

Oracle® Fusion Middleware

Introducing Web Services

11g Release 1 (11.1.1)

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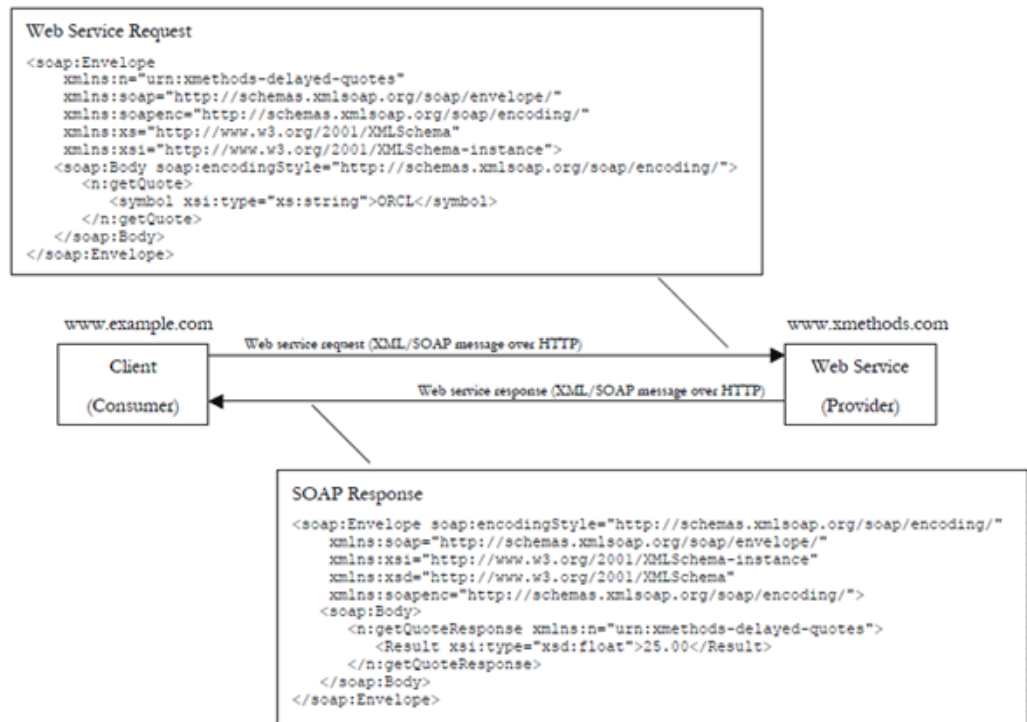
This document provides an overview of Web services in Oracle Fusion Middleware 11g. Sections include:

- [What are Web Services?](#)
- [Overview of Web Services in Oracle Fusion Middleware 11g](#)
- [Roadmap for Implementing Oracle Fusion Middleware Web Services](#)
- [Related Documentation](#)
- [Documentation Accessibility](#)

1 What are Web Services?

A Web service is a program that can be accessed remotely using different XML-based languages. What this program can do (that is, the functionality it implements) is described in a standard XML vocabulary called Web Services Description Language (WSDL). For example, a banking Web service may implement functions to check an account, print a statement, and deposit and withdraw funds. These functions are described in a WSDL file that any consumer can invoke to access the banking Web service. As a result, a consumer does not have to know anything more about a Web service than the WSDL file that describes what it can do.

A Web service consumer (such as, a desktop application or a Java Platform, Enterprise Edition client such as a portlet) invokes a Web service by submitting a request in the form of an XML document to a Web service provider. The Web service provider processes the request and returns the result to the Web service consumer in an XML document as shown in the example below.



In this example, the Web service consumer sends a request in the form of a Simple Object Access Protocol (SOAP) message (SOAP is an XML messaging framework designed to allow heterogeneous applications to exchange structured information in a distributed environment). The Web service provider (www.xmethods.com) processes the request and returns the response, in this case the stock quote for Oracle.

In the example above, the Web service provider may have asked for credentials to access the service, for example a username and a password. Also, the Web service provider may have encrypted the response (the value of the stock).

In summary, Web services are loosely coupled, distributed environments that allow companies to integrate heterogeneous applications within the enterprise or expose business functions to their customers and partners over the Internet.

Web services are characterized by three factors:

- What they do (the business functionality they expose),
- Where they are (the web site which exposes that functionality),
- How they can be accessed (the set of published interfaces necessary to use the exposed functionality).

Web services rely on XML-based industry standards:

- Extensible Markup Language (XML)—A data format that allows uniform communication between Web services consumers and Web services providers.
- XML Schema—A framework that describes XML vocabularies used in business transactions.
- SOAP—A protocol for exchanging structured information in the implementation of Web services.
- WSDL—An XML-based language providing a model for describing Web services.

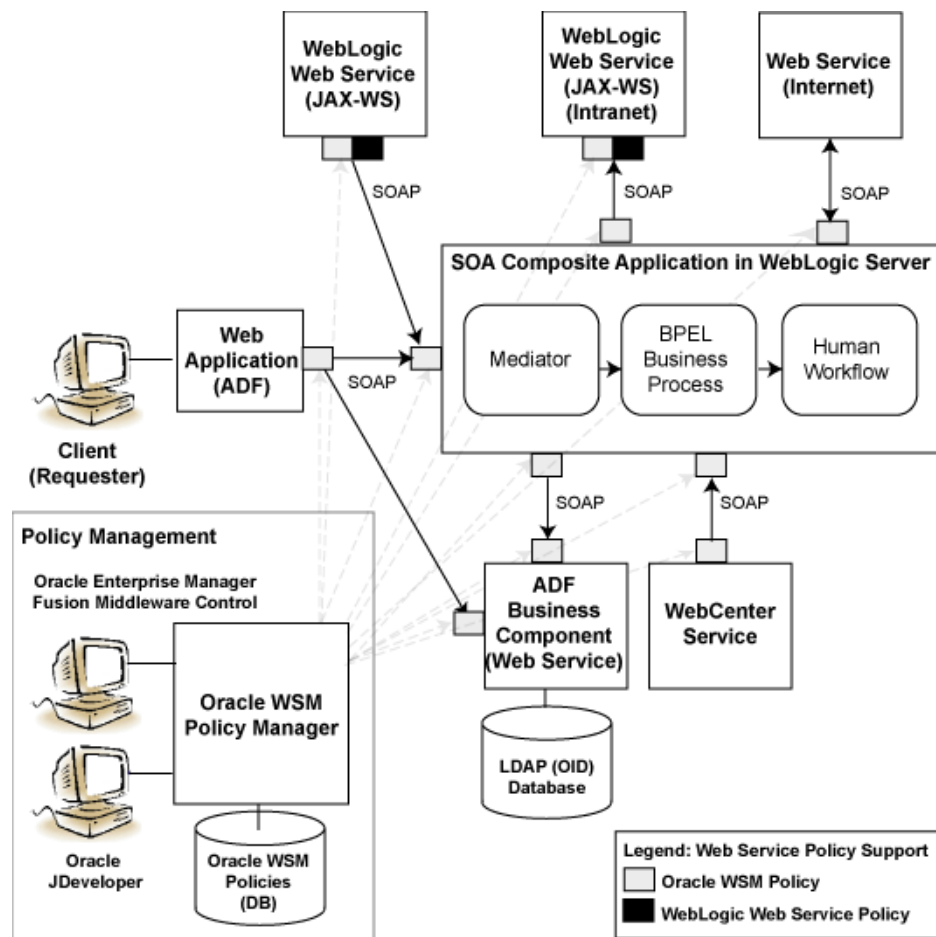
- WS-Policy—The WS-Policy framework enables one to specify policy information that can be processed by web services applications, such as Oracle WSM. A Web service provider may define conditions (or policies) under which a service is to be provided.
- Universal Description, Discovery, and Integration (UDDI)—A framework to publish and look up Web services on the Internet.

2 Overview of Web Services in Oracle Fusion Middleware 11g

The following illustration shows common interactions between Oracle Fusion Middleware Web services and clients, and identifies Web service policy support at each interaction point.

The Oracle Web Services Manager (WSM) Policy Manager is the security and management policy lynchpin for Oracle Fusion Middleware 11g Web services. For more information about how the Oracle WSM Policy Manager manages the policy framework, see "Understanding Oracle WSM Policy Framework" in *Oracle Fusion Middleware Security and Administrator's Guide for Web Services*.

Figure 1 Web Services in Oracle Fusion Middleware 11g



The following sections provide more detail about the Oracle Fusion Middleware 11g Web services architecture and each of the Web service components shown in the previous figure:

- [Web Services Architecture](#)
- [Types of Web Services and Clients](#)
- [Types of Web Service Policies](#)
- [Tools for Web Service Development, Security, and Administration](#)

For a complete roadmap of all Web service development, security, and administration tasks, see "[Roadmap for Implementing Oracle Fusion Middleware Web Services](#)" on page 9.

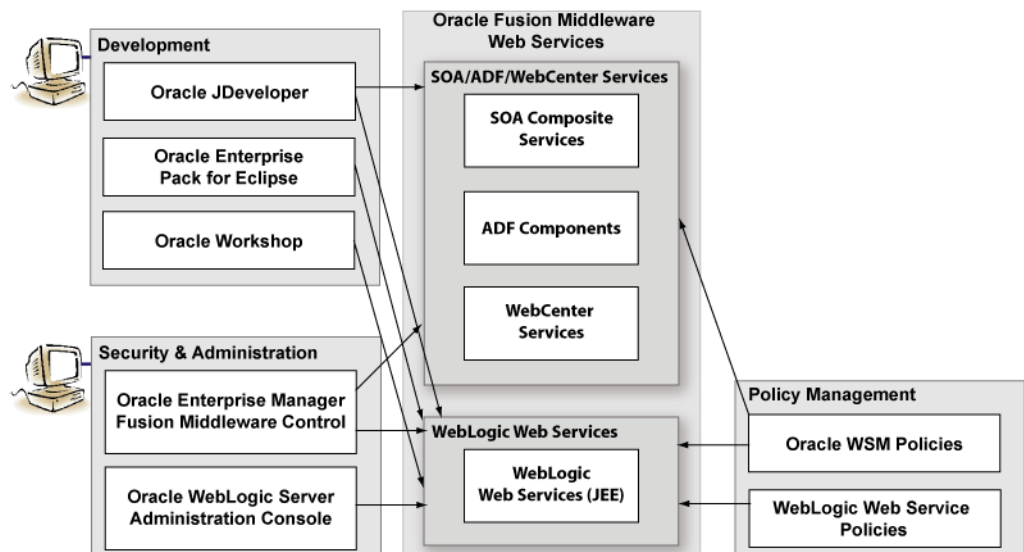
2.1 Web Services Architecture

In Oracle Fusion Middleware 11g, there are two categories of Web services to support the development, security, and administration of the following types of Web services:

- SOA, ADF, and WebCenter services
- WebLogic Web services (Java EE Web services)

The following figure illustrates the two Web services categories.

Figure 2 Web Services in Oracle Fusion Middleware 11g



2.2 Types of Web Services and Clients

[Table 1](#) summarizes the types of Web services supported in Oracle Fusion Middleware 11g.

Note: All Web services and clients can be deployed to an Oracle Fusion Middleware environment that runs on Oracle WebLogic Server. Oracle WebLogic Web services can be deployed to a standalone Oracle WebLogic Server, as well.

Table 1 Oracle Fusion Middleware Web Services

| Web Service | Description |
|--------------------------------|---|
| WebLogic Web service (Java EE) | <p>WebLogic Web services are implemented according to the Web services for Java EE specification, available at http://www.jcp.org/en/jsr/detail?id=109, that defines the standard Java EE runtime architecture for implementing Web services in Java.</p> <p>For more information about developing WebLogic Web services, see:</p> <ul style="list-style-type: none">■ <i>Introducing Web Services in Oracle WebLogic Server</i>■ <i>Getting Started Using JAX-WS Web Services for Oracle WebLogic Server</i>■ <i>Getting Started Using JAX-RPC Web Services for Oracle WebLogic Server</i>■ "Developing with Web Services" in the "Designing and Developing Applications" section of the <i>Oracle JDeveloper online help</i>. <p>You can deploy WebLogic Web services to any Oracle WebLogic Server environment, including a standalone environment.</p> |
| SOA service components | <p>SOA composite applications include SOA service components. SOA service components are the basic building blocks of SOA applications, implementing a part of the overall business logic functionality.</p> <p>The following SOA service components can be managed using Oracle WSM:</p> <ul style="list-style-type: none">■ BPEL Process—Provides process orchestration and storage of synchronous and asynchronous processes.■ Oracle Mediator—Routes events (messages) between different components.■ Human Workflow—Enables you to model a workflow that describes the tasks for users or groups to perform as part of an end-to-end business process flow.■ Business Rules—Design a business decision based on rules. <p>For more information about developing SOA service components, see <i>Oracle Fusion Middleware Developer's Guide for Oracle SOA Suite</i>.</p> <p>You can deploy SOA service components to the Oracle Fusion Middleware environment.</p> |
| SOA service binding components | <p>SOA Service binding components provide the outside world with an entry point to the SOA composite application. The WSDL file of the service advertises its capabilities to external applications. These capabilities are used for contacting the SOA composite application components. For more information, see <i>Oracle Fusion Middleware Developer's Guide for Oracle SOA Suite</i>.</p> |

Table 1 (Cont.) Oracle Fusion Middleware Web Services

| Web Service | Description |
|-------------------------|---|
| ADF Business Components | <p>ADF Business Components simplify the development, delivery, and customization of business applications for the Java EE platform by providing a library of reusable components and supporting design time facilities in Oracle JDeveloper. You can use an ADF Business Component if you implement the Web service as an application module.</p> <p>Using ADF Business Components, developers are not required to write the application infrastructure code required by the typical Java EE application to perform the following tasks:</p> <ul style="list-style-type: none">■ Connect to the database.■ Retrieve data.■ Lock database records.■ Manage transactions. <p>Additionally, you can use Oracle JDeveloper facilities to expose Business Components that encapsulate related business functions as Web services so that they can be consumed across modules of the deploy Fusion Web application.</p> <p>For more information about developing ADF Business Components, see <i>Oracle Fusion Middleware Fusion Developer's Guide for Oracle Application Development Framework</i>.</p> |
| WebCenter services | <p>WebCenter services expose Web 2.0 technologies for social networking and personal productivity, such as Wiki, RSS, and blogs. WebCenter provides a set of features and services (for example, portlets, customization, and content integration) that you can selectively add to your application. For more information about developing WebCenter services, see <i>Oracle Fusion Middleware Developer's Guide for Oracle WebCenter</i>.</p> |

Table 2 summarizes the types of Web service clients supported in Oracle Fusion Middleware 11g.

Table 2 Oracle Fusion Middleware Web Service Clients

| Web Service Client | Description |
|----------------------------------|---|
| Web service clients | <p>Client applications that invoke WebLogic Web Services can be written using any technology: Java, Microsoft .NET, and so on.</p> <p>There are two types of client applications:</p> <ul style="list-style-type: none">■ Stand-alone—A stand-alone client application can be a Java application, a .NET client, or any other type of client able to submit a Web service request. It runs completely separately from WebLogic Server.■ A Java EE component deployed to WebLogic Server—In this type of client application, the Web Service runs inside a Java Platform, Enterprise Edition (Java EE) Version 5 component deployed to WebLogic Server, such as an EJB, servlet, or another Web Service. This type of client application, therefore, runs inside a WebLogic Server container. <p>For more information about developing WebLogic Web service clients, see:</p> <ul style="list-style-type: none">■ "Invoking Web Services" in <i>Getting Started With JAX-WS Web Services for Oracle WebLogic Server</i>■ "Developing with Web Services" in the "Designing and Developing Applications" section of the <i>Oracle JDeveloper online help</i> |
| SOA reference binding components | <p>SOA reference binding components connect the SOA composite application to external partners. For more information about developing SOA reference binding components, see <i>Oracle Fusion Middleware Developer's Guide for Oracle SOA Suite</i>.</p> |
| ADF Web applications | <p>ADF Web applications can invoke a service, such as a WebLogic Web service, a SOA composite application, or an ADF Business Component, using a Web service data control or Web service proxy. For more information, see "Integrating Web Services into a Fusion Web Application" in <i>Oracle Fusion Middleware Developer's Guide for Oracle SOA Suite</i>.</p> |
| WebCenter portlets | <p>WebCenter portlets enable you to surface WebCenter services. For more information about developing WebCenter clients, see <i>Oracle Fusion Middleware Developer's Guide for Oracle WebCenter</i>.</p> |

2.3 Types of Web Service Policies

As shown in [Figure 2](#), there are two types of policies that can be attached to Web services.

Table 3 Types of Web Service Policies

| Type of Policy | Description |
|--|---|
| Oracle Web Services Manager (WSM) Policy | <p>Policy provided by the Oracle WSM. For more information about the Oracle WSM and the predefined policies, see <i>Oracle Fusion Middleware Security and Administrator's Guide for Web Services</i>.</p> <p>You can attach Oracle WSM policies to SOA, ADF, and WebCenter Web services. You can attach Oracle WSM security policies only to WebLogic JAX-WS Web services to interface with the SOA/ADF/WebCenter Web services, for example.</p> <p>You manage Oracle WSM policies from Oracle Enterprise Manager Fusion Middleware Control.</p> |
| WebLogic Web Service Policy | <p>Policy provided by WebLogic Server. For more information about the WebLogic Web service policies, see <i>Oracle Fusion Middleware Securing WebLogic Web Services for Oracle WebLogic Server</i>.</p> <p>A subset of WebLogic Web service policies interoperate with Oracle WSM policies. For more information, see "Interoperability with WebLogic Web Service Policies" in <i>Oracle Fusion Middleware Security and Administrator's Guide for Web Services</i>.</p> <p>You manage WebLogic Web service policies from WebLogic Administration Console.</p> |

Note: It is recommended that you use Oracle WSM policies over WebLogic Web services whenever possible. You cannot mix your use of Oracle WSM and WebLogic Web service policies on the same Web service.

2.4 Tools for Web Service Development, Security, and Administration

To develop Web services, you can use the tools described in the following table, or your favorite IDE.

Table 4 Tools for Web Service Development

| Tool | Description |
|---|--|
| Oracle JDeveloper | <p>Provides powerful tools that help you discover and use existing Web services, and develop and deploy new Web services. For more information, see the following sections in the Oracle JDeveloper online help:</p> <ul style="list-style-type: none"> ■ "Developing with Web Services" in the "Designing and Developing Applications" ■ "Developing ADF Applications" in the "Designing and Developing Applications" |
| Oracle Enterprise Pack for Eclipse (OEPE) | <p>Provides a collection of plug-ins to the Eclipse IDE platform that facilitate development of WebLogic Web services. For more information, see the Eclipse IDE platform online help.</p> |

Table 4 (Cont.) Tools for Web Service Development

| Tool | Description |
|-----------------|---|
| Oracle Workshop | Provides a collection plug-ins to the Eclipse IDE platform that facilitate development of WebLogic Web services. For more information, see http://download.oracle.com/docs/cd/E12839_01/wlw/docs103/index.html . NOTE: Oracle Workshop is deprecated, and is being replaced by OEPE, described above. |

To secure and administer Web services, the tools that you use vary depending on the Web service type.

Table 5 Tools for Web Service Security and Administration

| To secure and administer . . . | Use . . . |
|----------------------------------|--|
| SOA, ADF, and WebCenter services | Oracle Enterprise Manager Fusion Middleware Control for all security and administration tasks. For more information, see <i>Oracle Fusion Middleware Security and Administrator's Guide for Web Services</i> . |
| WebLogic Web Services | <ul style="list-style-type: none">■ Oracle Enterprise Manager Fusion Middleware Control to leverage Oracle Web Service Manager (Oracle WSM) to enforce policies at runtime, and test and monitor the performance of the WebLogic Web services. For more information, see <i>Oracle Fusion Middleware Security and Administrator's Guide for Web Services</i>■ WebLogic Server Administration Console to deploy and administer the WebLogic Web service, and attach, manage, and configure policies. For more information, see <i>Oracle Fusion Middleware Oracle WebLogic Server Administration Console Help</i>. |

3 Roadmap for Implementing Oracle Fusion Middleware Web Services

The following table provides a roadmap of common tasks for developing, securing, and administering Oracle Fusion Middleware Web Services. Roadmaps are presented for each Web service category shown in [Figure 2](#):

- [Roadmap for Implementing SOA, ADF, and WebCenter Services](#)
- [Roadmap for Implementing WebLogic \(Java EE\) Web Services](#)

3.1 Roadmap for Implementing SOA, ADF, and WebCenter Services

The following table provides a roadmap of common tasks for developing, securing, and administering SOA, ADF, and WebCenter services.

Table 6 Roadmap for Implementing SOA, ADF, and WebCenter Services

| Task | More Information |
|--|--|
| Develop SOA composite Web services and clients | <ul style="list-style-type: none"> ■ <i>Oracle Fusion Middleware Developer's Guide for Oracle SOA Suite</i> ■ "Developing SOA Applications" in the "Designing and Developing Applications" section of the Oracle JDeveloper online help |
| Develop ADF components and clients | <ul style="list-style-type: none"> ■ "Integrating Service-Enabled Application Modules" in <i>Oracle Fusion Middleware Fusion Developer's Guide for Oracle Application Development Framework</i> ■ "Integrating Web Services Into a Fusion Web Application" in <i>Oracle Fusion Middleware Fusion Developer's Guide for Oracle Application Development Framework</i> |
| Develop WebCenter services and clients | <ul style="list-style-type: none"> ■ <i>Oracle Fusion Middleware Developer's Guide for Oracle WebCenter</i> ■ "Developing WebCenter Framework Applications" in the "Designing and Developing Applications" section of the Oracle JDeveloper online help |
| Deploy Web services | <ul style="list-style-type: none"> ■ "Deploying Web Services" in <i>Oracle Fusion Middleware Security and Administrator's Guide for Web Services</i> ■ "Install a Web Service" in <i>WebLogic Server Administration Console Online Help</i> ■ "Deploying Web Services" in the "Designing and Developing Applications" section of the Oracle JDeveloper Online Help. |
| Administer Web services | <ul style="list-style-type: none"> ■ Part II: "Basic Administration" and Part III "Advanced Administration" in <i>Oracle Fusion Middleware Security and Administrator's Guide for Web Services</i> ■ "Web Services" in <i>WebLogic Server Administration Console Online Help</i> |
| Create policies | "Managing Web Service Policies" in <i>Oracle Fusion Middleware Security and Administrator's Guide for Web Services</i> |
| Create custom assertions | "Creating Custom Assertions" in <i>Oracle Fusion Middleware Security and Administrator's Guide for Web Services</i> |
| Attach policies (development time—Oracle JDeveloper) | <ul style="list-style-type: none"> ■ "Managing Policies" in <i>Oracle Fusion Middleware Developer's Guide for Oracle SOA Suite</i> ■ "Securing Web Service Data Controls" in <i>Oracle Fusion Middleware Fusion Developer's Guide for Oracle Application Development Framework</i> |

Table 6 (Cont.) Roadmap for Implementing SOA, ADF, and WebCenter Services

| Task | More Information |
|---|--|
| Attach policies (deployment time—Oracle Enterprise Manager Fusion Middleware Control) | <ul style="list-style-type: none"> ■ "Attaching Policies to Web Services" in <i>Oracle Fusion Middleware Security and Administrator's Guide for Web Services</i> ■ "Understanding Policies" in <i>Oracle Fusion Middleware Administrator's Guide for Oracle SOA Suite</i> ■ "Managing Security" in <i>Oracle Fusion Middleware Administrator's Guide for Oracle WebCenter</i> |
| Configure policies | "Configuring Policies" in <i>Oracle Fusion Middleware Security and Administrator's Guide for Web Services</i> |
| Test Web services | "Testing Web Services" in <i>Oracle Fusion Middleware Security and Administrator's Guide for Web Services</i> |
| Monitor Web service performance | "Monitoring the Performance of Web Services" in <i>Oracle Fusion Middleware Security and Administrator's Guide for Web Services</i> |
| Manage horizontal policy migration | "Managing Horizontal Policy Migration" in <i>Oracle Fusion Middleware Security and Administrator's Guide for Web Services</i> |
| Diagnose problems | "Diagnosing Problems" in <i>Oracle Fusion Middleware Security and Administrator's Guide for Web Services</i> |
| Interoperate with: <ul style="list-style-type: none"> ■ Oracle WSM 10g ■ Oracle Containers for J2EE (OC4J) ■ Oracle Web Service Gateways 10g ■ WebLogic Server Web service policies ■ Microsoft .NET 3.5 ■ Oracle Service Bus 10g | "Oracle WSM 11g Interoperability" in <i>Oracle Fusion Middleware Security and Administrator's Guide for Web Services</i> |

3.2 Roadmap for Implementing WebLogic (Java EE) Web Services

The following table provides a roadmap of common tasks for developing, securing, and administering WebLogic (Java EE) Web services.

Table 7 Roadmap for Implementing WebLogic (Java EE) Web Services

| Task | More Information |
|---|--|
| Develop WebLogic Web services and clients | <ul style="list-style-type: none">■ <i>Oracle Fusion Middleware Introducing WebLogic Web Services for Oracle WebLogic Server</i>■ <i>Oracle Fusion Middleware Getting Started With JAX-WS Web Services for Oracle WebLogic Server</i>■ <i>Oracle Fusion Middleware Getting Started With JAX-RPC Web Services for Oracle WebLogic Server</i>■ "Developing with Web Services" in the "Designing and Developing Applications" section of the Oracle JDeveloper online help |
| Deploy Web services | <ul style="list-style-type: none">■ "Install a Web Service" in <i>WebLogic Server Administration Console Online Help</i>■ "Deploying Web Services" in the "Designing and Developing Applications" section of the Oracle JDeveloper Online Help |
| Administer Web services | "Web Services" in <i>WebLogic Server Administration Console Online Help</i> |
| Create and configure policies | <i>Oracle Fusion Middleware Securing WebLogic Web Services for Oracle WebLogic Server:</i> <ul style="list-style-type: none">■ "Configuring Message-Level Security"■ "Configuring Transport-Level Security"■ "Configuring Access Control Security (JAX-RPC only)" |
| Create custom policy file | "Creating and Using a Custom Policy File" in <i>Oracle Fusion Middleware Security and Administrator's Guide for Web Services</i> |
| Attach policies (development time) | <ul style="list-style-type: none">■ "Attaching Policies to WebLogic Web Services and Clients" in <i>Oracle Fusion Middleware Security and Administrator's Guide for Web Services</i>■ "Using Oracle Web Service Security Policies" in <i>Securing WebLogic Web Services for Oracle WebLogic Server</i>■ "Using Policies with Web Services" in the "Designing and Developing Applications" section of the Oracle JDeveloper online help■ "Using Web Services Reliable Messaging" in <i>Oracle Fusion Middleware Programming Advanced Features of JAX-RPC Web Services for Oracle WebLogic Server</i> |
| Attach policies (deployment time) | "Associate a WS-Policy file with a Web Service" in <i>WebLogic Server Administration Console Online Help</i> |

Table 7 (Cont.) Roadmap for Implementing WebLogic (Java EE) Web Services

| Task | More Information |
|---|--|
| Test Web services | <ul style="list-style-type: none"> ■ "Testing Web Services" in <i>Oracle Fusion Middleware Security and Administrator's Guide for Web Services</i> ■ "Test a Web Service" in <i>WebLogic Server Administration Console Online Help</i> ■ "Testing and Debugging Web Services" in the "Designing and Developing Applications" section of the Oracle JDeveloper online help |
| Monitor Web service performance | <ul style="list-style-type: none"> ■ "Monitoring the Performance of Web Services" in <i>Oracle Fusion Middleware Security and Administrator's Guide for Web Services</i> ■ "Monitor a Web Service" in <i>WebLogic Server Administration Console Online Help</i> |
| Interoperate WebLogic and Oracle WSM Web service policies | "Oracle WSM 11g Interoperability" in <i>Oracle Fusion Middleware Security and Administrator's Guide for Web Services</i> |

4 Related Documentation

The following table summarizes the documentation that is related to Web services development, security, and administration.

Table 8 Related Documentation

| Document | Description |
|---|---|
| <i>Oracle Fusion Middleware Introducing Web Services</i> | This document. Provides an introduction to Web services for Oracle Fusion Middleware 11g. |
| <i>Oracle Fusion Middleware Security and Administrator's Guide for Web Services</i> | Describes how to secure and administer Web services. |
| <i>Oracle Fusion Middleware Introducing WebLogic Web Services for Oracle WebLogic Server</i> | Introduces WebLogic Web Services, the standards that are supported, interoperability information, and relevant samples and documentation. |
| <i>Oracle Fusion Middleware Getting Started With JAX-WS Web Services for Oracle WebLogic Server</i> | Provides 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. |
| <i>Oracle Fusion Middleware Programming Advanced Features of JAX-WS Web Services for Oracle WebLogic Server</i> | Describes how to program more advanced features using JAX-WS, such as callbacks, XML Catalog, and SOAP message handlers. |
| <i>Oracle Fusion Middleware Getting Started With JAX-RPC Web Services for Oracle WebLogic Server</i> | Provides 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. |

Table 8 (Cont.) Related Documentation

| Document | Description |
|--|---|
| <i>Oracle Fusion Middleware Programming Advanced Features of JAX-RPC Web Services for Oracle WebLogic Server</i> | Describes 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. |
| <i>Oracle Fusion Middleware Securing WebLogic Web Services for Oracle WebLogic Server</i> | Describes how to program and configure message-level (digital signatures and encryption), transport-level, and access control security for a Web Service. |
| <i>Oracle Fusion Middleware WebLogic Web Services Reference for Oracle WebLogic Server</i> | Provides reference information on JWS annotations, Ant tasks, reliable messaging WS-Policy assertions, security WS-Policy assertions, and deployment descriptors. |
| <i>Oracle Fusion Middleware Developer's Guide for Oracle SOA Suite</i> | Describes how to develop SOA composite services. |
| <i>Oracle Fusion Middleware Fusion Developer's Guide for Oracle Application Development Framework</i> | Describes how to develop ADF components. |
| <i>Oracle Fusion Middleware Developer's Guide for Oracle WebCenter</i> | Describes how to develop WebCenter services. |
| "Developing with Web Services" in the "Designing and Developing Applications" section of the Oracle JDeveloper online help | Describes how to develop Web services and attach policies using Oracle JDeveloper. |
| Oracle Workshop for WebLogic Server | Explains how to use Workshop to write and manage source code and design with sophisticated visual tools and Java frameworks. |

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