Oracle® Fusion Middleware

Understanding Web Services

12*c* (12.2.1)

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This document introduces Web services for Oracle Fusion Middleware and provides a documentation roadmap.

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Oracle Fusion Middleware Understanding Web Services, 12*c* (12.2.1)

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Contents

Preface

This preface describes the document accessibility features and conventions used in this guide—*Oracle Fusion Middleware Understanding Web Services*.

Documentation Accessibility

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Conventions

The following text conventions are used in this document:

Convention	Meaning
boldface	Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.
italic	Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.
`monospace`	Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.

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Understanding Web Services

This document describes web services in Oracle Fusion Middleware, including Oracle Infrastructure web services and Java EE (WebLogic) web services.

Sections include:

- New and Changed Features for Release 12c (12.2.1)
- New and Changed Features for Release 12c (12.1.3)
- New and Changed Features for Release 12c (12.1.2)
- Overview of Web Services
- Overview of Web Services in Oracle Fusion Middleware 12c
- Roadmaps for Implementing Oracle Fusion Middleware Web Services
- Related Oracle Fusion Middleware 12c Documentation

For definitions of unfamiliar terms found in this and other books, see the Glossary.

1.1 New and Changed Features for Release 12*c* (12.2.1)

Oracle Fusion Middleware 12*c* (12.2.1) includes new and changed features for this document.

- Reflects the Oracle Fusion Middleware product suites delivered in the 12.2.1 release.

1.2 New and Changed Features for Release 12*c* (12.1.3)

Oracle Fusion Middleware 12*c* (12.1.3) includes the following new and changed features for this document:

- Reflects the Oracle Fusion Middleware product suites delivered in the 12.1.3 release.

1.3 New and Changed Features for Release 12*c* (12.1.2)

Oracle Fusion Middleware 12*c* (12.1.2) includes new and changed features for this document.

- Reflects the Oracle Fusion Middleware product suites delivered in the 12.1.2 release.
- Reflects full support for Representational State Transfer (RESTful) web services and clients.

1.4 Overview of Web Services

A web service is a program that can be accessed remotely using different standards-based languages. What this program can do (that is, the functionality it implements) is described in a standard vocabulary.

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 that facilitates developing heterogeneous distributed applications

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).

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. Because you access web services using standard Web protocols such as XML or 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.

Table 1–1 lists the supported web service protocols.

Table 1–1   Supported Web Service Protocols

Protocol	Description
Simple Object Access Protocol (SOAP)	A protocol for exchanging structured information in the implementation of web services. For more information, see "About SOAP Web Services."
Representational State Transfer (REST)	Any simple interface that transmits data over a standardized interface (such as HTTP) without an additional messaging layer, such as SOAP. For more information, see "About RESTful Web Services."

1.4.1 About SOAP Web Services

SOAP provides a protocol for exchanging structured information in the implementation of web services. SOAP web services rely on XML-based and other industry standards:

- Simple Object Access Protocol (SOAP)—A protocol for exchanging structured information in the implementation of web services.

- 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.

- Web Services Description Language (WSDL)—An XML-based language providing a model for describing SOAP-based web services.

- WS-Policy—The WS-Policy framework provides a flexible and extensible grammar for describing the capabilities, requirements, and general characteristics of web services using policies.

- Universal Description, Discovery, and Integration (UDDI)—A framework to publish and look up web services on the Internet.

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.

Figure 1–1   Example of SOAP Message Exchange Between Web Service Consumer and Provider
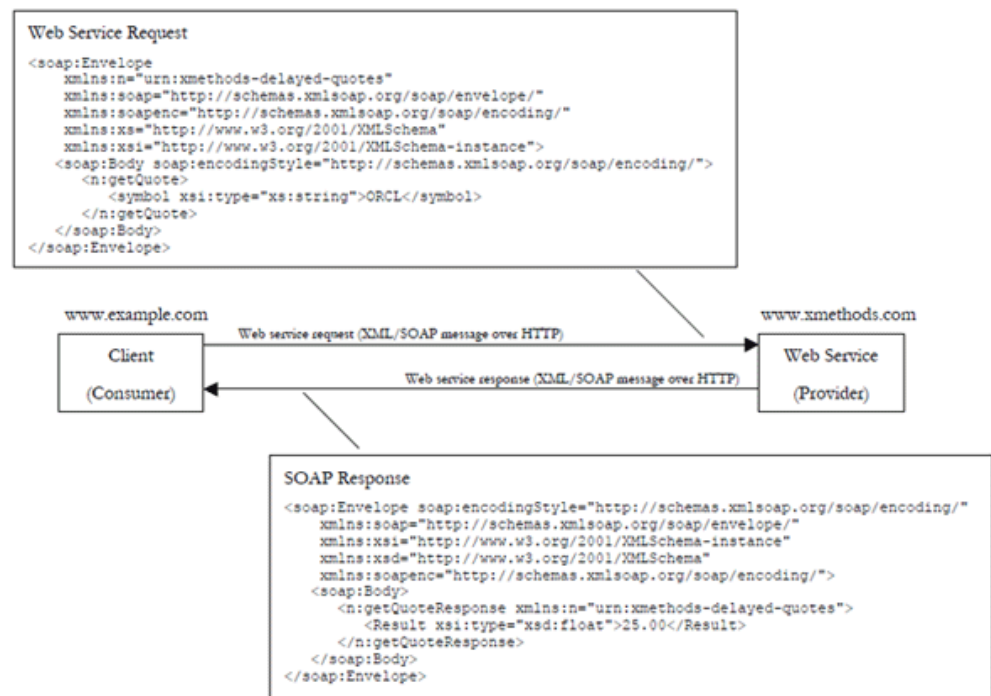
In this example, the web service consumer sends a request in the form of a SOAP message (SOAP is an XML messaging framework designed to allow heterogeneous applications to exchange structured information in a distributed environment). The web service provider (www.xmethods.com) processes the request 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).

1.4.2 About RESTful Web Services

REST describes any simple interface that transmits data over a standardized interface (such as HTTP) without an additional messaging layer, such as SOAP. REST provides a set of design rules for creating stateless services that are viewed as resources, or sources of specific information, and can be identified by their unique URIs. A client accesses the resource using the URI, a standardized fixed set of methods, and a representation of the resource is returned. The client is said to transfer state with each new resource representation.

RESTful web services are services that are built according to REST principles and, as such, are designed to work well on the Web. RESTful web services conform to the architectural style constraints defined in "Introduction to the REST Architectural Style" in *Developing and Securing RESTful Web Services for Oracle WebLogic Server*. Typically, RESTful web services are built on the HTTP protocol and implement operations that map to the common HTTP methods, such as GET, POST, PUT, and DELETE to create, retrieve, update, and delete resources, respectively.

The Java API for RESTful Web Services (JAX-RS) provides support for creating web services according to REST architectural style. JAX-RS uses **annotation**s to simplify the development of RESTful web services. By simply adding annotations to your web service, you can define the resources and the actions that can be performed on those resources.

A JAX-RS *resource* is an annotated POJO that provides resource methods that are able to handle HTTP requests for URI paths that the resource is bound to. Consider the following example:

```
package com.example;

import javax.ws.rs.GET;
import javax.ws.rs.Path;
import javax.ws.rs.Produces;
import javax.ws.rs.core.MediaType;

/**
 * Root resource (exposed at "myresource" path)
 */
@Path("myresource")
public class MyResource {

    /**
     * Method handling HTTP GET requests. The returned object will be sent
     * to the client as "text/plain" media type.
     *
     * @return String that will be returned as a text/plain response.
     */
    @GET
    @Produces(MediaType.TEXT_PLAIN)
    public String getIt() {
        return "Got it!";
    }
}
```

In this example, the resource:

- Exposes a single resource method that is able to handle HTTP GET requests.

- Is bound to /myresource URI path.

- Can produce responses with response message content represented in `text/plain` media type.

- Returns the same "Got it!" response to all client requests.

RESTful web services rely on the following industry standards:

- Web Application Description Language (WADL)—An XML-based language providing a model for describing RESTful web services.

- WS-Policy—The WS-Policy framework provides a flexible and extensible grammar for describing the capabilities, requirements, and general characteristics of web services using policies.

1.5 Overview of Web Services in Oracle Fusion Middleware 12*c*

In Oracle Fusion Middleware 12*c*, the two categories of web services exist: Oracle Infrastructure web services and Java EE web services.

- Oracle Infrastructure web services are SOA, Application Development Framework (ADF and Webcenter), Oracle Service Bus, and Oracle Enterprise Scheduler services

- Java EE web services are SOAP (Java API for XML Web Services (JAX-WS)) and RESTful (JAX-RS) web services

The following figure illustrates the two web services categories.

Figure 1–2   Web Services in Oracle Fusion Middleware 12c
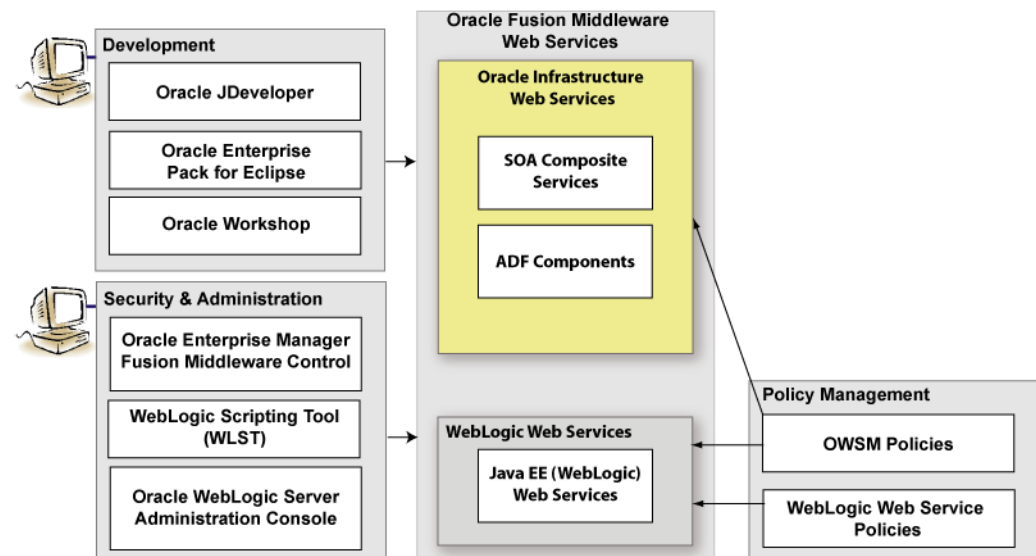
The following sections provide more detail about the Oracle Fusion Middleware 12*c* web services architecture and each of the web service components shown in the previous figure:

- About Oracle Fusion Middleware Types of Web Services and Clients

- About Oracle Fusion Middleware Types of Web Service Policies

- About Tools for Web Service Development, Security, and Administration

For a complete roadmap of all web service development, security, and administration tasks, see "Roadmaps for Implementing Oracle Fusion Middleware Web Services."

1.5.1 About Oracle Fusion Middleware Types of Web Services and Clients

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 1–2 summarizes the types of web services supported in Oracle Fusion Middleware 12*c*.

Table 1–2   *Oracle Fusion Middleware Web Services*

Web Service	Description
ADF Business Components (SOAP and RESTful)	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.
	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:
	■ Connect to the database.
	■ Retrieve data.
	■ Lock database records.
	■ Manage transactions.
	Additionally, Oracle JDeveloper facilities expose ADF Business Component application modules that encapsulate built-in data manipulation operations and custom methods as web services so that a service-enabled application module can be consumed across modules of the deployed Fusion Web application.
	For more information, see the following section in *Developing Fusion Web Applications with Oracle Application Development Framework*:
	■ "Creating SOAP Web Services with Application Modules"
	■ "Creating RESTful Web Services from Application Modules"
Oracle Enterprise Scheduler jobs	Oracle Enterprise Scheduler supports web service jobs that use synchronous, one-way, and asynchronous interfaces. Both Oracle JDeveloper and Oracle Enterprise Manager offer convenient graphical user interfaces to help you create web service job definitions. When the web service job type is selected, a wizard leads the user through a simple set of steps to define the web service job. This wizard obtains the WSDL URL and asks the user to select the WSDL service, port type, and operation. The wizard populates a set of predefined system properties in the job definition with values entered or derived from what the user enters in the wizard.
	For more information, see "Creating and Using Web Service Jobs" in *Developing Applications for Oracle Enterprise Scheduler*.

Table 1–2   (Cont.) Oracle Fusion Middleware Web Services

Web Service	Description
Java EE web service (SOAP and RESTful)	SOAP Java EE 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.
	RESTful Java EE web services are implemented according to the JSR-339 JAX-RS 2.0 specification, defined at: https://jcp.org/en/jsr/detail?id=339
	For more information about developing SOAP and RESTful Java EE web services, see:
	■ *Understanding WebLogic Web Services for Oracle WebLogic Server*
	■ *Developing JAX-WS Web Services for Oracle WebLogic Server*
	■ *Developing and Securing RESTful Web Services for Oracle WebLogic Server*
	■ *Developing JAX-RPC Web Services for Oracle WebLogic Server*
	■ "Developing and Securing Web Services" in *Developing Applications with Oracle JDeveloper*
Oracle Service Bus proxy service (SOAP and RESTful)	Oracle Service Bus provides intermediary services between service producers and service consumers to manage the routing and transformation of messages. Proxy services are definitions of those intermediary services that Oracle Service Bus implements locally and publishes to its clients. With Oracle Service Bus message brokering, service clients exchange messages with a proxy service rather than working directly with a service producer. For more information, see the following sections in *Developing Services with Oracle Service Bus*:
	■ "Creating and Configuring Proxy Services"
	■ "Securing Oracle Service Bus with Oracle Web Services Manager"
	■ "Securing Business and Proxy Services"
	JCA adapters enable you to integrate Oracle Service Bus business services with technologies such as databases and file systems.For more information, see "How to Generate a Proxy Service form a JCA Binding Resource" in *Developing Services with Oracle Service Bus*.
SOA service binding components	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 *Developing SOA Applications with Oracle SOA Suite*.
	JCA adapters enable you to integrate SOA services with technologies such as databases and file systems.For more information, see "JCA Adapters" in *Developing SOA Applications with Oracle SOA Suite*.

Table 1–2   (Cont.) Oracle Fusion Middleware Web Services

Web Service	Description
SOA service components (SOAP and RESTful)	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.
	The following SOA service components can be managed using OWSM:
	■ 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.
	For more information about developing and securing SOA service components, see:
	■ *Developing SOA Applications with Oracle SOA Suite*
	■ "Managing Service and Reference Binding Components" in *Administering Oracle SOA Suite and Oracle Business Process Management Suite*
WebCenter services	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 integrating WebCenter services, see *Developer's Guide for Oracle WebCenter*.

Table 1–3 summarizes the types of web service clients supported in Oracle Fusion Middleware 12*c*.

Table 1–3   Oracle Fusion Middleware Web Service Clients

Web Service Client	Description
Oracle ADF Web applications (SOAP and RESTful)	ADF Web applications can invoke a service, such as a WebLogic web service, a SOA composite application, or a service-enabled ADF application module.
	In addition, ADF Web applications can work with web services in the user interface using a web service data control. For more information about generating service-enabled application modules, calling a web service from an ADF application module, or creating web service data controls, see *Developing Fusion Web Applications with Oracle Application Development Framework*.

Table 1–3   (Cont.) Oracle Fusion Middleware Web Service Clients

Web Service Client	Description
Oracle Service Bus business services (SOAP and RESTful)	Oracle Service Bus business services are definitions of the enterprise services that exchange messages during business processes, such as Web Services, JMS destinations, and EJBs. A business service invokes an external service producer once a message has been routed through Oracle Service Bus to the business service. For more information, see the following sections in *Developing Services with Oracle Service Bus*: ■ "Creating and Configuring Business Services" ■ "Securing Oracle Service Bus with Oracle Web Services Manager" ■ "Securing Business and Proxy Services" JCA adapters enable you to integrate Oracle Service Bus business services with technologies such as databases and file systems.For more information, see "How to Generate a Business Service form a JCA Binding Resource" in *Developing Services with Oracle Service Bus*.
Web service clients (SOAP and RESTful)	Client applications that invoke Java EE web services can be written using any technology: Java, Microsoft.NET, and so on. There are two types of client applications: ■ 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. For more information about developing WebLogic web service clients, see: ■ "Developing JAX-WS Web Service Clients" in *Developing JAX-WS Web Services for Oracle WebLogic Server* ■ "Developing RESTful Web Service Clients" in *Developing RESTful Web Services for Oracle WebLogic Server* ■ "Developing JAX-RPC Web Service Clients" in *Developing JAX-RPC Web Services for Oracle WebLogic Server* ■ "Developing and Securing Web Services" in *Developing Applications with Oracle JDeveloper*

Table 1–3   (Cont.) Oracle Fusion Middleware Web Service Clients

Web Service Client	Description
SOA reference binding components (SOAP and RESTful)	SOA reference binding components connect the SOA composite application to external partners.
	For more information about developing and securing SOA reference binding components, see:
	■ *Developing SOA Applications with Oracle SOA Suite*
	■ "Managing Service and Reference Binding Components" in *Administering Oracle SOA Suite and Oracle Business Process Management Suite*
	JCA adapters enable you to integrate SOA references with technologies such as databases and file systems.For more information, see "JCA Adapters" in *Developing SOA Applications with Oracle SOA Suite*.
WebCenter portlets	WebCenter portlets enable you to surface WebCenter services. For more information about developing WebCenter portlets, see *Developer's Guide for Oracle WebCenter*.

1.5.2 About Oracle Fusion Middleware Types of Web Service Policies

Two types of policies can be attached to web services: Oracle Web Services Manager (OWSM) Policy and WebLogic Web Service Policy.

Table 1–4 table provides a brief description of supported policy types.

Table 1–4   Types of Web Service Policies

Type of Policy	Description
Oracle Web Services Manager (OWSM) Policy	Policy provided by OWSM. For more information about OWSM and the predefined policies, see *Understanding Oracle Web Services Manager*.
	You can attach OWSM policies to Oracle Infrastructure web services. You can only attach OWSM *security* policies to Java EE JAX-WS and RESTful web services.
	You manage OWSM policies from Oracle Enterprise Manager Fusion Middleware Control.
WebLogic Web Service Policy	Policy provided by WebLogic Server. For more information about the WebLogic web service policies, see *Securing WebLogic Web Services for Oracle WebLogic Server*.
	A subset of WebLogic web service policies interoperate with OWSM policies. For more information, see "Interoperability with Oracle WebLogic Server 12*c* Web Service Security Environments" in the *Interoperability Solutions Guide for Oracle Web Services Manager*.
	You manage WebLogic web service policies from WebLogic Administration Console.

> **Note:**   It is recommended that you use OWSM policies over WebLogic web services whenever possible. You cannot mix your use of OWSM and WebLogic web service policies on the same web service.

1.5.3 About Tools for Web Service Development, Security, and Administration

To develop Oracle Fusion Middleware web services, you can use tools such as Oracle JDeveloper, Ant, WebLogic Server Scripting Tool (WLST), Oracle Enterprise Pack for Eclipse (OEPE), Oracle Infrastructure Web Services, Java EE (WebLogic) Web Services, or you can use your preferred IDE.

Table 1–5 and Table 1–6 provide brief descriptions of supported tools for developing an Oracle Fusion Middleware web service.

Table 1–5   Tools for Web Service Development

Tool	Description
Oracle JDeveloper	Provides powerful tools that help you discover and use existing web services, and develop and deploy new web services. For more information, see "Developing and Securing Web Services" in *Developing Applications with Oracle JDeveloper*.
Ant	Uses XML-based configuration files (called build.xml by default) to execute tasks written in Java. Ant is a Java-based build tool, similar to the make command but much more powerful. For more information, see "Ant Task Reference" in *WebLogic Web Services Reference for Oracle WebLogic Server*.
WebLogic Server Scripting Tool (WLST)	Enables administrators to view and configure web services, and manage web service policies from the command line. For more information, see *WLST Command Reference for WebLogic Server*.
Oracle Enterprise Pack for Eclipse (OEPE)	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.

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

Table 1–6   Tools for Web Service Security and Administration

To secure and administer	Use
Oracle Infrastructure Web Services	■ Oracle Enterprise Manager Fusion Middleware Control for all security and administration tasks. For more information, see *Administering Web Services*. ■ Oracle WebLogic Scripting Tool (WLST) to view, configure, and secure Oracle Infrastructure web services. For more information, see *Oracle Fusion Middleware Oracle WebLogic Scripting Tool*.
Java EE (WebLogic) Web Services	■ Oracle Enterprise Manager Fusion Middleware Control to leverage Oracle Web Service Manager (OWSM) to enforce policies at runtime, and test and monitor the performance of the WebLogic web services. For more information, see *Administering Web Services* ■ WebLogic Server Administration Console to deploy and administer the WebLogic web service, and attach, manage, and configure policies. For more information, see *Oracle WebLogic Server Administration Console Online Help*.

1.6 Roadmaps for Implementing Oracle Fusion Middleware Web Services

Roadmaps provide lists of common tasks for developing, securing, and administering Oracle Fusion Middleware web services, with links to detailed information. The following roadmaps are presented for each web service category shown in Figure 1–2:

- Roadmaps for Implementing Oracle Infrastructure Web Services

- Roadmap for Implementing Java EE (WebLogic) Web Services

1.6.1 Roadmaps for Implementing Oracle Infrastructure Web Services

Roadmaps provide lists of common tasks for developing, securing, and administering Oracle Fusion Middleware web services, with links to detailed information.

This section contains the following roadmaps in table form:

- Table 1–7, " Roadmap for Implementing ADF Components and Clients"

- Table 1–8, " Roadmap for Implementing Oracle Enterprise Scheduler Service Jobs"

- Table 1–9, " Roadmap for Implementing Oracle Service Bus Services and Clients"

- Table 1–10, " Roadmap for Implementing SOA Composite Services and Clients"

- Table 1–11, " Roadmap for Implementing WebCenter Services and Clients"

- Table 1–12, " Roadmap for Implementing Java EE (WebLogic) Web Services"

Table 1–7 summarizes how to implement ADF components and clients.

Table 1–7   Roadmap for Implementing ADF Components and Clients

Task	More Information
Develop ADF components and clients	■ *Developing Fusion Web Applications with Oracle Application Development Framework* ■ *Developing Applications with Oracle ADF Data Controls*
Deploy web services	■ "Deploying a Fusion Web Application" in *Developing Fusion Web Applications with Oracle Application Development Framework* ■ "Deploying Web Services" in *Administering Web Services*
Administer web services	*Administering Web Services*
Create policies	"Managing Web Service Policies with Fusion Middleware Control" in *Securing Web Services and Managing Policies with Oracle Web Services Manager*
Create custom assertions	"Creating Custom Assertions" in *Extensibility Guide for Oracle Web Services Manager*
Attach policies (development time—Oracle JDeveloper)	*Developing Fusion Web Applications with Oracle Application Development Framework*
Attach policies (deployment time—Oracle Enterprise Manager Fusion Middleware Control)	"Attaching Policies in *Securing Web Services and Managing Policies with Oracle Web Services Manager*
Configure policies	"Securing Web Services" in *Securing Web Services and Managing Policies with Oracle Web Services Manager*

Table 1–7   (Cont.) Roadmap for Implementing ADF Components and Clients

Task	More Information
Test web services	"Testing Web Services" in *Administering Web Services*
Monitor web service performance	"Monitoring and Auditing Web Services" in *Administering Web Services*
Manage application migration between environments	"Managing Application Migration Between Environments" in *Administering Web Services*
Diagnose problems	"Managing Diagnostic and Message Logs" in *Administering Web Services*
Interoperate with other security environments	*Interoperability Guide for Oracle Web Services Manager*

Table 1–8 summarizes the roadmap for implementing Oracle Enterprise Scheduler web service jobs.

Table 1–8   Roadmap for Implementing Oracle Enterprise Scheduler Service Jobs

Task	More Information
Planning Job Development	"Planning Job Development" in *Developing Applications for Oracle Enterprise Scheduler*
Develop Oracle Enterprise Scheduler jobs	"Creating and Using Web Service Jobs" in *Developing Applications for Oracle Enterprise Scheduler*
Administer Oracle Enterprise Scheduler jobs	"Using Oracle Enterprise Manager to Create a Job Definition" in *Developing Applications for Oracle Enterprise Scheduler*
Create policies	"Managing Web Service Policies with Fusion Middleware Control" in *Securing Web Services and Managing Policies with Oracle Web Services Manager*
Create custom assertions	"Creating Custom Assertions" in *Extensibility Solutions Guide for Oracle Web Services Manager*
Attach policies (development time—Oracle JDeveloper)	"Using Oracle JDeveloper to Create a Job Definition" in *Developing Applications for Oracle Enterprise Scheduler*
Attach policies (deployment time—Oracle Enterprise Manager Fusion Middleware Control)	■ "Attaching Policies in *Securing Web Services and Managing Policies with Oracle Web Services Manager* ■ "Using Oracle Enterprise Manager to Create a Job Definition" in *Developing Applications for Oracle Enterprise Scheduler*
Configure policies	■ "Oracle Web Services Manager Policy Configuration" in *Developing Applications for Oracle Enterprise Scheduler* ■ "Securing Web Services" in *Securing Web Services and Managing Policies with Oracle Web Services Manager*
Diagnose problems	"Managing Diagnostic and Message Logs" in *Administering Web Services*
Interoperate with other security environments	*Interoperability Solutions Guide for Oracle Web Services Manager*

Table 1–9 summarizes the roadmap for implementing SOA composite services and clients.

Table 1–9   Roadmap for Implementing Oracle Service Bus Services and Clients

Task	More Information
Develop Oracle Service Bus web services and clients	*Developing Services with Oracle Service Bus* "Integrating REST Operations in SOA Composite Applications" in *Developing SOA Applications with Oracle SOA Suite*
Deploy web services	"Deploying Oracle Service Bus Services" in *Developing Services with Oracle Service Bus*
Administer web services	*Administering Oracle Service Bus* *Administering Web Services*
Create policies	"Managing Web Service Policies with Fusion Middleware Control" in *Securing Web Services and Managing Policies with Oracle Web Services Manager*
Create custom assertions	"Creating Custom Assertions" in *Extensibility Solutions Guide for Oracle Web Services Manager*
Attach policies (development time—Oracle JDeveloper)	"Attaching and Configuring Policies in JDeveloper" in *Developing Services with Oracle Service Bus* "Securing Oracle Service Bus with Oracle Web Services Manager" in *Developing Services with Oracle Service Bus* "Securing Business and Proxy Services" in *Developing Services with Oracle Service Bus*
Attach policies (development or deployment time—Oracle Service Bus Console)	"Attaching and Configuring Policies in the Oracle Service Bus Console" in *Developing Services with Oracle Service Bus* "Securing Oracle Service Bus with Oracle Web Services Manager" in *Developing Services with Oracle Service Bus* "Securing Business and Proxy Services" in *Developing Services with Oracle Service Bus*
Attach policies (deployment time—Oracle Enterprise Manager Fusion Middleware Control)	"Managing Security Policies" in *Administering Oracle Service Bus*
Configure policies	"Securing Business and Proxy Services" in *Developing Services with Oracle Service Bus* "Securing Web Services" in *Securing Web Services and Managing Policies with Oracle Web Services Manager*
Test web services	"Testing Proxy Services, Business Services, Pipelines, and Split-Joins" in *Developing Services with Oracle Service Bus* "Testing Web Services" in *Administering Web Services*
Monitor web service performance	"Monitoring Oracle Service Bus Service Health" in *Administering Oracle Service Bus* "Monitoring Web Services" in *Administering Web Services*

Table 1–9   (Cont.) Roadmap for Implementing Oracle Service Bus Services and Clients

Task	More Information
Manage application migration between environments	"Managing Application Migration Between Environments" in *Administering Web Services*
Diagnose problems	■ "Using the Diagnostic Frameworks for Diagnose Problems" in *Administering Oracle Service Bus* ■ "Managing Diagnostic and Message Logs" in *Administering Web Services*
Interoperate with other security environments	*Interoperability Solutions Guide for Oracle Web Services Manager*

Table 1–10 summarizes the roadmap for implementing SOA composite services and clients.

Table 1–10   Roadmap for Implementing SOA Composite Services and Clients

Task	More Information
Develop SOA composite web services and clients	■ *Developing Oracle Infrastructure Web Services* ■ *Developing SOA Applications with Oracle SOA Suite*
Deploy web services	■ "Deploying SOA Composite Applications" in *Developing SOA Applications with Oracle SOA Suite* ■ "Deploying Web Services" in *Administering Web Services* ■ *Oracle Fusion Middleware Enterprise Deployment Guide for Oracle SOA Suite*
Administer web services	■ "Configuring Service and Reference Binding Components" in *Administering Oracle SOA Suite and Oracle Business Process Management Suite* ■ "Managing Service and Reference Binding Components" in *Administering Oracle SOA Suite and Oracle Business Process Management Suite* ■ *Administering Web Services*
Create policies	"Managing Web Service Policies with Fusion Middleware Control" in *Securing Web Services and Managing Policies with Oracle Web Services Manager*
Create custom assertions	"Creating Custom Assertions" in *Extensibility Solutions Guide for Oracle Web Services Manager*
Attach policies (development time—Oracle JDeveloper)	"Enabling Security with Policies and Message Encryption in *Developing SOA Applications with Oracle SOA Suite*
Attach policies (deployment time—Oracle Enterprise Manager Fusion Middleware Control)	■ "Attaching Policies in *Securing Web Services and Managing Policies with Oracle Web Services Manager* ■ "Understanding Policies" in *Administering Oracle SOA Suite and Oracle Business Process Management Suite*

Table 1–10   (Cont.) Roadmap for Implementing SOA Composite Services and Clients

Task	More Information
Configure policies	"Securing Web Services" in *Securing Web Services and Managing Policies with Oracle Web Services Manager*
Test web services	"Testing Web Services" in *Administering Web Services*
Monitor web service performance	■ "Monitoring Service and Reference Binding Components" in *Administering Oracle SOA Suite and Oracle Business Process Management Suite* ■ "Monitoring Service and Reference Binding Components in the SOA Infrastructure" in *Administering Oracle SOA Suite and Oracle Business Process Management Suite* ■ "Monitoring Web Services" in *Administering Web Services*
Manage application migration between environments	"Managing Application Migration Between Environments" in *Administering Web Services*
Diagnose problems	"Managing Diagnostic and Message Logs" in *Administering Web Services*
Interoperate with other security environments	*Interoperability Solutions Guide for Oracle Web Services Manager*

Table 1–11, " Roadmap for Implementing WebCenter Services and Clients" summarizes the roadmap for implementing WebCenter services and clients.

Table 1–11   Roadmap for Implementing WebCenter Services and Clients

Task	More Information
Develop WebCenter services and clients	■ *Developer's Guide for Oracle WebCenter* ■ "Developing WebCenter Framework Applications" in the Oracle JDeveloper online help
Deploy WebCenter services	■ "Testing and Deploying Your WebCenter Application" in *Developer's Guide for Oracle WebCenter* ■ "Deploying WebCenter Applications" in *Oracle Fusion Middleware Administrator's Guide for Oracle WebCenter*
Administer WebCenter services	*Oracle Fusion Middleware Administrator's Guide for Oracle WebCenter*
Create policies	"Managing Web Service Policies" in *Administering Web Services*
Create custom assertions	"Creating Custom Assertions" in *Extensibility Guide for Oracle Web Services Manager*
Attach policies (deployment time—Oracle Enterprise Manager Fusion Middleware Control)	■ "Attaching Policies to Web Services" in *Administering Web Services* ■ "Managing Security" in *Oracle Fusion Middleware Administrator's Guide for Oracle WebCenter*

Table 1–11 (Cont.) Roadmap for Implementing WebCenter Services and Clients

Task	More Information
Configure policies	■ "Setting Up Your Environment for Policies" in *Administering Web Services* ■ "Configuring Policies" in *Administering Web Services*
Test WebCenter services	"Testing and Deploying Your WebCenter Application" in *Developer's Guide for Oracle WebCenter*
Monitor WebCenter service performance	*Oracle Fusion Middleware Administrator's Guide for Oracle WebCenter*
Manage application migration between environments	"Managing Application Migration Between Environments" in *Administering Web Services*
Diagnose problems	"Diagnosing Problems" in *Administering Web Services*
Interoperate with: ■ 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 ■ Axis 1.4 and WSS4J 1.5.8 ■ Glassfish Enterprise Server Release 3.0.1	*Interoperability Guide for Oracle Web Services Manager*

1.6.2 Roadmap for Implementing Java EE (WebLogic) Web Services

A roadmap lists common tasks for developing, securing, and administering Java EE (WebLogic) web services, and provides links to detailed information.

Table 1–12 provides links to detailed information for common Java EE (WebLogic) Web Services.

Table 1–12   Roadmap for Implementing Java EE (WebLogic) Web Services

Task	More Information
Develop Java EE web services and clients	■ *Understanding WebLogic Web Services for Oracle WebLogic Server* ■ *Developing JAX-WS Web Services for Oracle WebLogic Server* ■ *Developing JAX-RPC Web Services for Oracle WebLogic Server* ■ *Developing and Securing RESTful Web Services for Oracle WebLogic Server* ■ "Developing and Securing Web Services" in *Developing Applications with Oracle JDeveloper*
Deploy web services	■ "Install a Web Service" in *WebLogic Server Administration Console Online Help* ■ "Deploying Web Services" in *Developing Applications with Oracle JDeveloper*

Table 1–12   (Cont.) Roadmap for Implementing Java EE (WebLogic) Web Services

Task	More Information
Administer web services	"Web Services" in *WebLogic Server Administration Console Online Help*
Create OWSM policies	"Managing Web Service Policies with Fusion Middleware Control" in *Securing Web Services and Managing Policies with Oracle Web Services Manager*
Create WebLogic web service policies	■ "Configuring Message-Level Security" in *Securing WebLogic Web Services for Oracle WebLogic Server* ■ "Configuring Transport-Level Security" in *Securing WebLogic Web Services for Oracle WebLogic Server* ■ "Configuring Access Control Security (JAX-RPC only)" in *Securing WebLogic Web Services for Oracle WebLogic Server*
Configure OWSM policies	"Securing Web Services" in *Securing Web Services and Managing Policies with Oracle Web Services Manager*
Configure WebLogic web service policies	■ "Configuring Message-Level Security" in *Securing WebLogic Web Services for Oracle WebLogic Server* ■ "Configuring Transport-Level Security" in *Securing WebLogic Web Services for Oracle WebLogic Server* ■ "Configuring Access Control Security (JAX-RPC only)" in *Securing WebLogic Web Services for Oracle WebLogic Server*
Create custom OWSM policy file	"Creating Custom Assertions" in *Developing Extensible Applications with Oracle Web Services Manager*
Create custom WebLogic web service policy file	"Creating and Using a Custom Policy File" in *Securing WebLogic Web Services for Oracle WebLogic Server*
Attach OWSM policies (development time—Oracle JDeveloper)	■ "Attaching Policies in *Securing Web Services and Managing Policies with Oracle Web Services Manager* ■ "Attaching Policies" in *Developing Applications with Oracle JDeveloper*
Attach WebLogic web service policies (development time—Oracle JDeveloper)	■ "Using Oracle Web Service Manager Security Policies" in *Securing WebLogic Web Services for Oracle WebLogic Server* ■ "Attaching Policies" in *Developing Applications with Oracle JDeveloper* ■ "Using Web Services Reliable Messaging" in *Programming Advanced Features of JAX-RPC Web Services for Oracle WebLogic Server*
Attach OWSM policies (deployment time)	"Attaching Policies in *Securing Web Services and Managing Policies with Oracle Web Services Manager*

Table 1–12 (Cont.) Roadmap for Implementing Java EE (WebLogic) Web Services

Task	More Information
Attach WebLogic web service policies (deployment time)	"Associate a WS-Policy file with a Web Service" in *WebLogic Server Administration Console Online Help*
Test web services	■ "Testing Web Services" in *Administering Web Services* ■ "Test a Web Service" in *Oracle WebLogic Server Administration Console Online Help* ■ "Testing and Debugging Web Services" in *Developing Applications with Oracle JDeveloper*
Monitor web service performance	■ "Monitoring and Auditing Web Services" in *Administering Web Services* ■ "Monitor a Web Service" in *Oracle WebLogic Server Administration Console Online Help*
Interoperate WebLogic and OWSM web service policies	*Interoperability Solutions Guide for Oracle Web Services Manager*

1.7 Related Oracle Fusion Middleware 12*c* Documentation

Additional documentation exists to support Oracle Fusion Middleware 12c.

The following table summarizes the additional documentation related to web services development, security, and administration.

Table 1–13 Related Documentation

Document	Description
Understanding Web Services	This document. Provides an introduction to web services for Oracle Fusion Middleware.
Understanding WebLogic Web Services for Oracle WebLogic Server	Introduces WebLogic web services, the standards that are supported, interoperability information, and relevant samples and documentation.
Understanding Oracle Web Services Manager	Introduces Oracle Web Services Manager (OWSM) for securing web services and managing policies.
Developing JAX-WS Web Services for Oracle WebLogic Server	Describes how to develop WebLogic web service using JAX-WS. Includes use cases and examples, iterative development procedures, typical JWS programming steps, data type information, and how to invoke a web service.
Developing and Securing RESTful Web Services for Oracle WebLogic Server	Describes how to develop WebLogic web service using JAX-RS. Includes use cases and examples, iterative development procedures, typical JWS programming steps, data type information, and how to invoke a web service.
Developing JAX-RPC Web Services for Oracle WebLogic Server	Describes how to develop WebLogic web service using JAX-RPC. Includes use cases and examples, iterative development procedures, typical JWS programming steps, data type information, and how to invoke a web service.
Developing Oracle Infrastructure Web Services	Describes how to develop Oracle Infrastructure web services.
Developing Fusion Web Applications with Oracle Application Development Framework	Describes how to develop ADF components.

Table 1–13   (Cont.) Related Documentation

Document	Description
Developing Services with Oracle Service Bus	Describes how to develop Oracle Service Bus proxy and business services.
Developing SOA Applications with Oracle SOA Suite	Describes how to develop SOA composite services.
Developer's Guide for Oracle WebCenter	Describes how to develop WebCenter services.
Securing Web Services and Managing Policies with Oracle Web Services Manager	Describes how to use OWSM to secure web services and manage policies.
Securing WebLogic Web Services for Oracle WebLogic Server	Describes how to program and configure message-level (digital signatures and encryption), transport-level, and access control security for a web service.
Administering Web Services	Describes how to secure and administer web services.
Developing Extensible Applications for Oracle Web Services Manager	Describes how to build custom assertions for Oracle Web Services Manager (OWSM).
Interoperability Solutions Guide for Oracle Web Services Manager	Describes how to implement the most common OWSM interoperability scenarios.
WebLogic Web Services Reference for Oracle WebLogic Server	Provides reference information on JWS annotations, Ant tasks, reliable messaging WS-Policy assertions, security WS-Policy assertions, and deployment descriptors.
"Developing and Securing Web Services" in *Developing Applications with Oracle JDeveloper*	Describes how to develop web services and attach policies using Oracle JDeveloper.