans 2.0

Apache XMLBeans 2.0, described at [http://xmlbeans.apache.org](http://xmlbeans.apache.org), provides a technology for binding XML schema to Java types and for accessing XML data in a variety of ways. XMLBeans uses XML Schema to compile Java interfaces and classes that use to access and modify XML instance data. XMLBeans is the default binding technology for JAX-RPC Web services.

### 4.3 Java API for RESTful Web Services (JAX-RS) 1.1


WebLogic Server supports Jersey 1.9 JAX-RS Reference Implementation (RI), which is a production quality implementation of the JSR-311 JAX-RS 1.1 specification. As required, you can use a more recent version of the Jersey JAX-RS RI.

For more information, see Developing RESTful Web Services.

### 4.4 Java API for XML Registries (JAXR) 1.0

The Java API for XML Registries (JAXR) specification, described at [http://java.sun.com/webservices/jaxr](http://java.sun.com/webservices/jaxr), provides a uniform and standard Java API for accessing different kinds of XML Registries. An XML registry is an enabling infrastructure for building, deploying, and discovering Web services.

JAXR enables Java software programmers to use a single, easy-to-use abstraction API to access a variety of XML registries. Simplicity and ease of use are facilitated within JAXR by a unified JAXR information model, which describes content and metadata within XML registries.
4.5 Java API for XML-based RPC (JAX-RPC) 1.1

Namespace: http://java.sun.com/xml/ns/jax-rpc

The Java API for XML-based RPC (JAX-RPC) specification, described at https://jax-rpc.dev.java.net/, is a specification that defines the Java APIs for making XML-based remote procedure calls (RPC). In particular, these APIs are used to invoke and get a response from a Web service using SOAP 1.1, and XML-based protocol for exchange of information in a decentralized and distributed environment.

WebLogic Server implements all required features of the JAX-RPC Version 1.1 specification. Additionally, WebLogic Server implements optional data type support, as described in "Understanding Data Binding" in Getting Started With WebLogic Web Services Using JAX-RPC. WebLogic Server does not implement optional features of the JAX-RPC specification, other than what is described in this chapter.

Note: Because JAX-WS is the successor to the JAX-RPC and it implements many of the new features in Java EE 6, Oracle recommends that you develop Web services with JAX-WS. JAX-RPC is considered legacy and the specification is no longer evolving.

4.6 Java API for XML-based Web Services (JAX-WS) 2.2

Namespace: http://java.sun.com/xml/ns/jaxws

The Java API for XML-based Web Services (JAX-WS) specification, described at http://jcp.org/aboutJava/communityprocess/mrel/jsr224/index2.htm1, is a standards-based API for coding, assembling, and deploying Java Web services. The "integrated stack" includes JAX-WS 2.2, Java Architecture for XML Binding (JAXB) 2.2 and SOAP with Attachments API for Java (SAAJ) 1.3.

4.7 Java Architecture for XML Binding (JAXB) 2.2

Namespace: http://java.sun.com/xml/ns/jaxb

The Java Architecture for XML Binding (JAXB) specification, described at http://jcp.org/en/jsr/detail?id=222, provides a convenient way to bind an XML schema to a representation in Java code. This makes it easy for you to incorporate XML data and processing functions in applications based on Java technology without having to know much about XML itself.

Note: JAXB cannot be used with JAX-RPC.

4.8 JSR 109: Implementing Enterprise Web Services 1.3

The JSR 109: Implementing Enterprise Web Services specification, described at http://www.jcp.org/en/jsr/detail?id=109, defines the programming model and runtime architecture for implementing Web services in Java that run on a Java EE application server, such as WebLogic Server. In particular, it specifies that programmers implement Java EE Web services using one of two components:

- Java class running in the Web container
- Stateless session EJB running in the EJB container
The specification also describes a standard Java EE Web services packaging format, deployment model, and runtime services, all of which are implemented by WebLogic Web services.

4.9 Security Assertion Markup Language (SAML) 2.0 and 1.1

Namespaces:
urn:oasis:names:tc:SAML:2.0:assertion
urn:oasis:names:tc:SAML:2.0:protocol

The Security Assertion Markup Language (SAML) specification provides an XML standard for exchanging authentication and authorization data between security domains. For more information, see:

- http://www.oasis-open.org/specs/index.php#samlv2.0
- http://www.oasis-open.org/specs/index.php#samlv1.1

4.10 Security Assertion Markup Language (SAML) Token Profile 1.1 and 1.0

Namespace: urn:oasis:names:tc:SAML:1.0:assertion

The Web Services Security: SAML Token Profile 1.1 specification defines a set of SOAP extensions that implement SOAP message authentication and encryption. For more information, see:


4.11 Simple Object Access Protocol (SOAP) 1.1 and 1.2

Namespace: http://schemas.xmlsoap.org/wsd/soap

Simple Object Access Protocol (SOAP), described at http://www.w3.org/TR/SOAP, is a lightweight XML-based protocol used to exchange information in a decentralized, distributed environment. WebLogicServer includes its own implementation of versions 1.1 and 1.2 of the SOAP specification. The protocol consists of:

- An envelope that describes the SOAP message. The envelope contains the body of the message, identifies who should process it, and describes how to process it.
- A set of encoding rules for expressing instances of application-specific data types.
- A convention for representing remote procedure calls and responses.

This information is embedded in a Multipurpose Internet Mail Extensions (MIME)-encoded package that can be transmitted over HTTP, HTTPs, or other Web protocols. MIME is a specification for formatting non-ASCII messages so that they can be sent over the Internet.

The following example shows a SOAP 1.1 request for stock trading information embedded inside an HTTP request:

POST /StockQuote HTTP/1.1
Host: www.sample.com:7001
Content-Type: text/xml; charset="utf-8"
By default, WebLogic Web services use version 1.1 of SOAP; if you want your Web services to use version 1.2, you must specify the binding type in the JWS file that implements your service.

4.12 SOAP with Attachments API for Java (SAAJ) 1.3

The SOAP with Attachments API for Java (SAAJ) specification, described at https://saaj.dev.java.net, describes how developers can produce and consume messages conforming to the SOAP 1.1 specification and SOAP with Attachments notes.

The single package in the API, javax.xml.soap, provides the primary abstraction for SOAP messages with MIME attachments. Attachments may be entire XML documents, XML fragments, images, text documents, or any other content with a valid MIME type. In addition, the package provides a simple client-side view of a request-response style of interaction with a Web service.

4.13 Web Application Description Language (WSDL) 2009 Membership Submission

Namespace: http://wadl.dev.java.net/2009/02 wadl.xsd

Web Application Description Language (WADL), described at http://www.w3.org/Submission/wadl, is an XML-based specification that provides a machine-readable description of HTTP-based Web applications. Developers of WebLogic Web services do not need to create the WADL files; you generate these files automatically as part of the WebLogic Web services development process.

4.14 Web Services Addressing (WS-Addressing) 1.0 and 2004/08 Member Submission

Namespaces:

http://www.w3.org/2005/08/addressing
http://www.w3.org/2007/05/addressing/metadata

The Web Services Addressing (WS-Addressing) Core specification, described at http://www.w3.org/TR/ws-addr-core, provides transport-neutral mechanisms to address Web services and messages. In particular, the specification defines a number of XML elements used to identify Web service endpoints and to secure end-to-end endpoint identification in messages.
In addition to 1.0, the current release supports Web Services Addressing (August 2004 Member Submission), described at http://www.w3.org/Submission/2004/SUBM-ws-addressing-20040810.

The Web Services Addressing (WS-Addressing) Metadata specification, described at http://www.w3.org/TR/ws-addr-metadata, defines how the abstract properties defined in Web Services Addressing Core are described using WSDL and how WS-Policy can be used to indicate the support of WS-Addressing by a Web service.

4.15 Web Services Atomic Transaction (WS-AtomicTransaction) Version 1.2, 1.1, and 1.0

The Web Services Atomic Transaction (WS-AtomicTransaction) specification, described at http://docs.oasis-open.org/ws-tx/wstx-wsat-1.2-spec-cs-01/wstx-wsat-1.2-spec-cs-01.html, defines the Atomic Transaction coordination type that is to be used with the extensible coordination framework described in the Web Services Coordination specification. The WS-AtomicTransaction and WS-Coordination specifications define an extensible framework for coordinating distributed activities among a set of participants.

4.16 Web Services Coordination (WS-Coordination) Version 1.2, 1.1, and 1.0

The Web Services Coordination (WS-Coordination) specification, described at http://docs.oasis-open.org/ws-tx/wstx-wscoor-1.2-spec-cs-01/wstx-wscoor-1.2-spec-cs-01.html, defines an extensible framework for providing protocols that coordinate the actions of distributed applications. The WS-AtomicTransaction and WS-Coordination specifications define an extensible framework for coordinating distributed activities among a set of participants.

4.17 Web Services Description Language (WSDL) 1.1

Namespace: http://schemas.xmlsoap.org/wsdl

Web Services Description Language (WSDL), described at http://www.w3.org/TR/wsdl, is an XML-based specification that describes a Web service. A WSDL document describes Web services operations, input and output parameters, and how a client application connects to the Web service.

Developers of WebLogic Web services do not need to create the WSDL files; you generate these files automatically as part of the WebLogic Web services development process.

The following example, for informational purposes only, shows a WSDL file that describes the stock trading Web services StockQuoteService that contains the method GetLastStockQuote:

```xml
<?xml version='1.0'?>
<definitions name="StockQuote"

targetNamespace="http://sample.com/stockquote.wsdl"
xmlns:tns="http://sample.com/stockquote.wsdl"
xmlns:xsd="http://www.w3.org/2000/10/XMLSchema"
xmlns:xsd1="http://sample.com/stockquote.xsd"
xmlns:soap="http://schemas.xmlsoap.org/soap/"
xmlns="http://schemas.xmlsoap.org/wsdl/">
<message name="GetStockPriceInput">
<part name="symbol" element="xsd:string"/>
```
The WSDL specification includes optional extension elements that specify different types of bindings that can be used when invoking the Web service. The WebLogic Web services runtime:

- Fully supports SOAP bindings, which means that if a WSDL file includes a SOAP binding, the WebLogic Web services will use SOAP as the format and protocol of the messages used to invoke the Web service.
- Ignores HTTP GET and POST bindings, which means that if a WSDL file includes this extension, the WebLogic Web services runtime skips over the element when parsing the WSDL.
- Partially supports MIME bindings, which means that if a WSDL file includes this extension, the WebLogic Web services runtime parses the element, but does not actually create MIME bindings when constructing a message due to a Web service invoke.

### 4.18 Web Services MakeConnection 1.1

**Namespace**: http://docs.oasis-open.org/ws-rx/wsmc/200702

The *Web Services MakeConnection* specification, described at http://docs.oasis-open.org/ws-rx/wsmc/200702, provides a mechanism for the transfer of messages between two endpoints when the sending endpoint is unable...
to initiate a new connection to the receiving endpoint. For example, to enable asynchronous Web service invocation from behind a firewall.

4.19 Web Services Metadata for the Java Platform 2.0 (JSR-181)

Oracle recommends that you take advantage of the metadata annotations feature, described at [http://download.oracle.com/javase/6/docs/technotes/guides/language/annotations.html](http://download.oracle.com/javase/6/docs/technotes/guides/language/annotations.html), and use a programming model in which you create an annotated Java file and then use Ant tasks to convert the file into the Java source code of a standard Java class or EJB and automatically generate all the associated artifacts.

The Java Web Service (JWS) annotated file (called a JWS file for simplicity) is the core of your Web service. It contains the Java code that determines how your Web service behaves. A JWS file is an ordinary Java class file that uses JDK 5.0 metadata annotations to specify the shape and characteristics of the Web service. The JWS annotations you can use in a JWS file include the standard ones defined by the [Web Services Metadata for the Java Platform specification (JSR-181)](http://www.jcp.org/en/jsr/detail?id=181), as well as a set of other standard or WebLogic-specific ones, depending on the type of Web service you are creating.

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**Note:** As an alternative to using a JWS annotated file, you can program a WebLogic Web service manually by coding the standard Java class or EJB from scratch and generating its associated artifacts by hand (deployment descriptor files, WSDL, data binding artifacts for user-defined data types, and so on). However, the entire process can be difficult and tedious and is not recommended.

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4.20 Web Services Policy Attachment (WS-Policy Attachment) 1.5 and 1.2

Namespaces:

- WS-Policy Attachment 1.5: [http://www.w3.org/ns/ws-policy](http://www.w3.org/ns/ws-policy)

The Web Services Policy Attachment (WS-Policy Attachment) specification defines an abstract model and an XML-based expression grammar for policies. The specification defines two general-purpose mechanisms for associating such policies with the subjects to which they apply. This specification also defines how these general-purpose mechanisms can be used to associate WS-Policy with WSDL and UDDI descriptions.

For more information, see:

- **Web Services Policy 1.5 - Attachment** (Recommendation): [http://www.w3.org/TR/ws-policy-attach/](http://www.w3.org/TR/ws-policy-attach/)
- **Web Services Policy 1.2 - Attachment (WS-PolicyAttachment)** (Member Submission): [http://www.w3.org/Submission/WS-PolicyAttachment](http://www.w3.org/Submission/WS-PolicyAttachment)

4.21 Web Services Policy Framework (WS-Policy) 1.5 and 1.2

Namespaces:

- WS-Policy Framework 1.5: [http://www.w3.org/ns/ws-policy](http://www.w3.org/ns/ws-policy)
The WS-Policy Framework (WS-Policy) specification provides a general purpose model and corresponding syntax to describe and communicate the policies of a Web service. WS-Policy defines a base set of constructs that can be used and extended by other Web services specifications to describe a broad range of service requirements, preferences, and capabilities.

For more information, see:

- **Web Services Policy 1.5 - Framework (Recommendation):**
  http://www.w3.org/TR/ws-policy
- **Web Services Policy 1.2 - Framework (WS-Policy) (Member Submission):**
  http://www.w3.org/Submission/WS-Policy

### 4.22 Web Services Reliable Messaging (WS-ReliableMessaging)

**Namespace:** http://docs.oasis-open.org/ws-rx/wsrm/200702

The Web Services Reliable Messaging (WS-ReliableMessaging) specification, at http://docs.oasis-open.org/ws-rx/wsrm/200702, describes how two Web services running on different WebLogic Server instances can communicate reliably in the presence of failures in software components, systems, or networks. In particular, the specification provides for an interoperable protocol in which a message sent from a source endpoint to a destination endpoint is guaranteed either to be delivered or to raise an error.

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**Note:** The WebLogic Server WS-ReliableMessaging supports backward compatibility with older versions of the specification. For example, a WS-ReliableMessaging 1.2 Web service can be accessed by clients conforming to either the WS-ReliableMessaging 1.2 or 1.1 specifications. However, a WS-ReliableMessaging 1.2/1.1 client cannot communicate with a WS-ReliableMessaging 1.0 server. Note that WS-ReliableMessaging 1.2 (client or service) is supported on JAX-WS only.

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### 4.23 Web Services Reliable Messaging Policy Assertion (WS-RM Policy)

**Namespace:** http://docs.oasis-open.org/ws-rx/wsrmp/200702

The Web Services Reliable Messaging Policy Assertion (WS-RM Policy) specification defines a domain-specific policy assertion for reliable messaging for use with WS-Policy and WS-ReliableMessaging. This specification enables an RM Destination and an RM Source to describe their requirements for a given sequence.

For more information, see:

- **Version 1.2 (JAX-WS only):**
  http://docs.oasis-open.org/ws-rx/wsrmp/200702/wsrmp-1.2-spec-os.html
- **Version 1.1 (JAX-WS and JAX-RPC):**
  http://docs.oasis-open.org/ws-rx/wsrmp/200702/wsrmp-1.1-spec-os-01.html
4.24 Web Services Secure Conversation Language (WS-SecureConversation)

Namespace:
http://docs.oasis-open.org/ws-sx/ws-secureconversation/200512

The Web Services Secure Conversation Language (WS-SecureConversation) specification defines extensions that build on Web Services Security (WS-Security) 1.1 and 1.0 and Web Services Trust Language (WS-Trust) to provide secure communication across one or more messages. Specifically, this specification defines mechanisms for establishing and sharing security contexts, and deriving keys from established security contexts (or any shared secret).

For more information, see:

- Version 1.4 (JAX-WS):
- Version 1.3 (JAX-RPC):
  http://docs.oasis-open.org/ws-sx/ws-secureconversation/200512/ws-secureconversation-1.3-os.html

4.25 Web Services Security (WS-Security) 1.1 and 1.0

Namespaces:
http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-wssecuri
tysecext-1.0.xsd,
http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-wssecuri
tyutility-1.0.xsd,
http://docs.oasis-open.org/wss/oasis-wss-wssecurity-secext-1.1.xsd

The following description of Web Services Security is taken directly from the OASIS standard 1.1 specification, titled Web Services Security: SOAP Message Security, dated February 2006:

This specification proposes a standard set of SOAP [SOAP11, SOAP12] extensions that can be used when building secure Web services to implement message content integrity and confidentiality. This specification refers to this set of extensions and modules as the “Web Services Security: SOAP Message Security” or “WSS: SOAP Message Security”.

This specification is flexible and is designed to be used as the basis for securing Web services within a wide variety of security models including PKI, Kerberos, and SSL. Specifically, this specification provides support for multiple security token formats, multiple trust domains, multiple signature formats, and multiple encryption technologies. The token formats and semantics for using these are defined in the associated profile documents.

This specification provides three main mechanisms: ability to send security tokens as part of a message, message integrity, and message confidentiality. These mechanisms by themselves do not provide a complete security solution for Web services. Instead, this specification is a building block that can be used in conjunction with other Web service extensions and higher-level application-specific protocols to accommodate a wide variety of security models and security technologies.

These mechanisms can be used independently (for example, to pass a security token) or in a tightly coupled manner (for example, signing and encrypting a message or part of a message and providing a security token or token path associated with the keys used for signing and encryption).
WebLogic Web services also implement the following token profiles:

- Web Services Security: SOAP Message Security
- Web Services Security: Username Token Profile
- Web Services Security: X.509 Certificate Token Profile
- Web Services Security: SAML Token Profile 1.0 and 1.1


### 4.26 Web Services Security Policy (WS-SecurityPolicy) 1.3

**Namespace:**
http://docs.oasis-open.org/ws-sx/ws-securitypolicy/200702


All the asynchronous features of WebLogic Web services (callbacks, conversations, and Web service reliable messaging) use addressing in their implementation, but Web service programmers can also use the APIs that conform to this specification stand-alone if additional addressing functionality is needed.

### 4.27 Web Services Trust Language (WS-Trust)

**Namespace:** http://schemas.xmlsoap.org/ws/2005/02/trust

The Web Services Trust Language (WS-Trust) specification defines extensions that build on Web Services Security (WS-Security) 1.1 and 1.0 to provide a framework for requesting and issuing security tokens, and to broker trust relationships.

For more information, see:

- Version 1.4 (JAX-WS):
  http://docs.oasis-open.org/ws-sx/ws-trust/200802
- Version 1.3 (JAX-RPC):
  http://docs.oasis-open.org/ws-sx/ws-trust/200512/ws-trust-1.3-os.html

### 4.28 Additional Specifications Supported by WebLogic Web Services

- **XML Schema Part 1: Structures** described at http://www.w3.org/TR/xmlschema-1
- **XML Schema Part 2: Data Types** described at http://www.w3.org/TR/xmlschema-2