# Oracle® HTTP Server

Administrator's Guide

10*g* (9.0.4)

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Oracle HTTP Server Administrator's Guide, 10*g* (9.0.4)

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**Oracle HTTP Server Administrator's Guide, 10*g* (9.0.4)**

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# Preface

This guide describes how to administer the Oracle HTTP Server.

This preface contains these topics:

## Intended Audience

The *Oracle HTTP Server Administrator's Guide* is intended for application server administrators, security managers, and managers of databases used by application servers.

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# Organization

This document contains:

### Chapter 1, "Oracle HTTP Server Overview"

This chapter describes the Oracle HTTP Server, highlighting the differences between the Oracle distribution and the open source Apache product on which it is based. It also explains how to start, stop and restart the server.

### Chapter 2, "Oracle HTTP Server Concepts"

This chapter introduces you to the Oracle HTTP Server directory structure, and configuration files, configuration file syntax, modules, and directives.

### Chapter 3, "Specifying Server and File Locations"

This chapter explains how to set Oracle HTTP Server and server administrator options, and specifies file locations.

### Chapter 4, "Managing Server Processes"

This chapter provides an overview of the Oracle HTTP Server processes, and provides information on how to regulate, and monitor these processes.

### Chapter 5, "Managing the Network Connection"

This chapter provides information about specifying IP addresses and ports, and managing server interaction, and network connection persistence.

### Chapter 6, "Configuring and Using Server Logs"

This chapter discusses Oracle Diagnostic Logging, log formats, and describes various log files and their locations.

### Chapter 7, "Application Server Control Management"

This chapter provides information for managing Oracle HTTP Server using Oracle Enterprise Manager Application Server Control.

### Chapter 8, "Oracle HTTP Server Modules"

This chapter describes the modules (mods) included in the Oracle HTTP Server. The modules extend the basic functionality of the Web server, and support integration between Oracle HTTP Server and other Oracle Application Server components.

### Chapter 9, "Configuring and Using mod_oradav"

This chapter describes distributed authoring and versioning concepts, and explains how to configure and use `mod_oradav`. `mod_oradav` enables you to use OraDAV to access content in an Oracle database from a Web browser or a WebDAV client.

### Chapter 10, "Managing Security"

This chapter provides an overview of Oracle HTTP Server security features and configuration information for setting up a secure Web site using them.

### Chapter 11, "Frequently Asked Questions"

This chapter provides answers to frequently asked questions about Oracle HTTP Server.

### Chapter A, "Using Oracle Application Server Proxy Plug-in"

This appendix explains how the Oracle Application Server Proxy Plug-in enables you to use Oracle Application Server components in conjunction with a third-party HTTP listener.

### Chapter B, "Using Oracle Application Server SSO Plug-in"

This appendix explains how to use Oracle Application Server SSO Plug-in to protect third-party HTTP listener and its applications.

### Chapter C, "Using Oracle Application Server Containers for J2EE Plug-in"

This appendix explains how OC4J Plug-in enables you to use third party HTTP listeners to access servlets running in the OC4J J2EE within Oracle Application Server. It also contains information about using `mod_oc4j` in a non-Oracle Apache.

### Chapter D, "Oracle HTTP Server Configuration Files"

This appendix lists commonly used Oracle HTTP Server configuration files.

### Chapter E, "Third Party Licenses"

This appendix includes the Third Party License for all the third party products included with Oracle Application Server.

### Glossary

The glossary defines terminology used throughout this guide and the Oracle Application Server documentation set.

## Related Documentation

For more information, see these Oracle resources:

- Oracle Application Server Documentation Library
- Oracle Application Server Platform-Specific Documentation on Oracle Application Server Disk 1

Printed documentation is available for sale in the Oracle Store at

`http://oraclestore.oracle.com/`

To download free release notes, installation documentation, white papers, or other collateral, please visit the Oracle Technology Network (OTN). You must register online before using OTN; registration is free and can be done at

`http://otn.oracle.com/membership/`

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## Conventions

This section describes the conventions used in the text and code examples of this documentation set. It describes:

- Conventions in Text
- Conventions in Code Examples
- Conventions for Windows Operating Systems

## Conventions in Text

We use various conventions in text to help you more quickly identify special terms. The following table describes those conventions and provides examples of their use.

| Convention | Meaning | Example |
|---|---|---|
| **Bold** | Bold typeface indicates terms that are defined in the text or terms that appear in a glossary, or both. | When you specify this clause, you create an **index-organized table**. |
| *Italics* | Italic typeface indicates book titles or emphasis. | *Oracle9i Database Concepts*<br>Ensure that the recovery catalog and target database do *not* reside on the same disk. |
| `UPPERCASE monospace (fixed-width) font` | Uppercase monospace typeface indicates elements supplied by the system. Such elements include parameters, privileges, datatypes, RMAN keywords, SQL keywords, SQL*Plus or utility commands, packages and methods, as well as system-supplied column names, database objects and structures, usernames, and roles. | You can specify this clause only for a `NUMBER` column.<br>You can back up the database by using the `BACKUP` command.<br>Query the `TABLE_NAME` column in the `USER_TABLES` data dictionary view.<br>Use the `DBMS_STATS.GENERATE_STATS` procedure. |
| `lowercase monospace (fixed-width) font` | Lowercase monospace typeface indicates executables, filenames, directory names, and sample user-supplied elements. Such elements include computer and database names, net service names, and connect identifiers, as well as user-supplied database objects and structures, column names, packages and classes, usernames and roles, program units, and parameter values.<br>**Note:** Some programmatic elements use a mixture of UPPERCASE and lowercase. Enter these elements as shown. | Enter `sqlplus` to open SQL*Plus.<br>The password is specified in the `orapwd` file.<br>Back up the datafiles and control files in the `/disk1/oracle/dbs` directory.<br>The `department_id`, `department_name`, and `location_id` columns are in the `hr.departments` table.<br>Set the `QUERY_REWRITE_ENABLED` initialization parameter to `true`.<br>Connect as `oe` user.<br>The `JRepUtil` class implements these methods. |
| *`lowercase italic monospace (fixed-width) font`* | Lowercase italic monospace font represents placeholders or variables. | You can specify the *`parallel_clause`*.<br>Run `U`*`old_release`*`.SQL` where *`old_release`* refers to the release you installed prior to upgrading. |

## Conventions in Code Examples

Code examples illustrate SQL, PL/SQL, SQL*Plus, or other command-line statements. They are displayed in a monospace (fixed-width) font and separated from normal text as shown in this example:

```
SELECT username FROM dba_users WHERE username = 'MIGRATE';
```

The following table describes typographic conventions used in code examples and provides examples of their use.

| Convention | Meaning | Example |
|---|---|---|
| [ ] | Brackets enclose one or more optional items. Do not enter the brackets. | DECIMAL (*digits* [ , *precision* ]) |
| { } | Braces enclose two or more items, one of which is required. Do not enter the braces. | {ENABLE \| DISABLE} |
| \| | A vertical bar represents a choice of two or more options within brackets or braces. Enter one of the options. Do not enter the vertical bar. | {ENABLE \| DISABLE}<br>[COMPRESS \| NOCOMPRESS] |
| . . . | Horizontal ellipsis points indicate either:<br>■ That we have omitted parts of the code that are not directly related to the example<br>■ That you can repeat a portion of the code | CREATE TABLE ... AS *subquery*;<br><br>SELECT *col1*, *col2*, ... , *coln* FROM employees; |
| .<br>.<br>. | Vertical ellipsis points indicate that we have omitted several lines of code not directly related to the example. | SQL> SELECT NAME FROM V$DATAFILE;<br>NAME<br>----------<br>/fsl/dbs/tbs_01.dbf<br>/fs1/dbs/tbs_02.dbf<br>.<br>.<br>.<br>/fsl/dbs/tbs_09.dbf<br>9 rows selected. |
| Other notation | You must enter symbols other than brackets, braces, vertical bars, and ellipsis points as shown. | acctbal NUMBER(11,2);<br>acct CONSTANT NUMBER(4) := 3; |

| Convention | Meaning | Example |
|---|---|---|
| *Italics* | Italicized text indicates placeholders or variables for which you must supply particular values. | `CONNECT SYSTEM/system_password`<br>`DB_NAME = database_name` |
| `UPPERCASE` | Uppercase typeface indicates elements supplied by the system. We show these terms in uppercase in order to distinguish them from terms you define. Unless terms appear in brackets, enter them in the order and with the spelling shown. However, because these terms are not case sensitive, you can enter them in lowercase. | `SELECT last_name, employee_id FROM employees;`<br>`SELECT * FROM USER_TABLES;`<br>`DROP TABLE hr.employees;` |
| `lowercase` | Lowercase typeface indicates programmatic elements that you supply. For example, lowercase indicates names of tables, columns, or files.<br>**Note:** Some programmatic elements use a mixture of UPPERCASE and lowercase. Enter these elements as shown. | `SELECT last_name, employee_id FROM employees;`<br>`sqlplus hr/hr`<br>`CREATE USER mjones IDENTIFIED BY ty3MU9;` |

## Conventions for Windows Operating Systems

The following table describes conventions for Windows operating systems and provides examples of their use.

| Convention | Meaning | Example |
|---|---|---|
| Choose Start > | How to start a program. | To start the Database Configuration Assistant, choose Start > Programs > Oracle - *HOME_NAME* > Configuration and Migration Tools > Database Configuration Assistant. |
| File and directory names | File and directory names are not case sensitive. The following special characters are not allowed: left angle bracket (<), right angle bracket (>), colon (:), double quotation marks ("), slash (/), pipe (\|), and dash (-). The special character backslash (\) is treated as an element separator, even when it appears in quotes. If the file name begins with \\, then Windows assumes it uses the Universal Naming Convention. | `c:\winnt"\"system32 is the same as C:\WINNT\SYSTEM32` |
| `C:\>` | Represents the Windows command prompt of the current hard disk drive. The escape character in a command prompt is the caret (^). Your prompt reflects the subdirectory in which you are working. Referred to as the *command prompt* in this manual. | `C:\oracle\oradata>` |
| Special characters | The backslash (\) special character is sometimes required as an escape character for the double quotation mark (") special character at the Windows command prompt. Parentheses and the single quotation mark (') do not require an escape character. Refer to your Windows operating system documentation for more information on escape and special characters. | `C:\>exp scott/tiger TABLES=emp QUERY=\"WHERE job='SALESMAN' and sal<1600\"`<br>`C:\>imp SYSTEM/`*password*` FROMUSER=scott TABLES=(emp, dept)` |
| *HOME_NAME* | Represents the Oracle home name. The home name can be up to 16 alphanumeric characters. The only special character allowed in the home name is the underscore. | `C:\> net start Oracle`*HOME_NAME*`TNSListener` |

| Convention | Meaning | Example |
|---|---|---|
| *ORACLE_HOME* and *ORACLE_BASE* | In releases prior to Oracle8*i* release 8.1.3, when you installed Oracle components, all subdirectories were located under a top level *ORACLE_HOME* directory. For Windows NT, the default location was `C:\orant`.<br><br>This release complies with Optimal Flexible Architecture (OFA) guidelines. All subdirectories are not under a top level *ORACLE_HOME* directory. There is a top level directory called *ORACLE_BASE* that by default is `C:\oracle`. If you install the latest Oracle release on a computer with no other Oracle software installed, then the default setting for the first Oracle home directory is `C:\oracle\ora`*nn*, where *nn* is the latest release number. The Oracle home directory is located directly under *ORACLE_BASE*.<br><br>All directory path examples in this guide follow OFA conventions.<br><br>Refer to *Oracle9i Database Getting Starting for Windows* for additional information about OFA compliances and for information about installing Oracle products in non-OFA compliant directories. | Go to the *ORACLE_BASE*`\`*ORACLE_HOME*`\rdbms\admin` directory. |

# 1

# Oracle HTTP Server Overview

This chapter describes the Oracle HTTP Server, highlighting the differences between the Oracle distribution and the open source Apache product on which it is based. It also explains how to start, stop and restart the server.

Topics discussed are:

- Oracle HTTP Server Features
- Oracle HTTP Server Components
- Oracle HTTP Server Support
- Oracle HTTP Server Management
- Starting, Stopping, and Restarting Oracle HTTP Server

Documentation from the Apache Software Foundation is referenced when applicable.

> **Note:** Readers using this guide in PDF or hard copy formats will be unable to access third-party documentation, which Oracle provides in HTML format only. To access the third-party documentation referenced in this guide, use the HTML version of this guide and click on the hyperlinks.

# Oracle HTTP Server Features

Oracle HTTP Server is the Web server component of Oracle Application Server. It is based on the **Apache HTTP** Server, version 1.3.28. It is a robust, reliable Web server, pre-configured to do the following:

- provide a high availability infrastructure integration with **Oracle Process Manager and Notification Server** (OPMN), for process management, death detection and failover for OC4J and Oracle HTTP Server processes.

  **See Also:** *Oracle Application Server 10g High Availability Guide*

- provide Dynamic Monitoring Services (DMS) metrics that give runtime performance statistics for both Oracle HTTP Server and OC4J processes. As applications run, DMS collects detailed performance statistics. This data allows you to monitor the duration of important request processing phases and status information. With this information, you can locate performance bottlenecks and tune the application server to maximize throughput and minimize response time.

  **See Also:** *Oracle Application Server 10g Performance Guide*

- provide a request ID, which enhances request tracking through various components by attaching a request ID to each request. This provides more detailed information, allowing you to see how much time a particular request spends in any component or layer.
- integrate with single sign-on capability through Oracle Application Server Single Sign-On.

  **See Also:** *Oracle Application Server Single Sign-On Administrator's Guide*

- enable securing of transactions with Secure Sockets Layer (SSL) technology.

  **See Also:**

  - *Oracle Application Server 10g Security Guide*
  - Chapter 10, "Managing Security" on page 10-1

- execute Perl scripts in the same process as the Oracle HTTP Server, or as **CGI** script.
- access database stored procedures with a PL/SQL engine.

  **See Also:** *Oracle Application Server 10g mod_plsql User's Guide*

- enable scripting of HTML pages with PL/SQL code.
- support legacy use of Apache JServ, including a process management and death detection module (`mod_oprocmgr`).

  **See Also:** "mod_oprocmgr" on page 8-37

- provide proxy plug-in for non-Oracle HTTP listeners.

  **See Also:** Appendix A, "Using Oracle Application Server Proxy Plug-in" on page A-1

# Oracle HTTP Server Components

Oracle HTTP Server consists of several components that run within the same process. These components provide the extensive list of features that Oracle HTTP Server offers when handling client requests. Following are the major components:

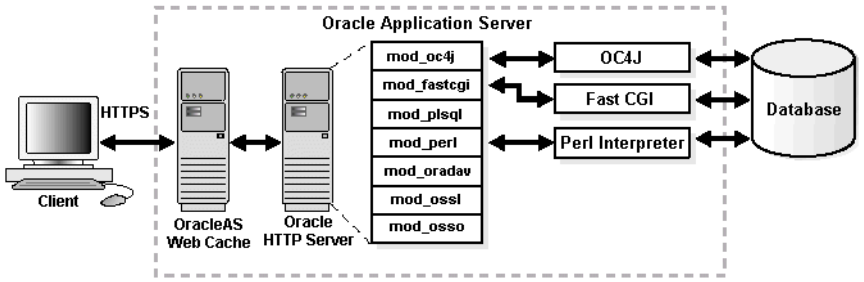
- **HTTP Listener**: Oracle HTTP Server is based on an Apache HTTP listener to serve client requests. An HTTP server listener handles incoming requests and routes them to the appropriate processing utility.
- **Modules (mods)**: Many of the standard Apache modules are included with Oracle HTTP Server. Oracle also includes several internal modules that are specific to Oracle Application Server components.

  **See Also:** "Oracle HTTP Server Modules" on page 1-5 for a complete list of modules shipped with Oracle HTTP Server.

- **Perl Interpreter**: A persistent Perl runtime environment embedded in Oracle HTTP Server through `mod_perl`.

Figure 1–1 shows the path of various requests through Oracle HTTP Server components, where a client machine connects to Oracle Application Server Web Cache, which in turn connects to Oracle HTTP Server. Oracle HTTP Server, using various modules, connects to the database through OC4J, FastCGI, or the Perl interpreter.

***Figure 1–1 Oracle HTTP Server Request Flow***




**See Also:** *Oracle Application Server 10g Concepts* for more information regarding Oracle Application Server components, and how they relate to each other.

## Oracle HTTP Server Modules

Table 1–1 identifies the modules shipped with Oracle HTTP Server. Modules extend the basic functionality of the Web server, and support integration between Oracle HTTP Server and other Oracle Application Server components. Note that the list differs from the Apache open source distribution (given the inclusion of Oracle modules), and that not all modules are supported by Oracle.

***Table 1–1 Oracle HTTP Server Modules***

| Module | Oracle Support | Notes |
|---|---|---|
| mod_access | **Yes** | |
| mod_actions | **Yes** | |
| mod_alias | **Yes** | |
| mod_asis | **No** | |
| mod_auth | **Yes** | |
| mod_auth_anon | **Yes** | |
| mod_auth_db | **No** | Disabled. Not shipped by Oracle. |
| mod_auth_dbm | **No** | |
| mod_auth_digest | **No** | Disabled. Experimental MD5 authentication; not shipped by Oracle. |
| mod_autoindex | **Yes** | |
| mod_cern_meta | **No** | |
| mod_certheaders | **Yes** | |
| mod_cgi | **Yes** | |
| mod_define | **Yes** | UNIX systems only. |
| mod_digest | **Yes** | |
| mod_dir | **Yes** | |
| mod_dms | **Yes** | Oracle module. |
| mod_env | **Yes** | |
| mod_example | **No** | |
| mod_expires | **Yes** | |
| mod_fastcgi | **Yes** | |

*Table 1–1 Oracle HTTP Server Modules (Cont.)*

| Module | Oracle Support | Notes |
|---|---|---|
| mod_headers | **Yes** | |
| mod_imap | **No** | |
| mod_include | **Yes** | |
| mod_info | **Yes** | |
| mod_isapi | **No** | Windows systems only. Not shipped by Oracle |
| mod_jserv | **Yes** | Disabled by default in Oracle configuration. |
| mod_log_agent | **No** | Deprecated. |
| mod_log_config | **Yes** | |
| mod_log_referer | **Yes** | Deprecated. |
| mod_mime | **Yes** | |
| mod_mime_magic | **Yes** | |
| mod_mmap_static | **No** | |
| mod_negotiation | **Yes** | |
| mod_oc4j | **Yes** | Oracle module. Recommended servlet container; enabled by default in Oracle configuration. |
| mod_onsint | **Yes** | Oracle module. |
| mod_oprocmgr | **Yes** | Oracle module. |
| mod_oradav | **Yes** | Oracle module. |
| mod_ossl | **Yes** | Oracle module. |
| mod_osso | **Yes** | Oracle module. |
| mod_perl | **Yes** | |
| mod_plsql | **Yes** | Oracle module. |
| mod_proxy | **Yes** | |
| mod_rewrite | **Yes** | |
| mod_setenvif | **Yes** | |
| mod_so | **Yes** | |
| mod_speling | **Yes** | |
| mod_status | **Yes** | |

*Table 1–1 Oracle HTTP Server Modules (Cont.)*

| Module | Oracle Support | Notes |
|---|---|---|
| mod_unique_id | **Yes** | |
| mod_userdir | **Yes** | |
| mod_usertrack | **Yes** | |
| mod_vhost_alias | **Yes** | |

# Oracle HTTP Server Support

Oracle provides technical support for the following Oracle HTTP Server features and conditions:

- Modules included in the Oracle distribution, except as noted in the table in Table 1–1, "Oracle HTTP Server Modules". Modules from any other source, including the Apache Software Foundation, are not supported by Oracle.
- Problems that can be reproduced within an Apache configuration consisting only of supported Oracle Apache modules.
- Use of the included Perl interpreter within the supported Apache configuration.

# Oracle HTTP Server Management

Oracle HTTP Server can be managed using the following two methods:

- Application Server Control
- Oracle Application Server Command-line Tools

## Application Server Control

You can manage Oracle HTTP Server using Oracle Enterprise Manager. Oracle Enterprise Manager enables you to manage your server from a Web browser using **Oracle Enterprise Manager Application Server Control** (Application Server Control).

**See Also:**

- Chapter 7, "Application Server Control Management" for information on managing Oracle HTTP Server using Application Server Control.
- *Oracle Application Server 10g Administrator's Guide* for detailed information on Oracle Enterprise Manager Application Server Control and other GUI-based management tools.

## Oracle Application Server Command-line Tools

You can use also the following command-line tools to manage Oracle HTTP Server:

### opmnctl

Provides a command-line utility for Oracle Process Manager and Notification Server (OPMN) for process management. It is located in

- UNIX: *ORACLE_HOME*/opmn/bin
- Windows: *ORACLE_HOME*\opmn\bin

**See Also:** *Oracle Process Manager and Notification Server Administrator's Guide* for more information on `opmnctl`.

### dcmctl

Provides a command-line utility for **Distributed Configuration Management** (DCM) for configuration management and application deployment. It is located in

- UNIX: *ORACLE_HOME*/dcm/bin
- Windows: *ORACLE_HOME*\dcm\bin

> **See Also:** *Distributed Configuration Management Reference Guide* for more information on dcmctl.

**Using dcmctl** You must use the DCM utility dcmctl in circumstances such as:

- Managing clusters and farms of Oracle Application Server instances. Manage the configuration of individual components, such as OC4J, Oracle HTTP Server instances, and Oracle Process Manager and Notification Server, or Java Authentication and Authorization Service.
- Performing cluster-wide OC4J application deployment.
- Managing versions of configuration with archive, save and restore, and import and export functions.

> **See Also:** *Distributed Configuration Management Reference Guide* for detailed information regarding dcmctl and the commands required to perform the above mentioned tasks.

# Starting, Stopping, and Restarting Oracle HTTP Server

Oracle HTTP Server is managed by Oracle Process Manager and Notification Server (OPMN). You can use Oracle Enterprise Manager Application Server Control to start, stop, and restart the server.

**See Also:** Chapter 7, "Application Server Control Management"

For command-line management, you can use the opmnctl utility to start, stop, and restart the server.

You must always use OPMN to start, stop and restart Oracle HTTP Server. Otherwise, the configuration management infrastructure cannot detect or communicate with the Oracle HTTP Server processes, and problems may occur.

---

**Note:** Do not use the `apachectl` utility to manage the Oracle HTTP Server.

---

To determine the state of Oracle HTTP Server, use the following command:

```
opmnctl status
```

The processes are listed with their current state (Up, Down, etc.)

## Starting Oracle HTTP Server

To start Oracle HTTP Server, use the `startproc` command:

- UNIX: *ORACLE_HOME*`/opmn/bin> opmnctl [verbose] startproc ias-component=HTTP_Server`
- Windows: *ORACLE_HOME*`\opmn\bin> opmnctl [verbose] startproc ias-component=HTTP_Server`

## Stopping Oracle HTTP Server

To stop Oracle HTTP Server, use the `stopproc` command:

- UNIX: *ORACLE_HOME*`/opmn/bin> opmnctl [verbose] stopproc ias-component=HTTP_Server`
- Windows: *ORACLE_HOME*`\opmn\bin> opmnctl [verbose] stopproc ias-component=HTTP_Server`

## Restarting Oracle HTTP Server

Restarting Oracle HTTP Server performs a graceful restart, which is invisible to clients. In a graceful restart, on UNIX, a `USR1` signal is sent. When the process receives this signal, it tells the children to exit after processing the current request. (Children that are not servicing requests exit immediately.)

The parent re-reads the configuration files and re-opens the log files, replacing the children with new children in accordance with the settings it finds when re-reading the configuration files. It always observes the process creation settings (`MaxClients`, `MaxSpareServers`, `MinSpareServers`) specified, and takes the current server load into account.

To restart Oracle HTTP Server, use the `restartproc` command:

- UNIX: *ORACLE_HOME*`/opmn/bin> opmnctl [verbose] restartproc ias-component=HTTP_Server`
- Windows: *ORACLE_HOME*`\opmn\bin> opmnctl [verbose] restartproc ias-component=HTTP_Server`

> **See Also:** *Oracle Process Manager and Notification Server Administrator's Guide* for more information on `opmnctl` command options.

# 2

# Oracle HTTP Server Concepts

This chapter introduces you to the Oracle HTTP Server directory structure, and configuration files, configuration file syntax, modules, and directives.

Topics discussed are:

- Understanding Oracle HTTP Server Directory Structure
- Accessing Configuration Files
- Configuration Files Syntax
- Understanding Modules
- Classes of Directives
- Scope of Directives
- About .htaccess Files

Documentation from the Apache Software Foundation is referenced when applicable.

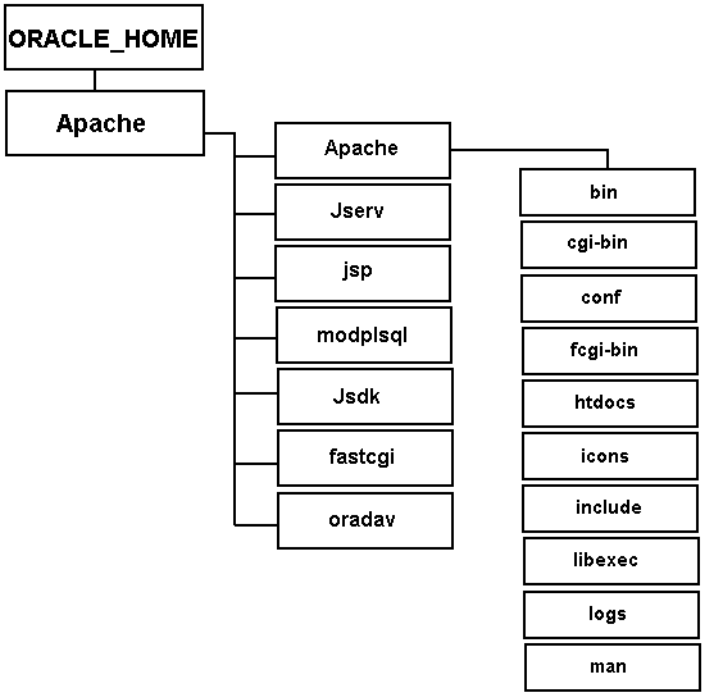
> **Note:** Readers using this guide in PDF or hard copy formats will be unable to access third-party documentation, which Oracle provides in HTML format only. To access the third-party documentation referenced in this guide, use the HTML version of this guide and click on the hyperlinks.

# Understanding Oracle HTTP Server Directory Structure

Oracle HTTP Server is installed in the *ORACLE_HOME*/Apache directory on UNIX or *ORACLE_HOME*\Apache directory on Windows for configuring modules. For example, the modplsql folder contains the subdirectories necessary to configure and run PL/SQL applications.

Figure 2–1 illustrated Oracle HTTP Server directory structure.

***Figure 2–1 Oracle HTTP Server Directory Structure***



The Apache directory is located at the top level under the *ORACLE_HOME*. It contains subdirectories for configuring modules such as mod_jserv, mod_plsql, mod_oradav. It also contains another directory called Apache, which is the base directory of Oracle HTTP Server. Table 2–1 contains information about the subdirectories within the Apache directory.

***Table 2–1 Apache Subdirectories***

| Directory Name | Contents |
|---|---|
| bin | Contains Oracle HTTP Server executables. |
| cgi-bin | Contains the CGI scripts. These are programs or shell scripts that can be executed by Oracle HTTP Server on the behalf of its clients. |
| conf | Contains the configuration files. |
| fcgi-bin | Contains FastCGI scripts. |
| htdocs | Contains the HTML scripts. The htdoc directory and its subdirectories are accessible to anyone on the Web, and therefore pose a severe security risk if used for anything other than publicly availably data. |
| icons | Contains the icons that Oracle HTTP Server uses when displaying information or error messages. |
| include | Contains header files for building custom modules. |
| libexec | Contains the all shared library files for modules. |
| log | Contains the log data, for both access and errors. |
| man | Contains the man page for Oracle HTTP Server. |

# Accessing Configuration Files

Oracle HTTP Server is configured by placing *directives*, which are basically instructions, into text configuration files. Most of the configuration files are located in:

- UNIX: *ORACLE_HOME*/Apache/Apache/conf
- Windows: *ORACLE_HOME*\Apache\Apache\conf

Some of these files are read only once when the server starts or is reloaded, whereas some files are read every time a related file or directory is requested.

The configuration files which are read only once are called *server-wide* configuration files.

> **See Also:** Appendix D, "Oracle HTTP Server Configuration Files" on page D-1

# Configuration Files Syntax

Oracle HTTP Server contains one directive per line. The back-slash "\" can be used as the last character on a line to indicate that the directive continues onto the next line. There must be no other characters or white space between the back-slash and the end of the line.

Directives in the configuration files are case-insensitive, but arguments to directives are often case-sensitive. Lines which begin with the character "#" are considered comments, and are ignored. Comments may not be included on a line after a configuration directive. Blank lines and white space occurring before a directive are ignored, so you may indent directives for clarity.

## Understanding Modules

Oracle HTTP Server is a modular server. Modules extend the basic functionality of the Web server, and support integration between Oracle HTTP Server and other Oracle Application Server components. Oracle HTTP Server includes Apache modules as well as Oracle HTTP Server modules.

You can add modules using the `LoadModule` directive. Below is an example of `LoadModule` usage.

```
LoadModule status_module modules/mod_status.so
```

**See Also:** Chapter 8, "Oracle HTTP Server Modules" on page 8-1

## Classes of Directives

Table 2–2 classifies directives according to the context in which they can be used: global, per-server, and per-directory.

***Table 2–2 Classes and Directives***

| Class | Context | Where Used |
|---|---|---|
| global | server configuration | Inside server configuration files, but only outside of container directives (directives such as `VirtualHost` that have a start and end directive). |
| per-server | server configuration, virtual host | Inside server configuration files, both outside (for the main server) and inside `VirtualHost` directives. |
| per-directory | server configuration, virtual host, directory | Everywhere; particularly inside the server configuration files. |

**Note:** In Table 2–2, each class is a subset of the class above it. For example, directives from the per-directory class can also be used in the per-server and global contexts, and directives from the per-server class can be used in the global context.

# Scope of Directives

Directives placed in the main configuration files apply to the entire server. If you wish to change the configuration for only a part of the server, you can scope your directives by placing them in specific sections.

The section below discusses the following types of directives:

- Container Directives
- Block Directives

## Container Directives

Container directives specify the scope within which directives take effect. The following container directives are discussed in detail below:

- <Directory>
- <DirectoryMatch>
- <Files>
- <FilesMatch>
- <Location>
- <LocationMatch>
- <Limit>
- <LimitExcept>
- <VirtualHost>

### <Directory>

It is used to enclose a group of directives that apply only to the named directory and subdirectories of that directory. Any directory that is allowed in a directory context may be used. The directory is either the full path to a directory, or a wildcard string. In a wildcard string, ? matches any single character and * matches any sequences of characters. It is important to note that `<Directory />` operated on the whole file system, where as `<Directory dir>` refers to absolute directories. `<Directory>` containers cannot be nested inside each other, but can refer to directories in the document root that are nested.

### <DirectoryMatch>

It should be used when specifying regular expressions, instead of using the tilde form of <Directory> with wildcards in the directory specification. The following two examples have the same result, matching directories starting with web and ending with a number from 1 to 9:

```
<Directory ~/web[1-9]/>
<DirectoryMatch "/web[1-9]/">
```

### <Files>

The <Files *file*> and </Files> directives support access control by filename. It is comparable to the <Directory> and <Location> directives. The directives given within this section can be applied to any object within a base name (the last component of the filename) matching the specified file name. <Files> sections are processed in the order that they appear in the configuration file, after the <Directory> sections, and .htaccess files are read, but before <Location> sections. Note that the <Files> directives can be nested inside <Directory> sections to restrict the portion of the file system to which they apply.

### <FilesMatch>

Provides access control by filename, just as the <Files> directive does. However, it accepts regular expression.

### <Location>

Limits the application of the directives within a block to those URLs specified, rather than to the physical file location like the <Directory> directive. <Location> sections are processed in the order that they appear in the configuration file, after the <Directory> sections and .htaccess files are read, and after the <Files> sections. <Location> accepts wildcard directories and regular expressions with the tilde character.

### <LocationMatch>

Functions in an identical manner to <Location> and you should use it for specifying regular expressions instead of the tilde form of <Location> with wildcards in the location specification.

For example:

```
<LocationMatch "/(extra|special)/data">
```

matches the URLs that contained the /extra/data or /special/data sub string.

### <Limit>

<Limit *method*> defines a block according to the HTTP method of the incoming request. The following example limits the application of the directives that follow scripts that use the specified method:

```
<Limit POST PUT OPTIONS>
  order deny, allow
  deny from all
  allow from 127.0.0.192.168
</Limit>
```

Generally, <Limit> should not be used unless needed. It is useful only for restricting directives to particular methods. <Limit> is frequently used with other containers, and it is contained in any of them.

### <LimitExcept>

Restrict access controls to all HTTP methods except the named ones.

### <VirtualHost>

Oracle HTTP Server has the capabilities to serve many different Web sites simultaneously. Directives can also be scoped by placing them inside `<VirtualHost>` sections, so that they will only apply to requests for a particular Web site.

Virtual host refers to the practice of maintaining more than one server on one machine, as differentiated by their apparent hostname. For example, it is often desirable for companies sharing a Web server to have their own domain, and Web servers accessible as, for example, `www.oracle1.com` and `www.oracle2.com`, without requiring you to know any extra path information.

Oracle HTTP Server supports both IP-based virtual hosts and name-based virtual hosts. The latter variant is sometimes also called host-based or non-IP virtual hosts.

Each virtual host can have its own name, IP address, and error and access logs. Within a `<VirtualHost>` container, you can set up a large number of individual servers run by a single invocation of the Oracle HTTP Server. With virtual hosting, you can specify a replacement set of the server-level configuration directives that define the main host, and are not allowed in any other container.

## Block Directives

Specify a condition which must be true in order for directives within to take effect.

`<IfModule>` and `<IfDefine>` are block directives rather than container directives because they do not limit the scope of the directives they contain. They define whether Oracle HTTP Server parses the directives inside the block into its configuration, and the directives are ignored once the server is running.

# About .htaccess Files

Oracle HTTP Server allows for decentralized management of configuration through special files places inside the Web tree. The special files are usually called `.htaccess`, but can be specified in the `AccessFileName` directive. Directives placed in `.htaccess` files apply to the directory where you place the file, and all subdirectories. The `.htaccess` files follow the same syntax as the main configuration files. Since `.htaccess` files are read on every request, changes made in these files take immediate effect.

The server administrator further controls what directives may be placed in `.htaccess` files by configuring the `AllowOverride` directive in the main configuration files.

# 3

# Specifying Server and File Locations

This chapter explains how to set Oracle HTTP Server and server administrator options, and specifies file locations.

Topics discussed are:

- Setting Server and Administrator Functions
- Specifying File Locations

Documentation from the Apache Software Foundation is referenced when applicable.

> **Note:** Readers using this guide in PDF or hard copy formats will be unable to access third-party documentation, which Oracle provides in HTML format only. To access the third-party documentation referenced in this guide, use the HTML version of this guide and click on the hyperlinks.

# Setting Server and Administrator Functions

The following set basic Oracle HTTP Server and administrator functions. They are located in the "Main Server Configuration" portion of the `httpd.conf` file.

**See Also:** "httpd.conf File Structure" on page D-3

- ServerName
- UseCanonicalName
- ServerAdmin
- ServerSignature
- ServerTokens
- ServerAlias

## ServerName

Enables the server to set a hostname that can be used to create redirection URLs, through which you can access directories without having to use a "/" at the end.

### Modifying ServerName for Oracle Application Server Web Cache

This section provides information about modifying `ServerName` directive for deployment if Oracle Application Server Web Cache is on a different host than Oracle HTTP Server.

At installation time, Oracle HTTP Server sets the `httpd.conf` file with the following directives that impact Oracle Application Server Web Cache:

- `Port=web_cache_port`: Specifies the Oracle Application Server Web Cache listening ports
- `Listen=Oracle_HTTP_Server_port`: Specifies the HTTP and HTTPS ports obtained by Oracle HTTP Server.
- `ServerName`: Specifies the host name of Oracle HTTP Server.

- `UseCanonicalName On`: Instructs Oracle HTTP Server to use the host names and port values set in the `ServerName` and `Port` directives when redirecting a URL. If it is set to "off", then the host and port provided by the client is used.

For example,

```
##
## httpd.conf -- Apache HTTP Server configuration file
##
...
Port 7777
Listen 7778
...
ServerName http_server.company.com
...
UseCanonicalName On
....
```

If Oracle Application Server Web Cache is deployed on a separate machine from Oracle HTTP Server, then the Oracle HTTP Server administrator must modify the `ServerName` directive in `httpd.conf` for each site hosted by Oracle Application Server Web Cache. This enables Oracle HTTP Server to redirect URLs to Oracle Application Server Web Cache. The following example shows `httpd.conf` modified to set requests for `www.company.com` to Oracle Application Server Web Cache with a listening port of 7777.

```
Port 7777
Listen 7778
...
ServerName www.company.com
...
UseCanonicalName On
....
```

> **See Also:** "`ServerName` directive" in the Apache Server documentation.

## UseCanonicalName

Determines which hostname and port to use when redirecting the URL to the same server.

- `on`: This is the default setting. Server uses the hostname and port values set in `ServerName` and `Port`.
- `off`: Server uses the hostname and port that you specify in the request.

**See Also:** "`UseCanonicalName` directive" in the Apache Server documentation.

## ServerAdmin

Creates an email address that is included with every default error message that clients encounter. It is useful to create a separate email address for this.

**See Also:** "`ServerAdmin` directive" in the Apache Server documentation.

## ServerSignature

Enables the server to recognize which server, amongst the various proxies, created the returned response, such as an error message.

- on: Server creates a footer to the returned document that includes information such as `ServerName` and server version number. This is the default.
- `email:` Server creates an additional "mailto:" reference to the `ServerAdmin` of the document.
- `off`: Footer and "mailto:" reference are not created.

**See Also:** "`ServerSignature` directive" in the Apache Server documentation.

## ServerTokens

Controls server information which is returned to clients, such as in error messages. This information includes a description of the generic operating system-type of the server, and compiled-in modules.

- `min(imal)`: provides information such as server name and version.
- `OS`: provides information such as server name, version and operating system.
- `full`: provides information such as server name, version, operating system, and complied modules.

> **See Also:** "`ServerTokens` directive" in the Apache Server documentation.

## ServerAlias

Sets alternate names for the current virtual host.

> **See Also:** "`ServerAlias` directive" in the Apache Server documentation.

# Specifying File Locations

The following directives to control the location of various server files. They are located in the "Global Environment" of the `httpd.conf` file.

> **See Also:** "httpd.conf File Structure" on page D-3

- CoreDumpDirectory
- DocumentRoot
- ErrorLog
- LockFile
- PidFile
- ScoreBoardFile
- ServerRoot

## CoreDumpDirectory

Specifies the directory in which the server dumps core. The default is the `ServerRoot` directory. This directive is applicable to UNIX only.

> **See Also:** "`CoreDumpDirectory` directive" in the Apache Server documentation.

## DocumentRoot

Sets the directory from which httpd serves files. Unless matched by a directive like `Alias`, the server appends the path from the requested URL to the document root to make the path to the document for static content.

> **See Also:** "`DocumentRoot` directive" in the Apache Server documentation.

## ErrorLog

Sets the name of the file to which the server notes any errors it encounters. If the name of the file does not begin with a slash (/), then it is assumed to be relative to the `ServerRoot`. If the name of the file begins with a pipe (|), then it is assumed to be a command to spawn to handle the error log.

> **See Also:** "`ErrorLog` directive" in the Apache Server documentation.

## LockFile

Sets the path to the lockfile used when Oracle HTTP Server is compiled with either `USE_FCNTL_SERIALIZED_ACCEPT` or `USE_FLOCK_SERIALIZED_ACCEPT`. It is recommended that default value be used. The main reason for changing it is if the logs directory is NFS mounted, since the lockfile must be stored on a local disk.

> **See Also:** "`LockFile` directive" in the Apache Server documentation.

## PidFile

Enables you to set and change the location of the `PID` file to which the server records the process identification number. If the filename does not begin with a slash (/), then it is assumed to be relative to the `ServerRoot`.

> **See Also:** "`PidFile` directive" in the Apache Server documentation.

## ScoreBoardFile

Required in some architectures to set a file that the server uses to communicate between the parent and children processes. To verify if your architecture requires a scoreboard file, run Oracle HTTP Server and see if it creates the file named by the directive. If your architecture requires it then you must ensure that this file is not used at the same time by more than one invocation of the server.

> **See Also:** "`ScoreBoardFile` directive" in the Apache Server documentation.

## ServerRoot

Specifies the directory that contains the `conf` and `logs` subdirectories. If the server is started with the `-f` option, then you will have to specify `ServerRoot`.

> **See Also:** "`ServerRoot` directive" in the Apache Server documentation.

# 4

# Managing Server Processes

This chapter provides an overview of the Oracle HTTP Server processes, and provides information on how to regulate, and monitor these processes.

Topics discussed are:

- Oracle HTTP Server Processing Model
- Handling Server Processes
- Limiting the Number of Processes and Connections
- Getting Information about Processes

Documentation from the Apache Software Foundation is referenced when applicable.

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# Oracle HTTP Server Processing Model

Once Oracle HTTP Server is started, the system is ready to listen for and respond to http(s) requests. The request processing model is different on UNIX and Windows.

After installation, the main httpd parent process, as well as the child processes, run as the user who installed Oracle Application Server. The `User` and `Group` directive are used to set the privileges for the child processes. These directives are ignored if you are not running as `root`.The child processes must be able to read all the content that will be served.

## Running Oracle HTTP Server as Root

On UNIX, if you want to run on ports less than 1024, then you will have to run as `root`.

In order to run Oracle HTTP Server as `root`, perform the following steps:

1. Shutdown Oracle HTTP Server using Application Server Control, or with the following command:
   - UNIX: *ORACLE_HOME*`/opmn/bin> opmnctl [verbose] stopproc ias-component=HTTP_Server`
   - Windows: *ORACLE_HOME*`\opmn\bin> opmnctl [verbose] stopproc ias-component=HTTP_Server`

   **See Also:**

   - "Application Server Control" on page 1-8
   - "Stopping Oracle HTTP Server" on page 1-11
2. Change to root user.
3. Navigate to *ORACLE_HOME*`/Apache/Apache/bin` on UNIX or *ORACLE_HOME*`\Apache\Apache\bin` on Windows and execute the following command:

```
chown root .apachectl
chmod 6750 .apachectl
```

4. Exit `root`.
5. Restart Oracle HTTP Server using Application Server Control, or with the following command:
   - UNIX: *ORACLE_HOME*`/opmn/bin> opmnctl [verbose] restartproc ias-component=HTTP_Server`
   - Windows: *ORACLE_HOME*`\opmn\bin> opmnctl [verbose] restartproc ias-component=HTTP_Server`

   **See Also:**

   - "Application Server Control" on page 1-8
   - "Restarting Oracle HTTP Server" on page 1-11

On Windows, Oracle HTTP Server launches a single parent process and one child process. The child process creates multiple threads that listen, and respond to client requests.

You must decide how you want to set Oracle HTTP Server to handle processes or threads.

## Additional Security Considerations

For additional security on UNIX, you can change the user to "nobody". Be sure that the child processes can accomplish their tasks as the user "nobody". Change all static content, such as the *ORACLE_HOME*/Apache/Apache/htdocs directory on UNIX or *ORACLE_HOME*\Apache\Apache\htdocs on Windows, so that all the files are readable, but ideally not writable by the user "nobody". Also, verify that all the CGI and FastCGI programs can be run by user "nobody".

If your PL/SQL application is using the file-system caching functionality in mod_plsql, then the httpd processes should have read and write privileges to the cache directory through the parameter PlsqlCacheDirectory in *ORACLE_HOME*/Apache/modplsql/conf/cache.conf on UNIX or *ORACLE_HOME*\Apache\modplsql\conf\cache.conf on Windows. By default, this parameter points to *ORACLE_HOME*/Apache/modplsql/cache on UNIX or *ORACLE_HOME*\Apache\modplsql\cache on Windows.

For Oracle Application Server Portal, the content cached by mod_plsql is used, or updated by the Parallel Page Engine running under OC4J Portal. This means that the cache directory is readable and writable by the OC4J Portal process as well. If Oracle HTTP Server is configured to run as "nobody", then OC4J_Portal should also run as the same user.

Finally, given that the cached content might contain sensitive data, the final contents of the file-system cache should be protected. So, although Oracle HTTP Server might run as "nobody", access to the system as this user should be well-protected.

**See Also:** "mod_plsql" on page 8-48

# Handling Server Processes

Use the following directives to manage the server processes:

- ServerType
- Group
- User

## ServerType

Provides the following two options, both being applicable on UNIX only:

**`inetd`**: Starts up a new child process every time a request comes in. The program exits once the request is dealt with. This setting eliminates the option of having several child processes in waiting, making it slower and expensive, but more secure.

**`standalone`**: Enables several waiting child processes, and requires the server to be started only once. It is the default and recommended setting for a busy Web site.

You must specify the `User` and `Group` under which the servers answer requests.

> **See Also:** "`ServerType` directive" in the Apache Server documentation.

## Group

Specifies the group under which the server answers requests. In order to use this directive, the standalone server must be run initially as root. It is recommended that you create a new group for running the server. This is applicable to UNIX only.

> **See Also:** "`Group` directive" in the Apache Server documentation.

## User

Specifies the user ID to which the server answers requests. Run the standalone server as `root` to use this directive.You should have privileges to access files that are available for everyone, and should not be able to execute code which is not meant for httpd requests. It is recommended that you set up a new user for running the server. This is applicable to UNIX only.

> **See Also:** "`User` directive" in the Apache Server documentation.

# Limiting the Number of Processes and Connections

The following directives control and limit the number of child processes or simultaneous requests. They are located in the "Global Environment" of the `httpd.conf` file.

**See Also:** "httpd.conf File Structure" on page D-3

- StartServers
- ThreadsPerChild
- MaxClients
- MaxRequestsPerChild
- MaxSpareServers
- MinSpareServers

## StartServers

Sets the number of child server processes created when Oracle HTTP Server is started. The default is set at 5. This is applicable to UNIX only.

**See Also:** "`StartServers` directive" in the Apache Server documentation.

## ThreadsPerChild

Controls the maximum number of child threads handling requests. The default is set at 50. This is applicable to Windows only.

**See Also:** "`ThreadsPerChild` directive" in the Apache Server documentation.

## MaxClients

Limits the number of requests that can be dealt with at one time. The default and recommended value is 150. This is applicable to UNIX only.

**See Also:** "`MaxClients` directive" in the Apache Server documentation.

## MaxRequestsPerChild

Controls the number of requests a child process handles before it dies. This value should be specified again if the machine is rebooted. If you select the value to be 0, which is the default, then the process will never die. This is applicable to UNIX only.

> **See Also:** "`MaxRequestsPerChild` directive" in the Apache Server documentation.

## MaxSpareServers

Sets the maximum number of idle child server processes. An idle process is one which is running, but not handling a request. The parent process kills off idle child processes that exceed the value set for this directive. The default is set at 10. This is applicable to UNIX only.

> **See Also:** "`MaxSpareServers` directive" in the Apache Server documentation.

## MinSpareServers

Sets the minimum number of idle child server processes. An idle process is one which is running but not handling a request. The parent process will create new children at the maximum rate of one process per second if there are fewer processes running. The default is set at 5. This is applicable to UNIX only.

> **See Also:** "`MinSpareServers` directive" in the Apache Server documentation.

# Getting Information about Processes

There are several ways to monitor Oracle HTTP Server processes.

1. Use Oracle Enterprise Manager Application Server Control to monitor Oracle HTTP Server processes.

   **See Also:** Chapter 7, "Application Server Control Management" on page 7-1 for detailed information on managing Oracle HTTP Server using Oracle Enterprise Manager Application Server Control.

   If a network error occurs on a device such as a router or firewall between the application server and the database, JDBC connections may stop responding. In this situation, you must stop the Oracle HTTP Server and JServ processes manually, and there may be a delay in stopping the processes.

2. Use the performance monitor on Windows, or the `ps` utility on UNIX.

   **See Also:** *Oracle Application Server 10g Performance Guide* and your operating system documentation for more information.

3. Use `mod_status` for server status. By default, it is available from localhost only.

# 5

# Managing the Network Connection

This chapter provides information about specifying IP addresses and ports, and managing server interaction, and network connection persistence.

Topics discussed are:

- Specifying Listener Ports and Addresses
- Managing Interaction Between Server and Network
- Managing Connection Persistence
- Configuring Reverse Proxies and Load Balancers

Documentation from the Apache Software Foundation is referenced when applicable.

> **Note:** Readers using this guide in PDF or hard copy formats will be unable to access third-party documentation, which Oracle provides in HTML format only. To access the third-party documentation referenced in this guide, use the HTML version of this guide and click on the hyperlinks.

# Specifying Listener Ports and Addresses

When Oracle HTTP Server is started, by default, it listens for requests on port 7777 (non-SSL). If port 7777 is occupied, Oracle HTTP Server listens on the next available port number between a range of 7777-7877. Thus, if port 7777 is busy, it would listen on port 7778, and so on.

A file named `setupinfo.txt` is automatically generated in *`ORACLE_HOME`*`/Apache/Apache` on UNIX or *`ORACLE_HOME`*`\Apache\Apache` on Windows . It contains port information for Oracle HTTP Server. This file is generated at install time, and is not updated thereafter. If you restart Oracle HTTP Server, the information in this file becomes inaccurate.

You can change the Oracle HTTP Server listener port (SSL and non-SSL) after installation. If you make a port change, then you have to also update other components to use the new port number.

> **See Also:** *Oracle Application Server 10g Administrator's Guide* for complete instruction.

You can specify the server to listen to more than one port, selected addresses, or a combination. The following directives, located in the "Global Environment" of the `httpd.conf` file, specify listener ports and addresses. Note that `BindAddress` and `Port` can be used only once. Apache group recommends the use of `Listen` instead.

- BindAddress
- Listen
- Port

> **See Also:** "httpd.conf File Structure" on page D-3

## BindAddress

Restricts the server to listen to a single IP address. If the argument to this directive is *, then it listens to all IP addresses. This directives has been deprecated. `Listen` offers similar functionality.

> **See Also:** "`BindAddress` directive" in the Apache Server documentation.

## Port

Specifies the **port** of the listener, if no `Listen` or `BindAddress` are present. If `Listen` is present, the `Port` value becomes the default port value that is used when Oracle HTTP Server builds URLs, or other references to itself. Usually, the values of `Port` and `Listen` should match, unless Oracle HTTP Server is fronted by a caching, or proxy server. Then, you can set `Port` to be the port that is being used by the front end server, and `Listen` to the port that Oracle HTTP Server is actually listening to. By doing this, redirects or other URLs generated by Oracle HTTP Server point to the front-end server rather than directly to Oracle HTTP Server.

> **See Also:** "`Port` directive" in the Apache Server documentation.

## Listen

Specifies an IP port that Oracle HTTP Server should listen on. Multiple `Listen` directives can be used to listen on multiple ports. If present, this value will override the value of `Port`. Accordingly, if you have a `Port` value of 7777 and a `Listen` value of 7778, then Oracle HTTP Server only listens on one port, 7778.

> **See Also:** "`Listen` directive" in the Apache Server documentation.

# Managing Interaction Between Server and Network

The following directives are used to specify how the server interacts with the network. They are located in the "Global Environment" of the `httpd.conf` file.

- ListenBackLog
- SendBufferSize
- TimeOut

**See Also:** "httpd.conf File Structure" on page D-3

## ListenBackLog

Specifies the maximum length of the queue of pending connections. This is useful if the server is experiencing a `TCP SYN` overload, which causes numerous new connections that open up but do not complete the task.

**See Also:** "`ListenBackLog` directive" in the Apache Server documentation.

## SendBufferSize

Increases the `TCP` buffer size to the number of bytes specified, thereby improving performance.

**See Also:** "`SendBufferSize` directive" in the Apache Server documentation.

## TimeOut

Sets the maximum time, in seconds, that the server waits for the following:

- The total amount of time it takes to receive a `GET` request.
- The amount of time between receipt of `TCP` packets on a `POST` or `PUT` request.
- The amount of time between `ACKs` on transmissions of `TCP` packets in responses.

The default is set at 300 seconds.

**See Also:** "`TimeOut` directive" in the Apache Server documentation.

# Managing Connection Persistence

The following directives determine how the server handles persistent connections. They are located in the "Global Environment" of the `httpd.conf` file.

- KeepAlive
- KeepAliveTimeout
- MaxKeepAliveRequests

**See Also:**

- *Oracle Application Server 10g Performance Guide*
- "httpd.conf File Structure" on page D-3

## KeepAlive

Enables a single connection to accept multiple requests from the same client. The default is set to "On".

**See Also:** "`KeepAlive` directive" in the Apache Server documentation.

## KeepAliveTimeout

Sets the number of seconds the server waits for a subsequent request before closing a `KeepAlive` connection. Once a request has been received, the timeout value specified by the `TimeOut` directive applies. The default is set at 15 seconds.

**See Also:** "`KeepAliveTimeout` directive" in the Apache Server documentation.

## MaxKeepAliveRequests

Limits the number of requests allowed per connection when `KeepAlive` is on. If it is set to "0", unlimited requests will be allowed. The default is set at 100.

**See Also:** "`MaxKeepAliveRequests` directive" in the Apache Server documentation.

# Configuring Reverse Proxies and Load Balancers

By default, Oracle Application Server installs using the local hostname as set up by `ServerName` directive in Oracle HTTP Server. Most Web sites tend to have a specific hostname or domain name for their Web or application server. However, this is not possible out of the box because with the `ServerName` directive, Oracle HTTP Server is instantiated with the local host.

***Example 5–1 Using Reverse Proxies and Load Balancers with Oracle HTTP Server***

**Domain Name**: www.oracle.com:80 123.456.7.8 (hosted on a reverse proxy, load balancer, or firewall)

**Host Name of Oracle Application Server Host**: server.oracle.com 123.456.7.9

**ServerName and Port of Oracle Application Server Host**: server.oracle.com:7777

Make the following changes in the `httpd.conf` file:

```
Port 80
Listen 7777
Listen 80
# Virtual Hosts
# This section is mandatory for URLs that are generated by
# the PL/SQL packages of the Oracle Portal and various other components
# These entries dictate that the server should listen on port
# 7777, but will assert that it is using port 80, so that
# self-referential URLs generated specify www.oracle.com:80
# This will create URLs that are valid for the browser since
# the browser does not directly see the host server.oracle.com.
NameVirtualHost 123.456.7.9:7777
<VirtualHost server.oracle.com:7777>
ServerName www.oracle.com
Port 80
</VirtualHost>
# Since the previous virtual host entry will cause all links
# generated by the Oracle Portal to use port 80, the server.company.com
# server needs to listen on 80 as well since the Parallel Page
# Engine will make connection requests to Port 80 to request the
# portlets.
NameVirtualHost 123.456.7.9:80
<VirtualHost server.oracle.com:80>
ServerName www.oracle.com
Port 80
<VirtualHost>
```

**See Also:** "Running Oracle HTTP Server as Root" on page 4-2 for instructions on running Oracle HTTP Server with ports lesser than 1024.

# 6

# Configuring and Using Server Logs

This chapter discusses Oracle Diagnostic Logging, log formats, and describes various log files and their locations.

Topics discussed are:

- Using Oracle Diagnostic Logging
- Specifying Log Formats
- Specifying Log Level
- Specifying Log Files

Documentation from the Apache Software Foundation is referenced when applicable.

> **Note:** Readers using this guide in PDF or hard copy formats will be unable to access third-party documentation, which Oracle provides in HTML format only. To access the third-party documentation referenced in this guide, use the HTML version of this guide and click on the hyperlinks.

# Using Oracle Diagnostic Logging

Oracle offers a new method for reporting diagnostic messages. This new method, Oracle Diagnostic Logging (ODL), presents a common format for diagnostic messages and log files, and a mechanism for correlating all diagnostic messages from various components across Oracle Application Server. Using ODL, each component logs messages to its own private local repository. A tool called `LogLoader` collects messages from each repository and loads them into a common repository where messages can be viewed as a single log stream, or analyzed in different ways.

You can view Oracle Application Server diagnostic log files using either Oracle Enterprise Manager Application Server Control, or a text editor.

> **See Also:** *Oracle Application Server 10g Administrator's Guide* for detailed information regarding Oracle Diagnostic Logging.

## Overview

Oracle HTTP Server enables you to choose the format in which you want to generate log messages. You can either continue to generate log messages in the legacy Apache message format, or generate log messages using ODL, which complies with the new Oracle-wide standards for generating log messages.

## Configuring Oracle HTTP Server

To enable Oracle HTTP Server to use ODL, enter the directives specified below in the `httpd.conf` file. Oracle recommends that you enter the directives before any modules are loaded (`LoadModule` directive) in the `httpd.conf` file so that module-specific logging severities are in effect before modules have the opportunity to perform any logging.

### OraLogMode apache | oracle

Enables you to switch between ODL and legacy Apache logging facility.

**Default**: apache

### OraLogSeverity [module_name <msg_type>[:msg_level]

Enables you to set message severity. The message severity specified with this directives is interpreted as the lowest message severity that is desired, and all messages of that severity level and higher will be logged. `OraLogSeverity` may be specified multiple times. It can be specified globally (no module_name) and once for each module for which a module-specific logging severity is desired.

#### module_name

This argument is the internal name of a module, as it appears in the module structure. The `<IfModule>` directive also makes use of this internal name. The module structure derives the module name from the value of the `_FILE_` macro, without path prefix, of the file which defines the module structure. If a module name is not supplied, the `OraLogSeverity` directive is applied globally.

If the module name is specified, then the directive overrides the global directive value of all the messages originating from the specified module. Specifying a module name for a module that does not get loaded generates an error.

#### msg_type

Message types may be specified in upper or lower case, but will appear in the message output in upper case. This parameter must be of one of the following values:

- `INTERNAL_ERROR`
- `ERROR`
- `WARNING`
- `NOTIFICATION`
- `TRACE`

#### msg_level

This parameter must be an integer in the range of 1-32.

Table 6–1 lists some examples of `OraLogSeverity`.

***Table 6–1 Examples of OraLogSeverity***

| OraLogSeverity Example | Action Taken |
|---|---|
| `OraLogSeverity INTERNAL_ERROR:10` | Logs all messages of type "internal error" of levels 1-10 |
| `OraLogSeverity WARNING:7` | Logs all messages of type "internal error" of all levels<br>Logs all messages of type "error" of all levels<br>Logs all messages of type "warning" of levels 1-7 |
| `OraLogSeverity WARNING`<br>`OraLogSeverity mod_oc4j.c NOTIFICATION:4` | If message source is `mod_oc4j`, then<br>■ Logs all messages of type "internal error" of all levels<br>■ Logs all messages of type "error" of all levels<br>■ Logs all messages of type "warning" of all levels<br>■ Logs all messages of type "notification" of levels 1-4<br>For messages from all other sources:<br>■ Logs all messages of type "internal error" of all levels<br>■ Logs all messages of type "error" of all levels<br>■ Logs all messages of type "warning" of all levels |

### Default

If a message level is not specified, then the level defaults to the lowest severity. If the entire directive is omitted, then the value of the global Apache `LogLevel` directive is used and translated to the corresponding Oracle message type and the lowest level within the corresponding range, as listed in Table 6–2:

***Table 6–2 Apache Log Level and Corresponding Oracle Message Type***

| Apache Log Level | Oracle Message Type |
|---|---|
| `emerg` | `INTERNAL_ERROR:16` |
| `alert` | `INTERNAL_ERROR:32` |
| `crit` | `ERROR:16` |
| `error` | `ERROR:32` |
| `warn` | `WARNING:32` |
| `notice` | `NOTIFICATION:16` |
| `info` | `NOTIFICATION:32` |
| `debug` | `TRACE:32` |

**See Also:** "Specifying Log Level" on page 6-7

## OraLogDir <bus stop dir>

Specifies the path to the directory which contains all log files. This directory must exit.

**Default**:

- UNIX: *ORACLE_HOME*`/Apache/Apache/logs/oracle`
- Windows: *ORACLE_HOME*`\Apache\Apache\logs\oracle`

# Specifying Log Formats

`LogFormat` specifies the information included in the log file, and the manner in which it is written. The default format is the Common Log Format (CLF). The CLF format is: `host ident authuser date request status bytes`

- `host`: This is the client domain name or its IP number.
- `ident`: If `IdentityCheck` is enabled and the client machine runs `identd`, then this is the client identity information.
- `authuser`: This is the user ID for authorized user.
- `date`: This is the date and time of the request in the `<day/month/year:hour:minute:second>` format.
- `request`: This is the request line, in double quotes, from the client.
- `status`: This is the three-digit status code returned to the client.
- `bytes`: This is the number of bytes, excluding headers, returned to the client.

# Specifying Log Level

Table 6–3 lists all the different logging levels, their descriptions, and, example messages:

***Table 6–3 Logging Level***

| Logging Level | Description | Example Message |
|---|---|---|
| `Emergency` | Emergencies- system is unusable. | "Child cannot open lock file. Exiting." |
| `Alert` | Action must be taken immediately. | "getpwuid: couldn't determine user name from uid" |
| `Critical` | Critical conditions. | "socket: Failed to get a socket, exiting child" |
| `Error` | Error conditions. | "Premature end of script headers" |
| `Warning` | Warning conditions. | "child process 1234 did not exit, sending another `SIGHUP`" |
| `Notice` | Normal but significant condition. | "httpd: caught `SIGBUS`, attempting to dump core in..." |
| `Information` | Informational messages that describe possible problems and possible solutions to those problems. | "Server seems busy, (you may need to increase `StartServers`, or `Min/MaxSpareServers`)..." |
| `Debug` | Debug-level messages. | "Opening config file..." |

# Specifying Log Files

The following section describes the function and location of log files listed below.

- Access Log
- CustomLog
- Error Log
- JServ Log
- PID File
- Piped Log
- Rewrite Log
- Script Log
- SSL Log
- Transfer Log

It is important to periodically rotate the log files by moving or deleting existing logs on a moderately busy server. For this, the server must be restarted after the log files are moved or deleted so that new log files are opened.

**See Also:** "Log Rotation" in the Apache Server documentation.

## Access Log

The server access log records all requests processed by the server. The location and content of the access log is controlled by the `CustomLog` directive. The `LogFormat` directive can be used to simplify the selection of the contents of the logs.

**See Also:** "Access Log" in the Apache Server documentation.

## CustomLog

The `CustomLog` directive is used to log requests to the server. A log format is specified, and the logging can optionally be made conditional on request characteristics using environment variables.

> **See Also:** "`CustomLog` directive" in the Apache Server documentation.

## Error Log

The server sends diagnostic information and records error messages to a log file located, by default, in:

- UNIX: *ORACLE_HOME*`/Apache/Apache/logs/error_log`
- Windows: *ORACLE_HOME*`\Apache\Apache\logs\error_log`

The file name can be set using the `ErrorLog` directive.

> **See Also:** "`ErrorLog` directive" in the Apache Server documentation.

## JServ Log

JServ Log tracks actions performed, and exceptions generated from JServ applications, such as servlets and JSPs. It is located in:

- UNIX: *ORACLE_HOME*`/Apache/Jserv/logs/jserv.log`
- Windows:*ORACLE_HOME*`\Apache\Jserv\logs\jserv.log`

## PID File

When the server is started, it notes the process ID of the parent httpd process to the PID file located by, default, in

- UNIX: *ORACLE_HOME*`/Apache/Apache/logs/httpd.pid`
- Windows: *ORACLE_HOME*`\Apache\Apache\logs\httpd.pid`

This filename can be changed with the `PidFile` directive. The process ID is for use by the administrator for restarting and terminating the daemon. If the process dies (or is killed) abnormally, then it is necessary to kill the children httpd processes.

> **See Also:** "Pid File" in the Apache Server documentation.

## Piped Log

Oracle HTTP Server is capable of writing error and access log files through a pipe to another process, rather than directly to file. This increases the flexibility of logging, without adding code to the main server. In order to write logs to a pipe, replace the file name with the pipe character "|", followed by the name of the executable which should accept log entries on its standard input. Oracle HTTP Server starts the piped-log process when the server starts, and restarts it if it crashes while the server is running.

Piped log processes are spawned by the parent Oracle HTTP Server httpd process, and inherit the user ID of that process. This means that piped log programs usually run as `root` so it is important to keep the programs simple and secure.

**See Also:** "Piped Log" in the Apache Server documentation.

## Rewrite Log

Rewrite Log is necessary for debugging when `mod_rewrite` is used. This log file produces a detailed analysis of how the rewriting engine transforms requests. The level of detail is controlled by the `RewriteLogLevel` directive.

**See Also:** "Rewrite Log" in the Apache Server documentation.

## Script Log

Script Log allows you to record the input to and output from the CGI scripts. This should only be used in testing, and not for live servers.

**See Also:** "Script Log" in the Apache Server documentation.

## SSL Log

When Oracle HTTP Server starts in SSL mode, it creates `ssl_engine_log` and `ssl_request_log` in

- UNIX: *`ORACLE_HOME`*`/Apache/Apache/logs`
- Windows: *`ORACLE_HOME`*`\Apache\Apache\logs`

`ssl_engine_log` tracks SSL and protocol issues, where as `ssl_request_log` records user activity. Use the `SSLLogFile` directive to control output.

**See Also:** "Enabling SSL" on page 10-12

## Transfer Log

Transfer Log specifies the file in which to store the log of accesses to the site. If it is not explicitly included in the `conf` file, then no log is generated. The server typically logs each request to a transfer file located, by default, in

- UNIX:*ORACLE_HOME*/Apache/Apache/logs/access_log
- Windows: *ORACLE_HOME*\Apache\Apache\logs\access_log

The filename can be set using a `CustomLog` directive.

# 7

# Application Server Control Management

This chapter provides information for managing Oracle HTTP Server using Oracle Enterprise Manager Application Server Control.

Topics discussed are:

- Overview
- Accessing Application Server Control
- Accessing Oracle HTTP Server Home Page
- Managing Oracle HTTP Server

Documentation from the Apache Software Foundation is referenced when applicable.

> **Note:** Readers using this guide in PDF or hard copy formats will be unable to access third-party documentation, which Oracle provides in HTML format only. To access the third-party documentation referenced in this guide, use the HTML version of this guide and click on the hyperlinks.

# Overview

You can manage Oracle HTTP Server in two ways: using Oracle Enterprise Manager, or using command-line utilities such as `opmnctl` and `dcmctl`. The sections below provide information on managing Oracle HTTP Server using Oracle Enterprise Manager.

Oracle Enterprise Manager enables you to manage Oracle HTTP Server from a Web browser using Oracle Enterprise Manager Application Server Control. Application Server Control is installed with each instance of Oracle Application Server, enabling you to administer and monitor a single Oracle Application Server instance. You can access and manage the Oracle HTTP Server from the Application Server Control, as described in the sections below.

**See Also:**

- "Oracle Application Server Command-line Tools" on page 1-8 for more information on management using `opmnctl` and `dcmctl`.
- *Oracle Application Server 10g Administrator's Guide* for more information on Oracle Enterprise Manager and Application Server Control.

# Accessing Application Server Control

After installation, you can access the Application Server Control from the URL specified in `setupinfo.txt` file. It is located in *`ORACLE_HOME`*`/Apache/Apache` on UNIX or *`ORACLE_HOME`*`\Apache\Apache` on Windows.

`setupinfo.txt` also contains the URL for Oracle Application Server Welcome page. You can access the Application Server Control by clicking on the "Login to Oracle Enterprise Manager" link on the Oracle Application Server Welcome page. Enter the username, which is `ias_admin`, and the password, which is specified during the installation process, to access the Application Server Control.

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**Note:** During installation, the Oracle Universal Installer's "End of Installation" screen also contains the location of the Application Server Control and Oracle Application Server Welcome page.

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**See Also:** *Oracle Application Server 10g Administrator's Guide* for detailed information on accessing Application Server Control.

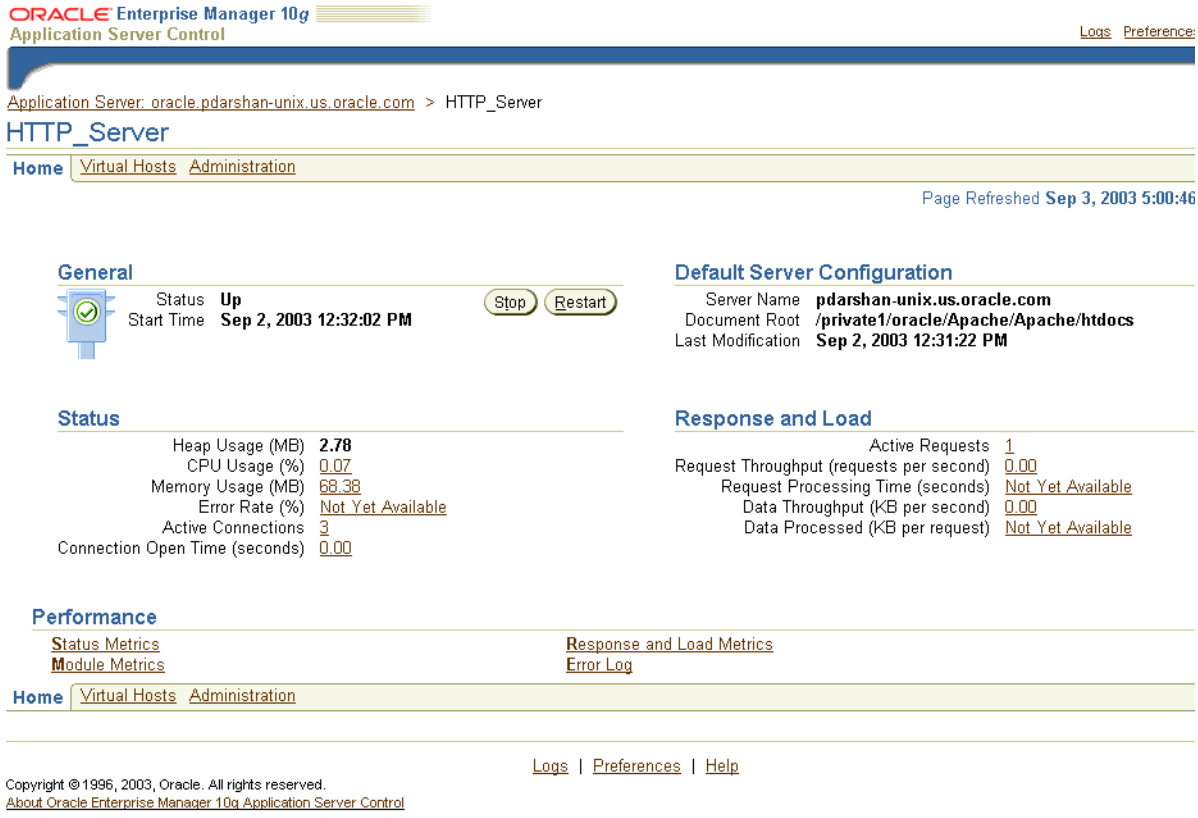
# Accessing Oracle HTTP Server Home Page

Oracle HTTP Server Home page enables you to perform tasks such as monitor the status and performance of your server, start and stop the server, create virtual hosts, modify configuration files, change log properties, manage client requests, and specify a port for a listener.

You can access the Oracle HTTP Server Home page by clicking on the "HTTP Server" link in the Name column of the "System Components" table on the Application Server Control.

Figure 7–1 displays the Oracle HTTP Server Home page.

***Figure 7–1 Oracle HTTP Server Home Page***



# Managing Oracle HTTP Server

The Oracle HTTP Server Home page is divided into three sections: Home, Virtual Hosts, and Administration, where you can perform tasks such as:

- Performing Basic Administration
- Managing Virtual Hosts
- Administering Oracle HTTP Server

> **Note:** Click on **Help** on the browser page you are on to get additional information about the functionality provided on that page.

## Performing Basic Administration

You can perform the following basic administration tasks under the "Home" tab of the Oracle HTTP Server Home page:

- Starting, Restarting, and Stopping Oracle HTTP Server
- Managing Default Server Configuration
- Monitoring Status
- Monitoring Response and Load
- Monitoring Performance

### Starting, Restarting, and Stopping Oracle HTTP Server

You can start, restart, or stop the server under the "Home" tab of Oracle HTTP Server Home page. To do so, click on the appropriate button in the "General" section. You can also see the status, and the start time in this section.

### Managing Default Server Configuration

You can verify the name of the server, the path of the document root, and the time the server was last modified on the "Default Server Configuration" section under the "Home" tab of the Oracle HTTP Server Home page.

> **See Also:** "Modifying the Document Root, Administrator E-mail, User, and Group Settings" on page 7-16 to modify these settings.

### Monitoring Status

You can monitor the heap usage, CPU usage, memory usage, error rate, number of active connections, and the time the connections have been open, on the "Status" section under the "Home" tab of the Oracle HTTP Server Home page.

### Monitoring Response and Load

You can monitor the number of active requests, the request throughput time, request processing time, data throughput, and data processed on the "Response and Load" section under the "Home" tab of the Oracle HTTP Server Home page.

### Monitoring Performance

You can view the general server status, and the response and load information under the "Home" tab on Oracle HTTP Server Home page.

**Status Metrics** The "Status" section provides information such as heap usage, CPU usage, memory usage, error rate, number of active connections, and time the connections have been open.

Click on "Status Metrics" under the "Performance" section to view detailed status details.

**Response and Load Metrics** The "Response and Load" section provides information such as number of active requests, how many requests were submitted, and how long it took for the server to respond to your request. It also provides information about how many bytes of data were processed with the requests.

Click on "Response and Load Metrics" under the "Performance" section to view detailed response and load information.

**Module Metrics** The "Module Metrics" section allows you to view the status of the modules being used by clicking on "Module Metrics" under the "Performance" section. It provides information such as the number of active requests, number of requests processed since startup, number of current requests throughput, and the current request processing time.

**Error Log** You can view the last 2000 lines of the httpds error log by clicking "Error Log" under the "Performance" section.

## Managing Virtual Hosts

Figure 7–2 displays the Virtual Hosts page. You can view the Virtual Hosts page by clicking on the "Virtual Hosts" tab on the Oracle HTTP Server Home page. The following topics are discussed in this section:

- Requirements for Managing Virtual Hosts
- Performing Basic Tasks on Virtual Hosts Page
- Modifying Virtual Hosts
- Administering Virtual Hosts

---

**Note:** Click on **Help** on the browser page you are on to get additional information about the functionality provided on that page.

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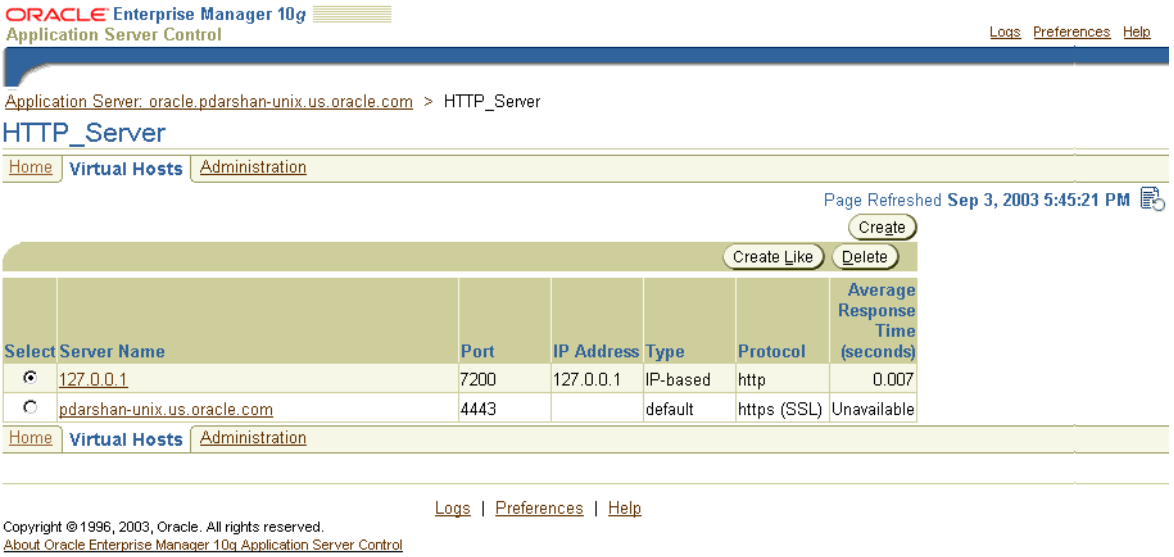
***Figure 7–2 Virtual Hosts Page***



### Requirements for Managing Virtual Hosts

Virtual hosts that meet the following requirements can be managed by the Application Server Control:

- A `ServerName` directive is specified for each virtual host.

  **See Also:** "ServerName" on page 3-2

- Only a single `<IP listen address>:<port>` pair that meets the following requirements can be specified for the virtual host:
  - The IP listen address is either a numeric IP address, * for all addresses, or the keyword `_default_`.
  - The port is either a port number or * for all the ports that Oracle HTTP Server is using. Alternatively, if `:<port>` is omitted, the main server's default port will be used.
- The virtual host must be specified in a particular section of the configuration file, as follows:
  - Non-SSL virtual hosts must be specified at the top nesting level of the configuration file.
  - SSL virtual hosts must be specified just inside an `<IfDefine SSL>` directive, and that directive must be at the top nesting level of the configuration file.

  **See Also:** "Block Directives" on page 2-9

### Performing Basic Tasks on Virtual Hosts Page

You can do the following on the Virtual Hosts page:

- View settings for a virtual host.
- Create a new virtual host using the Virtual Host Creating wizard. To do so, click **Create**.
- Create a new virtual host by modifying a copy of the settings of an existing virtual host. To do so, click **Create Link**. The existing virtual host is left unchanged.
- Delete a virtual host.
- Modify the settings for an existing virtual host. To do so, click on the link for the host and access modification features.

### Modifying Virtual Hosts

The sections below provide information on modifying or monitoring an existing virtual host. You can monitor the following for specific virtual hosts by clicking on their link on the "Virtual Hosts" page:

- Configuration
- Request Throughput
- Load
- Request Process Time

**Configuration** You can verify the type, the IP address, port number, protocol, and path of the document root of the virtual host, in the "Configuration" section of the virtual host page of the virtual host you selected.

**Request Throughput** You can monitor the number of active requests, the current throughput, the throughput since startup, and the total number of requests processed since startup, in the "Request Throughput" section of the virtual host page of the virtual host you selected.

**Load** You can monitor the current data throughput, the data throughput since startup, current response size, average response size since startup, and the total data since startup, in the "Load" section of the virtual host page of the virtual host you selected.

**Request Process Time** You can monitor the current processing time, and the average processing time since startup, in the "Request Processing Time" section of the virtual host page of the virtual host you selected.

## Administering Virtual Hosts

This sections contains information about administering virtual hosts. You can perform the following administrative tasks for specific virtual hosts by clicking on their link on the "Virtual Hosts" page:

- Virtual Hosts Properties
- Virtual Host MIME Languages
- Virtual Host MIME Encoding
- Virtual Host MIME Types

**Virtual Hosts Properties** You can view or modify the following settings on General section of the Virtual Hosts Properties page:

- **Virtual Host Type**: Displays the type of virtual host. The possible types are name-based, IP-based, or default.
- **Server Name**: Displays the server name for the virtual host.
- **Document Root**: Displays the path of the directory from which the server *serves* files. Note that the document root directory is different from the server root directory, which is only used to *store* the server files. You can specify the directory using the `DocumentRoot` directive.
- **Directory Index**: Specifies the resource or resources that Oracle HTTP Server will look for when the client requests the index of a directory by specifying a slash (/) at the end of the directory name.
- **Administrator Email**: Displays the server's main contact. This address receives notifications if the server experiences error conditions.
- **IP Address**: Specifies the IP address or addresses on which you want the virtual host to listen. The IP address you specify for the virtual host must already exist for Oracle HTTP Server.
- **Listening Ports**: Specifies the port or ports on which you want the virtual host to listen. Any ports you specify for the virtual host must already exist for Oracle HTTP Server. Ports for Oracle HTTP Server appear in the Listening Addresses/Ports section of the Server Properties page.

**See Also:** "Specifying a Port for a Listener" on page 7-18

- **Protocol**: Displays the protocol settings.

  You can also modify the SSL Wallet path if the virtual host is using the HTTPS protocol, which uses SSL for secure connections. Note that SSL is supported for default virtual hosts and IP-based virtual hosts, but not for name-based virtual hosts.

  The value of the SSL Wallet field corresponds to the `SSLWallet` entry in `httpd.conf` file. The path to the SSL Wallet must be in the form of a valid **Wallet Resource Locator**.

  **See Also:** "SSLWallet" on page 10-31

- **Logging**: Provides access to the server's error log files and access log files.

  The error log file is an important source of information for maintaining a well-performing server. The error log records all of the information about problem situations so that the system administrator can easily diagnose and fix the problems.

  To provide access to the error log file--without providing access to all of the other configuration files--you may need to move the error log file to a shared directory.

  The access log file contains basic information about every HTTP transaction that the server handles. This information can be used to generate statistical reports about the server's usage patterns.

  In addition to viewing error log files and access log files in the Logging section, you can also perform these tasks for the virtual host:

  Choose a logging level for the error log file.

  **See Also:** "Specifying Log Level" on page 6-7

  Setting the error logging level to `Notice`, `Informational`, or `Debug` tends to flood the error log with unimportant informational messages.

  - Change the error log file name or location
  - Remove an access log file
  - Change an access log file name or location

- Change the log format of an access log file

  **See Also:** "Specifying Log Formats" on page 6-6

- Add an access log file (click Add Another Row) and specify a log format and location for it

When you specify a location for an error log file or access log file, you can enter an absolute path and file name or a relative path and file name for the file. A relative path will be relative to the Server Root directory specified during initial configuration. The Server Root directory is displayed in the General section.

**Virtual Host MIME Languages** The Multipurpose Internet Mail Extension (MIME) Language setting maps the given file extensions to a particular language. This directive is used most commonly for content negotiation, where the Oracle HTTP Server returns the document that most closely matched the preferences set by the client.

To add a new MIME Language:

1. Select "Virtual Hosts MIME Languages" under the Administration section. This opens the Virtual Hosts MIME Languages page.
2. Enter the new language code in the Standard Language code field. Examples include `en` for English, `fr` for French, and `es` for Spanish.
3. Enter the types of files that should be opened with the language code in the File Extension(s) field. The extension argument is case-insensitive, and can be specified with or without a leading period. Examples include `.en`, `.fr`, and `.es`.
4. In the Default Language Code field, enter the default language type that should be used if no language is specified.
5. Click **Apply** at the bottom of the page to accept the changes. If you do not click **Apply**, you will lose your changes. If you make a mistake or want to undo any changes, click **Revert**.

   Oracle Enterprise Manager Application Server Control displays a confirmation page, which confirms that the appropriate configuration files have been updated.
6. Click **Yes** to restart the Oracle HTTP Server so the changes will take effect. Click **No** to restart the server later.

To remove a MIME language, select it and click **Remove**.

**Virtual Host MIME Encoding** The Multimedia Internet Mail Extension (MIME) mapping allows the Oracle HTTP Server to determine the type of file from the given extension. As part of its MIME support, Oracle HTTP Server allows you to add or remove MIME encodings. The Encoding directive maps the given filename extensions to the specified encoding type.

To add a new MIME encoding:

1. Select "Virtual Hosts MIME Encoding" under the Administration section. This opens the Virtual Hosts MIME Encoding page.
2. Click **Add Another Row**.
3. Enter the new encoding type in the Encoding field. Examples include `x-gzip`, and `x-compress`.
4. Enter the types of files that should be opened with the encoding type in the File Extension(s) field.The extension argument is case-insensitive, and can be specified with or without a leading period.
5. Click **Apply** at the bottom of the page to accept the changes. If you do not click **Apply**, you will lose your changes. If you make a mistake or want to undo any changes, click **Revert**.

   Oracle Enterprise Manager Application Server Control displays a confirmation page, which confirms that the appropriate configuration files have been updated.
6. Click **Yes** to restart the Oracle HTTP Server so the changes will take effect. Click **No** to restart the server later.

To remove a MIME encoding, select it and click **Remove**.

**Virtual Host MIME Types** The Multipurpose Internet Mail Extension (MIME) type maps the given filename extensions onto the specified content type. The MIME type is used for filenames containing an extension. This mapping is added to any extension already in use, overriding any mappings that already exist for the same extension.

To add a new MIME type:

1. Select "Virtual Hosts MIME Types" under the Administration section. This opens the Virtual Hosts MIME Types page.
2. Click **Add Another Row**.
3. Enter the new MIME type in the MIME type field. Examples include: text/plain, text/`.html`, and image/`.gif`.
4. Enter the types of files in the File Extension(s) field that should be opened with the MIME type. The extension argument is case-insensitive, and can be specified with or without a leading period. Examples include `.txt`, `.html`, and `.gif`.
5. In the Default MIME Type field, enter the default MIME type that should be used for unknown file types.
6. Click **Apply** at the bottom of the page to accept the changes. If you do not click **Apply**, you will lose your changes. If you make a mistake or want to undo any changes, click **Revert**.

   Oracle Enterprise Manager Application Server Control displays a confirmation page, which confirms that the appropriate configuration files have been updated.
7. Click **Yes** to restart the Oracle HTTP Server so the changes will take effect. Click **No** to restart the server later.

To remove a MIME type, select it and click **Remove**.

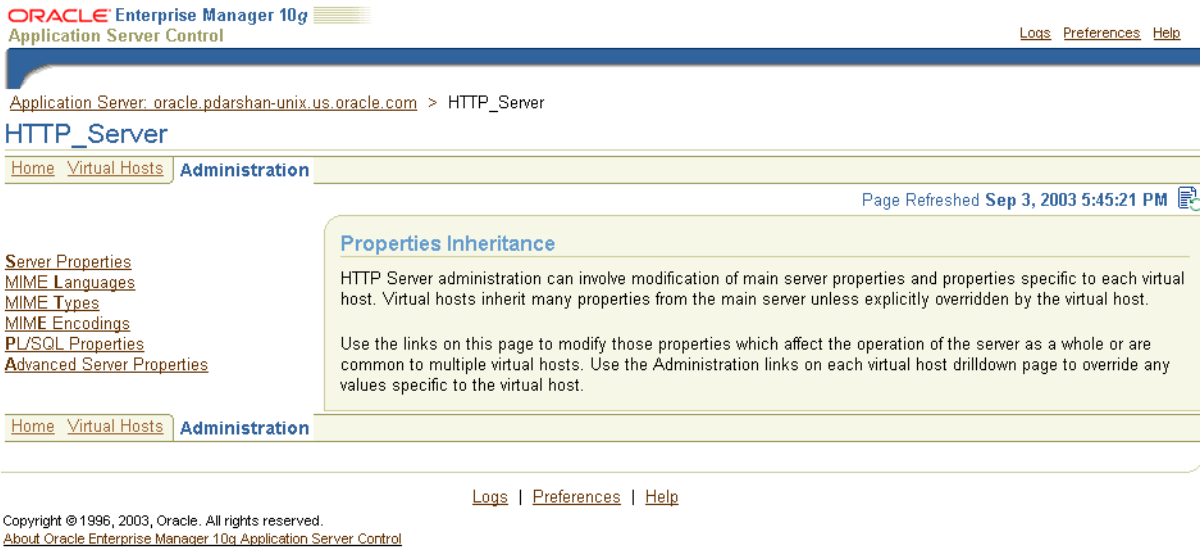
## Administering Oracle HTTP Server

Figure 7–3 displays the "Administration" page. You can view the "Administration" page by clicking on the "Administration" tab on the Oracle HTTP Server Application Server Control Home page. The following topics are discussed in this section:

- Server Properties
- MIME Languages
- MIME Types
- MIME Encoding
- PL/SQL Properties
- Advanced Server Properties

> **Note:** Click on **Help** on the browser page you are on to get additional information about the functionality provided on that page.

***Figure 7–3 Administration Page***



## Server Properties

You can view and modify the following basic settings for your Oracle HTTP Server on the "Server Properties" page.

- Modifying the Document Root, Administrator E-mail, User, and Group Settings
- Specifying a Port for a Listener
- Changing the Error Log Properties
- Adding an Access Log File
- Changing the Access Log Properties
- Managing the Client Request and Connection Handling

**Modifying the Document Root, Administrator E-mail, User, and Group Settings** After you start Oracle HTTP Server, the system is ready to listen for and respond to requests. You may need to make modifications to the document root, administrator email, `User`, and `Group` settings in order to process requests efficiently.

- **Document Root**: The directory from which the server *serves* files. Note that the document root directory is different from the server root directory, which is only used to *store* the server files. You can specify the directory using the `DocumentRoot` directive.
- **Administrator Email Address**: The server's main contact. This address receives notifications if the server experiences error conditions.
- **User**: Specifies the user ID to which the server answers requests. This directive is only used on UNIX systems. You should have privileges to access files that are available for everyone, and should be able to execute code which is not meant for HTTP requests. It is recommended that you set up a new user for running the server.
- **Group**: Specifies the group under which the server answers requests. This directive is only used on UNIX systems. It is recommended that you create a new group for running the server.

To modify these settings:

1. Select "Server Properties" under the "Administration" page. This opens the Oracle HTTP Server Properties page.
2. Type a new path in the "Document Root" field to change the document root directory. The path should be relative to the Server Root directory specified during initial configuration.
3. Type the appropriate email address in the "Administrator Email" field. Oracle HTTP Server uses this email address to issue notices and warnings. The administrator should have full privileges.
4. Add or change the `User` identifier by typing a new user name in the fields provided.
5. Add or change the `Group` identifier by typing a new group name in the fields provided.
6. Click **Apply** at the bottom of the page to accept the changes. If you do not click **Apply**, you will lose your changes. If you make a mistake or want to undo any changes, click **Revert**.

   Oracle Enterprise Manager Application Server Control displays a confirmation page, which confirms that the appropriate configuration files have been updated.
7. Click **Yes** to restart the Oracle HTTP Server so the changes will take effect. Click **No** to restart the server later.

**Specifying a Port for a Listener** When you start Oracle HTTP Server, it connects to a port and awaits client requests. Oracle HTTP Server automatically attempts to listen on port 7777.

**See Also:** "Specifying Listener Ports and Addresses" on page 5-2

To specify a listener port:

1. Select “Server Properties” in the “Administration” page. This opens the Server Properties page.
2. Scroll down to the Listening Addresses/Ports table.

   The first row in the Listening Addresses/Ports table identifies the default listener port. To edit the default listener port, edit the number in the Listening Port column.

   To add port settings, click **Add Another Row** to add a new row to the table. Enter the IP address and/or port number to the new row.
3. Click **Apply** at the bottom of the page to accept the changes. If you do not click **Apply**, you will lose your changes. If you make a mistake or want to undo any changes, click **Revert**.

   Oracle Enterprise Manager Application Server Control displays a confirmation page, which confirms that the appropriate configuration files have been updated.
4. Click **Yes** to restart the Oracle HTTP Server so the changes will take effect. Click **No** to restart the server later.

**Changing the Error Log Properties** You can change Error Log properties from the Oracle HTTP Server Home page. The Error Log file is an important source of information for maintaining a well-performing server. The Error Log records all of the information about problem situations so that you can easily diagnose and fix the problems.

> **See Also:** "Error Log" on page 6-9

To customize the error log properties:

1. Select "Server Properties" in the "Administration" page. This opens the Server Properties page.
2. Scroll to the "Logging" section of the Server Properties page.
3. Type the full path name of the directory where you want to keep the error log file in the Error Log Filename field. You can also type the relative path name. A relative path is assumed to be relative to the Server Root directory.
4. Select the logging level from the Error Logging Level drop-down menu. The logging level indicates the severity of the error being reported.

   > **Note:** Setting the log level to notice, info, or debug tends to flood the error log with informational messages. Use these options only if you need to perform a very detailed analysis or to debug a specific performance problem.

   > **See Also:** "Using Oracle Diagnostic Logging" on page 6-2 for more information on error log levels.

5. Click **Apply** at the bottom of the page to accept the changes. If you do not click **Apply**, you will lose your changes. If you make a mistake or want to undo any changes, click **Revert**.

   Oracle Enterprise Manager Application Server Control displays a confirmation page, which confirms that the appropriate configuration files have been updated.
6. Click **Yes** to restart the Oracle HTTP Server so the changes will take effect. Click **No** to restart the server later.

**Adding an Access Log File** You can change Access Log properties from the Oracle HTTP Server Home page. The Access Log contains basic information about every HTTP transaction that the server handles. Specifically, the access log file contains hostname, remote logname, remote user, time, request, response code, and bytes transferred. This information can be used to generate statistical reports about the server's usage patterns.

**See Also:** "Access Log" on page 6-8

---

**Note:** At installation time, an access log with the `common LogFormat` is created.

---

To create an access log file:

1. Select "Server Properties" in the "Administration" page. This opens the Server Properties page.
2. Scroll to the Logging section of the Server Properties page.
3. Click **Add Another Row** in the Select Access Log table to add a new row. When the page reloads, scroll back to the Logging section.
4. Type the full path and filename of the access log file you want to create in the empty field. For example, you can type the following location:
   - UNIX: *ORACLE_HOME*`/Apache/Apache/logs/access_log`
   - Windows: *ORACLE_HOME*`\Apache\Apache\logs\access_log`

   You can enter an absolute path or a relative path. A relative path will be relative to the Server Root directory specified during initial configuration.
5. Set the log format by typing a new format name. The default is `common`. For information on creating custom log formats, go to "Adding an Access Log File" from the online help for the Server Properties page.

---

**Note:** For a full description of the available log formats, click **Help** at the top of the Server Properties page.

---

6. Click **Apply** at the bottom of the page to accept the changes. If you do not click **Apply**, you will lose your changes. If you make a mistake or want to undo any changes, click **Revert**.

   Oracle Enterprise Manager Application Server Control displays a confirmation page, which confirms that the appropriate configuration files have been updated.

7. Click **Yes** to restart the Oracle HTTP Server so the changes will take effect. Click **No** to restart the server later.

**Changing the Access Log Properties** To change access log properties:

1. Select "Server Properties" in the "Administration" page. This opens the Server Properties page.
2. Scroll to the Logging section of the Server Properties page.
3. Select the Client Access Log file you want to relocate in the Select Access Log section.
4. Type the new destination in the Client Access Log Filename field. The destination can be the full path and filename, or a relative path and filename. A relative path is assumed to be relative to the Server Root directory.
5. Click **Apply** at the bottom of the page to accept the changes. If you do not click **Apply**, you will lose your changes. If you make a mistake or want to undo any changes, click **Revert**.

   Oracle Enterprise Manager Application Server Control displays a confirmation page, which confirms that the appropriate configuration files have been updated.

6. Click **Yes** to restart the Oracle HTTP Server so the changes will take effect. Click **No** to restart the server later.

**Managing the Client Request and Connection Handling** You can specify how the child processes on UNIX, child threads on Windows, and connections should initialize resources during the server's processing phase through the Oracle HTTP Server Home page. The Child Process and Connection settings impact the ability of the server to process requests. You may need to modify these settings as the number of requests increases or decreases to maintain a well-performing server.

> **See Also:** "Oracle HTTP Server Processing Model" on page 4-2 for more information on child processes and child threads.

To modify child process and connection settings:

1. Select “Server Properties” in the “Administration” page. This opens the Server Properties page.
2. Scroll to the Client Request Handling or Client Connection Handling sections of the Server Properties page.
3. Modify the Client Request Handling and Client Connections Handling directives by changing the default values in the appropriate fields.

   For help on individual settings, click **Help** at the top of the Server Properties page.
4. Click **Apply** at the bottom of the page to accept the changes. If you do not click **Apply**, you will lose your changes. If you make a mistake or want to undo any changes, click **Revert**.

   Oracle Enterprise Manager Application Server Control displays a confirmation page, which confirms that the appropriate configuration files have been updated.
5. Click **Yes** to restart the Oracle HTTP Server so the changes will take effect. Click **No** to restart the server later.

### MIME Languages

The Multipurpose Internet Mail Extension (MIME) Language setting maps the given file extensions to a particular language. This directive is used most commonly for content negotiation, where the Oracle HTTP Server returns the document that most closely matched the preferences set by the client.

To add a new MIME Language:

1. Select "MIME Language" in the "Administration" page. This opens the MIME Languages page.
2. Enter the new language code in the Standard Language code field. Examples include `en` for English, `fr` for French, and `es` for Spanish.
3. Enter the types of files that should be opened with the language code in the File Extension(s) field. The extension argument is case-insensitive, and can be specified with or without a leading period. Examples include `.en`, `.fr`, and `.es`.
4. In the Default Language Code field, enter the default language type that should be used if no language is specified.
5. Click **Apply** at the bottom of the page to accept the changes. If you do not click **Apply**, you will lose your changes. If you make a mistake or want to undo any changes, click **Revert**.

   Oracle Enterprise Manager Application Server Control displays a confirmation page, which confirms that the appropriate configuration files have been updated.
6. Click **Yes** to restart the Oracle HTTP Server so the changes will take effect. Click **No** to restart the server later.

To remove a MIME language, select it and click **Remove**.

### MIME Types

The Multipurpose Internet Mail Extension (MIME) type maps the given filename extensions onto the specified content type. The MIME type is used for filenames containing an extension. This mapping is added to any extension already in use, overriding any mappings that already exist for the same extension.

To add a new MIME type:

1. Select "MIME Types" in the "Administration" page. This opens the MIME Types page.
2. Click **Add Another Row**.
3. Enter the new MIME type in the MIME type field. Examples include: text/plain, text/`.html`, and image/`.gif`.
4. Enter the types of files in the File Extension(s) field that should be opened with the MIME type. The extension argument is case-insensitive, and can be specified with or without a leading period. Examples include `.txt`, `.html`, and `.gif`.
5. In the Default MIME Type field, enter the default MIME type that should be used for unknown file types.
6. Click **Apply** at the bottom of the page to accept the changes. If you do not click **Apply**, you will lose your changes. If you make a mistake or want to undo any changes, click **Revert**.

   Oracle Enterprise Manager Application Server Control displays a confirmation page, which confirms that the appropriate configuration files have been updated.
7. Click **Yes** to restart the Oracle HTTP Server so the changes will take effect. Click **No** to restart the server later.

To remove a MIME type, select it and click **Remove**.

### MIME Encoding

The Multimedia Internet Mail Extension (MIME) mapping allows the Oracle HTTP Server to determine the type of file from the given extension. As part of its MIME support, Oracle HTTP Server allows you to add or remove MIME encodings. The Encoding directive maps the given filename extensions to the specified encoding type.

To add a new MIME encoding:

1. Select "MIME Encoding" in the "Administration" page. This opens the MIME Encoding page.
2. Click **Add Another Row**.
3. Enter the new encoding type in the Encoding field. Examples include `x-gzip`, and `x-compress`.
4. Enter the types of files that should be opened with the encoding type in the File Extension(s) field.The extension argument is case-insensitive, and can be specified with or without a leading period.
5. Click **Apply** at the bottom of the page to accept the changes. If you do not click **Apply**, you will lose your changes. If you make a mistake or want to undo any changes, click **Revert**.

   Oracle Enterprise Manager Application Server Control displays a confirmation page, which confirms that the appropriate configuration files have been updated.
6. Click **Yes** to restart the Oracle HTTP Server so the changes will take effect. Click **No** to restart the server later.

To remove a MIME encoding, select it and click **Remove**.

### PL/SQL Properties

Oracle HTTP Server contains the mod_plsql module, which provides support for building PL/SQL-based applications on the Web. PL/SQL stored procedures retrieve data from a database, and generate HTTP responses containing data and code to display in a Web browser.

In order to use mod_plsql, you must install the PL/SQL Web Toolkit into a database, and create a Database Access Descriptor (DAD) which provides mod_plsql with connection information for the database.

> **See Also:** "mod_plsql" on page 8-48 for more information on installing the PL/SQL Web Toolkit into a database.

**Creating a Database Access Descriptor (DAD) for mod_plsql** You can create a DAD using Oracle HTTP Server Home page:

1. Select "PL/SQL Properties" in the "Administration" page. This opens the mod_plsql Services page.
2. On the mod_plsql Services page, scroll to the DAD Status section. Click **Create**. This opens the DAD Type page.
3. If you intend to use mod_plsql with Oracle Application Server Portal or Oracle Login Server, select the Portal radio button. Otherwise, select the General radio button. The subsequent screens are populated with default values based on your selection. Click **Next**. This opens the Database Connection page.
4. Type a unique name in the DAD Name field. Enter the database account, password, and connection information in the Database Connectivity Information section. In the Default page field, type the name of the PL/SQL procedure that should be invoked when one is not specified. In the NLS Language field, type the Oracle Language and Character Set for the back-end database. Choose an Authentication Mode in the Authentication Mode section. Click **Next**. This opens the Document, Alias, and Session page.
5. On the Document, Alias, and Session page, fill in the fields that are required for your DAD configuration. Click **Next**. This opens the Advanced page.

6. On the Advanced page, fill in the fields that are required for your DAD configuration. These fields are typically not configured. Refer to the online help for more information. Click **Finish**. This opens the Confirmation page. Click **OK**.
7. Restart Oracle HTTP Server.

> **See Also:** "mod_plsql" on page 8-48 for more information on mod_plsql configuration parameters.

**Deleting a Database Access Descriptor (DAD) for mod_plsql** You can delete a DAD using the Oracle HTTP Server Home page:

1. Select "PL/SQL Properties" in the "Administration" page. This opens the mod_plsql Services page.
2. On the mod_plsql Services page, scroll to the DAD Status section. Select the radio button in the Select column for the DAD you would like to delete. Click **Delete**.
3. Restart Oracle HTTP Server.

## Advanced Server Properties

You can access the Oracle HTTP Server configuration files directly on the Advanced Server Properties page. Use these files to customize the features of your server.

**Editing the Server Configuration Files** Perform the steps below to modify the Oracle HTTP Server configuration files:

1. Select "Advanced Server Properties" in the "Administration" section. This opens the Advanced Server Properties page.
2. Select the configuration file you want to edit. A text editor appears where you can make the appropriate changes.
3. Click **Apply** at the bottom of the page to accept the changes. If you do not click **Apply**, you will lose your changes. If you make a mistake or want to undo any changes, click **Revert**.

   Oracle Enterprise Manager Application Server Control displays a confirmation page, which confirms that the appropriate configuration files have been updated.
4. Click **Yes** to restart the Oracle HTTP Server so the changes will take effect. Click **No** to restart the server later.

# 8

# Oracle HTTP Server Modules

This chapter describes the **modules** (mods) included in the Oracle HTTP Server. The modules extend the basic functionality of the Web server, and support integration between Oracle HTTP Server and other Oracle Application Server components.

Documentation from the Apache Software Foundation is referenced when applicable.

> **Note:** Readers using this guide in PDF or hard copy formats will be unable to access third-party documentation, which Oracle provides in HTML format only. To access the third-party documentation referenced in this guide, use the HTML version of this guide and click on the hyperlinks.

# List of Modules

Table 8–1 lists all the Oracle HTTP Server modules discussed in this chapter.

***Table 8–1 Oracle HTTP Server Modules***

| Oracle HTTP Server Modules | | | |
|---|---|---|---|
| mod_access | mod_actions | mod_alias | mod_asis |
| mod_auth | mod_auth_anon | mod_auth_db | mod_auth_dbm |
| mod_auth_digest | mod_autoindex | mod_cern_meta | mod_certheaders |
| mod_cgi | mod_define | mod_digest | mod_dir |
| mod_dms | mod_env | mod_example | mod_expires |
| mod_fastcgi | mod_headers | mod_imap | mod_include |
| mod_info | mod_isapi | mod_jserv | mod_log_agent |
| mod_log_config | mod_log_referer | mod_mime | mod_mime_magic |
| mod_mmap_static | mod_negotiation | mod_oc4j | mod_onsint |
| mod_oprocmgr | mod_oradav | mod_ossl | mod_osso |
| mod_perl | mod_plsql | mod_proxy | mod_rewrite |
| mod_setenvif | mod_so | mod_speling | mod_status |
| mod_unique_id | mod_userdir | mod_usertrack | mod_vhost_alias |

## mod_access

Controls access to the server based on characteristics of a request, such as hostname or IP address.

> **See Also:** Module `mod_access` in the Apache Server documentation.

## mod_actions

Enables execution of CGI scripts based on file type or request method.

> **See Also:** Module `mod_actions` in the Apache Server documentation.

## mod_alias

Enables manipulation of URLs in processing requests. It provides mapping between URLs and filesystem paths, and URL redirection capabilities.

> **See Also:** Module `mod_alias` in the Apache Server documentation.

## mod_asis

Enables sending files that contain their own HTTP headers. It is not supported by Oracle.

> **See Also:** Module `mod_asis`" in the Apache Server documentation.

## mod_auth

Enables user authentication with files based user lists.

> **See Also:** Module `mod_auth` in the Apache Server documentation.

## mod_auth_anon

Enables anonymous user access to protected areas (similar to anonymous FTP, where the email addresses can be logged).

> **See Also:** Module `mod_auth_anon` in the Apache Server documentation.

## mod_auth_db

Uses Berkeley DB files to provide user authentication.

This module is disabled in the Oracle HTTP Server and is not supported by Oracle.

## mod_auth_dbm

Uses DBM files to provide user authentication.

This module is not supported by Oracle.

## mod_auth_digest

Uses MD5 Digest Authentication to provide user authentication.

This module is not supported by Oracle.

## mod_autoindex

Generates directory indexes automatically.

> **See Also:** Module `mod_autoindex` in the Apache Server documentation.

## mod_cern_meta

Emulates CERN (Conseil Europeen pour le Recherche Nucleaire) HTTPD metafile semantics. Metafiles are additional HTTP headers that can be produced for each file the server accesses, in addition to the typical set.

This module is not supported by Oracle.

# mod_certheaders

Allows reverse proxies that terminate SSL connections in front of Oracle HTTP Server, such as Oracle Application Server Web Cache, to transfer information regarding SSL connection, such as SSL client certificate information, to Oracle HTTP Server, and applications running behind Oracle HTTP Server. This information is transferred from the reverse proxy to Oracle HTTP Server using HTTP headers. The information is transferred from the headers to the standard CGI environment variable, which `mod_ossl` or `mod_ssl` populates if the SSL connection is terminated by Oracle HTTP Server. It also allows certain requests to be treated as HTTPS requests even though they are received through HTTP.

Perform the following steps to configure `mod_certheaders`:

1. Configure Oracle HTTP Server to load `mod_certheaders`. To do this, add a `LoadModule` directive to `httpd.conf` file as shown below:
   - UNIX: `LoadModule certheaders_module libexec/mod_certheaders.so`
   - Windows: `LoadModule certheaders_module modules/ApacheModuleCertHeaders.dll`
2. Specify which headers should be translated to CGI environment variables. This can be achieved by using the `AddCertHeader` directive. This directive takes a single argument, which is the CGI environment variable that should be populated from a HTTP header on incoming requests. For example, to populate the `SSL_CLIENT_CERT` CGI environment variable, add the following line to `httpd.conf`:

   ```
   AddCertHeader SSL_CLIENT_CERT
   ```

   The `AddCertHeader` directive can be a global setting if it is placed in the base virtual server section of `httpd.conf`. It can be specific to a single virtual host by placing it within a virtual host container, or it can be specific to a set of URIs by placing it within a `<Directory>` or `<Location>` container directive within `httpd.conf`. The combination of these directives are additive, so that for a given URI, all directives that are specific to that URI will be added to any that are specific to that request's virtual host, which will be added to any that is defined for that base virtual host.

Table 8–2 lists all the supported CGI environment variables with their corresponding HTTP header names.

***Table 8–2 CGI Environment Variables with Corresponding Header Names***

| CGI Variable | Header Name | CGI Variable | Header Name |
|---|---|---|---|
| SSL_PROTOCOL | SSL-Protocol | SSL_SESSION_ID | SSL-Session_Id |
| SSL_CIPHER | SSL-Cipher | SSL_CIPHER_EXPORT | SSL-Cipher-Export |
| SSL_CIPHER_ALGKEYSIZE | SSL-Cipher-Algkeysize | SSL_VERSION_LIBRARY | SSL-Version-Library |
| SSL_CLIENT_CERT | SSL-Client-Cert | SSL_VERSION_INTERFACE | SSL-Version-Interface |
| SSL_CLIENT_CERT_ CHAIN_n | SSL-Client-Cert-Chain -n | SSL_CIPHER_USEKEYSIZE | SSL-Cipher-Usekeysize |
| SSL_CLIENT_VERIFY | SSL-Client-Verify | SSL_SERVER_CERT | SSL-Server-Cert |
| SSL_CLIENT_M_VERSION | SSL-Client-M-Version | SSL_SERVER_M_VERSION | SSL-Server-M-Version |
| SSL_CLIENT_M_SERIAL | SSL-Client-M-Serial | SSL_SERVER_M_SERIAL | SSL-Server-M-Serial |
| SSL_CLIENT_V_START | SSL-Client-V-Start | SSL_SERVER_V_END | SSL-Server-V-End |
| SSL_CLIENT_V_END | SSL-Client-V-End | SSL_SERVER_V_END | SSL-Server-V-End |
| SSL_CLIENT_S_DN | SSL-Client-S-DN | SSL_SERVER_S_DN | SSL-Server-S-DN |
| SSL_CLIENT_S_DN_C | SSL-Client-S-DN-C | SSL_SERVER_S_DN_C | SSL-Server-S-DN-C |
| SSL_CLIENT_S_DN_ST | SSL-Client-S-DN-ST | SSL_SERVER_S_DN_ST | SSL-Server-S-DN-ST |
| SSL_CLIENT_S_DN_L | SSL-Client-S-DN-L | SSL_SERVER_S_DN_L | SSL-Server-S-DN-L |
| SSL_CLIENT_S_DN_O | SSL-Client-S-DN-O | SSL_SERVER_S_DN_O | SSL-Server-S-DN-O |
| SSL_CLIENT_S_DN_OU | SSL-Client-S-DN-OU | SSL_SERVER_S_DN_OU | SSL-Server-S-DN-OU |
| SSL_CLIENT_S_DN_CN | SSL-Client-S-DN-CN | SSL_SERVER_S_DN_CN | SSL-Server-S-DN-CN |
| SSL_CLIENT_S_DN_T | SSL-Client-S-DN-T | SSL_SERVER_S_DN_T | SSL-Server-S-DN-T |
| SSL_CLIENT_S_DN_I | SSL-Client-S-DN-I | SSL_SERVER_S_DN_I | SSL-Server-S-DN-I |
| SSL_CLIENT_S_DN_G | SSL-Client-S-DN-G | SSL_SERVER_S_DN_G | SSL-Server-S-DN-G |
| SSL_CLIENT_S_DN_S | SSL-Client-S-DN-S | SSL_SERVER_S_DN_S | SSL-Server-S-DN-S |
| SSL_CLIENT_S_DN_D | SSL-Client-S-DN-D | SSL_SERVER_S_DN_D | SSL-Server-S-DN-D |
| SSL_CLIENT_S_DN_UID | SSL-Client-S-DN-Uid | SSL_SERVER_S_DN_UID | SSL-Server-S-DN-Uid |
| SSL_CLIENT_S_DN_Email | SSL-Client-S-DN-Email | SSL_SERVER_S_DN_Email | SSL-Server-S-DN-Email |
| SSL_CLIENT_I_DN | SSL-Client-I-DN | SSL_SERVER_I_DN | SSL-Server-I-DN |
| SSL_CLIENT_I_DN_C | SSL-Client-I-DN-C | SSL_SERVER_I_DN_C | SSL-Server-I-DN-C |
| SSL_CLIENT_I_DN_ST | SSL-Client-I-DN-ST | SSL_SERVER_I_DN_ST | SSL-Server-I-DN-ST |
| SSL_CLIENT_I_DN_L | SSL-Client-I-DN-L | SSL_SERVER_I_DN_L | SSL-Server-I-DN-L |

*Table 8–2 CGI Environment Variables with Corresponding Header Names*

| CGI Variable | Header Name | CGI Variable | Header Name |
|---|---|---|---|
| SSL_CLIENT_I_DN_O | SSL-Client-I-DN-O | SSL_SERVER_I_DN_O | SSL-Server-I-DN-O |
| SSL_CLIENT_I_DN_OU | SSL-Client-I-DN-OU | SSL_SERVER_I_DN_OU | SSL-Server-I-DN-OU |
| SSL_CLIENT_I_DN_CN | SSL-Client-I-DN-CN | SSL_SERVER_I_DN_CN | SSL-Server-I-DN-CN |
| SSL_CLIENT_I_DN_T | SSL-Client-I-DN-T | SSL_SERVER_I_DN_T | SSL-Server-I-DN-T |
| SSL_CLIENT_I_DN_I | SSL-Client-I-DN-I | SSL_SERVER_I_DN_I | SSL-Server-I-DN-I |
| SSL_CLIENT_I_DN_G | SSL-Client-I-DN-G | SSL_SERVER_I_DN_G | SSL-Server-I-DN-G |
| SSL_CLIENT_I_DN_S | SSL-Client-I-DN-S | SSL_SERVER_I_DN_S | SSL-Server-I-DN-S |
| SSL_CLIENT_I_DN_D | SSL-Client-I-DN-D | SSL_SERVER_I_DN_D | SSL-Server-I-DN-D |
| SSL_CLIENT_I_DN_UID | SSL-Client-I-DN-Uid | SSL_SERVER_I_DN_UID | SSL-Server-I-DN-Uid |
| SSL_CLIENT_I_DN_Email | SSL-Client-I-DN-Email | SSL_SERVER_I_DN_Email | SSL-Server-I-DN-Email |
| SSL_CLIENT_A_SIG | SSL-Client-A-Sig | SSL_SERVER_A_SIG | SSL-Server-A-Sig |
| SSL_CLIENT_A_KEY | SSL-Client-A-Key | SSL_SERVER_A_KEY | SSL-Server-A-Key |

3. `mod_certheaders` can be used to instruct Oracle HTTP Server to treat certain requests as if they were received through HTTPS even though they were received through HTTP. This is useful when Oracle HTTP Server is front-ended by a reverse proxy or load balancer, which acts as a termination point for SSL requests, and forwards the requests to Oracle HTTP Server through HTTPS.

   If Oracle Application Server Web Cache is being used as the load balancer, it sends an HTTP header that identifies all requests it received through HTTPS. This means that `mod_certheaders` automatically detects which requests should be treated as HTTPS requests by simply looking for this header. To enable this, add the following directive to `httpd.conf`:

   ```
   AddCertHeader HTTPS
   ```

   This affects all URLs processed by Oracle HTTP Server.

For other load balancers, mod_certheaders must be explicitly configured to determine which requests should be treated as HTTPS requests. To do this, use the following directive:

```
SimulateHttps on
```

SimulateHttps can be embedded within a virtual host, such as:

```
<VirtualHost localhost:7777>
    SimulateHttps on
    .
    .
    .
</VirtualHost>
```

This tells mod_certheaders to treat every request handled by this virtual host as HTTPS, or the directive can be placed within a <LocationMatch>, <Directory>, or <DirectoryMatch> directive container such as:

```
<Location /foo/>
    SimulateHttps on
</Location>
```

This limits it to URLs starting with /foo/.

# mod_cgi

Enables the server to run CGI scripts.

**See Also:** Module mod_cgi in the Apache Server documentation.

# mod_define

Enables the Define directive, which defines a variable that can be expanded on any configuration line. The Define directive has the status Extension, which means that it is not compiled into the server by default.

This module requires the Extended API (EAPI). Oracle HTTP Server always has EAPI-enabled.

This module is available on UNIX systems only.

## mod_digest

Uses an older version of the MD5 Digest Authentication specification than that used in `mod_auth_digest` to provide user authentication. `mod_digest` probably only works with older browsers.

> **See Also:** Module `mod_digest` in the Apache Server documentation.

## mod_dir

Enables the server to perform slash (/) redirects. Directories must contain a trailing slash. If a request for a URL without a trailing slash is received, `mod_dir` redirects the request to the same URL followed by a trailing slash. For example:

```
http://myserver/documents/mydirectory
```

is redirected to

```
http://myserver/documents/mydirectory/
```

> **See Also:** Module `mod_dir` in the Apache Server documentation.

## mod_dms

Enables you to monitor performance of site components with Oracle's Dynamic Monitoring Service (DMS).

> **See Also:** *Oracle Application Server 10g Performance Guide*

## mod_env

Enables you to control the environment for CGI scripts and SSI (Server Side Includes) pages by passing, setting, and unsetting environment variables.

> **See Also:** Module `mod_env` in the Apache Server documentation.

## mod_example

Provides examples and guidance on how to write modules using the Apache API. When implemented, it demonstrates module callbacks triggered by the server.

This module is not supported by Oracle.

## mod_expires

Enables the server to generate Expires HTTP headers, which provide information to the client about document validity. Documents are served from the source if, based on the expiration criteria, the cached copy has expired.

> **See Also:** Module `mod_expires` in the Apache Server documentation.

## mod_fastcgi

Supports the FastCGI protocol, which enables you to maintain a pool of running servers for CGI applications, thereby eliminating start-up and initialization overhead.

> **See Also:** Module `mod_fastcgi` in the Apache Server documentation.

## mod_headers

Enables you to merge, replace, or remove HTTP response headers.

> **See Also:** Module `mod_headers` in the Apache Server documentation.

## mod_imap

Enables server-side image map processing.

This module is not supported by Oracle.

## mod_include

Provides a filter that processes documents for SSI (Server Side Includes) directives.

> **See Also:** Module `mod_include` in the Apache Server documentation.

## mod_info

Summarizes the entire server configuration, including all installed modules and directive settings.

> **See Also:** Module `mod_info` in the Apache Server documentation.

## mod_isapi

Enables serving of Internet Server extensions (such as `.dll` modules).

It is available on the Windows platform only, and is not supported by Oracle.

## mod_jserv

Connects the Oracle HTTP Server to the **JServ** servlet engine. It converts HTTP requests to servlet requests, returning HTTP responses to the client.

`mod_jserv` is disabled by default in the Oracle HTTP Server distribution; it is included for legacy support only. The instructions below explain how to enable it with `mod_oprocmgr`, in manual mode, or in automatic mode. Use the instructions for the mode that serves your needs. A working knowledge of JServ and Oracle HTTP Server directives is assumed.

## Enabling JServ with mod_oprocmgr

This section explains how to enable the Oracle default mode for JServ. Use this mode if you want process management and load balancing capabilities for multiple JVMs. The ApJServManual directive has a new mode, 'auto', that enables using JServ with the Oracle module mod_oprocmgr. The file jserv.conf file contains LoadModule directives for mod_jserv and mod_oprocmgr.

Follow these steps to enable JServ with mod_oprocmgr:

1. Uncomment the Include directive for the jserv.conf file in:

   UNIX: *ORACLE_HOME*/Apache/Apache/conf/httpd.conf

   ```
   #include "/ORACLE_HOME/Apache/Jserv/etc/jserv.conf"
   ```

   Windows: *ORACLE_HOME*\Apache\Apache\conf\httpd.conf

   ```
   #include "C:\ORACLE_HOME\Apache\Jserv\conf\jserv.conf"
   ```

2. Configure the ApJServManual directive in the file:

   UNIX: *ORACLE_HOME*/Apache/Jserv/etc/jserv.conf

   Windows: *ORACLE_HOME*\Apache\Jserv\conf\jserv.conf

   ```
   ApJServManual auto
   ```

3. Configure directives, if needed, in the file:

   UNIX: *ORACLE_HOME*/Apache/Jserv/etc/jserv.properties

   Windows: *ORACLE_HOME*\Apache\Jserv\conf\jserv.properties

4. Configure directives, if needed, in the file:

   UNIX: *ORACLE_HOME*/Apache/Jserv/etc/zone.properties

   Windows: *ORACLE_HOME*\Apache\Jserv\conf\zone.properties

5. Configure JServ using the Oracle Enterprise Manager Application Server Control:

   a. Navigate to the Oracle HTTP Server Home page on Application Server Control. Scroll to the "Administration" section.

   b. Select "Configure Components". This opens the "Configure Components" page.

   c. Choose "JServ" in the Component drop-down menu, enter the ias_admin password, and click **OK**.

6. Restart the Oracle HTTP Server.

   **See Also:** "Accessing Oracle HTTP Server Home Page" on page 7-3

## Enabling JServ in Automatic Mode

This section explains how to enable JServ in automatic mode. Use this mode if you need only one JVM. In this mode, the `ApJServManual` directive is set to 'off' and the `mod_jserv` module launches and monitors the JVM. If the Oracle HTTP Server is restarted or stopped, `mod_jserv` restarts or stops the JVM.

Follow these steps to enable JServ in automatic mode:

1. Uncomment the `Include` directive for the `jserv.conf` file in:

   UNIX: *ORACLE_HOME*`/Apache/Apache/conf/httpd.conf`

   ```
   #include "/ORACLE_HOME/Apache/Jserv/etc/jserv.conf"
   ```

   Windows: *ORACLE_HOME*`\Apache\Apache\conf\httpd.conf`

   ```
   #include "C:\ORACLE_HOME\Apache\Jserv\conf\jserv.conf"
   ```

2. Configure the `ApJServManual` directive in the file:

   UNIX: *ORACLE_HOME*`/Apache/Jserv/etc/jserv.conf`

   Windows: *ORACLE_HOME*`\Apache\Jserv\conf\jserv.conf`

   ```
   ApJServManual off
   ```

3. Configure other directives as needed in `jserv.conf`.
4. Set the port directive in the file:

   UNIX: *ORACLE_HOME*`/Apache/Jserv/etc/jserv.properties`

   Windows: *ORACLE_HOME*`\Apache\Jserv\conf\jserv.properties`

   to the same value as that specified in the `ApJServDefaultPort` directive.
5. Configure directives, if needed, in the file:

   UNIX: *ORACLE_HOME*`/Apache/Jserv/etc/zone.properties`

   Windows: *ORACLE_HOME*`\Apache\Jserv\conf\zone.properties`

6. Configure JServ using the Oracle Enterprise Manager Application Server Control:
   a. Navigate to the Oracle HTTP Server Home page on Application Server Control. Scroll to the "Administration" section.
   b. Select "Configure Components". This opens the "Configure Components" page.
   c. Choose "JServ" in the Component drop-down menu, enter the `ias_admin` password, and click **OK**.
7. Restart the Oracle HTTP Server.

**See Also:** "Accessing Oracle HTTP Server Home Page" on page 7-3

## Enabling JServ in Manual Mode

This section explains how to enable JServ in manual mode. Use this mode if you need to run multiple JVMs. In this mode, the `ApJServManual` directive is set to 'on' and you have to stop and start the JVM manually. To monitor the JVM, you must use an external monitoring facility.

Follow these steps to enable JServ in manual mode:

1. Uncomment the `Include` directive for the `jserv.conf` file in the file:

   UNIX: *ORACLE_HOME*`/Apache/Apache/conf/httpd.conf`

   ```
   #include "/ORACLE_HOME/Apache/Jserv/etc/jserv.conf"
   ```

   Windows: *ORACLE_HOME*`\Apache\Apache\conf\httpd.conf`

   ```
   #include "C:\ORACLE_HOME\Apache\Jserv\conf\jserv.conf"
   ```

2. Configure the `ApJServManual` directive in the file:

   UNIX: *ORACLE_HOME*`/Apache/Jserv/etc/jserv.conf`

   Windows: *ORACLE_HOME*`\Apache\Jserv\conf\jserv.conf`

   ```
   ApJServManual on
   ```

3. Configure other directives as needed in `jserv.conf`.

4. Configure directives in the file:

   UNIX: *ORACLE_HOME*/Apache/Jserv/etc/jserv.properties

   Windows: *ORACLE_HOME*\Apache\Jserv\conf\jserv.properties

5. Configure directives in the file:

   UNIX: *ORACLE_HOME*/Apache/Jserv/etc/zone.properties

   Windows: *ORACLE_HOME*\Apache\Jserv\conf\zone.properties

6. Before or while starting the JVM, set the arguments passed to the Java interpreter, and the classpath passed to the JVM, as specified by `wrapper.bin.parameters` and `wrapper.classpath` in the `jserv.properties` file.

   **Note:** Scripts are provided in the *ORACLE_HOME*/Apache/Apache/bin directory to start and stop JServ. These include commands to set the arguments and the classpath.

7. Configure JServ using the Oracle Enterprise Manager Application Server Control:

   a. Navigate to the Oracle HTTP Server Home page on Application Server Control. Scroll to the "Administration" section.

   b. Select "Configure Components". This opens the "Configure Components" page.

   c. Choose "JServ" in the Component drop-down menu, enter the `ias_admin` password, and click **OK**.

8. Restart the Oracle HTTP Server.

   **See Also:** "Accessing Oracle HTTP Server Home Page" on page 7-3

## Using JServ and OC4J Together

This section explains how to use `mod_rewrite` to enable some applications to execute on JServ, and others on Oracle Application Server Containers for J2EE (OC4J).

Perform the following configuration steps to enable JServ and OC4J to coexist. This is important if you have the Portal and Wireless installation type, because of the Portal dependency on OC4J.

1. Specify the engine on which applications should execute. Suppose you have these URLs:

   `/application1/file1.jsp` to execute on JServ, and

   `/application2/file2.jsp` to execute on OC4J.

   You must rewrite the URL for application1.

   a. Edit the following file

      UNIX: *ORACLE_HOME*`/Apache/Apache/conf/httpd.conf`

      Windows: *ORACLE_HOME*`\Apache\Apache\conf\httpd.conf`

      and uncomment that the following directives:

      ```
      LoadModule rewrite_module libexec/mod_rewrite.so
      AddModule mod_rewrite.c
      RewriteEngine on
      ```

   b. Edit:

      UNIX: *ORACLE_HOME*`/Apache/jsp/conf/ojsp.conf`

      Windows: *ORACLE_HOME*`\Apache\jsp\conf\ojsp.conf`

      to add these directives:

      ```
      RewriteRule /application1/(.*)/(.*).jsp$ /application1/$1/$2.jsp1
      ApJServAction .jsp1 /servlets/oracle.jsp.JspServlet
      ```

   c. Remove this directive:

      ```
      ApJServAction .jsp /servlets/oracle.jsp.JspServlet
      ```

**d.** Edit:

UNIX: *ORACLE_HOME*/Apache/Jserv/etc/jserv.conf

Windows: *ORACLE_HOME*\Apache\Jserv\conf\jserv.conf

and mount /servlets to the JVM that will service the JSP requests. Use the ApJServMount or ApJServGroupMount directive, depending on how the JServ processes are started.

2. Configure JServ using Oracle Enterprise Manager Application Server Control:

**a.** Navigate to the Oracle HTTP Server Home page on Application Server Control. Scroll to the "Administration" section.

**b.** Select "Configure Components". This opens the "Configure Components" page.

**c.** Choose "JServ" in the Component menu, enter the ias_admin password, and click **OK**.

3. Restart the Oracle HTTP Server.

**See Also:**

- "Accessing Oracle HTTP Server Home Page" on page 7-3
- JServ in the Apache Server documentation.

## Configuring Multiple JSP Applications on Different JVMs with mod_jserv

mod_jserv's mapping for JSP applications does not provide for specifying application paths, such as:

```
ApJServAction /path/.jsp ...
```

However, you can configure different JSP applications to run on different JVMs under mod_jserv. The configuration steps below show how to use mod_rewrite to change the extension of JSP pages associated with a JSP application at request time (where *.jsp1 files belong to application1, and *.jsp2 files belong to application2). Each .jsp extension has its own ApJServAction handler, so that multiple JVMs can be used to run different JSP applications.

Follow the instructions below, substituting application names, directories, page extensions, and hostnames as applicable to your system:

1. Enable mod_rewrite by adding the following lines to httpd.conf:

   ```
   LoadModule rewrite_module libexec/mod_rewrite.so
   AddModule mod_rewrite.c
   RewriteEngine on
   ```

2. Set up the applications as follows in ojsp.conf:

   ```
   RewriteRule ^/app1/(.*)/(.*)'jsp$ /app1/$1/$2.jsp1
   RewriteRule ^/app2/(.*)/(.*)'jsp$ /app2/$1/$2.jsp2

   ApJServAction .jsp1 /servlets1/oracle.jsp.JspServlet
   ApJServAction .jsp2 /servlets2/oracle.jsp.JspServlet
   ```

3. Mount /servlets1 and /servlets2 to different JVMs in jserv.conf:

   ```
   ApJServMount /servlets1
   ajpv12://hostname:8008/root
   ApJServMount /servlets2
   ajpv12://hostname:8009/root
   ```

## mod_log_agent

Enables logging of client user agents. It is deprecated; you should use `mod_log_config` instead of `mod_log_agent`.

This module is not supported by Oracle.

## mod_log_config

Provides configurable, customizable logging of server activities. You can choose the log format, and select or exclude individual requests for logging, based on characteristics of the requests.

> **See Also:** Module `mod_log_config` in the Apache Server documentation.

## mod_log_referer

Enables logging of documents that reference documents on the server. It is deprecated; you should use `mod_log_config` instead of `mod_log_referer`.

> **See Also:** Module `mod_log_referer` in the Apache Server documentation.

## mod_mime

Enables the server to determine the type of a file from its filename, and associate files with handlers for processing.

> **See Also:** Module `mod_mime` in the Apache Server documentation.

## mod_mime_magic

Enables the server to determine the MIME type of a file by examining a few bytes of its content. It is used in cases when `mod_mime` cannot determine a file type. Make sure that `mod_mime` appears before `mod_mime_magic` in the configuration file, so that `mod_mime` processes the files first.

> **See Also:** Module `mod_mime_magic` in the Apache Server documentation.

## mod_mmap_static

Maps a list of files into memory, useful for frequently requested files that are not changed often.

This module is not supported by Oracle.

## mod_negotiation

Enables the server for content negotiation (selection of documents based on the client's capabilities).

> **See Also:** Module `mod_negotiation` in the Apache Server documentation.

## mod_oc4j

Routes requests from the Oracle HTTP Server to Oracle Application Server Containers for J2EE (OC4J), through the AJP 1.3 protocol.

> **See Also:** *Oracle Application Server Containers for J2EE User's Guide*

`mod_oc4j` is enabled by default. During installation, the `oc4j_deploy_tool.jar` adds mount points to `mod_oc4j.conf` for applications deployed into OC4J instances. Requests that come in for specific mount points in `mod_oc4j` are routed to the OC4J instance for that mount point.

OC4J instances are started and managed by Oracle Process Manager and Notification Server (OPMN).

> **See Also:** *Oracle Process Manager and Notification Server Administrator's Guide*

This section discusses the following topics:

- Configuring mod_oc4j
- mod_oc4j Load Balancing
- Enabling SSL for mod_oc4j and OC4J
- Integrating Generic Apache with Oracle Application Server

## Configuring mod_oc4j

All relevant directives in `httpd.conf` and `mod_oc4j.conf` are described below. Sample configurations are also provided.

**See Also:** "mod_oc4j Sample Configurations" on page 8-27

### mod_oc4j Configuration File and Directives

The `mod_oc4j` directives are maintained in `mod_oc4j.conf`. The `mod_oc4j.conf` file is included by default into the `httpd.conf` file, using the directive below:

```
include "ORACLE_HOME/Apache/Apache/conf/mod_oc4j.conf"
```

The following directives are used to configure `mod_oc4j`:

- Oc4jCacheSize
- Oc4jConnTimeout
- Oc4jCookieExtension
- Oc4jExtractSSL
- Oc4jEnvVar
- Oc4jMount
- Oc4jMountCopy
- Oc4jSelectMethod
- Oc4jRoutingWeight

**See Also:** "Using mod_ossl Directives" on page 10-16 for detailed information on SSL configuration directives.

**LoadModule** Loads the `mod_oc4j` module.

| Category | Value |
|---|---|
| Syntax | `LoadModule oc4j_module` *`mod_oc4j shared library file`* |
| Required | Yes |
| Default | ■ UNIX: None<br>■ Windows: `LoadModule oc4j_module modules\ApacheModuleOc4j.dll` |
| Example | ■ UNIX: `LoadModule oc4j_module mod_oc4j.so`<br>■ Windows: `LoadModule oc4j_module modules/ApacheModuleOc4j.dll` |

**Oc4jCacheSize** Specifies the size of the OC4J connection cache.

| Category | Value |
|---|---|
| Syntax | `Oc4jCacheSize` *`size of connection cache`* |
| Required | No |
| Default | ■ UNIX: 1<br>■ Windows: 32 |
| Example | `Oc4jCacheSize 64` |
| Usage | Specifies the number of concurrent OC4J connections that can be cached by each Oracle HTTP Server process. Setting this directive to "0" will disable persistent connections between `mod_oc4j` and the OC4J instances. |

**Oc4jConnTimeout** Defines maximum idle time for unused connections.

| Category | Value |
|---|---|
| Syntax | `Oc4jCacheSize` *`size of connection cache`* |
| Required | No |
| Default | None |
| Example | `Oc4jCacheSize 64` |
| Usage | Useful for cases where there is a firewall between `mod_oc4j` and OC4J that times out connections. It should be set =< timeout value of the firewall. |

**Oc4jCookieExtension** Directs `mod_oc4j` to use `JSESSIONID_<cookie_name_extension>` as OC4J's session identifier in the cookie.

| Category | Value |
|---|---|
| Syntax | `Oc4jCookieExtension <cookie_name_extension>` |
| Required | No |
| Default | None |
| Example | `Oc4jCookieExtension MYEXT` |
| Usage | Directs `mod_oc4j` to use `JSESSIONID_<cookie_name_extension>` as OC4J's session identifier in the cookie, instead of `JSESSIONID`. In the above example, `JSESSIONID_MYEXT` is used as the OC4J's session identifier. |

**Oc4jExtractSSL** Governs passing SSL environment variables.

| Category | Value |
|---|---|
| Syntax | `Oc4jExtractSSL On\|Off` |
| Required | No |
| Default | Off |
| Example | `Oc4jExtractSSL On` |
| Usage | Directs `mod_oc4j` whether or not to pass three SSL environment variables, `SSL_CLIENT_CERT`, `SSL_CIPHER`, and `SSL_SESSION_ID` to OC4J. There is a performance cost associated with copying the SSL environment variables to OC4J, so set it to "On" only if the environment variables must be available to OC4J. |

**Note:** If configured, `mod_oc4j` passes some security environment parameters to OC4J, set by `mod_ossl` and `mod_osso`, at request time.

**Oc4jEnvVar** Directs `mod_oc4j` to pass some environment variables from Oracle HTTP Server to OC4J.

| Category | Value |
|---|---|
| Syntax | `Oc4jEnvVar` *`environment variable name [environment variable default value]`* |
| Required | No |
| Default | None |
| Example | `Oc4jEnvVar MY_ENV1`<br>`Oc4jEnvVar MY_ENV2 myenv_value` |
| Usage | For each `OC4jEnvVar` entry, you must also configure the Oracle HTTP Server directive, `PassEnv`, with the environment variable. Otherwise, `mod_oc4j` cannot acquire and pass the value.<br>Multiple entries are allowed. You could specify the default value for the environment variable as the second parameter, or leave it empty. If the environment variable's value is found in the Oracle HTTP Server environment, its value will be passed to OC4J. Otherwise, if the default value is set, the default value will be passed.<br>If this environment variable's value is not found in the Oracle HTTP Server environment and the default value is not set, nothing is passed to OC4J.<br>There is a performance degradation associated with `mod_oc4j` passing some configured environment variables over to OC4J with each request. |

**Note:** If configured, `mod_oc4j` passes some security environment parameters to OC4J, set by `mod_ossl` and `mod_osso`, at request time.

**Oc4jMount** Directs `mod_oc4j` to route requests containing a particular path to a destination. A destination can be a single OC4J process, or a set of OC4J instances.

| Category | Value |
|---|---|
| Syntax | `Oc4jMount` *`path [destination]`*<br>where path is the context root. The path parameter must be the same as the application context root specified in the OC4J configuration file *`xxx`*`-web-site.xml`. The application context root is shown in bold text in the example <web-site> element below.<br><default-web-app application="default" name="defaultWebApp" root="/j2ee"/><br>and where destination is one of these types:<br>■ `ajp13_dest`<br>■ `cluster_dest` (this is the default destination type)<br>■ `instance_dest`<br>If destination is not specified, the default OC4J instance name of `home` will be used. For example,<br>`Oc4jMount /myApp/*`<br>provides the same result as:<br>`Oc4jMount /myApp/* cluster://local_ias_cluster_name:home` |
| Required | No |
| Default | None |
| Examples | `Oc4jMount /app01/* ajp13://my-sun:8888`<br>`Oc4jMount /app02/*`<br>`Oc4jMount /app03/* home`<br>`Oc4jMount /app04/* ias_cluster_1:home`<br>`Oc4jMount /app05/* cluster://ias_cluster_1:home,ias_cluster_2:home`<br>`Oc4jMount /app06/* instance://ias_instance_1:home`<br>`Oc4jMount /app07/* instance://ias_instance_1:home_1,ias_instance_2:home_2`<br>`Oc4jMount /app08/* instance://`*`my-sun`*`:ias_instance_1:home` |

| Category | Value |
|---|---|
| Usage | Examples are provided for each routing destination:<br>**ajp13_dest**<br>Oc4jMount *path* ajp13://*my-sun:8888*<br>A request with the pattern specified in *path* is routed to an OC4J process listening on *my-sun*, port 8888 with the AJP 1.3 protocol. (*my-sun* and port 8888 are the AJP 1.3 protocol host and port specified in the OC4J configuration file *xxx*-web-site.xml.<br>**cluster_dest**<br>Oc4jMount *path* cluster: *//ias_cluster_name:OC4J_instance_name, ias_ cluster_name:OC4J_instance_name...*<br>A request with the pattern specified in *path* is load balanced to one or more of the OC4J instances specified (instances are separated by commas).<br>The Oracle Application Server Cluster Name is optional. If it is provided, the destination OC4J instance should be inside the named cluster. If none is provided, the destination OC4J instance should be inside the local Oracle Application Server cluster.<br>**instance_dest**<br>Oc4jMount *path* instance: *//host:ias_cluster_name:OC4J_instance_name, host:ias_cluster_name:OC4J_instance_name...*<br>A request with the pattern specified in *path* is load balanced to one or more of the OC4J instances specified (instances are separated by commas).<br>The host name is optional. If it is provided, the destination OC4J instance should be inside the Oracle Application Server instance residing on that host. If none is provided, the destination OC4J instance could be on any host. |

**Oc4jMountCopy** Copies mount points from the base server.

| Category | Value |
|---|---|
| Syntax | `Oc4jMountCopy` *`on`*`|`*`off`* |
| Required | No |
| Default | on |
| Example | `Oc4jMountCopy off` |
| Usage | Directs `mod_oc4j` whether to copy `Oc4jMount` points from the base server to the virtual host on which this directive is specified. If its value is On, all of the `Oc4jMount` points configured in the base server will be copied to the virtual host. If its value is Off, only the `Oc4jMount` points configured within the virtual host scope will be used. |

## mod_oc4j Sample Configurations

This section provides some sample configurations for `mod_oc4j`.

### Level 1 Configuration

Level 1 is the simplest configuration.

#### *Example 8–1 Sample mod_oc4j configuration*

This configuration mounts all requests starting with the URI /servlet/ to the default instance of OC4J processes. Because an instance of OC4J processes is handled by OPMN and the default instance must be the same as OPMN's default OC4J instance, this configuration requires that `mod_oc4j` must be used with OPMN.

Make this entry in the `httpd.conf` file:

```
Oc4jMount /servlet/*
```

***Example 8–2 Sample mod_oc4j configuration***

This configuration performs the same work as the configuration in Example 8–1, using a <Location> container directive instead of the Oc4jMount directive.

Make this entry in the httpd.conf file:

```
<Location /servlet>
    SetHandler oc4j-handler
</Location>
```

**Note:** This will only route requests to default the OC4J instance

***Example 8–3 Sample mod_oc4j configuration***

This configuration mounts all requests starting with the URI /servlet/ or /j2ee/ and all JSP pages to the default OC4J instance of OC4J processes. This configuration requires that mod_oc4j must be used with OPMN.

Make these entries in the mod_oc4j.conf file:

```
Oc4JMount /servlet/*
Oc4JMount /*.jsp
Oc4JMount /j2ee/*
```

***Example 8–4 Sample mod_oc4j configuration***

This configuration mounts:

- All requests starting with the URI /applicationA/ and all JSP pages to oc4j_instance_A, in which all OC4J processes are managed by OPMN. This configuration requires that mod_oc4j must be used with OPMN.
- All requests starting with the URI /applicationB/ to oc4j_instance_B, in which all OC4J processes are managed by OPMN. This configuration requires that mod_oc4j must be used with OPMN.

  Make these entries in the mod_oc4j.conf file:

  ```
  Oc4JMount /applicationA/* oc4j_instance_A
  Oc4JMount /applicationB/* oc4j_instance_B
  Oc4JMount /j2ee/*
  Oc4JMount /*.jsp oc4j_instance_A
  ```

## mod_oc4j Load Balancing

This section contains information about mod_oc4j load balancing

Table 8–3 lists load balancing policies that mod_oc4j supports:

***Table 8–3 mod_oc4j Load Balancing Policies***

| Name | Description |
|---|---|
| Random | mod_oc4j randomly selects an OC4J instance from a list of OC4J instances that are candidates to service a request. |
| Round Robin | mod_oc4j randomly selects an OC4J instance from an ordered list of OC4J instances that are candidates to service a request. Other OC4J instances are selected from the ordered list in turn, until the initially selected server is selected again. This sequence is repeated. If a particular OC4J instance is stopped or is unavailable, then that instance is skipped (no attempt is made to select it) until it can be brought back in service. |
| Random with Local Affinity | mod_oc4j randomly selects local OC4J processes to service requests. When no local OC4J processes are available, mod_oc4j randomly selects remote OC4J processes and gives them equal opportunity to be selected. |
| Round Robin with Local Affinity | mod_oc4j routes all requests to local OC4J processes in a round robin manner. When no local processes are available, mod_oc4j routes requests equally to each OC4J process on different hosts. |
| Random using Routing Weight | mod_oc4j distributes requests according to the routing weight configured for each host. One OC4J process is selected randomly from the OC4J processes on that host. |
| Round Robin using Routing Weight | mod_oc4j distributes the total request load to OC4J processes on each host based on the routing weight configured to each host. mod_oc4j selects an OC4J process in round robin manner from the OC4J processes on that host. |
| Metrics Based | mod_oc4j routes requests as per the run time metrics from OC4J processes that indicate how much load is currently being placed on the OC4J process. |
| Metric Based with Local Affinity | mod_oc4j routes all requests to local OC4J processes as per the run time performance metrics of OC4J processes. When there are no local OC4J processes available, mod_oc4j routes requests to each OC4J process on different hosts as per their performance metrics only. |

**Oc4jSelectMethod** Selects an OC4J instance for load balancing.

| Category | Value |
|---|---|
| Syntax | `Oc4jSelectMethod roundrobin \| roundrobin:local \| roundrobin:weighted \| random \| random:local \| random:weighted \| metric \| metric:local` |
| Required | No |
| Default | If `Oc4jSelectMethod` is not specified, it defaults to "`Oc4jSelectMethod roundrobin`". |
| Example | `Oc4jSelecctMethod random:local`<br>`Oc4jSelecctMethod metric` |
| Usage | ■ `Oc4jSelectMethod random`: Selects an OC4J process according to "Random" load balancing policy.<br>■ `Oc4jSelectMethod roundrobin:weighted`: Selects an OC4J process according to "Round Robin using Routing Weight" load balancing policy.<br>■ `Oc4jSelecctMethod metric:local`: Selects an OC4J process according to "Metric Based with Local Affinity" load balancing policy. |

This directive is only applicable to the base server for Oracle Application Server 10*g* (9.0.4) and an error will be printed at startup if specified within a `VirtualHost` container.

**Oc4jRoutingWeight** Associates a request routing weight for each machine during load balancing. Weighted routing is a load balancing strategy that distributes requests according to a predefined value assigned to each machine based on the predicted ability to handle load.

| Category | Value |
|---|---|
| Syntax | `Oc4jRoutingWeight` <*node_name*> <*routing_weight*> |
| Required | No |
| Default | It defaults to OC4J processes on all the nodes with routing weight as 1. If `Oc4jRoutingWeight` is specified, but some hosts are not specified, it defaults to OC4J processes on any non-specified node with routing weight as 1. |
| Example | ■ There are two hosts in an Oracle Application Server cluster: Host_A and Host_B. Each has Oracle HTTP Server and OC4J processes running on them.<br>`Oc4jSelectMethod random:local`<br>`Oc4jRoutingWeight Host_A 3`<br>`Oc4jRoutingWeight Host_B 2`<br>`Oc4jRoutingWeight` directives are ignored. `mod_oc4j` on Host_A randomly routes all requests to OC4J processes on Host_A, `mod_oc4j` on Host_B randomly routes all requests to OC4J processes on Host_B.<br>■ There are four hosts in an Oracle Application Server cluster: Host_A, Host_B, Host_C, and Host_D. Each has Oracle HTTP Server and OC4J processes running on them.<br>`Oc4jSelectMethod roundrobin:weighted`<br>`Oc4jRoutingWeight Host_A 3`<br>`Oc4jRoutingWeight Host_B 2`<br>`mod_oc4j` on all the machines route three times the number of requests to OC4J processes running on Host_A, two times the number of requests on Host_B, one time the number of requests on Host_C, and one time the number of requests on Host_D in a round robin manner.<br>■ There are four hosts in an Oracle Application Server cluster: Host_A, Host_B, Host_C, and Host_D. Each has Oracle HTTP Server and OC4J processes running on them.<br>`Oc4jSelectMethod roundrobin:weighted`<br>`mod_oc4j` on all the machines route requests equally to OC4J processes on Host_A, Host_B, Host_C, and Host_D in a round robin manner. |

| Category | Value |
|---|---|
| Usage | `Oc4jRoutingWeight` is taken into account only when `Oc4jSelectMethod` specifies with weighted.<br>"`Oc4jRoutingWeight` <*node_name*> <*routing_weight*>" associates a request routing weight to each node. `node_name` can be in host name or IP address format. For hosts with multiple interfaces, if different interfaces are specified, it is assumed that they are different hosts. |

This directive is only applicable to the base server for Oracle Application Server 10*g* (9.0.4) and an error will be printed at startup if specified within a `VirtualHost` container.

### Metric-based Load Balancing

Metric-based load balancing can be used when "`Oc4jSelectMethod metric | metric:local`" is specified in `mod_oc4j.conf` and the `<metric-collector>` element is configured in `server.xml`.

If `<metric-collector>` is not configured, then OC4J does not send any run time metrics to `mod_oc4j`. `mod_oc4j` then assumes that the missing value for OC4J is "50".

#### *Example 8–5 Metric-based Load Balancing*

"`Oc4jSelectMethod random:weighted`" is specified in `mod_oc4j.conf` and the `<metric-collector>` element is configured.

OC4J sends run time metrics to `mod_oc4j`, but `mod_oc4j` ignores it. It uses the Random using Routing Weight policy for each machine to perform load balancing. Weight is configured by `Oc4jRoutingWeight`.

#### *Example 8–6 Metric-based Load Balancing*

"`Oc4jSelectMethod metric`" is specified in `mod_oc4j.conf` and the `<metric-collector>` element is not configured.

OC4J sends the default value of "50" as run time metrics to `mod_oc4j`. `mod_oc4j` treats every OC4J process equally, and randomly selects OC4J processes.

## Enabling SSL for mod_oc4j and OC4J

Optionally, you can have direct SSL support for communication between `mod_oc4j` and OC4J. To do this, you have to enable SSL on the `mod_oc4j` side as well as the OC4J side. Steps to dp this are discussed in the topics discussed below:

- Enabling SSL for mod_oc4j
- Enabling SSL for OC4J

### Enabling SSL for mod_oc4j

Add the following directives in `mod_oc4j.conf` to enable SSL for `mod_oc4`:

**Oc4jEnableSSL** Indicates whether `mod_oc4j` needs to use SSL when communicating with OC4J processes. It should not be configured to "on" if `Oc4jiASPTActive` is configured to "On".

| Category | Value |
|---|---|
| Parameter Name | `Oc4jEnableSSL` |
| Parameter Type | string |
| Valid Values | `On/Off` |
| Default Value | `Off` |

**Oc4jSSLWalletFile** When `Oc4jEnableSSL` is set to "On", this directive specifies the location of an Oracle Wallet file that contains SSL certificates that are used for SSL communication with OC4J processes.

| Category | Value |
|---|---|
| Parameter Name | `Oc4jSSLWalletFile` |
| Parameter Type | string |
| Valid Values | Path to a wallet file that contains the SSL certificate to be used when establishing SSL connections to OC4J processes. |
| Default Value | N/A |

**Oc4jSSLWalletPassword** When `Oc4jEnableSSL` is set to "On", this value is the obfuscated password used for authentication when opening the wallet file. This value is obtained using the utility provided with the Oracle Wallet Manager.

| Category | Value |
|---|---|
| Parameter Name | `Oc4jSSLWalletPassword` |
| Parameter Type | string |
| Valid Values | Obfuscated password used for authentication when opening the wallet file specified by `Oc4jSSLWalletFile`. |
| Default Value | N/A |

**See Also:** *Oracle Application Server 10g Security Guide* for information on Oracle Wallet Manager.

---

**Note:** Wallet passwords have been deprecated. A warning message is generated in the Oracle HTTP Server log if this directive is used. For secure wallets, Oracle recommends that you get a SSO wallet instead. Refer to the *Oracle Application Server 10g Security Guide* for information on SSO wallet.

---

### Enabling SSL for OC4J

To enable SSL communication between `mod_oc4j` and OC4J, you have to enable SSL on the OC4J side too.

**See Also:** "Enabling SSL for OC4J" on page 10-49 for enabling SSL on the OC4J side.

## Integrating Generic Apache with Oracle Application Server

You can integrate generic Apache with Oracle Application Server, 10*g* (9.0.4). This enables you route requests from generic Apache to OC4J in the same manner as routing requests using Oracle HTTP Server and `mod_oc4j`.

**See Also:** "Integrating Generic Apache with Oracle Application Server" on page C-6

# mod_onsint

This module provides integration support with Oracle Notification Service (ONS) and OPMN (Oracle Process Manager and Notification Server).

## Benefits of mod_onsint

`mod_onsint` provides the following functionality:

- Provides a subscription mechanism for ONS notifications within Oracle HTTP Server. This is particularly important on UNIX where Oracle HTTP Server employs a multi-process architecture. In such an architecture, it is not feasible to have an ONS subscriber in each process since there are up to 8192 processes that comprise a single Oracle HTTP Server instance. Instead, `mod_onsint` provides a single process that receives notification for all modules within an Oracle HTTP Server instance.
- Publishes `PROC_READY` ONS notifications so that other components such as OPMN and OC4J are notified that the listener is up and ready. It also provides information such as DMS metrics and information about how the listener can be contacted. These notifications are sent periodically by `mod_onsint` as long as the Oracle HTTP Server instance is running.
- Provides functionality that allows Oracle HTTP Server to terminate as a single unit if the parent process fails. The parent process is responsible for starting and stopping all of the child processes for an Oracle HTTP Server instance. The failure of the parent process without first shutting down the child processes leaves Oracle HTTP Server in an inconsistent state that can only be fixed by manually killing all of the orphaned child processes. Until this is done, a new Oracle HTTP Server instance cannot be started since the orphaned child processes still occupy the ports Oracle HTTP Server wants to use. `mod_onsint` provides a monitor of the parent process. If it detects that the parent process has died, it kills all of the remaining child processes. When combined with OPMN, this provides restartability for Oracle HTTP Server in the case of a parent process failure. `mod_onsint` ensures that all of the Oracle HTTP Server child processes die, leaving the ports open for a new Oracle HTTP Server instance. OPMN ensures that a new instance is started once the failure of the original instance is detected.

## Implementation Differences for mod_onsint

Due to the difference in architecture of Oracle HTTP Server on UNIX and Windows, the implementation of `mod_onsint` varies slightly on these platforms.

On UNIX, `mod_onsint` spawns a process at module initialization time. This process is responsible for watching the parent process as well as sending and receiving ONS messages. Callback functions from other modules interested in ONS notifications are made in this process. For this information to be shared with other Oracle HTTP Server child processes, the use of an interprocess communication method such as a memory mapped file must be used. If a failure of a parent process is detected on UNIX, a signal is sent to all the other child processes, causing them to shut down.

On Windows, Oracle HTTP Server consists of only two processes, the parent and a multi-threaded child that handles all of the HTTP requests. In this model, `mod_onsint` runs as a thread within the child process. This thread watches the parent process as well as sending and receiving ONS messages. Callback functions from other modules interested in ONS notifications are made in the child process. If a failure of the parent process is detected, the `mod_onsint` terminates the child process, effectively shutting down Oracle HTTP Server.

**See Also:** "Oracle HTTP Server Processing Model" on page 4-2

There is no configuration of `mod_onsint` needed to provide functionality equivalent to that provided with Oracle HTTP Server in Oracle9*i* Application Server, Release 2 (9.0.2), other than the loading of the module. There is only an optional directive called `OpmnHostPort` that can be set. This directive allows you to specify a hostname and port that OPMN should use for pinging the Oracle HTTP Server instance that `mod_onsint` is running in. If `OpmnHostPort` is not specified, `mod_onsint` chooses an HTTP port automatically using the same algorithm that was use in Oracle HTTP Server in Oracle9*i* Application Server, Release 2 (9.0.2). However, in certain circumstances, you may want to choose a specific HTTP port and hostname that OPMN should use to ping the listener with.

OpmnHostPort takes a single argument which is a host:port string that specifies the values to pass to OPMN. For example, the following line would specify that OPMN should use the localhost interface and port 7778 to ping this listener:

```
OpmnHostPort localhost: 7778
```

This directive must be in the global section of the httpd.conf file. It cannot be embedded into any virtual host of location container. After installation, an OpmnHostPort directive is located in dms.conf. It points OPMN to the Oracle HTTP Server "diagnostic port", which is a special localhost only virtual host. It does not log internal diagnostic requests such as OPMN pings and DMS metric requests from Oracle Enterprise Manager Application Server Control.

## mod_oprocmgr

This Oracle module provides process management and load balancing services to JServ processes. It is provided for legacy users of JServ. JServ is disabled by default in the Oracle HTTP Server configuration. Oracle recommends using OC4J and mod_oc4j (which are enabled by default).

The following sections explain how to configure mod_oprocmgr. Terms used in these sections are defined below:

**mod_oprocmgr** A module that starts, stops, and detects death of processes (starting new processes to replace them), and provides load balancing services to the processes. mod_oprocmgr gets the topology management information through HTTP requests from JServ, and does its job based on this information.

**Group** A set of processes across which request traffic is distributed.

**Servlet Engine Process** A JVM instance that runs a servlet engine, such as JServ.

## Using mod_oprocmgr with mod_jserv

mod_oprocmgr provides infrastructure capabilities, such as automatic starting of processes, death detection and restart, and load balancing. These capabilities are enabled by a new mode, auto, for the ApJServManual directive.

Based on the configuration information provided by mod_jserv, mod_oprocmgr starts the specified number of JServ processes, managing them for the life of the servers.

---

**Note:** You must have at least one non-https port enabled for Oracle HTTP Server in order to enable mod_oprocmgr.

---

### Benefits

mod_oprocmgr enhances the functionality and administration of JServ in several ways:

**Process Management** With ApJServManual off, only one JServ engine can be started and managed automatically. Additional servlet engines have to be manually started, monitored and stopped.

With ApJServManual auto, any number of JServ engines can be started automatically. The process manager continually monitors the health of these processes and kills and restarts them, if necessary. You can still start JServ processes manually, if you need to.

**Configuration** Configuring multiple JServ processes with ApJServManual on/ApJServManual off is more complicated and error prone. For example, a 10 process “balance” configuration requires thirty two directives and ten jserv.properties files.

Configuring multiple JServ processes with the new `auto' mode requires much less effort. For example, a ten process “balance” configuration requires only 3 directives.

## Configuring mod_jserv for Process Management

If you are familiar with the configuration directives for `mod_jserv`, the configuration process for `mod_oprocmgr` is straightforward. The configuration files are listed below.

### Changes to httpd.conf

To use `mod_oprocmgr`, include the directives below in the `httpd.conf` file:

```
<IfModule mod_oprocmgr.c>
  ProcNode my-sun.us.oracle.com 7777
  <IfDefine SSL>
    ProcNode my-sun.us.oracle.com 80
  </IfDefine>
  <Location /oprocmgr-service>
    SetHandler oprocmgr-service
  </Location>
 </IfModule>
```

In addition, you must specify at least one non-SSL port. For a secure Web site (that is, one that only accepts SSL connections), you must provide an extra non- SSL port. To do this, add the directives shown below, substituting port and address values:

```
Listen <port>
<VirtualHost _default_:port>
   SSLEngine Off
  <Location />
    order deny, allow
    deny from all
    allow from <IP address 1 of local node>
    allow from <IP address 2 of local node>
    allow from <IP address 3 of local node>
  </Location>
</VirtualHost>
```

In the `LoadModule` section, ensure that `mod_oprocmgr` is loaded after `mod_osso`. The call back function of `mod_oprocmgr` in the 'check usrid' stage must be invoked before that of `mod_osso`.

### Changes to jserv.properties

In the file:

- UNIX: *ORACLE_HOME*/Apache/Jserv/etc/jserv.properties
- Windows: *ORACLE_HOME*\Apache\Jserv\etc\jserv.properties

specify the ports to which JServ will bind, as shown in the example below.

```
port=8007
```

If no ports are specified, the JServ processes will choose their ports. If you want the JServ processes to choose their ports, enter the port directive as shown below. If you eliminate the directive entirely, an error will occur.

```
port=
```

You can specify multiple ports, and separate the values with commas as shown in the example below. Note that a range of ports (9000-9010) is a valid value.

```
port=8007,9000-9010,8010
```

### Changes to jserv.conf

To use `mod_oprocmgr` with `mod_jserv`, you must change the directives as indicated below in the JServ configuration file:

- UNIX: *ORACLE_HOME*/Apache/Jserv/etc/jserv.conf
- Windows: *ORACLE_HOME*\Apache\Jserv\conf\jserv.conf

**ApJServManual** This directive accepts a mode, auto, which invokes the infrastructure functionality (in which `mod_oprocmgr` manages processes). The syntax is:

```
ApJServManual auto
```

You can set the mode to "On" or "Off" to use the standard JServ functionality.

**ApJServGroup** This directive defines groups for the process manager to manage for `mod_jserv`. If you have worked with `mod_jserv`, you will note that this directive replaces the `ApJServBalance`, `ApJServHost`, `ApJServRoute` and `ApJServShmFile` directives.

All JServ processes to be managed must belong to a group, and each group has its own `ApJServGroup` directive. If you only have one JServ process, you must define a group with just that process in it. The processes in a group are identical except for their listening ports, so requests directed to the group are distributed evenly among the processes.

The `ApJServGroup` directive takes four arguments: groupname, number of processes, node weight, and properties file. In the example below, the groupname is `mygroup`, the number of processes is 1, the node weight is 1, and the full path of the properties file used to start the JServ processes is *`ORACLE_HOME`*`/Apache/JServ/etc/jserv.properties`.

```
ApJServGroup mygroup 1 1 /private2/up_1022/Apache/Jserv/etc/jserv.properties
```

**ApJServGroupMount** This directive defines a mount point and maps it to a process group and zone. In the example below, the mount point is `/servlets`, the group is `mygroup`, and the zone is `root`. Note that the balance protocol is in use for routing, as in the standard JServ configuration.

```
ApJServGroupMount /servlets balance://mygroup/root
```

Place this directive after the `ApJServGroup` directive in the configuration file.

**ApJServGroupSecretKey** This directive specifies the secret key that JServ needs to authenticate clients. It can be disabled, as shown below:

```
ApJServGroupSecretKey disabled
```

When activated, the directive takes one or two arguments. In the example below, with group and filename arguments, the filename `mysecretkey` applies to the group `mygroup`.

```
ApJServGroupSecretKey mygroup /usr/local/apache/jserv/mysecretkey
```

You can supply only the filename argument, as shown below. No group is named, so the secret key filename applies to all groups.

```
ApJServGroupSecretKey /usr/local/apache/jserv/mysecretkey
```

You cannot combine directives using the one-argument syntax with directives using the two-argument syntax. If you use the two-argument syntax, the default for groups without a group-specific secret key is 'disabled'.

Place this directive after the `ApJServGroup` directive in the configuration file.

---

**Note:** The secret in the secret key file specified in `ApJServSecretKey` must be the same as that specified by the `security.secretKey` directive in the `jserv.properties` file. If the secrets are not the same, the death detection mechanism assumes that all the servlet engine processes are dead, eliminates them, and starts new processes to replace them (repeating the cycle endlessly).

---

## mod_oradav

This Oracle module (an OCI application written in C) that is an extended implementation of `mod_dav`, and is integrated with the Oracle HTTP Server. `mod_oradav` can read and write to local files or to an Oracle database. The Oracle database must have an OraDAV driver (a stored procedure package) that `mod_oradav` calls to map WebDAV activity to database activity. Essentially, `mod_oradav` enables WebDAV clients to connect to an Oracle database, read and write content, and query and lock documents in various schemas.

You can configure `mod_oradav` to an Oracle database using standard Oracle HTTP Server directives. `mod_oradav` can immediately leverage other module code (such as `mime_magic`) in order to perform content management tasks. Most OraDAV processing activity involves streaming content to and from a content provider; and `mod_oradav` uses OCI streaming logic directly within the Oracle HTTP Server.

To configure `mod_oradav`, you enter parameters within a `<Location>` container directive in `httpd.conf`. The `<Location>` container directive specifies the DAV-enabled URL. The `DAV` keyword is followed by a single value: `On`, which tells `mod_dav` to use the local file system for content.

The following example specifies that the directory `myfiles` under the Web server documents directory (`htdocs` by default) is to be DAV-enabled, along with all directories under `myfiles` in the hierarchy. (Note that there must not be any symlinks defined on `myfiles` or any of its subdirectories.)

```
<Location /myfiles>
   DAV On
</Location>
```

**See Also:**

- Chapter 9, "Configuring and Using mod_oradav" on page 9-1
- *Oracle Application Server Portal Configuration Guide*

For information about using `mod_oradav` to access database schemas for access by third-party tools (such as Adobe GoLive and Macromedia Dreamweaver) and Oracle *inter*Media, refer to the OraDAV information available on the Oracle Technology Network at

```
http://otn.oracle.com
```

# mod_ossl

This Oracle module enables strong cryptography for Oracle HTTP Server. It is a plug-in to Oracle HTTP Server that enables the server to use SSL. It is very similar to the OpenSSL module, `mod_ssl`. However, in contrast to the OpenSSL module, `mod_ossl` is based on the Oracle implementation of SSL, which supports SSL, version 3, and is based on Certicom and RSA Security technology.

**See Also:**

- *Oracle Application Server 10g Security Guide*
- "Using mod_ossl to Authenticate Users" on page 10-12

# mod_osso

This Oracle module enables **single sign-on** for Oracle HTTP Server. `mod_osso` examines incoming requests and determines whether the resource requested is protected, and if so, retrieves the Oracle HTTP Server cookie for you.

> **See Also:** *Oracle Application Server Single Sign-On Application Developer's Guide*

# mod_perl

This module embeds the Perl interpreter into the Oracle HTTP Server. This eliminates start-up overhead and enables you to write modules in Perl.

> **Note:** The demonstration script for this module that is shipped with Oracle Application Server should be disabled in production environments. It is included only to verify that the installation was successful.

> **See Also:** `mod_perl` Guide

## Database Usage Notes

This section provides information for `mod_perl` users working with databases. It explains how to test a local database connection and set character forms.

### Using Perl to Access the Database

The following section contains information about using Perl to access the database. Perl scripts access databases using the DBI/DBD driver for Oracle. The DBI/DBD driver is part of Oracle Application Server. It calls Oracle Callable Interface (OCI) to access the databases.

DBI must be enabled in `httpd.conf` for DBI to function. To do this, perform the following steps:

1. Edit `httpd.conf` using a text editor.
2. Search for "`PerlModule Apache: :DBI`".
3. Uncomment the line "`PerlModule Apache: :DBI`".
4. Restart Oracle HTTP Server.

**See Also:**

- "Application Server Control" on page 1-8
- "Restarting Oracle HTTP Server" on page 1-11

Files must be copied to *ORACLE_HOME*`/Apache/Apache/cgi-bin`

***Example 8–7 Using Perl to Access the Database***

```
#!<ORACLE_HOME>perl/bin/perl -w
  use DBI;
  my $dataSource = "host=<hostname.domain>;sid=<orclsid>;port=1521";
  my $userName = "scott";
  my $password = "tiger";
  my $dbhandle = DBI->connect("dbi:Oracle:$dataSource", $userName, $password)
    or die "Can't connect to the Oracle Database: $DBI::errstr\n";
  print "Content-type: text/plain\n\n";
  print "Database connection successful.\n";
  ### Now disconnect from the database
  $dbhandle->disconnect
    or warn "Database disconnect failed; $DBI::errstr\n";
  exit;
```

You can access the DBI scripts from the following locations:

```
http://<hostname.domain>:<port>/cgi-bin/<scriptname>
http://<hostname.domain>:<port>/perl/<scriptname>
```

If the script specifies "`use Apache::DBI`" instead of "`use DBI`", then it will only be able to run from `http://`*<hostname.domain>*`:`*<port>*`/perl/`*<scriptname>*.

## Testing Database Connection

Below is a sample Perl script for testing the database connection of a local seed database. To use the script to test another database connection, you must replace `scott/tiger` with the user name and password for the target database.

***Example 8–8 Sample Perl Script For Testing Connection for Local Seed Database***

```
##### Perl script start ######
use DBI;
print "Content-type: text/plain\n\n";
$dbh = DBI->connect("dbi:Oracle:", "scott/tiger", "") || die $DBI::errstr;
 $stmt = $dbh->prepare("select * from emp order by empno")|| die $DBI::errstr;
$rc = $stmt->execute() || die $DBI::errstr;
while (($empno, $name) = $stmt->fetchrow()) { print "$empno $name\n"; }
warn $DBI::errstr if $DBI::err;
die "fetch error: " . $DBI::errstr if $DBI::err;
$stmt->finish() || die "can't close cursor";
$dbh->disconnect() || die "cant't log off Oracle";
##### Perl script End ######
```

## Using SQL NCHAR Datatypes

SQL NCHAR datatypes have been refined in Oracle9*i*, and are now called reliable Unicode datatypes. SQL NCHAR datatypes such as NCHAR, NVARCHAR2 and NCLOB allow you to store any Unicode characters regardless of the database character set. The character set for those datatypes is specified by the national character set, which is either AL16UTF-16 or UTF8.

> **See Also:** Oracle9*i* documentation for more about SQL NCHAR datatypes.

This release of DBD::Oracle supports SQL NCHAR datatypes and provides driver extension functions to specify the character form for data binding. The following script shows an example to access SQL NCHAR data:

***Example 8–9 Sample Script to Access SQLNCHAR Data***

```
# declare to use the constants for character forms
use DBD::Oracle qw(:ora_forms);
# connect to the database and get the database handle
$dbh = DBI->connect( ... );
# prepare the statement and get the statement handle
$sth = $dbh->prepare( 'SELECT * FROM TABLE_N WHERE NCOL1 = :nchar1' );
# bind the parameter of a NCHAR type
$sth->bind_param( ':nchar1', $param_1 );
# set the character form to NCHAR
$sth->func( { ':nchar1' => ORA_NCHAR } , 'set_form' );
$sth->execute;
```

As shown above, the `set_form` function is provided as a private function that you can invoke with the standard DBI `func()` method. It takes an anonymous hash that specifies which placeholder should be associated with which character form. The valid values of character form are either `ORA_IMPLICIT` or `ORA_NCHAR`. Setting the character form to `ORA_IMPLICIT` causes the application's bound data to be converted to the database character set, and `ORA_NCHAR` to the national character set. The default form is `ORA_IMPLICIT`.

Another function is provided to specify the default character set form as follows:

```
# specify the default form to be NCHAR
$dbh->func( ORA_NCHAR, 'set_default_form' );
```

After this call is made, the form of all parameters is `ORA_NCHAR`, unless otherwise specified with `set_form` calls. Note that unlike the `set_form` function, this is a function on the database handle, so every statement from the database handle with its default form specified has the form of your choice by default.

**set_form** This function sets the character form for parameter(s). Valid forms are either `ORA_IMPLICIT` (default) or `ORA_NCHAR`. The constants are available as: `ora_forms` in `DBD::Oracle`.

***Example 8–10 Sample for set_form***

```
# a declaration example for the constants ORA_IMPLICIT and ORA_NCHAR
use DBD::Oracle qw(:ora_forms);
# set the character form for the placeholder :nchar1 to NCHAR
$sth->func( { ':nchar1' => ORA_NCHAR } , 'set_form' );
# set the character form using the positional index
$sth->func( { 2 => ORA_NCHAR } , 'set_form' );
# set the character form for multiple placeholders at once
$sth->func( { 1 => ORA_NCHAR, 2 => ORA_NCHAR } , 'set_form' );
```

**set_default_form** This function sets the default character form for a database handle.

***Example 8–11 Default Character Form for a Database Handle***

```
$dbh->func( ORA_NCHAR , 'set_default_form' );
```

# mod_plsql

This Oracle module connects the Oracle HTTP Server to an Oracle database, enabling you to create Web applications using Oracle stored procedures.

In order to access a Web-enabled PL/SQL application, configure a PL/SQL Database Access Descriptor (DAD) for `mod_plsql`. A DAD is a set of values that specifies how `mod_plsql` connects to a database server to fulfill an HTTP request. Besides the connect details, a DAD contains important configuration parameters for various operations in the database and for `mod_plsql` in general. Any Web-enabled PL/SQL application which makes use of the PL/SQL Web ToolKit needs to create a DAD to invoke the application.

- Any PL/SQL Application written using the PL/SQL Web ToolKit
- Oracle Application Server Portal

## Creating a DAD

If mod_plsql is part of Oracle Application Server, it is recommended that you use Oracle Enterprise Manager Application Server Control to create a DAD.

> **See Also:** "Creating a Database Access Descriptor (DAD) for mod_plsql" on page 7-26

If not, then perform the following steps to create a DAD:

1. Edit the DAD configuration file *ORACLE_HOME*/Apache/modplsql/conf/dads.conf.
2. Add a DAD where the DAD has the following format:
   a. The Oracle HTTP Server <Location> directive which defines a virtual path used to access the PL/SQL Web Application. This directive begins enclosing a group of directives that apply to the named Location.

      For example, the directive <Location /myapp> defines a virtual path called "/myapp" that will be used to invoke a PL/SQL Web Application through a URL like http://host:port/myapp/.

      ---

      **Note:** Older versions of mod_plsql were always mounted on a virtual path with a prefix of '/pls'. This restriction is removed in newer versions but might still be a restriction imposed by some of the older PL/SQL applications.

      ---

   b. The Oracle HTTP Server "SetHandler" directive which directs Oracle HTTP Server to enable mod_plsql to handle the request for the virtual path defined by the named Location

      ```
      SetHandler pls_handler
      ```

   c. Additional Oracle HTTP Server directives that are allowed in the context of a <Location> directive. Typically, the following directives are used:

      ```
      Order deny,allow
      Allow from all
      AllowOverride None
      ```

**d.** One or more `mod_plsql` specific directives. For example:

```
PlsqlDatabaseUsername        scott
PlsqlDatabasePassword        tiger
PlsqlDatabaseConnectString   orcl
PlsqlAuthenticationMode      Basic
```

**e.** An Oracle HTTP Server `</Location>` directive which closes the group of directives for the named `Location`, and defines a single DAD.

3. Save the edits.
4. Obfuscate the DAD password by running the "`dadTool.pl`" script located in *`ORACLE_HOME`*`/Apache/modplsql/conf`.

   **See Also:** "PlsqlDatabasePassword" on page 8-66 for instructions on performing the obfuscation.

5. If `mod_plsql` is part of Oracle Application Server, then issue the following command:

   ```
   $ORACLE_HOME/dcm/bin/dcmctl updateConfig -ct ohs
   ```

6. Restart the Oracle HTTP Server for the configuration to take effect.

You can create additional DADs by defining other uniquely named `Locations` in `dads.conf`.

This section contains the following topics:

## Configuration Files

mod_plsql configuration reside in the following three configuration files:

- plsql.conf
- dads.conf
- cache.conf

### plsql.conf

This file contains the LoadModule directive to load mod_plsql into Oracle HTTP Server, any global setting for mod_plsql, and include directives for dads.conf and cache.conf. This file is included by the Oracle HTTP Server configuration file *ORACLE_HOME*/Apache/Apache/conf/oracle_apache.conf on UNIX or *ORACLE_HOME*\Apache\Apache\conf\oracle_apache.conf on Windows, which itself gets included in the primary Oracle HTTP Server configuration file httpd.conf.

> **See Also:** "oracle_apache.conf" on page D-7

### dads.conf

This file contains the configuration parameters for the **PL/SQL database access descriptor** (DAD). A DAD is a set of values that specifies how mod_plsql connects to a database server to fulfill a HTTP request.

### cache.conf

This file contains the configuration settings for the file system caching functionality implemented in mod_plsql. This configuration file is relevant only if PL/SQL applications use the OWA_CACHE package to cache dynamically generated content in the file system.

> **See Also:** *Oracle Application Server 10g mod_plsql User's Guide* for details on caching functionality in mod_plsql.

## Configuration Parameters

Table 8–4 contains a list of `mod_plsql` configuration parameters. They are discussed in detail in later sections.

While specifying a value for a configuration parameter, follow Oracle HTTP Server conventions for specifying values. For instance, if a value has white spaces in it, enclose the value with double quotes. For example: `PlsqlNLSLanguage "TRADITIONAL CHINESE_TAIWAN.UTF8"`

Also, multi-line directives enables you to specify the same directive multiple times in a DAD.

***Table 8–4 mod_plsql Configuration Files and Parameters***

| Configuration File | Parameters |
|---|---|
| plsql.conf | PlsqlDMSEnable<br>PlsqlLogEnable<br>PlsqlLogDirectory<br>PlsqlIdleSessionCleanupInterval |
| dads.conf | PlsqlAfterProcedure<br>PlsqlAlwaysDescribeProcedure<br>PlsqlAuthenticationMode<br>PlsqlBeforeProcedure<br>PlsqlBindBucketLengths<br>PlsqlBindBucketWidths<br>PlsqlCGIEnvironmentList<br>PlsqlCompatibilityMode<br>PlsqlDatabaseConnectString<br>PlsqlDatabasePassword<br>PlsqlDatabaseUserName<br>PlsqlDefaultPage<br>PlsqlDocumentPath<br>PlsqlDocumentPath<br>PlsqlDocumentProcedure<br>PlsqlDocumentTablename<br>PlsqlErrorStyle |

*Table 8–4 mod_plsql Configuration Files and Parameters (Cont.)*

| Configuration File | Parameters |
|---|---|
| dads.conf (continued) | PlsqlExclusionList<br>PlsqlFetchBufferSize<br>PlsqlInfoLogging<br>PlsqlMaxRequestsPerSession<br>PlsqlNLSLanguage<br>PlsqlPathAlias<br>PlsqlPathAliasProcedure<br>PlsqlSessionCookieName<br>PlsqlSesssionStateManagement<br>PlsqlTransferMode<br>PlsqlUploadAsLongRaw |
| cache.conf | PlsqlCacheCleanupTime<br>PlsqlCacheDirectory<br>PlsqlCacheEnable<br>PlsqlCacheMaxAge<br>PlsqlCacheMaxSize<br>PlsqlCacheTotalSize |

### plsql.conf

This file contains the `LoadModule` directive to load `mod_plsql` into the Oracle HTTP Server, global settings for `mod_plsql`, and include directives for `dads.conf` and `cache.conf`.

---

**Note:** Refer to `plsql.README` located in *`ORACLE_HOME`*`/Apache/modplsql/conf` for detailed description of `plsql.conf`.

---

The following section discusses the following parameters that can be specified in `plsql.conf`:

- `PlsqlDMSEnable`
- `PlsqlLogEnable`
- `PlsqlLogDirectory`
- `PlsqlIdleSessionCleanupInterval`

**PlsqlDMSEnable** Enables Dynamic Monitoring Service (DMS) for `mod_plsql`.

| Category | Value |
|---|---|
| Syntax | `PlsqlDMSEnable` *`On/Off`* |
| Default | On |
| Example | `PlsqlDMSEnable On` |

**PlsqlLogEnable** Enables debug level logging for `mod_plsql`.

Debug level logging is meant to be used for debugging purposes only. When logging is enabled, log files are generated at:

- UNIX: *`ORACLE_HOME`*`/Apache/modplsql/logs`
- Windows: *`ORACLE_HOME`*`\Apache\modplsql\logs`

as configured by `PlsqlLogDirectory`. This parameter should be set to "Off" unless recommended by Oracle support to debug problems with `mod_plsql`.

To view more details about the internal processing of `mod_plsql`, set this directive to "On". This causes `mod_plsql` to start logging for every request that is processed. The log files are generated as specified by the `PlsqlLogDirectory` directive.

| Category | Value |
|---|---|
| Syntax | PlsqlLogEnable *`On/Off`* |
| Default | Off |
| Example | PlsqlLogEnable Off |

**PlsqlLogDirectory** Specifies the directory where debug level logs are written out.

Set the directory name of the location where log files should be generated when logging is enabled. To avoid possible confusion about the location of this directory, an absolute path is recommended.

On UNIX, this directory must have write permissions by the owner of the child httpd processes.

| Category | Value |
|---|---|
| Syntax | `PlsqlLogDirectory` *`directory`* |
| Default | None |
| Example | `PlsqlLogDirectory` *`ORACLE_HOME`*`/Apache/modplsql/logs` |

**PlsqlIdleSessionCleanupInterval** Specifies the time (in minutes) in which the idle database sessions should be closed and cleaned by `mod_plsql`.

This directive is used in conjunction with connection pooling of database connections and sessions in `mod_plsql`. When a session is not used for the specified amount of time, it is closed, and freed. This is done so that unused sessions can be cleaned, and the memory is freed on the database side.

Setting this time to a low number helps in faster cleanup of unused database sessions. Be aware that if this number is too low, then this may adversely affect the performance benefits of connection pooling in `mod_plsql`.

If the number of open database sessions is not a concern, you can increase the value of this parameter for best performance. In such a case, if the site is accessed frequently enough that the idle session cleanup interval is never reached for a session, then the DAD configuration parameter `PlsqlMaxRequestsPerSession` can be modified so that it is guaranteed that a pooled database session gets recycled on a regular basis.

For most installations, the default parameter value should suffice.

| Category | Value |
|---|---|
| Syntax | `PlsqlIdleSessionCleanupInterval` *`number`* |
| Default | 15 (minutes) |
| Example | `PlsqlIdleSessionCleanupInterval 15` |

### dads.conf

This file contains the configuration parameters for the PL/SQL Database Access Descriptor (DAD).

**DAD Parameters** This section describes all the DAD level parameters that can be specified in the `dads.conf` file. Besides these directives, you can also specify additional Oracle HTTP Server directives that can be specified in the context of a `<Location>` directive, such as:

```
Order deny,allow
AllowOverride None
```

The following parameters are discussed in detail in the subsequent sections:

- PlsqlAfterProcedure
- PlsqlAlwaysDescribeProcedure
- PlsqlAuthenticationMode
- PlsqlBeforeProcedure
- PlsqlBindBucketLengths
- PlsqlBindBucketWidths
- PlsqlCGIEnvironmentList
- PlsqlCompatibilityMode
- PlsqlDatabaseConnectString
- PlsqlDatabasePassword
- PlsqlDatabaseUserName
- PlsqlDefaultPage
- PlsqlDocumentPath
- PlsqlDocumentProcedure
- PlsqlDocumentTablename
- PlsqlErrorStyle
- PlsqlExclusionList
- PlsqlFetchBufferSize
- PlsqlInfoLogging

- PlsqlMaxRequestsPerSession
- PlsqlNLSLanguage
- PlsqlPathAlias
- PlsqlPathAliasProcedure
- PlsqlSessionCookieName
- PlsqlSesssionStateManagement
- PlsqlTransferMode
- PlsqlUploadAsLongRaw

**PlsqlAfterProcedure** Specifies the procedure to be invoked after calling the requested procedure. This enables you to put a hook point after the requested procedure is called. This is useful in doing SQL*Traces/SQL Profiles while debugging a problem with the requested procedure. This is also useful when you want to ensure that a specific call be made after running every procedure.

| Category | Value |
|---|---|
| Syntax | `PlsqlAfterProcedure` *`string`* |
| Default | None |
| Example | `PlsqlAfterProcedure portal.mypkg.myafterproc` |

Notes:

- For all purposes, except for debugging, this parameter should be omitted. You could use this parameter to stop SQL Trace/SQL Profiling.
- In older versions of the product, this parameter was called `after_proc`.

**PlsqlAlwaysDescribeProcedure** Specifies whether `mod_plsql` should describe a procedure before trying to execute it. If this is set to "On", then `mod_plsql` will always describe a procedure before invoking it. Otherwise, `mod_plsql` will only describe a procedure when its internal heuristics have interpreted a parameter type incorrectly.

| Category | Value |
|---|---|
| Syntax | `PlsqlAlwaysDescribeProcedure` *`On/Off`* |
| Default | Off |
| Example | `PlsqlAlwaysDescribeProcedure Off` |

Notes:

- For all purposes, except for debugging, you should leave this parameter set to "Off".
- In older versions of the product, this parameter was called `always_desc`.

**PlsqlAuthenticationMode** Specifies the authentication mode to use for allow access through this DAD.

| Category | Value |
|---|---|
| Syntax | `PlsqlAuthenticationMode` *`Basic/SingleSignOn/GlobalOwa/CustomOwa/PerPackageOwa`* |
| Default | Basic |
| Example | `PlsqlAuthenticationMode Basic` |

Notes:

- Most customer applications use Basic Authentication. Custom Authentication modes (`GlobalOwa`, `CustomOwa`, `PerPackageOwa`) are used by very few PL/SQL applications. The `SingleSignOn` mode is supported only for Oracle Application Server releases, and is used by Oracle Application Server Portal and Oracle Application Server Single Sign-On.
- If the DAD is not using the `Basic` authentication, then you must include a valid username/password in the DAD configuration. For the `Basic` mode, if you wish to perform dynamic authentication, the DAD username/password parameters must be omitted.

- In older versions of the product, this configuration parameter was derived from a combination of `enablesso` and `custom_auth`.
  - `enablesso = Yes` translates to `PlsqlAuthenticationMode SingleSignOn`
  - `custom_auth = Global` translates to `PlsqlAuthenticationMode GlobalOwa`
  - `custom_auth = Custom` translates to `PlsqlAuthenticationMode CustomOwa`
  - `custom_auth = PerPackage` translates to `PlsqlAuthenticationMode PerPackageOwa`

  All other combinations translate to `Basic`.

  **See Also:** "Securing Application Database Access through `mod_plsql`" chapter in the *Oracle Application Server 10g mod_plsql User's Guide* for more information regarding different authentication modes.

**PlsqlBeforeProcedure** Specifies the procedure to be invoked before calling the requested procedure. This enables you to put a hook point before the requested procedure is called. This is useful in doing SQL*Traces/SQL Profiles while debugging a problem with the requested procedure. This is also useful when you want to ensure that a specific call be made before running every procedure.

| Category | Value |
|---|---|
| Syntax | `PlsqlBeforeProcedure` *`string`* |
| Default | None |
| Example | `PlsqlBeforeProcedure portal.mypkg.mybeforeproc` |

Notes:

- For all purposes, except for debugging purposes, this parameter should be omitted. You could use this parameter to start SQL Trace/SQL Profiling.
- In older versions of the product, this parameter was called `before_proc`.

**PlsqlBindBucketLengths** Specifies the rounding size to use while binding the number of elements in a collection bind. While executing PL/SQL statements, the Oracle database maintains a cache of PL/SQL statements in the shared SQL area, and attempts to reuse the cached statement if the same statement is executed again. Oracle's matching criteria requires that the statement texts be identical, and that the bind variable data types match. Unfortunately, the type match for strings is sensitive to the exact byte size specified, and for collection bindings is also sensitive to the number of elements in the collection. Since `mod_plsql` binds statements dynamically, the odds of hitting the shared cache are low, and it may fill up with near-duplicates and lead to contention for the latch on the shared area. This parameter reduces that effect by bucketing bind lengths to the nearest level.

All numbers specified should be in ascending order. After the last specified size, subsequent bucket sizes will be assumed to be twice the last one.

| Category | Value |
|---|---|
| Syntax | `PlsqlBindBucketLengths` *`number multiline`* |
| Default | 4,20,100,400 |
| Example | `PlsqlBindBucketLengths 4`<br>`PlsqlBindBucketLengths 25`<br>`PlsqlBindBucketLengths 125` |

Notes:

- This parameter is relevant only if you are using procedures with array parameters, and passing varying number of parameters to the procedure.
- The default should be sufficient for most PL/SQL applications.
- To see if this parameter needs to be changed, check the number of versions of a SQL statement in the SQL area.
- Consider using flexible parameter passing to reduce the problem.
- In older versions of the product, this parameter was called `bind_bucket_lengths`.

**PlsqlBindBucketWidths** Specifies the rounding size to use while binding the number of elements in a collection bind. While executing PL/SQL statements, the Oracle database maintains a cache of PL/SQL statements in the shared SQL area, and attempts to reuse the cached statement if the same statement is executed again. Oracle's matching criteria requires that the statement texts be identical, and that the bind variable data types match. Unfortunately, the type match for strings is sensitive to the exact byte size specified, and for collection bindings is also sensitive to the number of elements in the collection. Since `mod_plsql` binds statements dynamically, the odds of hitting the shared cache are low, and it may fill up with near-duplicates and lead to contention for the latch on the shared area. This parameter reduces that effect by bucketing bind widths to the nearest level.

All numbers specified should be in ascending order. After the last specified size, subsequent bucket sizes will be assumed to be twice the last one.

The last bucket width must be equal to or less than 4000. This is due to the restriction imposed by OCI where array bind widths cannot be greater than 4000.

| Category | Value |
|---|---|
| Syntax | `PlsqlBindBucketWidths` *`number multiline`* |
| Default | `32,128,1450,2048,4000` |
| Example | `PlsqlBindBucketWidths 40`<br>`PlsqlBindBucketWidths 400`<br>`PlsqlBindBucketWidths 2000` |

Notes:

- This parameter is relevant only of you are using procedures with array parameters, and passing varying number of parameters to the procedure.
- The default should be sufficient for most PL/SQL applications.
- To see if this parameter needs to be changed, check the number of versions of a SQL statement in the SQL area.
- Consider using flexible parameter passing to reduce the problem.
- In older versions of the product, this parameter was called `bind_bucket_widths`.

**PlsqlCGIEnvironmentList** Specifies overrides and/or additions of CGI environment variables to the default set of environment variables passed down to a PL/SQL procedure. This is a multi-line directive of name-value pairs to be added, overridden or removed. You can only specify one environment variable for each directive.

You can add CGI environment variables from the Oracle HTTP Server environment by specifying the variable name. To remove a CGI environment variable, set it equal to nothing. To add your own name-value pair, use the syntax `myname=myvalue`.

| Category | Value |
|---|---|
| Syntax | `PlsqlCGIEnvironmentList string` *`multiline`* |
| Default | None |
| Example | ■ To add a new environment variable from the Oracle HTTP Server environment:<br>`PlsqlCGIEnvironmentList DOCUMENT_ROOT`<br>■ To remove an environment variable:<br>`PlsqlCGIEnvironmentList MYENVAR2=`<br>■ To override from the Oracle HTTP Server environment:<br>`PlsqlCGIEnvironmentList REQUEST_PROTOCOL=HTTPS`<br>■ To add your own environment variable:<br>`PlsqlCGIEnvironmentList MY_VARNAME=MY_VALUE` |

Notes:

- Environment variables added here are available in the PL/SQL application through the function `owa_util.get_cgi_env`.
- In older versions of the product, this parameter was called `cgi_env_list`.

**PlsqlCompatibilityMode** Specifies the compatibility mode for running `mod_plsql`. This parameter is supported only for Oracle Application Server releases, and is used when you are using `mod_plsql` with an older version of Oracle Application Server Portal. In such situations, if you are running `mod_plsql` against a pre-9.0.2 version of Oracle Application Server Portal, this should be set to 1.

| Category | Value |
|---|---|
| Syntax | `PlsqlCompatibilityMode` *`BitFlag`* |
| Default | 0 |
| Example | `PlsqlCompatibilityMode 1` |

Notes:

- This parameter enables an old bug in `mod_plsql` in which `mod_plsql` incorrectly converted the plus symbol (+) to space characters for document downloads. Enabling the first bit in this flag will make it impossible to download documents that have a plus symbol `(+)` in the document name.

**PlsqlDatabaseConnectString** Specifies the connection to an Oracle database.

| Category | Value |
|---|---|
| Syntax | `PlsqlDatabaseConnectString`<br>*`stringServiceNameFormat/SIDFormat/TNSFormat/NetServiceNameFormat`*, where string can be one of the following based on the second argument:<br>■ `ServiceNameFormat`: `HOST:PORT:SERVICE_NAME` format where `HOST` is the hostname running the database, `PORT` is the port number the TNS listener is listening on, `SERVICE_NAME` is the database service name.<br>■ `SIDFormat`: `HOST:PORT:SID` format where `HOST` is the hostname running the database, `PORT` is the port number the TNS listener is listening on, `SID` is the database SID.<br>■ `TNSFormat`: A valid TNS alias which resolves using Net8 utilities like `tnsping` and SQL*Plus.<br>■ `NetServiceNameFormat`: A valid net service name which resolves to a connect descriptor. A connect descriptor is a specially formatted description of the destination for a network connection. A connect descriptor contains destination service and network route information.<br>If the format argument is not specified, then `mod_plsql` assumes that 'string' is either in the `HOST:PORT:SID` format, or resolvable by Net8. The differentiation between the two is made by the presence of the colon in the specified string.<br>It is recommended that newer DADs do not use the `SIDFormat` syntax. This exists only for backward compatibility reasons. Use the new two argument format for newly created DADs. |
| Default | None |
| Example | ■ `PlsqlDatabaseConnectString` *`myhost.com`*`:1521:`*`myhost`*`.iasdb.inst ServiceNameFormat`<br>■ `PlsqlDatabaseConnectString` *`myhost.com`*`:1521:iasdb SIDFormat`<br>■ `PlsqlDatabaseConnectString` *`myhost_tns`* `TNSFormat`<br>■ `PlsqlDatabaseConnectString cn=oracle,cn=iasdb NetServiceNameFormat`<br>■ `PlsqlDatabaseConnectString (DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(Host=`*`myhost.com`*`)( Port= 1521))(CONNECT_DATA=(SID=iasdb))) TNSFormat`<br>■ `PlsqlDatabaseConnectString` *`myhost_tns`*<br>■ `PlsqlDatabaseConnectString` *`myhost.com`*`:1521:iasdb` |

Notes:

- If the database is running in the same Oracle home, or the environment variable "TWO_TASK" is set (called "LOCAL" on Windows NT), this parameter need not be specified.
- If the database is running in a separate Oracle home, then this parameter is mandatory.
- If you have problems connecting to the database:
  - Check the username and password information in the DAD.
  - Make sure that you run "tnsping <*string*>" and execute commands such as:

    sqlplus *DADUsername*/*DADPassword*@<*string*>

  - Ensure that TNS_ADMIN is configured properly.
  - Verify that the HOST:PORT:SERVICE_NAME format makes the connection go through.
  - Ensure that the TNS listener and database are up and running.
  - Ensure that you can ping the host from this machine.
- From a mod_plsql perspective, TNSFormat and NetServiceNameFormat are synonymous and denote connect descriptors that are resolved by Net. The TNSFormat is provided as a convenience so that end-users use this to signify that the name resolution happens through the local tnsnames.ora. For situations where the resolution is through an LDAP lookup as configured in sqlnet.ora, it is recommended that the format specifier of NetServiceNameFormat be used.

  If your database supports high availability, for example, RAC database, it is highly recommended that you use the NetServiceNameFormat such that the resolution for the net service name is through LDAP. This enables you to add or remove RAC nodes accessible through mod_plsql by just changing Oracle Internet Directory with the new/deleted node information. In such situations, hard-coding database listener HOST:PORT information in dads.conf or in the local tnsnames.ora is not recommended.
- In older versions of the product, this configuration parameter was called connect_string.

**PlsqlDatabasePassword** Specifies the password to use to log in to the database.

| Category | Value |
|---|---|
| Syntax | `PlsqlDatabasePassword` *`string`* |
| Default | None |
| Example | `PlsqlDatabasePassword tiger` |

After making manual configuration changes to DAD passwords, it is recommended that the DAD passwords are obfuscated by running the "`dadTool.pl`" script located in *`ORACLE_HOME`*`/Apache/modplsql/conf`.

Following are the steps to obfuscate DAD passwords:

1. If necessary, switch user to the Oracle software owner user, typically `oracle` using the following command:

   ```
   $su - oracle
   ```

2. Set the *`ORACLE_HOME`* environment variable to specify the path to the Oracle home directory for the current release and set the `PATH` environment variable to include the directory containing the Perl executable and the location of the `dadTool.pl` script.

   On Bourne, Bash, or Korn Shell:

   ```
   ORACLE_HOME=new_ORACLE_HOME_path;export ORACLE_HOME
   PATH=ORACLE_HOME/Apache/modplsql/conf:ORACLE_HOME/perl/bin:PATH;export PATH
   ```

   On C or tcsh Shell:

   ```
   setenv ORACLE_HOME new_ORACLE_HOME_PATH
   setenv PATH ORACLE_HOME/Apache/modplsql/conf:ORACLE_HOME/perl/bin:PATH
   ```

   On Windows:

   ```
   set PATH=ORACLE_HOME\Apache\modplsql\conf;ORACLE_
   HOME\perl\5.6.1\bin\MSWin32-x86;%PATH%
   ```

   **Note:** The preceding command for Windows should be issued in one line.

3. Set the appropriate shared library path environment variable for your platform.
   - On UNIX platforms, include the *ORACLE_HOME*/lib directory in your shared library path. Table 8–5 shows the appropriate environment variable for each platform.

***Table 8–5 Platform Type and Corresponding Shared Library Path Environment Variable***

| Platform | Environment Variable |
|---|---|
| AIX | LIBPATH |
| HP-UX | SHLIB_PATH |
| Linux, Solaris, and Tru64 UNIX | LD_LIBRARY_PATH |

   For example, to set the SHLIB_PATH environment in the Bourne shell on HP-UX systems, enter the following command:

```
$SHLIB_PATH=$ORACLE_HOME/lib:$SHLIB_PATH;export SHLIB_PATH
```

   - On Windows, include $*ORACLE_HOME*/bin in your PATH, for example:

```
set PATH=%ORACLE_HOME%\bin;%PATH%
```

4. Change directory to the mod_plsql configuration directory for the current release of Oracle HTTP Server:

```
cd $ORACLE_HOME/Apache/modplsql/conf
```

5. Invoke the following Perl script to obfuscate DAD password:

```
perl dadTool.pl -o
```

Notes:

- This is a mandatory parameter, except for a DAD that sets PlsqlAuthenticationMode to Basic and uses dynamic authentication.
- For DADs using SingleSignOn authentication, this parameter is the name of the schema owner.
- In older versions of the product, this configuration parameter was called password.

**PlsqlDatabaseUserName** Specifies the username to use to logon to the database.

| Category | Value |
|---|---|
| Syntax | `PlsqlDatabaseUsername` *`string`* |
| Default | None |
| Example | `PlsqlDatabaseUsername scott` |

Notes:

- This is a mandatory parameter, except for a DAD that sets `PlsqlAuthenticationMode` to `Basic` and uses dynamic authentication.
- For DADs using `SingleSignOn` authentication, this parameter is the name of the schema owner.
- In older versions of the product, this configuration parameter was called `username`.

**PlsqlDefaultPage** Specifies the default procedure to call if none is specified in the URL.

| Category | Value |
|---|---|
| Syntax | `PlsqlDefaultPage` *`string`* |
| Default | None |
| Example | `PlsqlDefaultPage myschema.mypackage.home` |

Notes:

- You can also use Oracle HTTP Server Rewrite rules to achieve the same effect as you get by setting this configuration parameter.
- In older versions of the product, this parameter was called `default_page`.

**PlsqlDocumentPath** Specifies a virtual path in the URL that initiates document download form the document table. For example, if this parameter is set to `docs`, then the following URLs will start the document downloading process for URLs of the format:

```
/pls/dad/docs
/pls/plsqlapp/docs
```

| Category | Value |
|---|---|
| Syntax | `PlsqlDocumentPath` *`string`* |
| Default | `docs` |
| Example | `PlsqlDocumentPath docs` |

Notes:

- Omit this parameter for applications that do not perform document uploads or downloads.

  **See Also:** *Oracle Application Server 10g mod_plsql User's Guide*

- In older versions of the product, this parameter was called `document_path`.

**PlsqlDocumentProcedure** Specifies the procedure to call when a document download is initiated. This procedure is called to process the download.

| Category | Value |
|---|---|
| Syntax | `PlsqlDocumentProcedure` *`string`* |
| Default | None |
| Example | `PlsqlDocumentProcedure portal.wwdoc_process.process_download` |

Notes:

- Omit this parameter for applications that do not perform document uploads or downloads.

  **See Also:** *Oracle Application Server 10g mod_plsql User's Guide*

- In older versions of the product, this parameter was called `document_proc`.

**PlsqlDocumentTablename** Specifies the table in the database to which all documents are uploaded.

| Category | Value |
|---|---|
| Syntax | `PlsqlDocumentTablename` *`string`* |
| Default | None |
| Example | `PlsqlDocumentTablename myschema.document_table` |

Notes:

- Omit this parameter for applications that do not perform document uploads or downloads.

  **See Also:** *Oracle Application Server 10g mod_plsql User's Guide*

- In older versions of the product, this parameter was called `document_table`.

**PlsqlErrorStyle** Specifies the Error Reporting Mode for `mod_plsql` errors. This parameter accepts the following values:

- **ApacheStyle**: This is the default mode. In this mode, `mod_plsql` indicates to Oracle HTTP Server the HTTP error that was encountered. Oracle HTTP Server then generates the error page. This can be used with the Oracle HTTP Server `ErrorDocument` directive to produce customized error messages.
- **ModplsqlStyle**: `mod_plsql` generates the error pages, usually a short message indicating the PL/SQL error that was encountered and PL/SQL exception stack, if any. For example:

  ```
  scott.foo PROCEDURE NOT FOUND
  ```

- **DebugStyle**: This mode provides more details than `ModplsqlStyle`. `mod_plsql` provides more details about the URL, parameters and also produces server configuration information. This mode is for debugging purposes only. Do not use this in a production system, since displaying internal server variables could be a security risk.

| Category | Value |
|---|---|
| Syntax | `PlsqlErrorStyle ApacheStyle/ModplsqlStyle/DebugStyle` |
| Default | `ApacheStyle` |
| Example | `PlsqlErrorStyle ModplsqlStyle` |

In older versions of the product, this parameter was called `error_style`.

**PlsqlExclusionList** Specifies a pattern for excluding certain procedures, packages, or schema names from being directly executed from a browser. This is a multi-line directive in which each pattern occupies one line. The pattern is case-insensitive and can accept simple wildcards such as *, ? and [a-z]. The default patterns excluded from direct URL access are: `sys.*`, `dbms_*`, `utl_*`, `owa_*`, `owa.*`, `htp.*`, `htf.*`.

Setting this directive to "`#NONE#`" will disable all protection. This is not recommended for a live site, however, it is sometimes used for debugging purposes.

If this parameter is overridden, the defaults are no longer in effect. In that case, you must explicitly add the default list to the list of excluded patterns.

| Category | Value |
|---|---|
| Syntax | `PlsqlExclusionList string multiline/#NONE#` |
| Default | `dbms_*`<br>`utl_*`<br>`owa_*`<br>`owa.*`<br>`htp.*`<br>`htf.*` |

| Category | Value |
|---|---|
| Example | `PlsqlExclusionList sys.*`<br>`PlsqlExclusionList dbms_*`<br>`PlsqlExclusionList utl_*`<br>`PlsqlExclusionList owa_*`<br>`PlsqlExclusionList owa.*`<br>`PlsqlExclusionList htp.*`<br>`PlsqlExclusionList htf.*`<br>`PlsqlExclusionList myschema.private.*`<br>The preceding configuration excludes access to URLs containing sys.*, dbms_*, utl_*, owa_*, owa.*, htp.*, htf.*, myschema.private.* |

Notes:

- Besides the patterns specified with this parameter, `mod_plsql` also disallows any fully qualified procedure names which contain special characters like tabs, newlines, carriage-returns, single-quotes, the reverse slash, the form feed, the open parenthesis, close parenthesis, and space. This cannot be changed.
- To add a pattern to the defaults, you must specify the default list with the pattern you have added (as in the example in the table).
- In older versions of the product, this parameter was called `exclusion_list`.

> **See Also:** *Oracle Application Server 10g mod_plsql User's Guide* for more information regarding security.

**PlsqlFetchBufferSize** Specifies the number of rows of content to fetch from the database for each trip, using either `owa_util.get_page` or `owa_util.get_page_raw`.

By default, `mod_plsql` attempts to fetch 200 response lines of output where each line is of 255 bytes. In situations where the response bytes are single-bytes, the response buffer is populated to the maximum and can pack 255*200=51000 bytes for each round trip. However, for responses containing multi-byte data, the byte packing for each row could be less than ideal resulting in lesser bytes getting transferred for each round trip. If your application generates large pages frequently and the response does not fit in one round trip, then consider setting this parameter higher. However, the memory usage for `mod_plsql` will increase.

| Category | Value |
|---|---|
| Syntax | `PlsqlFetchBufferSize` *`number`* |
| Default | 200 |
| Example | `PlsqlFetchBufferSize` 256 |

Notes:

- This parameter is changed only for performance reasons. The minimum value for this parameter is 28, but it is seldom reduced.
- Change this parameter only under the following circumstances:
  - The average response page is large and you want to reduce the number of round-trips `mod_plsql` makes to the database to fetch the response.
  - The character set in use is multi-byte, and you want to compensate for the problem of `get_page` or `get_page_raw` fetching fewer bytes for each row (calculations in the OWA Web ToolKit are character-based and in the case of multi-byte characters, OWA packages assume a worst-case character byte size and do not attempt to pack each row to its maximum).
- In older versions of the product, this parameter was called `response_array_size`.
- In older versions of the product, the default for this parameter was 128.

**PlsqlInfoLogging** Specifies what mode `mod_plsql` should use to do extra performance logging.

The mode is:

**InfoDebug**: This logs more information to the Apache's `error_log`. This is used in conjunction with Apache's "info" logging level. If the Apache's logging level is not at least set to this high, this setting will be ignored.

| Category | Value |
|---|---|
| Syntax | `PlsqlInfoLogging` *`InfoDebug`* |
| Default | Empty |
| Example | `PlsqlInfoLogging InfoDebug` |

This logging setting is useful for debugging problems in your PL/SQL application.

**PlsqlMaxRequestsPerSession** Specifies the maximum number of requests a pooled database connection should service before it is closed and re-opened.

| Category | Value |
|---|---|
| Syntax | `PlsqlMaxRequestsPerSession` *number* |
| Default | 1000 |
| Example | `PlsqlMaxRequestsPerSession 1000` |

Notes:

- This parameter helps relieve memory and resource problems that may occur due to prolonged session reuse by a PL/SQL application.
- This parameter should not need to be changed; the default is sufficient in most cases.
- Setting this parameter to a low number can degrade performance. A case for a lower value might be an infrequently used DAD whose performance is not a concern, and for which limiting the number of requests provides some benefit.
- In older versions of the product, the equivalent to this parameter is `reuse`. Instead of taking a value of "Yes" or "No", the new parameter enables you to have finer control over the connection pool reuse in `mod_plsql`.

**PlsqlNLSLanguage** Specifies the `NLS_LANG` variable for this DAD. This parameter overrides the `NLS_LANG` environment variable. When this parameter is set, the PL/SQL Gateway uses the specified `NLS_LANG` to connect to the database. Once connected, an alter session command is issued to switch to the specified language and territory. If the middle tier character set matches that of the database, then no alter session call is issued by `mod_plsql`.

| Category | Value |
|---|---|
| Syntax | `PlsqlNLSLanguage` *string* |
| Default | None |
| Example | `PlsqlNLSLanguage America_America.UTF8` |

Notes:

- Most applications have PlsqlTransferMode set to CHAR which means that the character set in PlsqlNLSLanguage needs to match the character set of the database. In one special case, where the database and mod_plsql are both using fixed-size character sets, and the character set width matches, the character set can be different. The response character set is always the mod_plsql character set.
- If PlsqlTransferMode is set to RAW, then this parameter can be ignored.
- In older versions of the product, this parameter was called nls_lang.

**PlsqlPathAlias** Specifies a virtual path alias to map to a procedure call. This is application specific.

| Category | Value |
|---|---|
| Syntax | PlsqlPathAlias *string* |
| Default | None |
| Example | PlsqlPathAlias url |

Notes:

- For applications that do not use path aliasing,this parameter may be omitted.

  **See Also:** *Oracle Application Server 10g mod_plsql User's Guide* for more information about path aliasing functionality.

- In older versions of the product, this parameter was called pathalias.

**PlsqlPathAliasProcedure** Specifies the procedure to call when the virtual path in the URL matches the path alias as configured by PlsqlPathAlias.

| Category | Value |
|---|---|
| Syntax | PlsqlPathAliasProcedure *string* |
| Default | None |
| Example | PlsqlPathAliasProcedure portal.wwpth_api_alias.process_download |

Notes:

- For applications that do not use path aliasing, this parameter may be omitted.

  **See Also:** *Oracle Application Server 10g mod_plsql User's Guide* for more information about path aliasing functionality.

- In older versions of the product, this parameter was called `pathaliasproc`.

**PlsqlSessionCookieName** Specifies the cookie name when PlsqlAuthenticationMode is set to `SingleSignOn`. This parameter is supported only for Oracle Application Server releases, and is used by the Oracle Application Server Portal and Oracle Application Server Single Sign-On.

| Category | Value |
|---|---|
| Syntax | `PlsqlSessionCookieName` *`cookie_name`* |
| Default | Same as DAD name |
| Example | `PlsqlSessionCookieName mycookie` |

Notes:

- For DADs not using `SingleSignOn` authentication, this parameter can be omitted. In most other cases, the session cookie name should be omitted (and this parameter automatically defaults to the DAD name).
- A session cookie name must be specified only for Oracle Application Server Portal instances that need to participate in a distributed Oracle Application Server Portal environment. For those Oracle Application Server Portal nodes you want to seamlessly participate as a federated cluster, ensure that the session cookie name for all of the participating nodes is the same.
- Independent Oracle Application Server Portal nodes need to use distinct session cookie names.
- In older versions of the product, this configuration parameter was called `sncookiename`.

**PlsqlSesssionStateManagement** Specifies how package and session state should be cleaned up at the end of each `mod_plsql` request.

- Setting this parameter to `StatelessWithResetPackageState` causes `mod_plsql` to call `dbms_session.reset_package_state` at the end of each `mod_plsql` request.
- Setting this parameter to `StatelessWithPreservePackageState` causes `mod_plsql` to call `htp.init` at the end of each `mod_plsql` request. This cleans up the state of session variables in the OWA Web ToolKit. The PL/SQL application is responsible for cleaning up its own session state. Failure to do so causes erratic behavior, in which a request starts recognizing or manipulating state modified in previous requests.
- Setting this parameter to `StatelessWithFastResetPackageState` causes `mod_plsql` to call `dbms_session.modify_package_state(dbms_session.reinitialize)` at the end of each `mod_plsql` request. This API is a lot faster than the mode of `StatelessWithResetPackageState`, and avoids some latch contention issues, but exists only in database versions 8.1.7.2 and higher. This mode uses up slightly more memory than the default mode.

| Category | Value |
|---|---|
| Syntax | `PlsqlSessionStateManagement`<br>`StatelessWithResetPackageState/StatelessWithFastResetPackageState/StatelessWithPreservePackageState` |
| Default | `StatelessWithResetPackageState` |
| Example | `PlsqlSessionStateManagement`<br>`StatelessWithResetPackageState` |

Notes:

- In older versions of the product, this configuration parameter was called `stateful`.
- An older value of `stateful=no` or `stateful=STATELESS_RESET` corresponds to `PlsqlSessionStateManagement StatelessWithResetPackageState`
- An older value of `stateful=STATELESS_FAST_RESET` corresponds to `PlsqlSessionStateManagement StatelessWithFastResetPackageState`

- An older value of `stateful=STATELESS_PRESERVE` corresponds to `PlsqlSessionStateManagement StatelessWithPreservePackageState`

`mod_plsql` does not support stateful mode of operation. To equip PL/SQL applications with stateful behavior, save state in cookies and/or in the database.

**PlsqlTransferMode** Specifies the transfer mode for data from the database back to `mod_plsql`. Most applications use the default value of `CHAR`.

| Category | Value |
|---|---|
| Syntax | `PlsqlTransferMode` *`CHAR/RAW`* |
| Default | `CHAR` |
| Example | `PlsqlTransferMode CHAR` |

Notes:

- This parameter only needs to be changed to enable sending back responses in different character sets from the same DAD. In such a case, the `CHAR` mode is useless, since it always converts the response data from the database character set to the `mod_plsql` character set.
- In older versions of the product, `RAW` transfer mode was not supported.

**PlsqlUploadAsLongRaw** Specifies the extensions to be uploaded as `LONGRAW` data type, as opposed to using the default `BLOB` data type. The default can be overridden by specifying multi-line directives of file extensions for field. A value of '*' in this field causes all documents to be uploaded as `LONGRAW`.

| Category | Value |
|---|---|
| Syntax | `PlsqlUploadAsLongRaw` *`string multiline`* |
| Default | None |
| Example | `PlsqlUploadAsLongRaw jpg`, `PlsqlUploadAsLongRaw gif` |

Notes:

- For applications that do not do document uploads or downloads, this parameter may be omitted.

  **See Also:** *Oracle Application Server 10g mod_plsql User's Guide* for more information about upload and download processes and the structure of the restrictions on the document table format.

- In older versions of the product, this parameter was called `upload_as_log_raw`.

### cache.conf

cache.conf file contains the cache settings for `mod_plsql`. This file contains parameters which specify the characteristics of the `mod_plsql` cache system.

**See Also:** This file is relevant only if the PL/SQL Application uses the `OWA_CACHE` packages to cache content in the file system. Extremely few customer applications make use of the `OWA_CACHE` packages.

The following parameters are specified in `cache.conf` file:

- `PlsqlCacheCleanupTime`
- `PlsqlCacheDirectory`
- `PlsqlCacheEnable`
- `PlsqlCacheMaxAge`
- `PlsqlCacheMaxSize`
- `PlsqlCacheTotalSize`

**PlsqlCacheCleanupTime** Specifies the time to start the cleanup of the cache storage.

This setting defines the exact day and time in which cleanup should occur. The frequency can be set as daily, weekly, and monthly.

- To define daily frequency, the keyword "`Everyday`" is used. The cleanup starts everyday at the time defined. For example, `Everyday 2:00`. This causes the cleanup to happen everyday at 2 AM (local time) in the morning.

- To define weekly frequency, the days of the week such as "`Sunday`", "`Monday`", "`Tuesday`", and so on are used. For example, `Wednesday 15:30`. This causes the cleanup to happen every Wednesday at 3:30 PM (local time) in the afternoon.
- To define monthly frequency, the keyword "`Everymonth`" is used. The cleanup starts at the Saturday of the month at the time defined. For example, `Everymonth 23:00`. This causes the cleanup to happen the first Saturday of every month at 11:00 PM (local time) at night.

| Category | Value |
|---|---|
| Syntax | `PlsqlCacheCleanupTime <Sunday-Saturday, Everyday, Everymonth> <hh:mm>` |
| Default | Saturday 23:00 |
| Example | `PlsqlCacheCleanupTime Saturday 23:00` |

**PlsqlCacheDirectory** Specifies the directory where cache files are written out by `mod_plsql`. This directory must exist or else Oracle HTTP Server will not start.

On UNIX, this directory must have write permissions by the owner of the child httpd processes.

| Category | Value |
|---|---|
| Syntax | `PlsqlCacheDirectory <directory>` |
| Default | none |
| Example | `PlsqlCacheDirectory ORACLE_HOME/Apache/modplsql/cache` |

In older versions, this parameter was called "`cache_dir`" and resides in the "[PLSQL Cache]" section of *`ORACLE_HOME`*`/Apache/modplsql/cfg/cache.cfg`.

**PlsqlCacheEnable** Enables `mod_plsql` caching.

| Category | Value |
|---|---|
| Syntax | `PlsqlCacheEnable` *`On/Off`* |
| Default | Off |
| Example | PlsqlCacheEnable `On` |

Notes:

- If you are sure that your application does not make use of the `OWA_CACHE` packages, in the PL/SQL Web Toolkit, then you can choose to disable caching. In such situations, there will be a very minor performance benefit.
- In older versions, this parameter is called "enabled" and resided in the "[PLSQL Cache]" section of *`ORACLE_HOME`*`/Apache/modplsql/cfg/cache.cfg`.

**PlsqlCacheMaxAge** Specifies the maximum time, in days, a cache file can be allowed to reside in a file system cache, after which the cached file will be removed for cache maintenance.

This setting is to ensure that the cache system does not contain old content. This setting removes old cache files and makes space for new ones.

| Category | Value |
|---|---|
| Syntax | `PlsqlCacheMaxAge` *`<number>`* |
| Default | 30 (30 days) |
| Example | `PlsqlCacheMaxAge 30` |

**PlsqlCacheMaxSize** Specifies the maximum possible size of a cache file.

This setting is to prevent the case in which one file can fill up the entire cache. In general, it is recommended that this be set to about 1-3 percent of the total cache size.

| Category | Value |
|---|---|
| Syntax | `PlsqlCacheMaxSize <number>` |
| Default | 1048576 (1 MB) |
| Example | `PlsqlCacheMaxSize 1048576` |

In older versions, this parameter was called "`max_size`" and resided in the "[PLSQL Cache]" section of *ORACLE_HOME*`/Apache/modplsql/cfg/cache/cfg`.

**PlsqlCacheTotalSize** Specifies the total size of the cache directory.

This setting limits the amount of space the cache is allowed to use. Both PLSQL cache and Session Cookie cache share this cache space. Note that this setting is not a hard limit. It might exceed the limit temporarily during normal processing. This is normal behavior.

The cleanup algorithm uses this setting to determine how much to reduce the cache files. Therefore, the real space limit is the physical storage's available size.

This parameter takes bytes as values;

- 1 megabytes = 1048576 bytes
- 10 megabytes = 10485760 bytes

| Category | Value |
|---|---|
| Syntax | `PlsqlCacheTotalSize <number>` |
| Default | 20971520 (20 MB) |
| Example | `PlsqlCacheTotalSize 20971520` |

In older versions, this parameter was called "`total_size`" and resided in the "[PLSQL Cache]" section of *ORACLE_HOME*`/Apache/modplsql/cfg/cache/cfg`.

# mod_proxy

This module provides proxy capability for `FTP`, `CONNECT` (for SSL), HTTP/0.9, HTTP/1.0, and HTTP/1.1.

**See Also:**

- Module `mod_proxy` in the Apache Server documentation.
- "Using mod_proxy Directives" on page 10-33

# mod_rewrite

Oracle HTTP Server provides `mod_rewrite` as a tool for URL manipulation. A rewriting engine based on a regular-expression parser is used by `mod_rewrite` to rewrite requested URLs. The granularity of URL manipulations can be affected by the formats of server variables, environment variables, HTTP headers, and time stamps.

This module operates on the full URLs (including the path-info part) both in per-server context (`httpd.conf`) and per-directory context (`.htaccess`) and can generate query-string parts on result.

The following topics are discussed in sections below:

- mod_rewrite Rules Processing
- mod_rewrite Directives
- Rewrite Rules Hints
- Redirection Examples

## mod_rewrite Rules Processing

Apache processes HTTP in phases. A hook for each of these phases is provided by the Apache API. `mod_rewrite` uses two of these hooks- the URL-to-filename translation hook which is used after the HTTP request has been read but before any authorization starts, and the Fixup hook which is triggered after the authorization phases and after the per-directory configuration files (`.htaccess`) have been read, but before the content handler is activated.

`mod_rewrite` reads the configured rulesets from its configuration structure. Server level rulesets are best configured at startup, while directory level rulesets are configured during the directory access of the kernel.

mod_rewrite loops through the ruleset rule by rule (RewriteRule directive) and when a particular rule matches, it loops through corresponding conditions (RewriteCond directives). First the URL is matched against the Pattern of each rule. When it fails, mod_rewrite looks for corresponding rule conditions. If none are present, it just substitutes the URL with a new value which is constructed from the string Substitution and goes on with its rule-looping. But if conditions exist, it starts an inner loop for processing them in the order that they are listed.

For conditions, a string TestString is created by expanding variables, back-references map lookups, and then CondPattern is matched against the expanded TestString. If the pattern does not match, the complete set of conditions and the corresponding rule fails. If the pattern matches, then the next condition is processed until no more conditions are available. If all conditions match, processing is continued with substituting the URL using Substitution.

When request seeks a URL with more than one slash (/), for example, http://*yourserver*//oldpath/rqstdrsrc, the "//oldpath" may bypass RewriteCond and RewriteRule directives if they are not correctly written.

For example, consider the following rule:

```
RewriteRule ^/oldpath(.*) /newpath$1 [R]
```

Requesting http://*yourserver*/oldpath/files will redirect and return the page http://*yourserver*/newpath/files as expected.

However, requesting http://*yourserver*//oldpath/files will bypass this particular rule, potentially serving a page that you were not expecting it to. You can work around the problem by making sure that rules will capture more than one slash (/). To fix the example above, you should use this replacement:

```
RewriteRule ^/+somepath(.*) /otherpath$1 [R]
```

## mod_rewrite Directives

This section discusses the following mod_rewrite directives:

- RewriteEngine
- RewriteOptions
- RewriteLog
- RewriteLogLevel
- RewriteBase

**RewriteEngine** Enables or disables the runtime rewriting engine. If it is set to "Off", this module does no runtime processing at all. Use this directive to disable the module instead of commenting out all the `RewriteRule` directives.

Rewrite configurations are not inherited by default. This means that you need to have `ReWriteEngine On` directive for each virtual host in which you want to use it.

**RewriteOptions** By specifying `RewriteOptions` 'inherit', you can force the configuration of the parent by the children. In virtual-server context this means that the maps, conditions and rules of the main server are inherited. In directory context this means that conditions and rules of the `.htaccess` configuration of the parent directory are inherited.

**RewriteLog** Sets the name of the file to which the server logs any rewriting action that it performs. If the name does not begin with a slash (/), then it is assumed to be relative to the `Server Root`. To disable logging, either remove or comment out the `RewriteLog` directive or use `RewriteLogLevel 0`. Avoid setting the filename to `/dev/null` to prevent logging. This can slow down the server with no advantage.

**RewriteLogLevel** Sets the verbosity level of the rewriting log file. The default level 0 means no logging, while 9 or more means that practically all actions are logged.

**RewriteBase** Explicitly sets the base URL for pre-directory rewrites. Rewrite rule can be used in per-directory configuration (`.htaccess`) files. When a substitution occurs for a new URL, the base URL should be added into the server processing. To be able to do this, the module needs to know what the corresponding URL-prefix or URL-base is. By default, this prefix is the corresponding file path itself. However, at most Web sites, URLs are not directly related to physical filename paths. In such cases, you have to use the `RewriteBase` directives to specify the correct URL-prefix.

If the URLs of your Web server are not directly related to physical file paths, you have to use `RewriteBase` in every `.htaccess` files where you want to use `RewriteRule` directives.

***Example 8–12 RewriteBase Directive***

Assume the following per-directory configuration file:

```
## /abc/def/.htaccess - - per-dir config file for directory /abc/def
 # /abc/def is the physical path of /xyz,
RewriteEngine On
RewriteBase /xyz
RewriteRule ^oldstuff\.html$ newstuff.html
```

In Example 8–12, a request to `/xyz/oldstuff.html` gets correctly rewritten to the physical file `/abc/def/newstff.html`.

## Rewrite Rules Hints

Table 8–6 provide hints for using rewrite rules.

***Table 8–6 Rewrite Rules Hints***

| Value | Definition |
|---|---|
| . | Any single character |
| [char] | Any character listed within a square bracket |
| b* | Any character b any number of times |
| .* | Any character any number of times |

For example, if you want to redirect requests from `/demo1`, `/demo2`, and `/demo3` to `/alldemos`, write the rewrite rule as one of the following:

```
RewriteRule /demo. /alldemos [R]
```

or,

```
RewriteRule /demo [123] /alldemos [R]
```

If you intend that `/DemoA`, `/DemoB`, and `/DemoC` to be redirected to `/alldemos`, add NC (no case) to the above rewrite rules, such as:

```
RewriteRule /demo [123] /alldemos [R, NC]
```

This rewrite rule will not work to redirect from `/demonstration1` to `/demos`, because "." works form one character only. To enable redirection of all URLs beginning with "demo", irrespective of subsequent characters, use the rewrite rule as follows:

```
RewriteRule ^/demo* /alldemos [R, NC]
```

In the above example, ^ means the beginning, * means any character after demo.

If there was a request for `/demo1/not_just_index.html`, al the above rewrite rules would have redirected the request the request to `/alldemos/index.html`, that may not be what you want. It is quite possible that you may want to redirect to the corresponding files in `/alldemos`, as listed in Table 8–7.

***Table 8–7 Request Redirection***

| Request for | Redirected to |
|---|---|
| `/demo1/happy.html` | `/alldemos/happy.html` |
| `/demo1/go.jpg` | `/alldemos/go.jpg` |
| `/demos1/lucky.jpg` | `/alldemos/lucky.jpg` |

Then you have to use substitution in your rewrite rule as follows:

```
RewriteRule ^/demos1(.*)$ //alldemos/$1 [R NC]
```

The explanation for this rule is:

Take the value of the expression, such as `happy.html`, `go.jpg`, and `lucky.jpg`, that appears after `demo1` as variables ($1) and substitute it after `/alldemos/`.

> **See Also:** Module `mod_rewrite` in the Apache Server documentation.

## Redirection Examples

For redirecting requests from the `DocumentRoot` to a directory called `newroot`, set the following `mod_rewrite` directives:

```
RewriteEngine On
RewriteRule ^/(.*)$ /newroot/$1 [R]
```

For directing requested for files from one directory (olddir) to another (newdir), set the following directives:

```
RewriteEngine On
RewriteRule ^/olddir(.*)$ /newdir/$1 [R]
```

In each of these cases, you should ensure that the requested resources are indeed available in the redirected location. The mod_rewrite module does not ensure the existence of the requested resource in the new location.

For disabling all requests using the HTTP TRACE method, set the following mod_rewrite directives:

```
RewriteEngine On
RewriteCond %{REQUEST_METHOD} ^TRACE
RewriteRule .* - [F]
```

## mod_setenvif

This module enables you to set environment variables based on characteristics of a request.

> **See Also:** Module mod_setenvif in the Apache Server documentation.

## mod_so

This module loads executable code and modules into the server at start-up time.

> **See Also:** Module mod_so in the Apache Server documentation.

## mod_speling

This module attempts to correct misspelled or miscapitalized URLs.

> **See Also:** Module mod_speling in the Apache Server documentation.

## mod_status

This module displays an HTML page of server activity and performance.

**See Also:** Module `mod_status` in the Apache Server documentation.

## mod_unique_id

This module creates a unique ID for each request.

**See Also:** Module `mod_unique_id` in the Apache Server documentation.

This module is available on UNIX systems only.

## mod_userdir

This module maps requests to user-specific directories.

**See Also:** Module `mod_userdir` in the Apache Server documentation.

## mod_usertrack

This module tracks user activity by creating a log.

**See Also:** Module `mod_usertrack` in the Apache Server documentation.

## mod_vhost_alias

This module enables dynamically configured mass virtual hosting.

**See Also:** Module `mod_vhost_alias` in the Apache Server documentation.

# 9

# Configuring and Using mod_oradav

This chapter describes distributed authoring and versioning concepts, and explains how to configure and use `mod_oradav`. `mod_oradav` enables you to use OraDAV to access content in an Oracle database from a Web browser or a WebDAV client.

Topics discussed are:

- Concepts
- OraDAV Users
- OraDAV Usage Model
- OraDAV Configuration Parameters
- WebDAV Security Considerations
- OraDAV Performance Considerations
- mod_oradav Usage Notes

Documentation from the Apache Software Foundation is referenced when applicable.

> **Note:** Readers using this guide in PDF or hard copy formats will be unable to access third-party documentation, which Oracle provides in HTML format only. To access the third-party documentation referenced in this guide, use the HTML version of this guide and click on the hyperlinks.

# Concepts

The term *OraDAV* refers to the capabilities available through the `mod_oradav` module. `mod_oradav` is an extended implementation of `mod_dav`, which is an implementation of the WebDAV specification. This section explains the following concepts:

- WebDAV
- mod_dav
- mod_oradav
- OraDAV

## WebDAV

WebDAV is a protocol extension to HTTP 1.1 that supports distributed authoring and versioning. With WebDAV, the Internet becomes a transparent read and write medium, where content can be checked out, edited, and checked in to a URL address.

WebDAV enables collaboration among authors building Web sites. WebDAV also serves as universal read and write access protocol to arbitrary hierarchies of content (not necessarily Web sites). With WebDAV, you can save content to a URL provided by an Internet Service Provider (ISP), and then be able to access and optionally change that content from various devices.

WebDAV was initiated as an IETF standard. The first phase of WebDAV is specified in RFC 2518, which provides the basic primitives for managing hierarchies of information, locking, reading, writing, and querying properties of a WebDAV document. Subsequent work on WebDAV is ongoing and is focusing on completing issues relating to content management over the Web. This includes WebDAV authentication and authorization (access controls), versioning, bindings, ordered collections, and querying (DAV Advanced Searching and Locating).

Microsoft Web folders is a WebDAV client on Windows 2000, NT, and later versions (using Internet Explorer 5.0 and higher). Office 2000 and Office XP applications and the IIS server support WebDAV, meaning that you can start a Microsoft Office application and specify a URL, edit the content, and save it back to the URL from which it was retrieved. WebDAV also has Java Clients (such as DAV Explorer), open source tools (such as Cadaver and Sitecopy), and Apple GUI tools (such as Goliath).

**Note:** When a WebDAV client first connects to Oracle HTTP Server, you must use the full `ServerName` string (as specified in the `httpd.conf` file) in the URL for the connection. Do not use an abbreviated form of the server name.

For example, if the `ServerName` value is `"server1.acme.com"`, connect to Oracle HTTP Server using the string `"http://server1.acme.com:7778"`, not an abbreviated form such as `"http://server1:7778"`.

If you use an abbreviated form, the connection might succeed, but `COPY` and `MOVE` operations will fail to execute and generate `BAD_GATEWAY` errors.

## mod_dav

`mod_dav` is the Apache Software Foundation native implementation of the WebDAV specification.

## mod_oradav

`mod_oradav` is the Oracle module (an OCI application written in C) that is an extended implementation of `mod_dav`, and is integrated with Oracle HTTP Server. `mod_oradav` performs read/write activity to local files and to Oracle databases. Oracle databases must have an OraDAV driver (a stored procedure package) that `mod_oradav` calls to map WebDAV activity to database activity. Essentially, `mod_oradav` enables `mod_dav` to connect to an Oracle database, read and write content, and query and lock documents in various schemas.

You can configure `mod_oradav` to an Oracle database using standard Oracle HTTP Server directives. `mod_oradav` can immediately leverage other module code (such as mime_magic) in order to perform content management tasks. Most WebDAV processing activity involves streaming content to and from a content provider; and `mod_oradav` uses OCI streaming logic directly within Oracle HTTP Server.

## OraDAV

OraDAV refers to the whole set of capabilities that are available through `mod_oradav` to Oracle Application Server users. Some OraDAV-specific terms include:

- **Apache OraDAV**: Code in the Apache HTTP server that supports file-based DAV access and makes calls to Oracle.
- **OraDAV driver API**: Set of stored procedure calls that are used by the OraDAV driver to manage content in an Oracle database, providing support for the following WebDAV functions over the Internet: reading and writing documents, locking and unlocking documents, managing (creating, populating, deleting) hierarchies of information, retrieving properties associated with documents, and associating properties with specific documents.
- **OraDAV driver**: Stored procedure implementation of the OraDAV driver API that executes in Oracle and manages a repository.
- **OraDAV *inter*Media driver**: Lightweight reference implementation of an OraDAV driver. The OraDAV interMedia driver is included with the interMedia Clipboard, which you can download and install from the Oracle Technology Network at:

  ```
  http://otn.oracle.com
  ```

  This driver lets you use third-party tools to access files and database content; for example, Dreamweaver can use WebDAV as the protocol for transferring files between a local folder on your system to the remote site where your Web site is published.

# OraDAV Architecture

OraDAV fits into an architecture in which `mod_oradav`, within Oracle HTTP Server, provides access to content in one or more schemas in one or more Oracle databases.

A simple form of the architecture is illustrated in Figure 9–1.

***Figure 9–1 OraDAV Architecture***

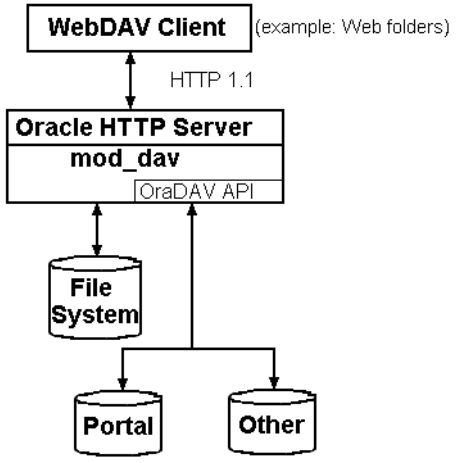



Figure 9–1 shows a WebDAV client, such as Microsoft Web folders, passing HTTP requests to Oracle HTTP Server. If the request is for content stored in the file system (not in an Oracle database), `mod_oradav` handles the access. If the request is for content stored in an Oracle database, the OraDAV API handles the access.

The OraDAV API provides capabilities that are equivalent to using `mod_oradav` running with a file system. The following HTTP methods are supported by the OraDAV API:

- `COPY`
- `DELETE`
- `MOVE`
- `MKCOL`
- `GET`

- HEAD
- LOCK
- PROPFIND
- PROPPATCH
- PUT
- UNLOCK

The OraDAV API supports shared and exclusive locking, retrieving basic DAV properties, and defining and retrieving server-defined live properties or client-defined dead properties. Set-based operations such as COPY, MOVE, DELETE can be done completely by a single call to an OraDAV driver.

## OraDAV Users

The primary direct users of OraDAV are Oracle HTTP Server administrators and Oracle DBAs. End users interact only indirectly with OraDAV through Web browsers or WebDAV client tools.

OraDAV administration involves tasks for a Web master and for a DBA:

- The Web master needs to know how to start and stop Oracle HTTP Server, and how to configure Oracle HTTP Server to direct URL traffic to an OraDAV driver.
- The DBA needs to know how to set up client connectivity to Oracle database from the system running Oracle HTTP Server, to install and administer the OraDAV driver, and perhaps to tune the content managed by the driver based on physical storage characteristics.

# OraDAV Usage Model

OraDAV usage can involve any combination of the following activities:

- **Browsing**: Read-only activity which uses WebDAV to access content in an Oracle database. Its usage model is that of a typical read-only Web site.
- **Restructuring**: Deleting, moving, and copying content. Restructuring is usually done infrequently by a restricted set of individuals who have write access to the WebDAV content. Restructuring has the same limitations and complications that one encounters when restructuring a file directory. In some cases this directory hierarchy is owned and managed by one user. If the directory is shared, the client doing restructuring is given sole access to the hierarchy through WebDAV exclusive locks.
- **Editing**: Modifying one or a small subset of resources in a hierarchy. Properly designed WebDAV clients will take out shared or exclusive locks on such resources to coordinate these activities.
- **Property Management**: Associating properties and attributes (for example, author) with documents for ease of lookup and for categorization. WebDAV clients assign properties to documents using the `PROPPATCH` directive and retrieve properties using the `PROPFIND` directive.

# OraDAV Configuration Parameters

Configuration of OraDAV is mainly done through parameters in the `httpd.conf` file, which is used by an Oracle HTTP Server instance when it is initializing. Some configuration parameters are required for all OraDAV drivers, and others are driver-specific.

When Oracle Application Server is installed, all required OraDAV parameters are set with values that are designed to enable Oracle database content to be accessed through a Web browser or WebDAV client. If necessary, you can later modify the values for required parameters and specify values for optional parameters if the default values do not meet your needs. The parameters used in `httpd.conf` to support OraDAV configuration start with `DAV` and `DAVParam`. These parameters are specified within a `<Location>` container directive, and they provide:

- A way of configuring how Oracle HTTP Server connects to the database.
- Coarse controls on OraDAV behavior.

The `DAV` parameter indicates that a URL location is DAV-enabled. The `DAV` keyword is followed by a single value "`On`", indicating that `mod_oradav` is to use the local file system for content, or "`Oracle`", indicating that `mod_oradav` is to use OraDAV for all content.

`DAVParam` parameters are used to specify name-value pairs. The required pairs are those that enable Oracle HTTP Server to connect to an Oracle database. These include the names `OraService`, `OraUser`, and `OraPassword` or `OraAltPassword`.

Example 9–1 shows a configuration for accessing files on the local system. It specifies that the directory `myfiles` under the Web server documents directory (`htdocs` by default) is to be DAV-enabled, along with all directories under `myfiles` in the hierarchy. Note that there must not be any symlinks defined on `myfiles` or any directory under it in the hierarchy.

***Example 9–1 Configuration Parameters: File System Access***

```
<Location /myfiles>
   DAV On
</Location>
```

Example 9–2 shows a configuration for accessing content through Oracle Application Server Portal. After Oracle Application Server Portal has been installed in Oracle Application Server, Oracle HTTP Server configuration file should be populated with a <Location> container directive which points to the Oracle Application Server Portal schema. In this example, the location /portal will be OraDAV-enabled and will (once populated with the correct values) connect to the Oracle Application Server Portal schema so that users can use WebDAV clients to access Oracle Application Server Portal data.

***Example 9–2 Configuration Parameters: Portal Access***

```
<Location /portal>
   DAV Oracle
   DAVParam ORACONNECT dbhost:dbport:dbsid
   DAVParam ORAUSER portal_schema
   DAVParam ORAPASSWORD portal_schema_password
   DAVParam ORAPACKAGENAME portal_schema.wwdav_api_driver
</Location>
```

Each OraDAV driver can use the DAVParam mechanism to create its own driver-specific settings. All DAVParam name-value pairs are passed to the OraDAV driver. In addition to the OraDAV parameters, you should consider whether to specify certain DAV parameters, such as DAVDepthInfinity.

> **See Also:** "DAV Parameter Information" on page 9-27 for information on DAV parameters.

Table 9–1 lists each OraDAV parameter, whether it is required or optional, and its default value. `ORAGetSource` applies only to file system access; the other parameters apply only to OracleAS Portal driver and other (non-file system) access.

***Table 9–1 OraDAV Parameters***

| Name | Required/Optional | Default Value |
|---|---|---|
| ORAConnect | Required[1] | (none) |
| ORAConnectSN | Required[1] | (none) |
| ORAService | Required[1] | (none) |
| ORAUser | Required | (none) |
| ORAPassword | Required[2] | (none) |
| ORAAltPassword | Required[2] | (none) |
| ORAPackageName | Optional | `ORDSYS.DAV_API_DRIVER` |
| ORALockExpirationPad | Optional | 0 (seconds) |
| ORAAllowIndexDetails | Optional | `FALSE` |
| ORAContainerName | Required | (none) |
| ORAGetSource | Optional | (none) |
| ORACacheDirectory | Optional | (none) |
| ORACacheMaxResourceSize | Optional | (none) |
| ORACachePrunePercent | Optional | 25 |
| ORACacheTotalSize | Optional[3] | (none) |
| ORARootPrefix | Optional | (none) |

[1] ORAService, ORAConnect, or OraConnectSN must be specified, but no more than one.

[2] Either ORAPassword or ORAAltPassword must be specified, but not both.

[3] ORACacheTotalSize is required if ORACacheDirectory is used; otherwise, do not specify the parameter.

**Note:** All OraDAV parameters are passed from Oracle HTTP Server to the routines in the `ORAPackageName` package as part of the `context` parameter. Keys are uppercase in Oracle HTTP Server, such as `ORAUSER`, but the values, such as `scott`, are not.

## ORAAllowIndexDetails

In an Oracle HTTP Server environment that is not OraDAV-enabled, `mod_dav` itself does not respond to HTTP `GET` requests. Instead, normal Oracle HTTP Server mechanisms are used to respond to `GET` requests. However, when all your content is in an Oracle database, normal Oracle HTTP Server mechanisms cannot be used to respond to `GET` requests, and thus OraDAV must respond to `GET` requests.

The `ORAAllowIndexDetails` parameter controls how OraDAV responds when a `GET` request is performed on a DAV collection and no `index.html` file is found in that collection (directory). In a typical Oracle HTTP Server environment, a separate module takes control, automatically generating and returning to the client HTML that represents an "index" of the resources (files) in that collection.

An OraDAV-enabled Oracle HTTP Server performs similar actions when responding to a `GET` request on a collection. A Description column (containing links to more detailed information about each resource) is included in the generated index when `ORAAllowIndexDetails` is set to `TRUE`.

The default is `FALSE`, in which case no "Description" column appears in the generated index, and if `?details` is used in a URL, it is ignored and the URL contents are returned.

| Category | Value |
|---|---|
| Applies to | Portal driver and other (non-file system) access |
| Required/Optional | Optional |
| Values | `TRUE/FALSE` |
| Default | `FALSE` |

## ORAAltPassword

Specifies the password associated with the user specified by the `ORAUser` parameter, but the password is a base-64 encoded character string. The `ORAAltPassword` parameter provides an alternative if you do not want the password to appear in unencoded plain text in that parameter.

| Category | Value |
|---|---|
| Applies to | Portal driver and other (non-file system) access |
| Required/Optional | Required, unless `ORAPassword` is specified |
| Values | (character string) |
| Default | (none) |

If the `ORAPassword` parameter is not specified, the `ORAAltPassword` parameter is used for the password.

## ORACacheDirectory

Specifies the directory to use for disk caching operations. If you do not use this parameter, disk caching is not performed for OraDAV operations.

| Category | Value |
|---|---|
| Applies to | Portal driver and other (non-file system) access |
| Required/Optional | Optional |
| Values | (character string) |
| Default | (none) |

The specified directory must exist and be readable by Oracle HTTP Server, but cannot be visible to normal `GET` requests. (If the directory is visible to normal `GET` requests, security measures could be bypassed by users accessing the cache directory.)

The directory should not be an NFS mounted directory, because most UNIX locking mechanisms caution against this. The directory should be located on a file system that supports a "last accessed" time. On Windows systems this means using NTFS (not FAT) formatted partitions.

Do not use the cache directory for anything other than caching. Any files in the cache directory are subject to deletion.

If you use the `ORACacheDirectory` parameter, you must also use the `ORACacheTotalSize` parameter.

**See Also:** "Using Disk Caching with OraDAV" on page 9-23

## ORACacheMaxResourceSize

Specifies a maximum cachable resource size for disk caching operations.

| Category | Value |
|---|---|
| Applies to | Portal driver and other (non-file system) access |
| Required/Optional | Optional |
| Values | (integer, with optional unit character string) |
| Default | (none) |

***Example 9–3 OraCacheMaxResourceSize Parameter***

```
DAVParam ORACacheMaxResourceSize 1024KB
```

Setting in Example 9–3 would prevent OraDAV from caching any resource larger than one megabyte. The goal is to give Web masters the ability to prevent large media files from dominating the cache. However, be aware that the performance benefit from caching a large file is greater than from caching a small file.

You can specify KB (for kilobytes) or MB (for megabytes) after an integer. If you do not specify a unit after the integer, the default unit is bytes.

**See Also:** "Using Disk Caching with OraDAV" on page 9-23

## ORACachePrunePercent

Specifies percentage of disk cache usage to be freed up when the cache is full. When the disk cache is full, the oldest files in the cache are deleted ("pruned") until the cache disk usage is reduced by the `ORACachePrunePercent` value.

| Category | Value |
|---|---|
| Applies to | Portal driver and other (non-file system) access |
| Required/Optional | Optional |
| Values | integer (1 to 100) |
| Default | 25 |

**See Also:** "Using Disk Caching with OraDAV" on page 9-23

## ORACacheTotalSize

Specifies the size of the cache to use for disk caching operations.

| Category | Value |
|---|---|
| Applies to | Portal driver and other (non-file system) access |
| Required/Optional | Optional, unless `ORACacheDirectory` is specified |
| Values | (integer, with optional unit character string) |
| Default | (none) |

***Example 9–4 ORACacheTotalSize Parameter***

```
DAVParam ORACacheTotalSize 1GB
DAVParam ORACacheTotalSize 10485760
```

You can specify MB (for megabytes) or GB (for gigabytes) after an integer, as shown in Example 9–4. If you do not specify a unit after the integer, the default unit is bytes. The maximum value is 4GB.

If you use the `ORACacheDirectory` parameter, you must also use the `ORACacheTotalSize` parameter.

The ORACacheTotalSize value should be large enough to hold either a significant fraction of your Web site, or all of your most frequently accessed files plus 25 percent of more space. If the value is too small, overall performance degrades because of the extra work of writing BLOB data to the file system, and quickly deleting files to make room for newer cache requests.

The actual space utilized by the disk cache might sometimes exceed the ORACacheTotalSize value, possibly by as much as the ORACacheMaxResourceSize value. You should also be aware of file system block size issues that could cause the cache to use more disk space than the ORACacheTotalSize value.

**See Also:** "Using Disk Caching with OraDAV" on page 9-23

## ORAConnect

Specifies the Oracle database to connect to. The value must be in the following format: *database-host*:*database-port*:*database-sid* as shown in Example 9–5.

| Category | Value |
|---|---|
| Applies to | Portal driver and other (non-file system) access |
| Required/Optional | Required, unless ORAService or ORAConnectSN is specified |
| Values | (character string) |
| Default | (none) |

***Example 9–5 ORAConnect Parameter***

```
my-pc.acme.com:1521:mysid
```

The ORAConnect parameter lets you connect to a database that is not included in the tnsnames.ora file.

You must specify one, and no more than one, of the following parameters: ORAService, ORAConnect, or ORAConnectSN.

## ORAConnectSN

Specifies the Oracle database to connect to. The value must be in the following format: <*database-host*:*database-port*:*database-service-name*>, as shown in Example 9–6.

***Example 9–6 ORAConnectSN Parameter***

```
my-pc.acme.com:1521:myservice
```

| Category | Value |
|---|---|
| Applies to | Portal driver and other (non-file system) access |
| Required/Optional | Required, unless ORAService or ORAConnect is specified |
| Values | (character string) |
| Default | (none) |

The ORAConnectSN parameter lets you connect to a database that is not included in the tnsnames.ora file.

You must specify one, and no more than one, of the following parameters: ORAService, ORAConnect, or ORAConnectSN.

## ORAContainerName

Within the schema specified by the ORAUser parameter, there must exist a container. The ORAContainerName parameter specifies the name of the container to use for the location.

| Category | Value |
|---|---|
| Applies to | Portal driver and other (non-file system) access |
| Required/Optional | Required |
| Values | (any valid character string, up to 20 characters) |
| Default | (none) |

## ORAGetSource

Applies only to file system access. It specifies one or more file extensions (including periods) to identify types of files that are not to be executed, but rather opened for editing. Use a comma to separate file extensions. For example:

```
".htm, .html, .jsp1, .jsp2"
```

| Category | Value |
|---|---|
| Applies to | File system access |
| Required/Optional | Optional |
| Values | (character string in double quotation marks) |
| Default | (none) |

The `ORAGetSource` parameter lets you open for editing files that are usually executed as a result of a `GET` operation.

> **Note:** `.jsp` and `.sqljsp` files are by default opened for editing, so you do not need to specify them with the `ORAGetSource` parameter.

## ORALockExpirationPad

Intended to be used in high-latency network environments, to adjust for the "refresh lock" behavior in Microsoft Office. Microsoft Office attempts to refresh locks on DAV resources just before the lock is set to expire. However, if there is network congestion between the Microsoft Office client and the DAV server, the refresh request might arrive too late, that is, after the lock has expired.

OraDAV periodically looks for locks on resources that have expired and deletes those locks. The `ORALockExpirationPad` parameter can be used to provide some additional ("pad") time between when a lock expires and when that lock is deleted. For example, if `ORALockExpirationPad` is set to 120, OraDAV does not actually delete locks until at least two minutes after the expiration time.

| Category | Value |
|---|---|
| Applies to | Portal driver and other (non-file system) access |
| Required/Optional | Optional |
| Values | (number of seconds) |
| Default | 0 |

## ORAPackageName

Identifies the OraDAV driver implementation that is to be called when issuing OraDAV commands. The default is the OraDAV *inter*Media driver, which is the `ORDSYS.DAV_API_DRIVER` package.

| Category | Value |
|---|---|
| Applies to | Portal driver and other (non-file system) access |
| Required/Optional | Required |
| Values | (character string) |
| Default | `ORDSYS.DAV_API_DRIVER` |

## ORAPassword

Specifies the password associated with the user specified by the `ORAUser` parameter.

| Category | Value |
|---|---|
| Applies to | Portal driver and other (non-file system) access |
| Required/Optional | Required, unless `ORAAltPassword` is specified |
| Values | (character string) |
| Default | (none) |

If you do not want to specify the password as an unencoded text string with the `ORAPassword` parameter, you can specify the password as a base-64 encoded string with the `ORAAltPassword` parameter.

## ORARootPrefix

Specifies the directory within the database repository to use as the root. If this parameter is specified, WebDAV clients will see this directory as the `root` and are not be able to see the repository directories that lead up to it.

| Category | Value |
|---|---|
| Applies to | Portal driver and other (non-file system) access |
| Required/Optional | Optional |
| Values | (character string) |
| Default | (none) |

In Example 9–7, assume that the database repository contains the directory `/first/second/third/fourth`, and that `ORARootPrefix` is defined as follows (do not include a trailing slash (/) in the value):

***Example 9–7 ORARootPrefix Parameter***

```
DAVPARAM ORARootPrefix /first/second
```

In this case, WebDAV clients will see the `/third` directory and be able to navigate to the `/third/fourth` directory, but will not be able to see or navigate to the `/first` or `/first/second` directories.

## ORAService

Specifies the Oracle database to connect to. The specified value must match a SID value in the `tnsnames.ora` file as shown in Example 9–8.

***Example 9–8 ORAService Parameter***

```
mydbsid.mydomain.com
```

To connect to a database that is not included in the `tnsnames.ora` file, use the `ORAConnect` parameter. You must specify one, and no more than one, of the following parameters: `ORAService`, `ORAConnect`, or `ORAConnectSN`.

| Category | Value |
|---|---|
| Applies to | Portal driver and other (non-file system) access |
| Required/Optional | Required, unless `ORAConnect` or `ORAConnectSN` is specified |
| Values | (character string matching an entry in the `tnsnames.ora` file) |
| Default | (none) |

## ORAUser

Specifies the database user (schema) to use when connecting to the service specified by the `ORAService` parameter.

This user must have been granted the following privileges:

- `CONNECT`
- `RESOURCE`
- `CREATE TABLESPACE`
- `DROP TABLESPACE`
- `CREATE ANY TRIGGER`

| Category | Value |
|---|---|
| Applies to | Portal driver and other (non-file system) access |
| Required/Optional | Required |
| Values | (character string) |
| Default | (none) |

# WebDAV Security Considerations

Because WebDAV enables read-write capabilities, users on the Internet can write to your Web site or to an Oracle database. A major concern is preventing users from placing an inappropriate file (a "Trojan horse") that can execute on the Web server system. If the WebDAV configuration and authorization is not set up properly, an inappropriate file from the file system can be executed. This problem does not apply to content from an Oracle database, because such content cannot execute in the middle tier.

The HTTP protocol issues `GET` requests both to static and executable files, without differentiation. Oracle HTTP Server executes files based on their location or extension. For example, a shell script (which typically has no file extension) is executed if it is in the `cgi-bin` directory, but is retrieved as a static text file if it is in the `htdocs` directory. On the other hand, a Java Server Page, which has a `.jsp` extension, will normally be executed regardless of its location. However, by default, `mod_oradav` prevents a WebDAV-enabled directory from executing a `.jsp` or `.sqljsp` file. For a file with one of these extensions, `mod_oradav` reads the content directly, bypassing any Oracle HTTP Server logic that attempts to execute the file. Files with these extensions are retrieved as having the `text/plain` MIME type and can be edited. You can add to the list of file types that are never to be executed and always retrieved as `text/plain` by using the `ORAGetSource` parameter.

One way to limit execution of files is to use the Apache `ForceType` directive in a `<Location>` container directive. This forces all content under a location to be retrieved as `text/plain`. However, this simple and sweeping approach may not be what you want in many cases, wherein you want the standard behavior associated with the actual MIME type, for example, for `.gif` files, to be used.

To decide how to handle these security issues with content on file systems, you should determine what kinds of WebDAV users are going to have access to the content. WebDAV users typically fall into two categories: Web authors who want to collaborate and manage a Web site, and end users who want to use WebDAV as a public storage area. End users should never be able to upload and execute a file, so for end users you may want to specify many file extensions with the `ORAGetSource` parameter or to use the `ForceType` directive.

Be sure to apply the standard Basic or Digest authentication and authorization mechanisms supported by Oracle HTTP Server. You probably want to do this for the default location, such as `dav_public`, in the supplied `moddav.conf` file. This restricts who can use your system for remote storage, preventing unauthorized users from filling up your disks. You should always apply Oracle HTTP Server authentication and authorization to authors of the Web site.

You should also provide both an execution context and an editing context, so that Web authors, after being properly authenticated and authorized, can edit a `.jsp` or other executable file and then see how it executes. To do this, create an alias for the directory associated with the execution context, and then DAV-enable the aliased location. For example, assume that you want to be able to execute a script if the URL specifies the `cgi-bin` directory (for example, `http://www.acme.com/cgi-bin/printenv`), but to edit the script if the URL specifies an alias named `edit-cgi-bin` (for example, `http://www.acme.com/edit-cgi-bin/printenv`). In Example 9–9, the configuration file entries achieve this goal, setting up `edit-cgi-bin` as an editing context for content in the `cgi-bin` directory:

***Example 9–9 Editing Context***

```
Alias /edit-cgi-bin /usr/local/apache/cgi-bin
<Location /edit-cgi-bin>
  DAV On
  ForceType text/plain
</Location>
```

# OraDAV Performance Considerations

This section provides information that can help you optimize the performance of various kinds of operations. It contains the following topics:

- Using Disk Caching with OraDAV
- Bypassing Oracle Application Server Web Cache for WebDAV Activities
- Using Oracle Application Server Web Cache for Browsing Activities

## Using Disk Caching with OraDAV

Oracle Application Server can use local file system disk caching with data that is retrieved from an Oracle database. Disk caching is designed to improve the performance of HTTP `GET` operations on frequently accessed database data. When data is requested from the database, it is retrieved and is also stored in a disk cache on the local file system. If a subsequent request is for the same data and if the data is still in the disk cache, Oracle Application Server checks to see if the data has changed in the database (by examining the `etag` value); and if the data has not changed, it is retrieved from the cache, which is more efficient than retrieving a substantial amount of data from the database.

The performance benefit from disk caching is greatest with medium-size to large files (roughly 50 KB and larger). However, with smaller files, the performance benefit is less, and with very small files the performance can be worse with disk caching than without disk caching. For example, if the file `myfile.dat` is requested and if the file size is only 24 bytes, the time required for copying the file from the database to the local system is very small compared to the time required for accessing the database to check if the file has changed. If disk caching is not used, there is no check of the database to see if the file has changed, and the file is copied from the database in all cases.

You can set several OraDAV parameters to control disk caching for OraDAV operations:

- `ORACacheDirectory`
- `ORACacheTotalSize`
- `ORACacheMaxResourceSize`
- `ORACachePrunePercent`

If you specify `ORACacheDirectory`, disk caching for OraDAV operations is enabled; and in this case you must also specify an `ORACacheTotalSize` value, and you can specify `ORACacheMaxResourceSize` and `ORACachePrunePercent` values. If you do not specify `ORACacheDirectory`, disk caching for OraDAV operations is not enabled, and other disk cache-related parameters are not relevant.

> **See Also:** "OraDAV Configuration Parameters" on page 9-8 for information about each parameter.

## Bypassing Oracle Application Server Web Cache for WebDAV Activities

Oracle Application Server Web Cache is a feature that enhances performance for most Web activity, which involves client read-only operations of data on the Web server system. However, Oracle Application Server Web Cache does not cache OraDAV operations, which are designed for read/write capability. Thus, for better performance, WebDAV clients can connect directly to Oracle HTTP Server.

To bypass Oracle Application Server Web Cache for WebDAV clients, you can use port 7778, which is the standard port for Oracle HTTP Server. If you do this, WebDAV clients connects directly to port 7778, resulting in better performance than if Oracle Application Server Web Cache was used.

## Using Oracle Application Server Web Cache for Browsing Activities

If your WebDAV clients always bypass Oracle Application Server Web Cache, you may want to tune Web Cache for read-only clients such as Web browsers. To do so, add the `DAVOraWebCacheReadOnly On` setting for an OraDAV-enabled location in the `httpd.conf` file, as shown in Example 9–10.

***Example 9–10 Using Oracle Application Server Web Cache for Browsing Activities***

```
<Location /dav_public>
  DAV On
  DAVOraWebCacheReadOnly On
</Location>
```

This setting prevents WebDAV clients from performing write operations while using Oracle Application Server Web Cache; however, it does allow read-only activity by Web browsers and WebDAV clients.

> **See Also:** "DAVOraWebCacheReadOnly" on page 9-30 for information on this setting.

# mod_oradav Usage Notes

This section contains usage notes relating to mod_oradav. Some of the information, including most of the material relating to DAV parameters, is taken or adapted from material written by Greg Stein (gstein@lyra.org) and available at the following URL:

http://www.webdav.org/mod_dav/install.html

## Mapping Containers Under the Root Location

Note the following when mapping containers under the root location:

- Do not map the root itself. That is, do not specify <Location />.
- Do not map a container as a subelement in the hierarchy to another container. For example, do not specify the following two containers: <Location /project1> and <Location /project1/project2>. However, it is acceptable to specify <Location /project1> and <Location /project2>.
- Do not create any symlinks to the container or any location under the container in the hierarchy.

## Globalization Support Considerations with OraDAV

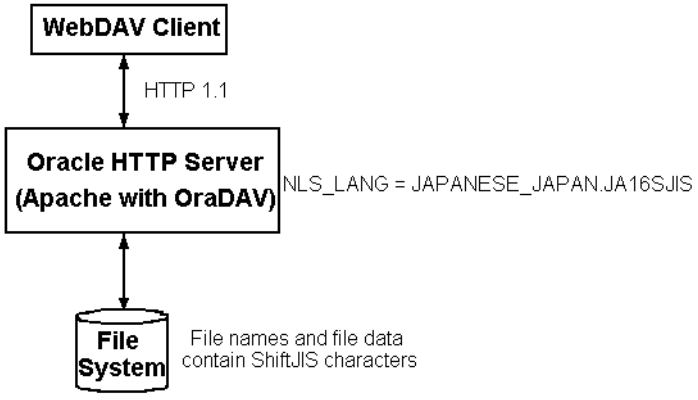
For access to database data, the character set used for client requests, such as in URLs and file names, must be compatible with the character set used for the database. Specifically, if the character set for the database is not the same as for the client requests, the character set for the database must provide for conversion of all possible characters in client requests (and thus must be a superset of the character set for client requests). That is, the character set for the database must not cause replacement characters during the conversion.

When you start Oracle HTTP Server, the NLS_LANG environment variable must reflect the character set for client requests. For example, if file names and URLs contain Kanji characters, you can specify NLS_LANG=JAPANESE_JAPAN.JA16SJIS (for ShiftJIS characters). In this case, the database character set must be one that accommodates SJIS characters, for example, UTF8.

For access to the local file system, as opposed to database access, the character set for the file system must be the same as or compatible with the character set for URLs embedded in client requests. The character set for the file system must provide for conversion of all possible characters in client requests. The `NLS_LANG` parameter value must represent the character set of both the client and the OraDAV server. You must also specify the parameter `DAVOraNLS On`.

For example, assume that you are using Web folders on a system where the files have ShiftJIS characters and that the file system under `dav_public` is represented by the operating system in the `JAPANESE_JAPAN.JA16SJIS` character sets shown in Figure 9–2.

***Figure 9–2 OraDAV Access to File System with ShiftJIS Characters***




In this case, you must do the following:

1. Set the `NLS_LANG` value to `JAPANESE_JAPAN.JA16SJIS`.
2. Include the following in the `httpd.conf` file:

```
<Location /dav_public>
  DAV On
  DAVOraNLS On
</Location>
```

**Note:** If you use Microsoft Internet Explorer with OraDAV and a multibyte character set, you must disable (uncheck) the Internet option (Internet Options, Advanced tab) `Always send URLs as UTF-8`. (By default, this option is enabled.) The requirement to disable this option applies to both database access and file system access.

## DAV Parameter Information

This section describes the following DAV parameters that you can set in the `httpd.conf` file:

- DAVLockDB
- DAVMinTimeout
- DAVDepthInfinity
- DAVOraNLS
- DAVOraReadOnly
- DAVOraWebCacheReadOnly
- LimitXMLRequestBody
- Limit
- LimitExcept

### DAVLockDB

To create the DAV lock database, add a DAVLockDB directive at the top-level of the configuration file (that is, outside a <Directory> or <Location> container directive). The DAVLockDB directive should specify the name of a file that mod_dav creates. The directory in which the file is to be created must exist and, and Oracle HTTP Server process must have write permission to it.

> **Note:** The directory should not be on an NFS-mounted partition. mod_dav uses flock/fcntl to manage access to the database. Some operating systems cannot use these operations on an NFS-mounted partition.

***Example 9–11 DAVLockDB Parameter***

```
DAVLockDB ORACLE_HOME/Apache/var/DAVLock
```

In Example 9–11, the DAV lock database is stored in the *ORACLE_HOME*/Apache/var directory, which must be writable by Oracle HTTP Server process. The file name will be DAVLock when mod_dav needs to create it. (Actually, mod_dav will create one or more files using this file name plus an extension).

The DAVLockDB directive can appear outside of any container or within a <VirtualHost> specification. It only needs to appear once, and a file extension should not be supplied.

### DAVMinTimeout

Specifies the minimum lifetime of a lock in seconds. If a client requests a lock timeout less than DAVMinTimeout value, then the DAVMinTimeout value is used and returned instead. For example, Microsoft's Web Folders defaults to a lock timeout of 2 minutes (120 seconds); however, you might decide to specify 10 minutes (600 seconds) instead, to reduce network traffic and the chance that the client might lose a lock due to network latency.

The DAVMinTimeout directive is optional, and may be used on a per-server or per-directory or location basis. The DAVMinTimeout directive takes a single positive integer. Because this value represents a minimum allowed, setting it to zero (0) disables this feature. The default value for DAVMinTimeout is zero.

### DAVDepthInfinity

A `PROPFIND` request with a `Depth: Infinity` header can impose a large burden on the server. These kinds of requests could "walk" the entire repository, returning information about each resource found. `mod_dav` builds the response in memory, so these kinds of requests can consume a lot of memory. (The memory is released at the end of the request, but the peak memory usage can be high.)

To prevent these kinds of requests, the `DAVDepthInfinity` directive is provided. It is a simple on/off directive, which can be used on a per-server, per-directory or location basis. If the value is set to `off`, these kinds of requests are not allowed. A value of `on` (that is, allowing depth infinity requests) makes it easier for denial of service attacks to occur. However, some clients, such as `sitecopy`, require a `DAVDepthInfinity` value of "`On`".

---

**Note:** The WebDAV Working Group has stated that it is acceptable for DAV servers to refuse these kinds of requests. Properly written client software should not issue such requests, and you should not worry about disabling them.

---

### DAVOraNLS

Provides globalization support for access to the local file systems. This directive specifies whether or not the file names in the file system need to go through conversion using the `NLS_LANG` setting. A value of "`Off`", the default, means that no conversion is needed. A value of "`On`" means that the character set for the file system provides for conversion of all possible characters in client requests.

**See Also:** "Globalization Support Considerations with OraDAV" on page 9-25

### DAVOraReadOnly

Specifies whether or not WebDAV should be used in a read-only mode by WebDAV clients. A value of "`Off`", the default, means that WebDAV clients function normally. A value of "`On`" prevents WebDAV clients from performing write operations while using WebDAV; however, it does allow read-only activity by Web browsers and WebDAV clients.

**See Also:** "DAVOraWebCacheReadOnly" directive on page 9-30

### DAVOraWebCacheReadOnly

Specifies whether or not Oracle Application Server Web Cache should be used in a read-only mode by WebDAV clients. A value of "`Off`", the default, means that Oracle Application Server Web Cache functions normally. A value of "`On`" prevents WebDAV clients from performing write operations while using Oracle Application Server Web Cache; however, it does allow read-only activity by Web browsers and WebDAV clients.

**See Also:**

- "Using Oracle Application Server Web Cache for Browsing Activities" on page 9-24
- "DAVOraReadOnly" directive on page 9-29

### LimitXMLRequestBody

`mod_dav` parses XML request bodies into memory. One technique used in denial of service attacks is to send a large request body at a `mod_dav` server. Oracle HTTP Server defines a directive named `LimitRequestBody`, which limits all methods' request bodies. Unfortunately, this is not an effective mechanism for a `mod_dav` server because large `PUT` operations should be allowed.

To limit just the methods that have an XML request body, `mod_dav` provides the `LimitXMLRequestBody` directive. The default for this value is a compile-time constant, which is set to one million (1000000) bytes in the standard distribution. Setting the value to zero (0) will disable the size limit.

`LimitXMLRequestBody` may be set on a per-server or a per-directory or location basis, and takes a single non-negative integer argument.

## Limit

The DAV and DAVLockDB directives are the only two configuration changes necessary to operate a DAV server. However, it is usually best to secure the site to be writable only by specific authorized users.This requires the use of <Limit>.

***Example 9–12 Securing Site by Using the <Limit> Directive***

```
<Location /mypages>
DAV On
<Limit PUT POST DELETE PROPFIND PROPPATCH MKCOL COPY MOVE LOCK UNLOCK>
Require user greg
</Limit>
</Location>
```

The configuration in Example 9–12 allows only authorized users to manipulate the site. However, it does allow them a bit more freedom than you may like. In particular, they may be able to place an .htaccess file into the target directory, altering your server configuration. The server may have already been configured to not read .htaccess files, but it is best to make sure. Also, you may want to disallow other options within the DAV-enabled directory -- CGI, symbolic links, server-side includes, and so on.

Example 9–13 shows a modified configuration with the additional restrictions placed on it through the addition of AllowOverride None and Options None:

***Example 9–13 Securing Site by Using Additional Restrictions***

```
<Location /mypages>
DAV On
AllowOverride None
Options None
<Limit PUT POST DELETE PROPFIND PROPPATCH MKCOL COPY MOVE LOCK UNLOCK>
Require user greg
</Limit>
</Location>
<Location /mypages>
DAV On
AllowOverride None
Options None
<Limit PUT POST DELETE PROPFIND PROPPATCH MKCOL COPY MOVE LOCK UNLOCK>
Require user greg
</Limit>
</Location>
```

### LimitExcept

Rather than using the <Limit> directive and specifying an exhaustive list of HTTP methods to secure, it is also possible to use the <LimitExcept> directive, as shown in Example 9–14. This directive applies the access restrictions to all methods except for the methods listed.

***Example 9–14 Securing Site Using the <LimitExcept> Directive***

```
<Location /mypages>
 DAV On
 AllowOverride None
 Options None
 <LimitExcept GET HEAD OPTIONS>
 require user webadmin
 </LimitExcept>
</Location>
```

Choosing to use one or the other is a matter of preference. The <Limit> directive is precise and explicit, but the <LimitExcept> directive automatically restricts methods that are added in the future.

## PROPFIND Security

In the example configurations in the preceding sections on the <Limit> and <LimitExcept> directives, the PROPFIND method was limited, even though it is read-only. This is because the PROPFIND method can be used to list all the files in the DAV-enabled directory. For security reasons, it is probably best to protect the list of files from general read access.

An alternative would be to limit the PROPFIND to a group of people, a set of domains, or a set of hosts, while the methods that modify content are limited to just a few authors. This scenario allows, say, your company's employees to browse the files on the server, yet only a few people can change them. Anonymous (non-authenticated) visitors cannot browse or modify.

Finally, you can simply omit PROPFIND from the limits if your Web server is intended as a general, read-only repository of files. This allows anybody to arbitrarily browse the directories and then to fetch the files.

# 10

# Managing Security

This chapter provides an overview of Oracle HTTP Server security features and configuration information for setting up a secure Web site using them.

Topics discussed are:

- About Oracle HTTP Server Security
- Classes of Users and Their Privileges
- Resources Protected
- Authentication and Authorization Enforcement
- Security Services Implemented Within Oracle HTTP Server
- Leveraging Oracle Identity Management Infrastructure

**See Also:** For additional information about security, refer to the following documents:

- The *Oracle Application Server 10g Security Guide* provides an overview of Oracle Application Server security and its core functionality.
- The *Oracle Identity Management Concepts and Deployment Planning Guide* provides guidance for administrators of the Oracle security infrastructure.

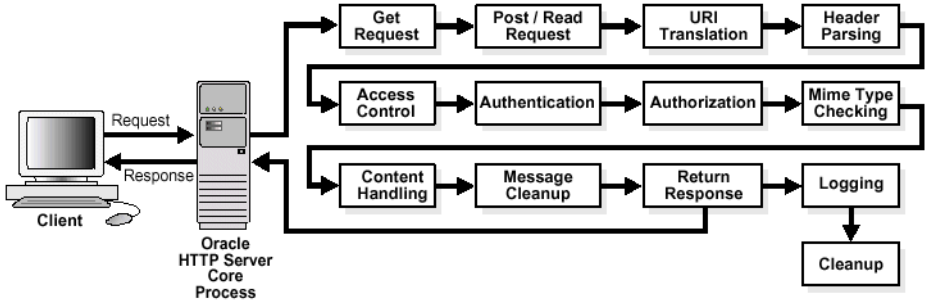
# About Oracle HTTP Server Security

Security can be organized into the three categories of authentication, authorization, and confidentiality. Oracle HTTP Server provides support for all three of these categories. It is based on the Apache Web server, and its security infrastructure is primarily provided by the Apache modules, `mod_auth` and `mod_access`, and the Oracle modules, `mod_ossl` and `mod_osso`. `mod_auth` provides authentication based on user name and password pairs, `mod_access` controls access to the server based on the characteristics of a request, such as hostname or IP address, `mod_ossl` provides confidentiality and authentication with X.509 client certificates over SSL, and `mod_osso` enables **single sign-on** authentication for Web applications.

Based on the Apache model, Oracle HTTP Server provides access control, authentication, and authorization methods that can be configured with access control directives in the `httpd.conf` file. When URL requests arrive at Oracle HTTP Server, they are processed in a sequence of steps determined by server defaults and configuration parameters. The steps for handling URL requests are implemented through a module or plug-in architecture that is common to many Web listeners.

Figure 10–1 shows how URL requests are handled by the server. Each step in this process is handled by a server module depending on how the server is configured. For example, if basic authentication is used, then the steps labeled "Authentication" and "Authorization" in Figure 10–1 represent the processing of the `mod_auth` module.

***Figure 10–1 Steps for Handling URL Requests in Oracle HTTP Server***



## Classes of Users and Their Privileges

Oracle HTTP Server authorizes and authenticates users before allowing them to access, or modify resources on the server. Below are three classes of users that access the server using Oracle HTTP Server, and their privileges.

- Users that access the server without providing any authentication. They have access to unprotected resources only.
- Users that have been authenticated and potentially authorized by modules within Oracle HTTP Server. This includes users authenticated by `mod_auth` and `mod_ossl`. Such users have access to URLs defined in `http.conf` file.

  **See Also:** "Authentication and Authorization Enforcement" on page 10-4

- Users that have been authenticated through `mod_osso` and Single Sign-On server. These users have access to resources allowed by Single Sign-On.

  **See Also:** *Oracle Application Server Single Sign-On Administrator's Guide* for more information.

## Resources Protected

Oracle HTTP Server is configured to protect resources such as:

- Static content such as static HTML pages, graphics interchange format, `.gif`, files, and other static files that Oracle HTTP Server provides directly.
- CGI/FastCGI scripts, simple scripts or programs that Oracle HTTP Server invokes directly.
- Content generated by modules within Oracle HTTP Server. Modules such as `mod_perl`, `mod_dms` generate responses that are returned to the client.
- Oracle Application Server components that exist behind Oracle HTTP Server, including servlets and JSPs running with OC4J that are accessed through `mod_oc4j`. Oracle HTTP Server forms the first line of authentication and authorization for these components, although further authentication may occur at the component level.

# Authentication and Authorization Enforcement

Oracle HTTP Server provides user authentication and authorization at two stages:

- **Host-based Access Control (stage one)**: This is based on the details of the incoming HTTP request and its headers, such as IP addresses or host names.
- **User Authentication and Authorization (stage two)**: This is based on different criteria depending on the HTTP server configuration. The server can be configured to authenticate users with user name and password pairs that are checked against a list of known users and passwords. You can also configure the server to use single sign-on authentication for Web applications or X.509 client certificates over SSL.

## Host-based Access Control

Early in the request processing cycle, access control is applied, which can inhibit further processing based on the host name, IP address, or other characteristics such as browser type. You use the `deny`, `allow`, and `order` directives to set this type of access control. These restrictions are configured with Oracle HTTP Server configuration directives and can be based on particular files, directories, or URL formats using the `<Files>`, `<Directory>`, and `<Location>` container directives as shown in the Example 10–1 below:

***Example 10–1 Host-based Access Control***

```
<Directory /internalonly/>
  order deny, allow
  deny from all
  allow from 192.168.1 us.oracle.com
</Directory>
```

In Example 10–1, the `order` directive determines the order in which Oracle HTTP Server reads the conditions of the `deny` and `allow` directives. The `deny` directive ensures that all requests are denied access. Then, using the `allow` directive, requests originating from any IP address in the 192.168.1.* range, or with the domain name `us.oracle.com` are allowed access to files in the directory `/internalonly/`. It is common practice to specify both `allow` and `deny` in host-based authentication to make the access policy explicit.

If you want to match objects at the file system level, then you must use <Directory> or <Files>. If you want to match objects at the URL level, then you must use <Location>.

> **Note:** Allowing or restricting access based on a host name for Internet access is not considered a very good method of providing security, because host names are easy to spoof. While the same is true of IP addresses, sabotage is more difficult. However, setting access control with intranet IP address ranges is reasonable because the same risks do not apply. This assumes that your firewalls have been properly configured.

## Access Control for Virtual Hosts

To set up access control for virtual hosts, place the AccessConfig directive inside a virtual host container in the server configuration file, httpd.conf. When used in a virtual host container, the AccessConfig directive specifies an access control policy contained in a file. Example 10–2 shows an excerpt from an httpd.conf file which provides the syntax for using AccessConfig this way:

***Example 10–2 Using AccessConfig to Set Up Access Control***

```
...
<VirtualHost ip_address_of_host.some_domain.com>
  ... virtual host directives ...
  AccessConfig conf/access.conf
</VirtualHost>
```

### Using mod_access and mod_setenvif for Host-based Access Control

Using host-based access control schemes, you can control access to restricted areas based on where HTTP requests originate. Oracle HTTP Server uses `mod_access` and `mod_setenvif` to perform host-based access control. `mod_access` provides access control based on client hostname, IP address, or other characteristics of the client request, and `mod_setenvif` provides the ability to set environment variables based upon attributes of the request. When you enter configuration directives into the `httpd.conf` file that use these modules, the server fulfills or denies requests based on the address or name of the host, or based on the HTTP request header contents.

You can use host-based access control to protect static HTML pages, applications, or components.

Oracle HTTP Server supports four host-based access control schemes:

- Controlling Access by IP Address
- Controlling Access by Domain Name
- Controlling Access by Network or Netmask
- Controlling Access with Environment Variables

All of these allow you to specify the machines from which access to protected areas is granted or denied. Your decision to choose one or more of the host-based access control schemes is determined by which scheme most efficiently protects your restricted content and applications, or which scheme is easiest to maintain.

**Controlling Access by IP Address** Controlling access with IP addresses is a preferred method of host-based access control. It does not require DNS lookups that consume time, system resources, and make your server vulnerable to DNS spoofing attacks.

***Example 10–3 Controlling Access by IP Address***

```
<Directory /secure_only/>
  order deny,allow
  deny from all
  allow from 207.175.42.*
</Directory>
```

In Example 10–3, requests originating from all IP addresses except 207.175.42.* range are denied access to the `/secure_only/` directory.

**Controlling Access by Domain Name** Domain name-based access control can be used with IP address-based access control to solve the problem of IP addresses changing without warning. When you combine these methods, if an IP address changes, then the secure areas of your site are still protected because the domain names you want to keep out will still be denied access.

To combine domain name-based with IP address-based access control, use the syntax shown in Example 10–4:

***Example 10–4 controlling Access by Domain Name***

```
<Directory /co_backgr/>
  order allow,deny
  allow from all
  # 141.217.24.* is the IP for malicious.cracker.com
  deny from malicious.cracker.com 141.217.24.*
</Directory>
```

In Example 10–4, all requests for directory `/co_backgr/` are accepted except those that originate from the domain name `malicious.cracker.com` or the IP address 141.217.24.* range. Although this is not a fool proof precaution against domain name or IP address spoofing, it protects your site from `malicious.cracker.com` even if they change their IP address.

**Controlling Access by Network or Netmask** You can control access based on subsets of networks, specified by IP address. The syntax is shown in Example 10–5:

***Example 10–5 Controlling Access by Network or Netmask***

```
<Directory /payroll/>
  order deny,allow
  deny from all
  allow from 10.1.0.0/255.255.0.0
</Directory>
```

In Example 10–5, access is allowed from a network/netmask pair. A netmask shows how an IP address is to be divided into network, subnet, and host identifiers. Netmasks enable you to refer to only the host ID portion of an IP address.

The netmask in Example 10–5, 255.255.0.0, is the default netmask setting for a Class B address. The binary ones (decimal 255) mask the network ID and the binary zeroes (decimal 0) retain the host ID of a given IP address.

**Controlling Access with Environment Variables** You can use arbitrary environment variables for access control, instead of using IP addresses or domain names. Use `BrowserMatch` and `SetEnvIf` directives for this type of access control.

> **Note:** Typically, `BrowserMatch` and `SetEnvIf` are not used to implement security policies. Instead they are used to provide different handling of requests based on browser types and versions.

Use `BrowserMatch` when you want to base access on the type of browser used to send a request. For instance, if you want to allow access only to requests that come from a Netscape browser, then use the syntax shown in Example 10–6:

***Example 10–6 Controlling Access with Environment Variables***

```
BrowserMatch ^Mozilla netscape_browser
<Directory /mozilla-area/>
  order deny,allow
  deny from all
  allow from env=netscape_browser
</Directory>
```

Use `SetEnvIf` when you want to base access on header information contained in the HTTP request. For instance, if you want to deny access from any browsers using HTTP version 1.0 or earlier, then use the syntax shown in Example 10–7:

***Example 10–7 Controlling Access with SetEnv***

```
SetEnvIf Request_Protocol ^HTTP/1.1 http_11_ok
<Directory /http1.1only/>
  order deny,allow
  deny from all
  allow from env=http_11_ok
</Directory>
```

**See Also:** "Scope of Directives" on page 2-6

## User Authentication and Authorization

Basic authentication prompts for a user name and password before serving an HTTP request. When a browser requests a page from a protected area, Oracle HTTP Server responds with an unauthorized message (status code 401) containing a `WWW-Authenticate:` header and the name of the realm configured by the configuration directive, `AuthName`. When the browser receives this response, it prompts for a user name and password. After the user enters a user name and password combination, the browser sends this information back to the server in an Authorization header. In the authorization header message, the user name and password are encoded as a base 64 encoded string.

User authorization involves checking the authenticated user against an access control list that is associated with a specific server resource such as a file or directory. To configure user authorization, place the `require` directive in the `httpd.conf` file, usually within a virtual host container. User authorization is commonly used in combination with user authentication. After the server has authenticated a user's user name and password, then the server compares the user to an access control list associated with the requested server resource. If Oracle HTTP Server finds the user or the user's group on the list, then the resource is made available to that user.

### Using mod_auth to Authenticate Users

User authentication is based on user names and passwords that are checked against a list of known users and passwords. These user name and password pairs may be stored in a variety of forms, such as a text file, database, or directory service. Then configuration directives are used in `httpd.conf` to configure this type of user authentication on the server. `mod_auth` uses the `AuthUserFile` directive to set up basic authentication. It supports only files.

Any authentication scheme that you devise requires that you use a combination of the configuration directives listed in Table 10–1.

***Table 10–1 Directives Descriptions***

| Directive Name | Description |
|---|---|
| `AuthName` | Defines the name of the realm in which the user names and passwords are valid. Use quotation marks if the name includes spaces. |
| `AuthType` | Specifies the authentication type. Most authentication modules use basic authentication, which transmits user names and passwords in clear text. This is not recommended. |
| `AuthUserFile` | Specifies the path to a file that contains user names and passwords. |
| `AuthGroupFile` | Specifies the path to a file that contains group names and their members. |

### Using mod_osso to Authenticate Users

mod_osso enables single-sign on for Oracle HTTP Server. mod_osso examines incoming requests and determines whether the resource requested is protected, and if so, retrieves the Oracle HTTP Server cookie for the user.

Through mod_osso, Oracle HTTP Server becomes a single sign-on (SSO) partner application enabled to use SSO to authenticate users and obtain their identity using Oracle Application Server Single Sign-On, and to make user identities available to Web applications as an Apache header variable.

Using mod_osso, Web applications can register URLs that require SSO authentication. When Oracle HTTP Server receives URL requests, mod_osso detects which requests require SSO authentication and redirects them to the SSO server. Once SSO server authenticates the users, it passes the user's authenticated identity back to mod_osso in a secure token, or cookie. mod_osso retrieves the user's identity from the cookie and propagates the user's identity information to applications running in Oracle HTTP Server instance. mod_osso can propagate the user's identity information to applications running in CGI, and those running in OC4J, and it can also authenticate users for access to static files.

**See Also:**

- *Oracle Application Server Single Sign-On Application Developer's Guide* for more information on mod_osso and Oracle Application Server Single Sign-On.
- "Leveraging Oracle Identity Management Infrastructure" on page 10-53 for information on how mod_ossl uses Oracle Identity Management.

### Using mod_ossl to Authenticate Users

Secure Sockets Layer (SSL) is an encrypted communication protocol that is designed to securely send messages across the Internet. It resides between Oracle HTTP Server on the application layer and the TCP/IP layer, transparently handling encryption and decryption when a secure connection is made by a client.

One common use of SSL is to secure Web HTTP communication between a browser and a Web server. This case does not preclude the use of non-secured HTTP. The secure version is simply HTTP over SSL (named HTTPS). The differences are that HTTPS uses the URL scheme `https://` rather than `http://`, and its default communication port is 4443.

`mod_ossl` is a plug-in to Oracle HTTP Server that enables the server to use SSL. `mod_ossl` replaces `mod_ssl` in the Oracle HTTP Server distribution. Oracle no longer supports `mod_ssl`.

> **See Also:** "Using mod_ossl" on page 10-14 for detailed information regarding `mod_ossl`.

### Enabling SSL

By default, SSL is disabled when you install Oracle Application Server. If you want to enable SSL after installation, perform the following steps:

1. Open `opmn.xml` in a text editor.
2. In the `<ias-component id=HTTP_Server>` entry, change the start mode from “ssl-disabled” to “ssl-enabled”. After modification is made, the entry should look like the following:

   ```
   <data id="start-mode" value="ssl-enabled"/>
   ```

3. Save and close `opmn.xml`.
4. Reload OPMN using the following command:

   ```
   opmnctl reload
   ```

5. Stop Oracle HTTP Server using Application Server Control, or with the following command:

   - UNIX: *ORACLE_HOME*/opmn/bin> opmnctl [verbose] stopproc ias-component=HTTP_Server
   - Windows: *ORACLE_HOME*\opmn\bin> opmnctl [verbose] stopproc ias-component=HTTP_Server

   **See Also:** "Application Server Control" on page 1-8

6. Start Oracle HTTP Server using Application Server Control, or with the following command:

   - UNIX: *ORACLE_HOME*/opmn/bin> opmnctl [verbose] startproc ias-component=HTTP_Server
   - Windows: *ORACLE_HOME*\opmn\bin> opmnctl [verbose] startproc ias-component=HTTP_Server

   **See Also:** "Application Server Control" on page 1-8

7. You can verify if SSL was enabled successfully by navigating to the SSL port, for example:

   ```
   HTTPS://hostname:4443
   ```

---

**Note:** The steps above enable SSL for Oracle HTTP Server using a default insecure certificate. To achieve completely secure SSL communication with Oracle HTTP Server, obtain and configure a real certificate within `mod_ossl`.

---

# Security Services Implemented Within Oracle HTTP Server

Oracle HTTP Server provides security services that enable you to protect your server from unwanted users and malicious attacks. These security services ensure secure data exchanged between client and the server.

`mod_ossl` enables secure connections between Oracle HTTP Server and a browser client by using an Oracle-provided encryption mechanism over SSL. It also provides data integrity and strong authentication for users and HTTP servers.

Data exchange between `mod_oc4j` and OC4J can be made more secure through *port tunneling*. Port tunneling offers a higher degree of security by allowing all communication between Oracle HTTP Server and OC4J to happen on a single port using SSL.

These security services are further discussed in the following topics:

- Using mod_ossl
- Understanding Port Tunneling

## Using mod_ossl

`mod_ossl` provides standard support for HTTPS protocol connections to Oracle Application Server. It enables secure connections between Oracle HTTP Server and a browser client by using an Oracle-provided encryption mechanism over SSL. It may also be used for authentication over the Internet through the use of digital certificate technology. It supports SSL v. 3.0, and provides:

- Encrypted communication between client and server, using **RSA** or **DES** encryption standards.
- Integrity checking of client-server communication using **MD5** or **SHA** checksum algorithms.
- Certificate management with Oracle **wallet**s.

Table 10–2 identifies the differences between `mod_ossl`, and `mod_ssl`.

***Table 10–2 Differences between mod_ossl and mod_ssl***

| Feature | mod_ossl | mod_ssl |
|---|---|---|
| SSL versions supported | 3.0 | 2.0, 3.0, TLS 1.0 |
| Certificate management | Oracle Wallet[1, 2] | Text file |

[1] Oracle Wallet Manager is a tool that manages certificates for mod_ossl.
[2] Supports obfuscated passwords.

The `mod_ssl` directives listed below are not supported by `mod_ossl`.

- `SSLRandomSeed`
- `SSLCertificateFile`
- `SSLCertificateKeyFile`
- `SSLCertificateChainFile`
- `SSLCACertificateFile`
- `SSLCACertificatePath`
- `SSLVerifyDepth`

**Caution:** The server will not start if these directives are used.

### Using mod_ossl Directives

To configure SSL for your Oracle HTTP Server, enter the `mod_ossl` directives you want to use in the `httpd.conf` file.

The following directive are described below:

- SSLAccelerator
- SSLCARevocationFile
- SSLCARevocationPath
- SSLCipherSuite
- SSLEngine
- SSLLog
- SSLLogLevel
- SSLMutex
- SSLOptions
- SSLPassPhraseDialog
- SSLProtocol
- SSLRequire
- SSLRequireSSL
- SSLSessionCache
- SSLSessionCacheTimeout
- SSLVerifyClient
- SSLWallet
- SSLWalletPassword

**SSLAccelerator** Specifies if SSL accelerator is used. Currently only nFast card is supported.

| Category | Value |
|---|---|
| Valid Values | `yes/no` |
| Syntax | `SSLAccelerator yes\|no` |
| Default | `SSLAccelerator no` |
| Context | server configuration |

**SSLCARevocationFile** Specifies the file where you can assemble the Certificate Revocation Lists (CRLs) from **CA**s (Certificate Authorities) that you accept certificates from. These are used for client authentication. Such a file is the concatenation of various **PEM**-encoded CRL files in order of preference. This directive can be used alternatively or additionally to SSLCARevocationPath.

| Category | Value |
|---|---|
| Syntax | `SSLCARevocationFile` *`file_name`* |
| Example | `SSLCARevocationFile /`*`ORACLE_HOME`*`/Apache/conf/ssl.crl/ca_bundle.crl` |
| Default | None |
| Context | server configuration, virtual host |

**SSLCARevocationPath** Specifies the directory where **PEM**-encoded Certificate Revocation Lists (CRLs) are stored. These CRLs come from the **CA**s (Certificate Authorities) that you accept certificates from. If a client attempts to authenticate itself with a certificate that is on one of these CRLs, then the certificate is revoked and the client cannot authenticate itself with your server.

| Category | Value |
|---|---|
| Syntax | `SSLCARevocationPath` *`path/to/CRL_directory/`* |
| Example | `SSLCARevocationPath` */`ORACLE_HOME`*`/Apache/conf/ssl.crl/` |
| Default | None |
| Context | server configuration, virtual host |

**SSLCipherSuite** Specifies the SSL **cipher suite** that the client can use during the SSL handshake. This directive uses a colon-separated cipher specification string to identify the cipher suite. Table 10–3 shows the tags you can use in the string to describe the cipher suite you want.

Tags are joined together with prefixes to form cipher specification string.

| Category | Value |
|---|---|
| Valid Values | `none`: Adds the cipher to the list<br>`+` : Adds the cipher to the list and place them in the correct location in the list<br>`-` : Remove the cipher from the list (can be added later)<br>`!` : Remove the cipher from the list permanently |
| Example | `SSLCipherSuite` *`ALL:!LOW:!DH`*<br>In this example, all ciphers are specified except low strength ciphers and those using the **Diffie-Hellman key negotiation algorithm**. |
| Syntax | `SSLCipherSuite` *`cipher-spec`* |
| Default | None |
| Context | server configuration, virtual host, directory |

***Table 10–3 SSLCipher Suite Tags***

| Function | Tag | Meaning |
|---|---|---|
| Key exchange | kRSA | RSA key exchange |
| Key exchange | kDHr | Diffie-Hellman key exchange with RSA key |
| Authentication | aNULL | No authentication |
| Authentication | aRSA | RSA authentication |
| Authentication | aDH | Diffie-Hellman authentication |
| Encryption | eNULL | No encryption |
| Encryption | DES | DES encoding |
| Encryption | 3DES | Triple DES encoding |
| Encryption | RC4 | RC4 encoding |
| Data Integrity | MD5 | MD5 hash function |
| Data Integrity | SHA | SHA hash function |
| Aliases | SSLv3 | All SSL version 3.0 ciphers |
| Aliases | EXP | All export ciphers |
| Aliases | EXP40 | All 40-bit export ciphers only |
| Aliases | EXP56 | All 56-bit export ciphers only |
| Aliases | LOW | All low strength ciphers (export and single DES) |
| Aliases | MEDIUM | All ciphers with 128-bit encryption |
| Aliases | HIGH | All ciphers using triple DES |
| Aliases | RSA | All ciphers using RSA key exchange |
| Aliases | DH | All ciphers using Diffie-Hellman key exchange |

**Note:** There are restrictions if export versions of browsers are used. Oracle module, `mod_ossl`, supports RC4-40 encryption only when the server uses 512 bit key size wallets.

*Table 10–4 Cipher Suites Supported in Oracle Advanced Security 9i*

| Cipher Suite | Authentication | Encryption | Data Integrity |
|---|---|---|---|
| SSL_RSA_WITH_3DES_EDE_CBC_SHA | RSA | 3DES EDE CBC | SHA |
| SSL_RSA_WITH_RC4_128_SHA | RSA | RC4 128 | SHA |
| SSL_RSA_WITH_RC4_128_MD5 | RSA | RC4 128 | MD5 |
| SSL_RSA_WITH_DES_CBC_SHA | RSA | DES CBC | SHA |
| SSL_DH_anon_WITH_3DES_EDE_CBC_SHA | DH anon | 3DES EDE CBC | SHA |
| SSL_DH_anon_WITH_RC4_128_MD5 | DH anon | RC4 128 | MD5 |
| SSL_RSA_WITH_3DES_EDE_CBC_SHA | RSA | 3DES EDE CBC | SHA |
| SSL_DH_anon_WITH_DES_CBC_SHA | DH anon | DES CBC | SHA |
| SSL_RSA_EXPORT_WITH_RC4_40_MD5 | RSA | RC4 40 | MD5 |
| SSL_RSA_EXPORT_WITH_DES40_CBC_SHA | RSA | DES40 CBC | SHA |
| SSL_DH_anon_EXPORT_WITH_RC4_40_MD5 | DH anon | RC4 40 | MD5 |
| SSL_DH_anon_EXPORT_WITH_DES40_CBC_SHA | DH anon | DES40 CBC | SHA |

**SSLEngine** Toggles the usage of the SSL Protocol Engine. This is usually used inside a `<VirtualHost>` section to enable SSL for a particular virtual host. By default, the SSL Protocol Engine is disabled for both the main server and all configured virtual hosts.

***Example 10–8 Using SSL Engine Directive***

```
<VirtualHost_dafault_:4443>
  SSLEngine on
  ...
</VirtualHost>
```

| Category | Value |
|---|---|
| Syntax | `SSLEngine on\|off` |
| Default | `SSLEngine off` |
| Context | server configuration, virtual host |

**SSLLog** Specifies where the SSL engine log file will be written. (Error messages will also be duplicated to the standard Oracle HTTP Server log file specified by the ErrorLog directive.)

Place this file at a location where only root can write, so that it cannot be used for symlink attacks. If the filename does not begin with a slash (/), it is assumed to be relative to the `ServerRoot`. If the filename begins with a bar (|), then the string following the bar is expected to be a path to an executable program to which a reliable pipe can be established.

This directive should occur only once per virtual server configuration.

| Category | Value |
|---|---|
| Syntax | `SSLVerifyClient` *`path/to/filename`* |
| Default | None |
| Context | server configuration, virtual host |

**SSLLogLevel** Specifies the verbosity degree of the SSL engine log file.

| Category | Value |
|---|---|
| Valid Values | The levels are (in ascending order, where each level is included in the levels above it):<br>■ `none`: No dedicated SSL logging is done. Messages of type 'error' are duplicated to the standard HTTP server log file specified by the `ErrorLog` directive.<br>■ `error`: Only messages of the type 'error' (conditions that stop processing) are logged.<br>■ `warn`: Messages that notify of non-fatal problems (conditions that do not stop processing) are logged.<br>■ `info`: Messages that summarize major processing actions are logged.<br>■ `trace`: Messages that summarize minor processing actions are logged.<br>■ `debug`: Messages that summarize development and low-level I/O operations are logged. |
| Syntax | `SSLLogLevel` *`level`* |
| Default | None |
| Context | server configuration, virtual host |

**SSLMutex** Type of semaphore (lock) for SSL engine's mutual exclusion of operations that have to be synchronized between Oracle HTTP Server processes.

| Category | Value |
|---|---|
| Valid Values | ■ `none`: Uses no mutex at all. Not recommended, because the mutex synchronizes the write access to the SSL session cache. If you do not configure a mutex, the session cache can become garbled.<br>■ `file:`*`path/to/mutex`*: Uses a file for locking. The process ID (PID) of the Oracle HTTP Server parent process is appended to the filename to ensure uniqueness. If the filename does not begin with a slash (/), it is assumed to be relative to `ServerRoot`. This setting is not available on Windows.<br>■ `sem`: Uses an operating system semaphore to synchronize writes. On UNIX, it would be a Sys V IPC semaphore; on Windows, it is a Windows Mutex. This is the best choice, if the operating system supports it. |
| Example | `SSLMutex file:`*`/usr/local/apache/logs/ssl_mutex`* |
| Syntax | `SSLMutex` *`type`* |
| Default | `SSLMutex` *`none`* |
| Context | server configuration |

**SSLOptions** Controls various runtime options on a per-directory basis. In general, if multiple options apply to a directory, the most comprehensive option is applied (options are not merged). However, if all of the options in an `SSLOptions` directive are preceded by a plus ('+') or minus ('-') symbol, then the options are merged. Options preceded by a plus are added to the options currently in force, and options preceded by a minus are removed from the options currently in force.

| Category | Value |
|---|---|
| Valid Values | ■ `StdEnvVars`: Creates the standard set of CGI/SSI environment variables that are related to SSL. This is disabled by default because the extraction operation uses a lot of CPU time and usually has no application when serving static content. Typically, you only enable this for CGI/SSI requests.<br>■ `ExportCertData`: Enables the following additional CGI/SSI variables:<br>`SSL_SERVER_CERT`<br>`SSL_CLIENT_CERT`<br>`SSL_CLIENT_CERT_CHAIN_n` (where n= 0, 1, 2...)<br>These variables contain the Privacy Enhanced Mail (**PEM**)-encoded X.509 certificates for the server and the client for the current HTTPS connection, and can be used by CGI scripts for deeper certificate checking. All other certificates of the client certificate chain are provided. This option is "Off" by default because there is a performance cost associated with using it.<br>`SSL_CLIENT_CERT_CHAIN_n` variables are in the following order: `SSL_CLIENT_CERT_CHAIN_0` is the intermediate CA who signs `SSL_CLIENT_CERT`. `SSL_CLIENT_CERT_CHAIN_1` is the intermediate CA who signs `SSL_CLIENT_CERT_CHAIN_0`, and so forth, with `SSL_CLIENT_ROOT_CERT` as the root CA.<br>■ `FakeBasicAuth`: Translates the subject **distinguished name** of the client **X.509** certificate into an HTTP basic authorization user name. This means that the standard HTTP server authentication methods can be used for access control. Note that no password is obtained from the user; the string 'password' is substituted. |

| Category | Value |
|---|---|
| Valid Values (for `SSLOptions` continued) | ■ `StrictRequire`: Denies access when, according to `SSLRequireSSL` or `SSLRequire` directives, access should be forbidden. Without `StrictRequire`, it is possible for a `'Satisfy any'` directive setting to override the `SSLRequire` or `SSLRequireSSL` directive, allowing access if the client passes the host restriction or supplies a valid user name and password.<br>Thus, the combination of `SSLRequireSSL` or `SSLRequire` with `SSLOptions +StrictRequire` gives `mod_ossl` the ability to override a `'Satisfy any'` directive in all cases.<br>■ `CompatEnvVars`: Exports obsolete environment variables for backward compatibility to Apache SSL 1.x, `mod_ssl` 2.0.x, Sioux 1.0, and Stronghold 2.x. Use this to provide compatibility to existing CGI scripts.<br>■ `OptRenegotiate`: This enables optimized SSL connection renegotiation handling when SSL directives are used in a per-directory context. |
| Syntax | `SSLOptions` *`[+-] option`* |
| Default | None |
| Context | server configuration, virtual host, directory |

**SSLPassPhraseDialog** Type of pass phrase dialog for wallet access. `mod_ossl` asks the administrator for a pass phrase in order to access the wallet.

| Category | Value |
|---|---|
| Valid Values | ■ `builtin`: when the server is started, `mod_ossl` prompts for a password for each wallet.<br>This cannot be used when Oracle HTTP Server is managed by OPMN. No user interaction is allowed when Oracle HTTP Server is started by OPMN.<br>■ `exec:`*`path/to/program`* - when the server is started, `mod_ossl` calls an external program configured for each wallet. This program is invoked with two arguments: *`servername:portnumber`* and `RSA` or `DSA`. |
| Syntax | `SSLPassPhraseDialog` *type* |
| Example | `SSLPassPhraseDialog exec:`*`/usr/local/apache/sbin/pfilter`* |
| Default | `SSLPassPhraseDialog` *`builtin`* |
| Context | server configuration |

**SSLProtocol** Specifies SSL protocol(s) for `mod_ossl` to use when establishing the server environment. Clients can only connect with one of the specified protocols.

| Category | Value |
|---|---|
| Valid Values | `SSLv3`<br>SSL version 3.0 |
| Example | To specify only SSL version 3.0, set this directive to the following:<br>`SSLProtocol +`*`SSLv3`* |
| Syntax | `SSLProtocol` *`[+-] protocol`* |
| Default | `SSLProtocol +SSLv3` |
| Context | server configuration, virtual host |

**SSLRequire** Denies access unless an arbitrarily complex boolean expression is true. The expression must match the syntax below (given as a BNF grammar notation):

| Category | Value |
|---|---|
| | `expr ::= "true" \| "false"`<br>`"!" expr`<br>`expr "&&" expr`<br>`expr "\|\|" expr`<br>`"(" expr ")"` |
| | `comp ::=word "==" word \| word "eq" word`<br>`word "!=" word \|word "ne" word`<br>`word "<" word \|word "lt" word`<br>`word "<=" word \|word "le" word`<br>`word ">" word \|word "gt" word`<br>`word ">=" word \|word "ge" word`<br>`word "=~" regex`<br>`word "!~" regex`<br>`wordlist ::= word`<br>`wordlist "," word` |
| | `word ::= digit`<br>`cstring`<br>`variable`<br>`function` |
| | `digit ::= [0-9]+` |
| | `cstring ::= "..."` |
| | `variable ::= "%{varname}"`<br><br>Table 10–5 and Table 10–6 list standard and SSL variables. These are valid values for varname. |
| | `function ::= funcname "(" funcargs ")"`<br><br>For funcname, the following function is available:<br>`file(`*`filename`*`)`<br>The file function takes one string argument, the filename, and expands to the contents of the file. This is useful for evaluating the file's contents against a regular expression. |
| Syntax | `SSLRequire` *`expression`* |
| Default | None |
| Context | directory |

Table 10–5 lists the standard variables for `SSLRequire` varname.

***Table 10–5 Standard Variables for SSLRequire Varname***

| Standard Variables | Standard Variables | Standard Variables |
|---|---|---|
| HTTP_USER_AGENT | PATH_INFO | AUTH_TYPE |
| HTTP_REFERER | QUERY_STRING | SERVER_SOFTWARE |
| HTTP_COOKIE | REMOTE_HOST | API_VERSION |
| HTTP_FORWARDED | REMOTE_IDENT | TIME_YEAR |
| HTTP_HOST | IS_SUBREQ | TIME_MON |
| HTTP_PROXY_CONNECTION | DOCUMENT_ROOT | TIME_DAY |
| HTTP_ACCEPT | SERVER_ADMIN | TIME_HOUR |
| HTTP:headername | SERVER_NAME | TIME_MIN |
| THE_REQUEST | SERVER_PORT | TIME_SEC |
| REQUEST_METHOD | SERVER_PROTOCOL | TIME_WDAY |
| REQUEST_SCHEME | REMOTE_ADDR | TIME |
| REQUEST_URI | REMOTE_USER | ENV:variablename |
| REQUEST_FILENAME | | |

Table 10–6 lists the SSL variables for `SSLRequire` varname.

***Table 10–6 SSL Variables for SSLRequire Varname***

| SSL Variables | SSL Variables | SSL Variables |
|---|---|---|
| HTTPS | SSL_PROTOCOL | SSL_CIPHER_ALGKEYSIZE |
| SSL_CIPHER | SSL_CIPHER_EXPORT | SSL_VERSION_INTERFACE |
| SSL_CIPHER_USEKEYSIZE | SSL_VERSION_LIBRARY | SSL_SESSION_ID |
| SSL_CLIENT_V_END | SSL_CLIENT_M_SERIAL | SSL_CLIENT_V_START |
| SSL_CLIENT_S_DN_ST | SSL_CLIENT_S_DN | SSL_CLIENT_S_DN_C |
| SSL_CLIENT_S_DN_CN | SSL_CLIENT_S_DN_O | SSL_CLIENT_S_DN_OU |
| SSL_CLIENT_S_DN_G | SSL_CLIENT_S_DN_T | SSL_CLIENT_S_DN_I |
| SSL_CLIENT_S_DN_UID | SSL_CLIENT_S_DN_S | SSL_CLIENT_S_DN_D |
| SSL_CLIENT_I_DN_C | SSL_CLIENT_S_DN_Email | SSL_CLIENT_I_DN |

*Table 10–6 SSL Variables for SSLRequire Varname (Cont.)*

| SSL Variables | SSL Variables | SSL Variables |
|---|---|---|
| SSL_CLIENT_I_DN_O | SSL_CLIENT_I_DN_ST | SSL_CLIENT_I_DN_L |
| SSL_CLIENT_I_DN_T | SSL_CLIENT_I_DN_OU | SSL_CLIENT_I_DN_CN |
| SSL_CLIENT_I_DN_S | SSL_CLIENT_I_DN_I | SSL_CLIENT_I_DN_G |
| SSL_CLIENT_I_DN_Email | SSL_CLIENT_I_DN_D | SSL_CLIENT_I_DN_UID |
| SSL_CLIENT_CERT | SSL_CLIENT_CERT_ CHAIN_n | SSL_CLIENT_ROOT_CERT |
| SSL_CLIENT_VERIFY | SSL_CLIENT_M_VERSION | SSL_SERVER_M_VERSION |
| SSL_SERVER_V_START | SSL_SERVER_V_END | SSL_SERVER_M_SERIAL |
| SSL_SERVER_S_DN_C | SSL_SERVERT_S_DN_ST | SSL_SERVER_S_DN |
| SSL_SERVER_S_DN_OU | SSL_SERVER_S_DN_CN | SSL_SERVER_S_DN_O |
| SSL_SERVER_S_DN_I | SSL_SERVER_S_DN_G | SSL_SERVER_S_DN_T |
| SSL_SERVER_S_DN_D | SSL_SERVER_S_DN_UID | SSL_SERVER_S_DN_S |
| SSL_SERVER_I_DN | SSL_SERVER_I_DN_C | SSL_SERVER_S_DN_Email |
| SSL_SERVER_I_DN_L | SSL_SERVER_I_DN_O | SSL_SERVER_I_DN_ST |
| SSL_SERVER_I_DN_CN | SSSL_SERVER_I_DN_T | SSL_SERVER_I_DN_OU |
| SSL_SERVER_I_DN_G | SSL_SERVER_I_DN_I | |

**SSLRequireSSL** Denies access to clients not using SSL. This is a useful directive for absolute protection of a SSL-enabled virtual host or directories in which configuration errors could create security vulnerabilities.

| Category | Value |
|---|---|
| Syntax | `SSLRequireSSL` |
| Default | None |
| Context | directory |

**SSLSessionCache** Specifies the global/interprocess session cache storage type. The cache provides an optional way to speed up parallel request processing.

| Category | Value |
|---|---|
| Valid Values | ■ `none`: disables the global/interprocess session cache. Produces no impact on functionality, but makes a major difference in performance.<br>■ `shmht:`*`/path/to/datafile[bytes]`*: Uses a high-performance hash table (`bytes` specifies approximate size) inside a shared memory segment in RAM, which is established by the `/path/to/datafile`. This hash table synchronizes the local SSL memory caches of the server processes.<br>■ `shmcb:`*`/path/to/datafile[bytes]`*: Uses a high-performance Shared Memory Cyclic Buffer (SHMCB) session cache to synchronize the local SSL memory caches of the server processes. The performance of `shmcb` is more uniform in all environments when compared to `shmht`. |
| Syntax | `SSLSessionCache` *`type`* |
| Examples | `SSLSessionCache shmht:` */ORACLE_HOME*`/Apache/Apache/logs/ssl_scache(512000)`<br>`SSLSessionCache shmcb:` */ORACLE_HOME*`/Apache/Apache/logs/ssl_scache(512000)` |
| Default | `SSLSessionCache` *none* |

**SSLSessionCacheTimeout** Specifies the number of seconds before a SSL session in the session cache expires.

| Category | Value |
|---|---|
| Syntax | `SSLSessionCacheTimeout` *`seconds`* |
| Default | 300 |
| Context | server configuration |

**SSLVerifyClient** Specifies whether or not a client must present a certificate when connecting.

| Category | Value |
|---|---|
| Valid Values | ▪ `none`: No client certificate is required<br>▪ `optional`: Client may present a valid certificate<br>▪ `require`: Client must present a valid certificate |
| Syntax | `SSLVerifyClient` *`level`* |
| Default | None |
| Context | server configuration, virtual host |

> **Note:** The level `optional_no_ca` included with `mod_ssl` (in which the client can present a valid certificate, but it need not be verifiable) is not supported in `mod_ossl`.

**SSLWallet** Specifies the location of the wallet with its **WRL**.

| Category | Value |
|---|---|
| Syntax | `SSLWallet` *`wrl`*<br>The format of `wrl` is: *`file:path to wallet`* |
| Example | `SSLWallet` *`file:/etc/`*`ORACLE/WALLETS/`*`server`*<br>Other values of wrl may be used as permitted by the Oracle SSL product. |
| Default | None |
| Context | server configuration, virtual host |

**SSLWalletPassword** Specifies the Wallet password needed to access the wallet specified within the same context. You can choose either a cleartext wallet password or an obfuscated password. The obfuscated password is created with the command line tool `iasobf`. If you must use a regular wallet, Oracle recommends that you use the obfuscated password instead of a cleartext password.

**See Also:** "Using the iasobf Utility" on page 10-36

| Category | Value |
|---|---|
| Syntax | `SSLWalletPassword` *`password`*<br>If no password is required do not set this directive.<br>Note: If a wallet created with the Auto Login feature of Oracle Wallet Manager is used, then do not set this directive because these wallets do not require passwords. |
| Default | None |
| Context | server configuration, virtual host |

**Note:** `SSLWalletPassword` has been deprecated. A warning message is generated in the Oracle HTTP Server log if this directive is used. For secure wallets, Oracle recommends that you get a SSO wallet instead. Refer to the *Oracle Application Server 10g Security Guide* for information on SSO wallet.

### Using mod_proxy Directives

The following directives are for `mod_proxy` support only:

- SSLProxyCache
- SSLProxyCipherSuite
- SSLProxyProtocol
- SSLProxyWallet
- SSLProxyWalletPassword

**SSLProxyCache** Specifies whether the proxy cache will be used. The proxy will use the same session as the SSL server uses.

| Category | Value |
|---|---|
| Syntax | `SSLProxyCache` *`on/off`* |
| Default | `SSLProxyCache off` |
| Context | server configuration, virtual host |

**SSLProxyCipherSuite** Specifies the proxy server's cipher suite.

| Category | Value |
|---|---|
| Syntax | `SSLCipherSuite` *`cipher-spec`* |
| Default | `None` |
| Context | server configuration, virtual host |

**SSLProxyProtocol** Controls the proxy server's SSL protocol flavors.

| Category | Value |
|---|---|
| Syntax | `SSLProxyProtocol [+-]` *`protocol`* |
| Default | `None` |
| Context | server configuration, virtual host |

**SSLProxyWallet** Specifies the location of the wallet containing the certificates to use when opening proxy connections.

| Category | Value |
|---|---|
| Syntax | `SSLProxyWallet` *`wrl`* |
| Default | `None` |
| Context | server configuration, virtual host |

**SSLProxyWalletPassword** Specifies the proxy wallet password.

| Category | Value |
|---|---|
| Syntax | `SSLProxyWalletPassword` *`password`* |
| Default | `None` |
| Context | server configuration, virtual host |

**Note:** `SSLProxyWalletPassword` has been deprecated. A warning message is generated in the Oracle HTTP Server log if this directive is used. For secure wallets, Oracle recommends that you get a SSO wallet instead. Refer to the *Oracle Application Server 10g Security Guide* for information on SSO wallet.

### Using mod_ossl Directives to Configure Client Authentication

This section provides instructions on how you can use the directives mentioned above to set up configurations that enable you to use client certificates for authenticating clients. Below are some scenarios:

- **Authenticating clients based on certificates when all clients are known.**

  The server wallet has imported the CA certificate which signed all the client certificates.

  For example, specify the following directives in the `httpd.conf` file:

  ```
  SSLVerifyClient require
  ```

- **Authenticating for a particular URL based on certificates, while allowing arbitrary clients to access the rest of the server**

  To enable this, use the per-directory reconfiguration feature of `mod_ossl`. Session re-negotiation allows an SSL session to be re-negotiated with a client after the initial request and URL have been read. This is only supported for requests that do not contain body data, such as `GET` requests.

  **See Also:**

  - "Classes of Directives" on page 2-5 for more information.
  - `mod_ssl` documentation.

  For example, specify the following directives in the `httpd.conf` file:

  ```
  <Location /secure/area>
    SSLVerifyClient require
  </Location>
  ```

### Using the iasobf Utility

The `iasobf` utility enables you to generate an obfuscated wallet password from a **cleartext** password.

If you are using an Oracle Wallet that has been created with Auto Login enabled (an SSO wallet), then you do not need to use this utility. However, if you must use a regular wallet with a password, then Oracle recommends that you use the password obfuscation tool `iasobf`, which is located in *`ORACLE_HOME`*`/Apache/Apache/bin`, to generate an obfuscated wallet password from a cleartext password.

To generate an obfuscated wallet password, the command syntax is:

```
iasobf -p password
```

The obfuscated password is printed to the terminal. The arguments are optional. If you do not type them, the tool will prompt you for the password.

---

**On Windows systems:** The corresponding tool for Windows environments is called `osslpassword`, which can be used in the same way as `iasobf`.

---

## Understanding Port Tunneling

Port tunneling allows all communication between Oracle HTTP Server and OC4J to happen on a single, or a small number of ports. Previously, the firewall configuration had to include port information for several ports to handle communication between Oracle HTTP Server and multiple OC4J instances. Using port tunneling, a daemon called `iaspt` routes requests to the appropriate OC4J instances. Only one, or a small number of ports have to be opened through the firewall regardless of the number of OC4J instances involved, thereby offering a higher degree of security for the communication between Oracle HTTP Server and OC4J.

To enable this, a **de-militarized zone** environment is provided where a firewall exists typically between the client and the Oracle HTTP Server, and another that exists between Oracle HTTP Server and OC4J. In this configuration, Oracle HTTP Server exists in the DMZ bracketed by the two firewalls. OC4J, and other business logic components, exist behind both firewalls in the intranet. To ensure the highest degree of security, all communication transmitted between machines is encrypted using SSL. Port tunneling provides the framework to support this level of security in a flexible, manageable manner, which enhances performance.

The suggested port range is 7501-7599, the default being 7501, but you can select a port of your choice.

***Figure 10–2 Port Tunneling***

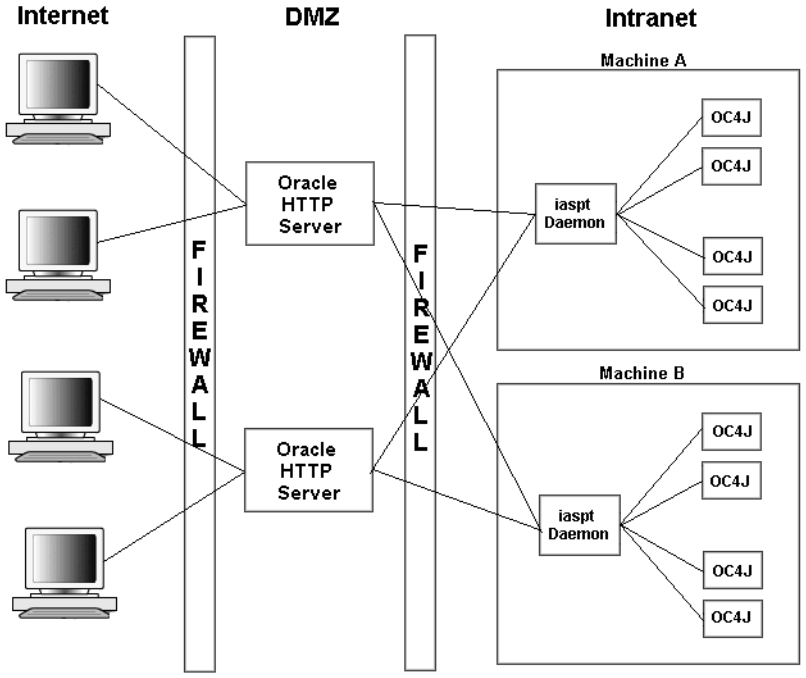



Figure 10–2 shows an Oracle Application Server configuration using port tunneling. The `iaspt` daemon, a stand-alone component, acts as a communication concentrator for connections between Oracle HTTP Server and the Java Virtual Machine (JVM), which contains OC4J. Oracle HTTP Server does not connect directly to OC4J. Instead, it connects to the `iaspt` daemon which then dispatches communication on to OC4J. By doing this concentration of connections, only one port is opened per port tunneling on the internal firewall, instead of one port per OC4J instance.

The communication between Oracle HTTP Server and the `iaspt` daemon is encrypted using SSL. Authentication is enabled when these connections are established using SSL Client Certificates. These connections are persistent, and are maintained for a reasonable time depending on connection resources. The AJP 1.3 protocol, modified to include routing information that indicates which servlet engine a request is to be routed to, is used.

Port tunneling supports connections between Oracle HTTP Server and OC4J. To support OC4J, Oracle HTTP Server module `mod_oc4j` is modified to use SSL encrypted communication and to route requests through the port tunneling processes. Port tunneling supports static configurations.

There must be at least one `iaspt` daemon per machine. More than one `iaspt` daemon can be run for higher **availability**. Oracle HTTP Server supports round robin partitioning of requests across `iaspt` daemons, and support application partitioning. Oracle HTTP Server also supports automatic **failover** of requests which cannot be sent to a given `iaspt` daemon.

### Configuring Port Tunneling

The sections below contain instructions for configuring port tunneling on your machine. Topics discussed are:

- Configuration Files
- Configuring iaspt.conf
- Configuration mod_oc4j
- Configuring iaspt Daemon in opmn.xml
- Configuring OC4J

**Configuration Files** Port tunneling impacts several configuration files. The following configuration files require modification:

- opmn.xml
- mod_oc4j.conf
- iaspt.conf

**opmn.xml** Describes the processes that OPMN manages within an Oracle Application Server installation.

> **See Also:** "opmn.xml" on page D-10 for more details, including location.

As part of port tunneling, an **entry** that describes the `iaspt` daemon process to be started should exist in OPMN. This entry describes the following:

- number of `iaspt` daemon processes to start.
- ports that these processes can use.

> **See Also:** "Configuring iaspt.conf" on page 10-42 section contains detailed information about adding this entry.

An out of the box Oracle Application Server installation contains an `iaspt` component in `opmn.xml`, but it is disabled by default.

**mod_oc4j.conf** Configures `mod_oc4j` within Oracle HTTP Server.

> **See Also:** "mod_oc4j.conf" on page D-6 for more details, including location.

For port tunneling, you need to add the directives that specify the following:

- whether port tunneling should be used
- static location for an `iaspt` daemon process
- location of SSL certificates to be used in establishing connections with the `iaspt` daemon processes.

> **See Also:** "Configuring iaspt.conf" on page 10-42 section contains detailed information about adding these directives.

**iaspt.conf** Configures port tunneling.

> **See Also:** "iaspt.conf" on page D-2 for more details, including location.

It specifies the following information:

- Wallet file and password that should be used
- Log file location and log level
- Port that `iaspt` daemon should listen on (optionally). This port can either be specified in `iaspt.conf`, or can be passed in from `opmn.xml` by specifying a range of ports. By doing so, more than one port tunneling process can use the same `iaspt.conf` file.

**Configuring iaspt.conf** The `iaspt.conf` file is a set of name value pairs. The names of the parameters accepted are described below:

- wallet-file
- wallet-password
- log-file
- log-level
- iaspt-port

**wallet-file** Specifies the location of an Oracle Wallet file that contains SSL certificates that are used for SSL communication with peers.

| Category | Value |
|---|---|
| Parameter Name | `wallet-file` |
| Parameter Type | string |
| Valid Values | Path to a wallet file that contains the SSL certificate to be used when establishing SSL connections to other processes. |
| Default Value | N/A |
| Syntax | Valid filename<br>For example: `/foo/bar/myfilename` |

**wallet-password** Specifies the value of the obfuscated password used for authentication when opening the wallet file. This value is obtained using the utility provided with Oracle Wallet Manager.

| Category | Value |
|---|---|
| Parameter Name | `wallet-password` |
| Parameter Type | string |
| Valid Values | Obfuscated password used for authentication when opening the wallet file specified by `wallet-file` |
| Default Value | N/A |

**See Also:** *Oracle Application Server 10g Security Guide* for information on Oracle Wallet Manager.

**log-file** Specifies the path to a log file where `iaspt` daemon logging messages are written to.

| Category | Value |
|---|---|
| Parameter Name | `log-file` |
| Parameter Type | string |
| Valid Values | Path to a log file where `iaspt` daemon logging messages are written to. |
| Default Value | N/A |
| Syntax | Valid filename<br>For example: `/foo/bar/`*`myfilename`* |

**log-level** Specifies the logging level where 9 is the highest and 0 implies no logging.

| Category | Value |
|---|---|
| Parameter Name | `log-level` |
| Parameter Type | integer |
| Valid Values | Integer from 0 to 9 |
| Default Value | 3 |

**iaspt-port** Specifies the port value that the `iaspt` daemon should accept connections on. This is optional.

| Category | Value |
|---|---|
| Parameter Name | `iaspt-port` |
| Parameter Type | integer |
| Valid Values | Valid TCP/IP port value |
| Syntax | Integer<br>For example: 9898 |
| Default Value | N/A |

**Configuration mod_oc4j** Perform the following steps to configure `mod_oc4j` to use port tunneling:

By default, `mod_oc4j` communicates directly to OC4J. For port tunneling process, `mod_oc4j` should communicate to OC4J through the `iaspt` daemon.

Use the directives below to connect `mod_oc4j` to the `iaspt` daemon:

- Oc4jiASPTActive
- Oc4jiASPTProcess

**Oc4jiASPTActive** Indicates whether `mod_oc4j` needs to consider port tunneling when routing requests. This should not be configured to "On" if `Oc4jEnableSSL` is configured to "On". To enable port tunneling process, set this directive to "On".

| Category | Value |
|---|---|
| Parameter Name | `Oc4jiASPTActive` |
| Parameter Type | string |
| Valid Values | `On/Off` |
| Default Value | `Off` |

**Oc4jiASPTProcess** Describes the listening host and port of a port tunneling process. There can be multiple of these lines within a `mod_oc4j.conf` file for multiple port tunneling processes.

As specified below, the syntax for this directive is `host:port`. The host value should match the value of the location where an `iaspt` daemon listens on. The port value should match the value configured in `opmn.xml` `iaspt` port. Both regular hostname and IP address is allowed in the host.

| Category | Value |
|---|---|
| Parameter Name | `Oc4jiASPTProcess` |
| Parameter Type | string |
| Valid Values | `host:port` values of the available `iaspt` daemons. |
| Default Value | N/A |
| Syntax | `host:port`<br>For example: *`myhost.us.oracle.com`*`:6667` |

**Configuring mod_oc4j to Use SSL** `mod_oc4j` should use SSL when communicating with the `iaspt` daemon. To enable this, add the following directives to the `mod_oc4j.conf` file:

- Oc4jiASPTWalletFile
- Oc4jiASPTWalletPassword

**Oc4jiASPTWalletFile** Specifies the location of an Oracle Wallet file that contains SSL certificates that are used for SSL communication with the `iaspt` daemon.

| Category | Value |
|---|---|
| Parameter Name | `Oc4jiASPTWalletFile` |
| Parameter Type | string |
| Valid Values | Path to a wallet file that contains the SSL certificate to be used when establishing SSL connections to the iaspt daemon. |
| Default Value | N/A |
| Syntax | Valid filename<br>For example: `/foo/bar/`*`myfilename`* |

**Oc4jiASPTWalletPassword** Specifies the value of the obfuscated password used for authentication when opening the wallet file. This value is obtained using the utility provided with Oracle Wallet Manager.

| Category | Value |
|---|---|
| Parameter Name | `Oc4jiASPTWalletPassword` |
| Parameter Type: | string |
| Valid Values | Obfuscated password used for authentication when opening the wallet file specified by `Oc4jSSLWalletFile` |
| Default Value | N/A |

**See Also:** *Oracle Application Server 10g Security Guide* for information on Oracle Wallet Manager.

**Configuring iaspt Daemon in opmn.xml** Below are examples of how the `iaspt` daemon component is configured in `opmn.xml`.

***Example 10–9 Process Module Configuration***

This is an example of the configuration required to load and use the module effectively. Processes managed by this module identify the module by module ID.

```
<module path="/ORACLE_HOME/opmn/lib/libopmniaspt.so">
  <module-id id="IASPT" />
</module>
```

***Example 10–10 Minimum Configuration***

This is an example of the smallest possible configuration for the `iaspt` daemon. Reasonable defaults are assigned to all other configuration elements/attributes that can be used with this component.

```
<ias-component id="IASPT">
  <process-type id="IASPT" module-id="IASPT">
    <process-set id="IASPT" numprocs="1"/>
  </process-type>
</ias-component>
```

***Example 10–11 Full Configuration***

This is a complete example configuration for the `iaspt` daemon. It contains all possible configuration elements/attributes that can be used with this component.

```
<module path="/ORACLE_HOME/opmn/lib/libopmniaspt">
  <module-id id="IASPT" />
</module>
<ias-component id="IASPT" status="enabled" id-matching="false">
  <process-type id="IASPT" module-id="IASPT">
    <port id="ajp" range="6701-6703"/>
    <process-set id="IASPT" restart-on-death="true" numprocs="3"/>
  </process-type>
</ias-component>
```

Table 10–7 contains information about the values specified in Example 10–9, Example 10–10, and Example 10–11.

***Table 10–7 opmn.xml Value Description***

| Value | Description | Requirement | Valid Value | Default Value | Path |
|---|---|---|---|---|---|
| id= "IASPT" | This name is required and cannot be changed to anything else. It must match `targets.xml` or else Application Server Control will not work. | true | `IASPT` | N/A | `ias-component` |
| module-id= "IASPT" | This name defines the type of process and associates this configuration with OPMN's port tunneling module. | true | `IASPT` | N/A | `ias-component/ process-type` |
| numproc="3" | This attribute tells how many port tunneling processes to be started. If the value is 1, no ajp/range has to be configured in port's property. The port number defined in `iaspt.conf` is used if there is no ajp/range configured. If the value is greater than 1, ajp/range has to be configured to specify enough ports for each `iaspt` daemon process. | true | Any number | N/A | `ias-component/ process-type/p rocess-set` |
| port id="ajp" | This should be used together with range in port property to specify the ajp ports to be used by `iaspt` daemons. If it is specified, the port number configured in `iaspt.conf` file will be overwritten. | false | `ajp` | N/A | `ias-component/ process-type/p rocess-set` |
| port range="6701 -6703" | This should be used together with ID in port property to specify the ajp ports to be used by `iaspt` daemons. If numprocs is specified to be more than 1, a range of ports has to be configured. If no port is configured in `opmn.xml` (in this case, numprocs must be 1), the port number defined in `iaspt.conf` will be used. | false | Any single port or a range of ports | N/A | `ias-component/ process-type/p rocess-set` |

In opmn.xml,

1. Change the status of the following entry from "disabled" to "enabled".

   ```
   <ias-component id="iaspt" status="disabled">
   ```

2. Be sure that the port in the entry below matches the port specified in mod_oc4j.conf:

   ```
   <port id="ajp" range="7501-7600"/>
   ```

   **Note:** The port specified in opmn.xml has higher priority than the port specified in the iaspt-port entry of iaspt.conf.

   **See Also:** *Oracle Process Manager and Notification Server Administrator's Guide*

**Configuring OC4J** By default, OC4J does not require any modifications for port tunneling process. Optionally, if you want to the communication between `iaspt` daemon and OC4J to use SSL, do the following:

- Enabling SSL for iaspt Daemon
- Enabling SSL for OC4J

**Enabling SSL for iaspt Daemon** You can enable SSL for `iaspt` daemon by opening `iaspt.conf` in a text editor and uncommenting, and changing the following entry from "false" to "true".

```
destination-ssl=false
```

This entry determines whether SSL should be used between `iaspt` daemon and OC4J.

**Enabling SSL for OC4J** You can enable SSL for OC4J by editing `web-site.xml` and using Keytool.

---

**Note:** `web-site.xml` refers to the file that the `web-site` element in `server.xml` points to. `server.xml` is the top level configuration file for OC4J. It usually resides in:

- UNIX: *`ORACLE_HOME`*`/j2ee/home/config`
- Windows: *`ORACLE_HOME`*`/j2ee/home/config`

---

**Server Authentication**: This section pertains to the authentication of OC4J by the client. To make the client, for example `mod_oc4j`, authenticate the server (OC4J), the certificate of the CA that signs OC4J's certificate must be imported into the wallet used by `mod_oc4j`.

- **Configuration File Extensions**: The AJP Web site declaration in `web-site.xml` is extended to support the additional marked bold characters.

```
<web-site display-name="Oracle 9iAS Containers for J2EE HTTP web site"
protocol="ajp13" secure="true">
  <default-web-app application="default" name="defaultWebApp" />
  <access-log path="../log/default-web-access.log" /
  <ssl-config keystore="keystore" keystore-password="welcome"/>
</web-site>
```

  Here, the `secure="true"` attribute instructs the AJP 1.3 protocol to use a SSL socket. When secure is set to "true", then the `ssl-config` element must be specified too.

  The identity of OC4J, for the Web site described in the configuration, is stored in a file as per the keystore format. The `keystore` attribute points to this file. If it is not present as a relative path (not beginning with "/"), it is relative to the directory where `server.xml` is located.

**Client Authentication by the Server**: Optionally, the server can be configured to accept or reject clients (that is, client connecting through AJP/SSL) based on their identity. In this mode, the server explicitly requests client authentication. The client authenticates by sending a certificate chain. Ultimately, the chain ends with a root certificate. The server can be configured to accept a list of root certificates, thus establishing a chain of trust back to the client.

- **Configuration File Extensions**: The following configuration extensions in `web-site.xml` are defined as follows:

```
<web-site display-name="Oracle 9iAS Containers for J2EE HTTP web site"
protocol="ajp13" secure="true"
  <default-web-app application="default" name="defaultWebApp" />
  <access-log path="../log/default-web-access.log" />
    <ssl-config keystore="keystore" keystore-password="welcome"
    needs-client-auth="true">
  </ssl-config>
</web-site>
```

  `needs-client-auth` instructs OC4J to request the client certificate chain upon connection. If OC4J recognizes the client certificate, it proceeds to traverse the chain up to the root certificate. If the root certificate is recognized as well, then the client is accepted.

  The specified keystore must contain the certificates of the clients that are authorized to connect to OC4J through AJP/SSL.

- **Managing a Keystore**: Keystore is a protected database that holds **key**s and **certificate**s for an enterprise. Access to a keystore is guarded by a password (defined at the time the keystore is created, by the person who creates the keystore, and changeable only when provided with the current password). In addition, each **private key** in a keystore can be guarded by its own password.

  Keytool is a key and certificate management utility. Use keytool to manage your keystore, for example to

  - create **public/private key pair**s.
  - issue certificate requests (which you send to the appropriate Certification Authority).
  - import certificate replies (obtained from the Certification Authority you contacted).
  - designate **public key**s belonging to other parties as trusted.

    **See Also:** `http://java.sun.com` for information on keystore and keytool.

- **OC4J Identity**: OC4J certificate can be generated using the JDK keytool program. To generate a self-signed certificate:

  ```
  keytool -genkey -keyalg rsa -keystore myKeystoreFile -storepass
  mypassword -alias www.mysite.com -dname 'cn=www.mysite.com, ou=myUnit,
  o=myOrg, l=myLocality, c=myCountry'
  ```

  Using keytool, a certification request can then be made for the self-signed certificate to any CA. This example generates a certificate request into a file that can be used with a CA.

  ```
  keytool -certreq -rfc  -keystore myKeystoreFile -storepass -alias
  www.mysite.com -file reqfile
  ```

  The CA generated certificate chain will then be imported and replaced by the self-signed one. If the certificate is stored into certfile, the command is as follows:

  ```
  keytool -import -keystore myKeystoreFile -storepass -alias
  www.mysite.com -file certfile
  ```

- **Trusted CAs**: The public keys, packaged as certificates, of the trusted CAs are well known and publicly available. You can obtain such a certificate using the Certification Authority Web site. Once the CA certificate is obtained, import it into the keystore using:

  ```
  keytool -import -keystore myKeystoreFile -storepass -alias
  www.mysite.com -file certfile
  ```

- **Clients**: When `needs-client-auth` is set to "true", the client certificate has to be either a trusted CA certificate, or be signed by a trusted CA.

# Leveraging Oracle Identity Management Infrastructure

This section discusses how Oracle HTTP Server uses the Oracle Identity Management Infrastructure.

## Overview

Oracle Identity Management is an integrated infrastructure that the Oracle Application Server relies on for distributed security. It consists of Oracle Internet Directory, Oracle Directory Integration and Provisioning, Delegated Administrative Service, Oracle Application Server Single Sign-On, and Oracle Certificate Authority.

> **See Also:** *Oracle Identity Management Concepts and Deployment Planning Guide* for detailed information regarding Oracle Identity Management and its components.

## Using Oracle Application Server Single Sign-On and mod_osso

Oracle Application Server supports single sign-on (SSO) to Web-based applications through Oracle Application Server Single Sign-On. Oracle Application Server Single Sign-On enables you to log in to Oracle Application Server and gain access to those applications for which you have authorization for, without requiring to re-enter a user name and password for each application. It is fully integrated with Oracle Internet Directory, which stores user information. It supports LDAP-based user and password management through Oracle Internet Directory.

`mod_osso`, an Oracle HTTP Server module, enables the transparent use of Oracle Application Server Single Sign-On across all of Oracle Application Server. Through `mod_osso`, Oracle HTTP Server becomes a SSO partner application enabled to use SSO to authenticate users and obtain their identity, and to make user identities available to Web applications as an Apache header variable.

# 11

# Frequently Asked Questions

This chapter provides answers to frequently asked questions about Oracle HTTP Server.

> **See Also:** "Frequently Asked Questions" in the Apache Server documentation.

Documentation from the Apache Software Foundation is referenced when applicable.

> **Note:** Readers using this guide in PDF or hard copy formats will be unable to access third-party documentation, which Oracle provides in HTML format only. To access the third-party documentation referenced in this guide, use the HTML version of this guide and click on the hyperlinks.

## Creating Application-specific Error Pages

Oracle HTTP Server has a default content handler for dealing with errors. You can use the `ErrorDocument` directive to override the defaults.

> **See Also:** "ErrorDocument directive" in the Apache Server documentation.

## Offering HTTPS to ISP (Virtual Host) Customers

For HTTP, Oracle HTTP Server supports two types of virtual hosts: name-based and IP-based. HTTPS supports only IP-based virtual hosts.

If you are using IP-based virtual hosts for HTTP, then the customer has a virtual server listening on port 80 of a per-customer IP address. To provide HTTPS for these customers, simply add an additional virtual host per user listening on port 4443 of that same per-customer IP address and use SSL directives, such as SSLRequireSSL to specify the per-customer SSL characteristics. Note that each customer can have their own wallet and server certificate.

If you are using name-based virtual hosts for HTTP, each customer has a virtual server listening on port 80 of a shared IP address. To provide HTTPS for those customers, you can add a single shared IP virtual host listening on port 4443 of the shared IP address. All customers will share the SSL configuration, including the wallet and ISP's server certificate.

> **See Also:** "Running Oracle HTTP Server as Root" on page 4-2 for instructions on running Oracle HTTP Server with ports lesser than 1024.

## Using Oracle HTTP Server as Cache

You can use the Oracle HTTP Server as a cache by setting the `ProxyRequests` to "On" and `CacheRoot` directives.

> **See Also:** "`ProxyRequests` and `CacheRoot` directives" in the Apache Server documentation.

## Using Different Language and Character Set Versions of Document

You can use *multiviews*, a general name given to the Apache server's ability to provide language and character-specific document variants in response to a request.

**See Also:** "Multiviews" in the Apache Server documentation.

## Using OracleAS Web Cache as Front-end

You can use directives such as `ExpiresActive`, `ExpiresByType`, `ExpiresDefault`, to set the length of time that any cache existing between the client and the Web server will cache the returned Web pages.

**See Also:** "ExpiresActive, ExpiresByType, ExpiresDefault directives" in the Apache Server documentation.

## Sending Proxy Sensitive Requests to HTTP Server Behind a Firewall

You should use the Proxy directives, and not the Cache directives, to send proxy sensitive requests across firewalls.

## mod_oc4j Information

`mod_oc4j` is a module that integrates with Web servers, typically Oracle HTTP Server, and routes request to the backend OC4J processes. OPMN module keeps `mod_oc4j` aware of the status of different OC4J processes, so `mod_oc4j` routes only to the processes that are up and running. `mod_oc4j` also understands the concepts of Oracle Application Server Clusters and OC4J islands, and routes accordingly to provide as much transparent failover as possible.

**See Also:**

- `"mod_oc4j"` on page 8-20
- *Oracle Application Server 10g Concepts*

## mod_oc4j Compatibility with Other Web Servers

Beginning with Oracle Application Server, 10*g* (9.0.4), `mod_oc4j` supports other Web servers including IIS, Sun ONE, and non-Oracle HTTP Server Apache Servers.

## mod_oc4j Communication to OC4J using SSL

The AJP communication between `mod_oc4j` and OC4J processes can now be over AJP/SSL. Previously, this was in the clear. Also, the SSL negotiation does not happen each time `mod_oc4j` and OC4J communicate, resulting in less performance impact.

**See Also:** "Enabling SSL for mod_oc4j and OC4J" on page 8-33

## Oracle HTTP Server Version Number

Oracle HTTP Server is based on Apache version 1.3.28.

## Apache v2.0 Support with Oracle Application Server, 10*g* (9.0.4)

Oracle Application Server, 10*g* (9.0.4) is still based on the 1.3.x stack from Apache organization.

## Applying Apache Security patches to Oracle HTTP Server

You cannot apply the Apache security patches to Oracle HTTP Server for the following reasons:

- Oracle tests and appropriately modifies security patches before releasing them to Oracle HTTP Server users.
- In many cases those alerts may not be applicable, for example, `openSSL` alerts, since Oracle has removed those components from the stack in use.
- Oracle releases these patches soon enough that the time-delay impact of getting the patch from Oracle versus open source organization should be minimal and the benefit with respect to supportability, tremendous.

## Compressing Output from Oracle HTTP Server

In general, Oracle recommends the use of Oracle Application Server Web Cache for this purpose. There are other freeware modules, such as `mod_gzip` that may be plugged in for this purpose, but their use is not supported. When using these, there may be an error message with respect to EAPI, but in general that can be ignored.

## Supporting PHP

`mod_php` is not supported, however, you have the following two options:

- Install `mod_php` by yourself and use it. If there is a support question on any aspect of Oracle HTTP Server, you might be asked to reproduce the problem without `mod_php`.
- Use PHP in a CGI mode, in which case support of the rest of the Oracle HTTP Server stack would not be an issue.

## Creating Namespace that Works Across Firewalls, Clusters, Web Cache

The general idea is that all servers in a distributed Web site should agree on a single URL namespace. Every server serves some part of that namespace, and is able to redirect or proxy requests for URLs that it does not serve to a server that is "closer" to that URL. For example, your namespaces could be the following:

```
/app1/login.html
/app1/catalog.html
/app1/dologin.jsp
/app2/orderForm.html
/apps/placeOrder.jsp
```

We could initially map this namespace to two Web servers by putting `app1` on server1 and `app2` on server2. Server1's configuration might look like the following:

```
Redirect permanent /app2 http://server2/app2
Alias /app1 /myApps/application1
<Directory /myApps/application1>
  ...
</Directory>
```

Server2's configuration is complementary. If you decide to partition the namespace by content type (HTML on server, JSP on server2), change server configuration and move files around, but do not have to make changes to the application itself. The resulting configuration of server1 might look like the following:

```
RedirectMatch permanent (.*) \.jsp$ http://server2/$1.jsp
AliasMatch ^/app(.*) \.html$ /myPages/application$1.html
<DirectoryMatch "^/myPages/application\d">
  ...
</DirectoryMatch>
```

Note that the amount of actual redirection can be minimized by configuring a hardware load balancer like F5 system's BigIP to send requests to server1 or server2 based on the URL.

## Protecting Web Site From Hackers

There are many attacks, and new attacks are invented everyday. Following are some general guidelines for securing your site. You can never be completely secure, but you can avoid being an easy target.

- Use a commercial firewall, such as Checkpoint FW-1 or Cisco PIX between your ISP and your Web server. Recognize, however, that not all hackers are outside your organization.
- Use switched ethernet to limit the amount of traffic a compromised server can sniff. Use additional firewalls between Web server machines and highly sensitive internal servers running database and enterprise applications.
- Remove unnecessary network services such as RPC, Finger, telnet from your server machine.
- Carefully validate all input from Web forms. Be especially wary of long input strings and input that contains non-printable characters, HTML tags, or javascript tags.
- Encrypt or randomize the contents of cookies that contain sensitive information. For example, it should be difficult to guess a valid sessionID to prevent a hacker from hijacking a valid session.
- Check often for security patches for all your system and application software, and install them as soon as possible. Be sure these patches come from bona fide sources; download from trusted sites and verify the cryptographic checksum.

- Use an intrusion detection package to monitor for defaced Web pages, viruses, and presence of "rootkits" that indicate hackers have broken in. If possible, mount system executables and Web content on read-only file systems.
- Have a "forensic analysis" package on hand to capture evidence of a break in as soon as detected. This aids in prosecution of the hackers.

# A

# Using Oracle Application Server Proxy Plug-in

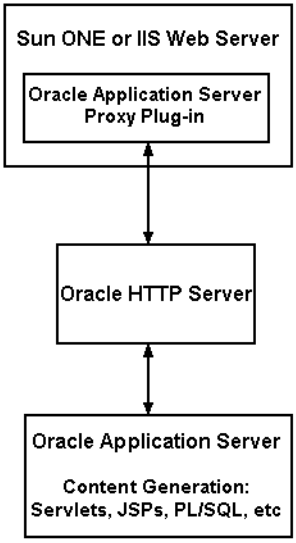
This appendix explains how the Oracle Application Server Proxy Plug-in enables you to use components in conjunction with a third-party HTTP listener. The Oracle Application Server Proxy Plug-in works with the Sun ONE Web Server Enterprise Edition, version 4.1 and 6.0, on UNIX and Windows NT systems, or the Microsoft Internet Information Server (IIS), version 4.0 or 5.0 on Windows systems, to send requests to Oracle Application Server.

Topics discussed are:

# Overview

Oracle Application Server Proxy Plug-in is a reverse HTTP proxy. The **plug-in** forwards incoming HTTP requests to an Oracle Application Server instance as shown in Figure A–1.

***Figure A–1 Oracle Application Server Proxy Plug-in***




This proxy logic is provided as a plug-in, a shared library that is loaded by the third-party HTTP listeners. The plug-in uses APIs provided with the third-party listeners to directly handle HTTP requests, in much the same way that modules are plugged into Oracle HTTP Server.

Oracle HTTP Server can mimic the address and port that the third-party listener is using. That is, when sending a request to Oracle HTTP Server, the proxy can be configured to send a different Host: HTTP header than the actual hostname and port that the request is being sent to, so that downstream applications are shielded from the introduction of the reverse proxy.

# Downloading Proxy Plug-in

The plug-in is distributed on the OracleAS Repository Creation Assistant/Utilities CD, which is included in your Oracle Application Server CD Pack.

# Installing Proxy Plug-in

After downloading the plug-in, place the configuration files and shared library in directories that the third-party listener can access.

## Installing Proxy Plug-in on UNIX Systems

The plug-in consists of a single shared library, `oracle_proxy.so`. To install the plug-in into the listener, place the library in a directory to which the listener has read and execute privileges.

## Installing Proxy Plug-in on Windows Systems

The plug-in consists of a single `.dll`, `oracle_proxy.dll` for IIS, or `oracle_proxy_nes.dll` for Sun ONE. To install this plug-in, copy the `.dll` to a directory the listener can access.

# Using Application Server Control

When you install Oracle Application Server, you can administer Oracle HTTP Server using Application Server Control. However, if you choose to use Sun ONE or IIS instead of Oracle HTTP Server, then it is recommended that you disable Oracle HTTP Server on Application Server Control so that it no longer appears there.

Oracle does not support monitoring or administering of non-Oracle HTTP Server listener with Application Server Control.

**See Also:**

- Chapter 7, "Application Server Control Management" for detailed information on managing Oracle HTTP Server using Application Server Control.
- *Oracle Application Server 10g Administrator's Guide* for detailed information on Oracle Enterprise Manager Application Server Control and other GUI-based management tools.

# Configuring Proxy Plug-in

There is one configuration file for Oracle Application Server Proxy Plug-in. It controls the proxy functionality. The presence of the configuration file in the Web server's file system makes the functionality active.

You also need to modify configuration files specific to the third-party listener to enable the plug-in on to these listeners.

## Proxy Server Definition File

The **proxy server** definition file must reside in a directory that is readable by the third-party listener. For simplicity, you could create a directory called `proxy` in a convenient location on your system, and place the proxy server definition file, the proxy module file (`oracle_proxy.dll` for Windows NT IIS, `oracle_proxy_nes.dll` for NT Sun ONE, or `oracle_proxy.so` for Solaris Sun ONE), and proxy log files in it.

Described in detail in Proxy Configuration File Parameters section below, the proxy server definition file contains:

- Name value pairs that describe the servers that will be used to proxy requests to Oracle Application Server.
- Options for communicating with the servers.
- A set of rules that map URLs to the servers.

You can create this file with the text editor of your choice. The `oproxy.serverlist` parameter must list at least one server name, or the proxy will not function.

Example A–1 provides a sample proxy server definition file.

***Example A–1 Sample Proxy Server Definition File***

```
# This file defines proxy server behavior.
#
# Server names that the proxy plug-in will recognize.
oproxy.serverlist=ias1

# Hostname to use when communicating with a specific server.
oproxy.ias1.hostname=oasdocs.us.oracle.com

# Port to use when communicating with a specific server.
oproxy.ias1.port=7777

# Description of URL(s) that will be redirected to this server.
oproxy.ias1.urlrule=/*
```

## Proxy Configuration File Parameters

The following section discusses the proxy configuration file parameters listed below:

- `oproxy.serverlist`
- `oproxy.servername.hostname`
- `oproxy.servername.port`
- `oproxy.servername.alias`
- `oproxy.servername.urlrule`

**oproxy.serverlist** Lists all of the server names that the plug-in recognizes.

| Category | Value |
|---|---|
| Parameter Type | string list |
| Allowable Values | Comma separated list of server names, one for each Oracle HTTP Server to which requests will be sent. All servers in the serverlist must also be defined in the file. |
| Default Value | None. At least one server name must be provided for the proxy to be functional. |
| Example | `oproxy.serverlist=ias1,ias2` |

**oproxy.*servername*.hostname** Defines the hostname to use when communicating with a specific server.

| Category | Value |
|---|---|
| Parameter Type | string |
| Allowable Values | Valid hostname |
| Default Value | None. |
| Example | `oproxy.ias1.hostname=www1.us.oracle.com` |

**oproxy.*servername*.port** defines the port to use when communicating with a specific server.

| Category | Value |
|---|---|
| Allowable Values | Valid port value |
| Default Value | 80. |
| Example | `oproxy.ias1.port=7777` |

**oproxy.*servername*.alias** Supports the mimicing feature of the proxy by defining the hostname and port that clients use to access the third-party HTTP listener. If defined, this value will be passed as the Host: HTTP header. If not defined, the hostname and port of the machine actually being communicated with will be sent.

| Category | Value |
|---|---|
| Parameter Type | string |
| Allowable Values | host:port |
| Default Value | `oproxy.`*`servername.hostname:oproxy.servername.port`* |
| Example | `oproxy.ias1.alias=www.oracle.com:80` |

**oproxy.*servername*.urlrule** Describes a URL or set of URLs that are redirected to this server. A given server can have any number of `urlrule` properties assigned to it.

| Category | Value |
|---|---|
| Parameter Type | string |
| Example | `oproxy.ias1.urlrule=/foo/*` |

Three types of rules can be used: exact match, context match, or suffix match.

- **Exact matches**: One URL is mapped to a server.

  For example:

  `oproxy.ias1.urlrule=/foo/bar/foo.html` would map only the URL `/foo/bar/foo.html` to be proxied to the server with the name `ias1` (the details for the server `ias1` are configured in the server configuration file).

- **Context matches**: A set of URLs with a common prefix or context are all mapped to a server. For example, `oproxy.ias1.urlrule=/foo/*` would map URLs beginning with `/foo` to the server with the name `ias1`.

  For context matches, you can use the stripcontext option with the `urlrule` parameter to send only the portion of the url *following* the wildcard to the server. The default for the stripcontext option is false, so you do not need to include it unless you are setting it to true. It is shown below for completeness of the example.

Example: In following configuration:

```
oproxy.ias1.urlrule=/ias1/*
oproxy.ias1.stripcontext=false
```

and the URL request:

```
http://hostname/ias1/header1.gif
```

retrieves

```
ORACLE_HOME/Apache/Apache/htdocs/ias1/header1.gif
```

In the following configuration:

```
oproxy.ias1.urlrule=/ias1/*
oproxy.ias1.stripcontext=true
```

and the URL request:

```
http://hostname/ias1/header1.gif
```

retrieves

```
ORACLE_HOME/Apache/Apache/htdocs/header1.gif
```

- **Suffix matches**: All files with a common file extension are mapped to a server.

  For example, `oproxy.ias1.urlrule=/*.jsp` would map all of the URLs that end in `.jsp` to the server ias1. This can be combined with the context rule to have something like `/foo/bar/*.jsp` so that only URLs that start with `/foo/bar` and end in `.jsp` would be proxied.

---

**Note:** For the `oproxy.servername.urlrule`, when multiple rules apply to the same URL, the following precedence applies:

1. Exact matches
2. Longest context match plus suffix match
3. Longest context match

Some examples of the precedence are:

```
/foo/bar/index.html would take precedence over /foo/bar/*
/foo/bar/*.jsp would take precedence over /foo/bar/*
/foo/bar/* would take precedence over /foo/*
```

---

### Defining Proxy Plug-in Behavior

In the proxy server definition file, you define which servers and URLs to proxy to the plug-in.

1. In the first line of the file, specify the list of all the servers that can be used by the plugins. For example:

   ```
   oproxy.serverlist=ias1,ias2
   ```

2. Set the relevant properties (hostname, port, and server alias) for each server. For example:

   ```
   oproxy.ias1.hostname=myhost.us.oracle.com
   oproxy.ias1.port=7777
   oproxy.ias1.alias=www.oracle.com
   ```

   The hostname must be provided. If you do not specify the port, 80 is assigned. If an alias value is not given, the combination of the hostname and port given are used. The alias enables the back end server to receive requests that have an HTTP Host: header that looks exactly like the one the client delivers to the third-party listener.

3. Set the `urlrule` parameter to specify redirection between servers. For example, the rule:

   ```
   oproxy.ias1.urlrule=/*
   ```

   maps all incoming requests to be proxied to the Web server on the server `ias1`. These rules can be of three forms, exact URL, context match, or extension-based. An exact match maps exactly one URL to a server, for example:

   ```
   oproxy.ias1.urlrule=/my/path/index.html
   ```

   maps only accesses to `/my/path/index.html` for proxying. An example of a context rule is:

   ```
   oproxy.ias1.urlrule=/app1/*
   ```

   which maps any URL beginning with `/app1`. An extension-based rule, such as:

   ```
   oproxy.ias1.urlrule=/*.jsp
   ```

   maps any URL ending with `.jsp`.

   All requests sent to a mapped URL are proxied through HTTP/1.1 to the specified server.

# Configuring Sun ONE Listener to Use Proxy Plug-in

This section provides proxy plug-in configuration instructions for Sun ONE Enterprise Server listener on UNIX and Windows NT systems.

---

**Notes:** If you are configuring the Sun ONE listener on Windows NT, use forward slashes (/) in all paths.

The default configuration files for Sun ONE route all incoming requests for the URI `/servlet` to the Sun ONE servlet handler. The Oracle Application Server Proxy Plug-in does not override settings configuration settings. You must ensure that the URL mappings to the Oracle Application Server Proxy Plug-in are distinct from the URL mappings to the Sun ONE servlet engine.

---

1. Open the `magnus.conf` file in version 6, or `obj.conf` in version 4 in the Sun ONE listener `/config` directory.
2. Add the load-modules line:

   On UNIX:

   ```
   Init fn="load-modules" shlib="/path/oracle_proxy.so" funcs=op_init,op_
   objecttype,op_service
   ```

   On Windows:

   ```
   Init fn="load-modules" shlib="/path/oracle_proxy_nes.dll" funcs=op_init,op_
   objecttype,op_service
   ```

   where `/path/` is the path to the shared library for the plug-in. This line tells the listener where the proxy shared library is, and which functions are exposed by this library.

3. Add the configuration parameters line:

```
Init fn="op_init" server_defs="/path/servers"
logfile="/path/oproxy.log" log_level=error
```

where `/path/` is the path to the proxy server definition and log files. The proxy server definition file contains all of the configuration information for the servers that the proxy plug-in can communicate with. A log file and log level to log messages from the plug-in can also be specified (optional).

> **See Also:** "Proxy Server Definition File" on page A-4 for a complete description and example.

4. Add the following line to the `<Object name=default>` section of the `obj.conf` file, before all other lines beginning with the word `ObjectType`:

```
ObjectType fn=op_objecttype UseOutputStreamSize=8192
```

5. Add the following line before all other lines that begin with the word `Service`:

```
Service type="oracle/proxy" fn="op_service"
```

6. Start the listener using the GUI or the shell script.

# Configuring IIS Listener to Use Proxy Plug-in

This section provides proxy plug-in configuration instructions for the IIS listener on Windows systems. The process involves creating Windows registry entries and using the IIS management console to add directories and filters. You must restart the listener after configuring the plug-in.

To configure the plug-in, follow the steps below:

1. From the Start menu, select **Run**.
2. In the run dialog box, type `regedit` and click **OK**.

   The Registry Editor window opens.
3. In the Registry Editor window, expand the `HKEY_LOCAL_MACHINE` folder (click on the + preceding its name).
4. Expand the `SOFTWARE` folder (click on the + preceding its name).
5. Click on the `ORACLE` folder.
6. From the Edit menu, select New, then Key.

   A new folder is added under the `ORACLE` folder with the name `New Key #1`.
7. Type `IIS Proxy Adapter` for the key name.
8. From the Edit menu, select New, then String Value.

   A new value is added in the right window pane with the name `New Value #1`.
9. Type `server_defs` for the value name.
10. From the Edit menu, select Modify. The Edit String dialog box appears.
11. In the Value data field, type the full path of your proxy server definition file. Click **OK**.
12. Specify `log_file` and `log_level` using the procedure specified in steps 8-11. This is optional.
    a. Add a string value with the name `log_file` and the desired location of the log file (for example, `d:\proxy\proxy.log`)
    b. Add a string value with the name `log_level` and a value for the desired log level. Valid values are debug, inform, error and emerg.

13. Using the IIS management console, add a new virtual directory to your IIS Web site with the same physical path as that of `oracle_proxy.dll`. Name the directory `oproxy` and give it execute access.
14. Using the IIS management console, add `oracle_proxy.dll` as a filter in your IIS Web site. The name of the filter should be `oproxy` and its executable must point to the directory containing `oracle_proxy.dll` (for example, `d:\proxy\oracle_proxy.dll`).
15. Restart IIS (stop and then start the IIS Server), ensuring that the `osso` filter is marked with a green upward arrow.

---

**Note:** To restart IIS, you must stop all of the IIS services through the control panel, or restart the computer. This is the only way to ensure that the `.dll` is reloaded. Restarting IIS through the management console is not sufficient.

---

# Oracle Application Server Proxy Plug-In Usage Notes

This section highlights development and usage practices to consider when developing an application that runs behind the Oracle Application Server Proxy Plug-in. Some of these also have relevance when enabling an application to run behind Oracle Application Server Web Cache.

- **Check for configurations based on the Oracle HTTP Server being the entry point into the network.**

  This is usually only relevant if an application has a module that plugs directly into the Oracle HTTP Server. Specifically, look for dependencies on obtaining information about the client based on the connection made to the Oracle HTTP Server, such as using the SSL certificate for authentication. Currently, SSL is not supported, so even if the client uses SSL to connect to the third-party listener, an unencrypted HTTP message will be sent from the third-party listener to the Oracle HTTP Server. This means that client certificates will not be available to components that reside behind the plug-in. The environment variable `REMOTE_ADDR` has been specifically preserved when Oracle Application Server Proxy Plug-in and Oracle Application Server Web Cache are used, but other client information may, in practice, represent the machine on which the proxy resides rather than the actual client host. These behaviors must be discovered and eliminated in cases where the Oracle HTTP Server is not the external listener for Oracle Application Server.

- **Avoid returning non-relative links in HTML, that is, avoid embedding host names into HTML unless the link is external to the Web site.**

  This includes static HTML pages, dynamic pages generated by servlets, JSPs, PL/SQL, etc. Examine all code that obtains the server name of Oracle HTTP Server to ensure that it is not embedding the server name into pages that are sent back to the client. To test for this behavior, use a "spider" application that traverses all links in a Web site. Open source tools with this functionality are available.

- **Avoid returning host and port information in applications (such as applets or javascript) downloaded to the client.**

  If you have an application that uses browser-based code, ensure that the code does not contain the hostname and port of Oracle HTTP Server that actually delivers the content. Instead, it must have the actual client-accessible address used by the third-party listener.

- **Ensure that all URLs within an application can be easily mapped to a set of rules that the proxy can use.**

  In order to successfully proxy all requests for an application, the Oracle Application Server Proxy Plug-in must have a complete description of the URL space for that application. Each Oracle Application Server application must describe the set of rules necessary to configure the plug-in for that application. This set of rules must include all URLs that the application could generate. If an application generates a URL that is not described by the proxy `urlrule` parameters, the request will be served by the third-party HTTP listener, and a "document not found" error may occur (or, worse, a document other then the intended document may be delivered to the client).

  Developers of applications that use common top level directories (such as a reliance on mapping /images) should be prepared to:

  - Change these common links to something that will not conflict with applications that might already be deployed on the third-party listener.
  - Instruct the user to copy the necessary content to the third-party listener's directory structure. For performance reasons, it is a good idea to have the third-party listener handle static `.gif` and `.jpg` files anyway, but it requires extra effort.

# Troubleshooting

This section describes common problems and possible solutions.

### Listener Fails to Start

- Ensure that you have the newest version of the Oracle Application Server Proxy Plug-in.
- Verify that your listener configuration is set up correctly. (The IIS listener may need to be restarted in order to make the filter work properly.) A proxy server definition file must exist.

  **See Also:** "Proxy Server Definition File" on page A-4 for a description of this file and parameter requirements.

- Check for problems in the proxy server definition file. Each server in the serverlist line must be defined later in the file, and you must have at least one server defined. If a server name is listed but not defined, the listener may not start (although the reverse is not true). Ensure that there are no typographical errors or missing quotes in the proxy server definition file.
- **For Sun ONE 6.0 on UNIX and Windows:** Ensure that `Init` lines are added to the `magnus.conf` file and `ObjectType` and `Service` lines are added to the `obj.conf` file.

### Listener Returns Incorrect URLs

- Verify that changes to the proxy server definition file have been saved and the listener has been restarted.
- Ensure that there are no typographical errors in the proxy server definition file.
- Ensure that the `urlrule` parameter is set up correctly, and consider whether the stripcontext option should be set to true.
- Verify that the `serverlist` line in the proxy server definition file specifies the back-end server you are trying to reach.
- Verify that the back-end server is running, and that the file you are attempting to retrieve exists and is accessible on the back-end server.
- Verify that the host, port and `urlrule` parameters in the proxy server definition file target the correct area on the back-end server.
- Ensure that client requests are being sent to the correct port on the third-party listener machine.

- Check the listener log files, the proxy log (may need to be turned on in "debug" mode, and may require restarting the listener), and the back-end server logs to verify that requests are getting through.

### Changes Made to Proxy Server Definition File are Not Reflected

- Ensure that you have saved the proxy server definition file and restarted the listener.
- **For IIS:** To pick up the changes, you must stop and start the WWW Publishing Service from the Control Panel. This takes a few minutes.

### IIS Listener Displays Incomplete Pages or Garbled Characters

Do not display an IIS pages with a Sun ONE browser.

### Parsing Error Occurs with Sun ONE 6.0

If you try to change the ports or turn on security (for SSL), the server may return the error message "Unable to parse `magnus.conf`".

Remove any comments and added lines preceding and following the `Init` lines in the `magnus.conf` file.

### "File Not Found" Error Occurs

If you are using a context-based `urlrule` parameter to retrieve a file that is known to exist, and the listener returns "`Not Found`", you probably need to set "`stripcontext=true`".

**See Also:** `"oproxy.servername.urlrule"` on page A-7

### Partial URL Requests Return Unexpected Results

The IIS and Sun ONE servers auto-complete URLs differently. Requests of "`http://serviceman`", "`http://serviceman/`", and "`http://serviceman/index.html`" do not necessarily return the same results on different platforms. The `oproxy.`*`servername`*`.urlrule` parameter can be used to work around this problem.

**See Also:** `"oproxy.servername.urlrule"` on page A-7

### Sun ONE Server Returns "Server Error" with "/servlet" Request

The default Sun ONE configuration maps any URL requests to "/servlet" to its own servlet handler. You must edit the proxy server definition file, or change the Sun ONE configuration to correct this.

### Server Returns Page with Broken Image Links

If you use an exact `urlrule` parameter, for example, `"urlrule=/*.html"`, in the proxy server definition file (or a similar scenario), the server retrieves the specified page, but all other links are forbidden to the user, including inline images in the page. (If you use an exact `urlrule` with `stripcontext=true`, a "Server Error" is returned.)

### Unexpected Pages are Displayed

Clear the memory cache in your client browser. Earlier versions of Sun ONE and IE cache pages even when told to retrieve the page every time, when no memory is allocated for caching (you may need to restart the browser to get this behavior to work). If you see a page you're not expecting, try refreshing or reloading the page.

### REMOTE_ADDR Contains Unexpected IP Address

The `REMOTE_ADDR` field usually contains the IP address of the client machine. In some URL request cases, if there is a proxy server in the environment, the field may contain the IP address of the proxy server.

### Redirects Go To Network Entry Point

If the back-end server returns a redirect to the entry point of the network, do one of the following, the first option being the preferred one:

- Set the following directives in the `httpd.conf` file:

```
UseCanonicalName On
ServerName name of listener host
Port port of listener host
```

- Set the following directives in the `httpd.conf` file:

```
UseCanonicalName port
Port port of listener host
```

  Edit the proxy plug-in server configuration file:

```
oproxy.serverName.alias=name of listener host:port of listener host
```

### SSL Requests Yield Unexpected Results

The proxy plug-in supports SSL connections made between the client and the proxy host, but does not support SSL connections between the proxy and the back-end server. To implement the latter, set up the listener to receive SSL connections and start the back-end server in non-SSL mode. No changes to the proxy configuration are needed.

# B

# Using Oracle Application Server SSO Plug-in

This appendix explains how to use Oracle Application Server SSO Plug-in to protect third-party HTTP listener and its applications. The Oracle Application Server SSO Plug-in works with the Sun ONE Web Server Enterprise Edition, version 4.1 and 6.0, on UNIX and Windows NT systems, and the Microsoft Internet Information Server (IIS), version 4.0 or 5.0, on Windows systems.

Topics discussed are:

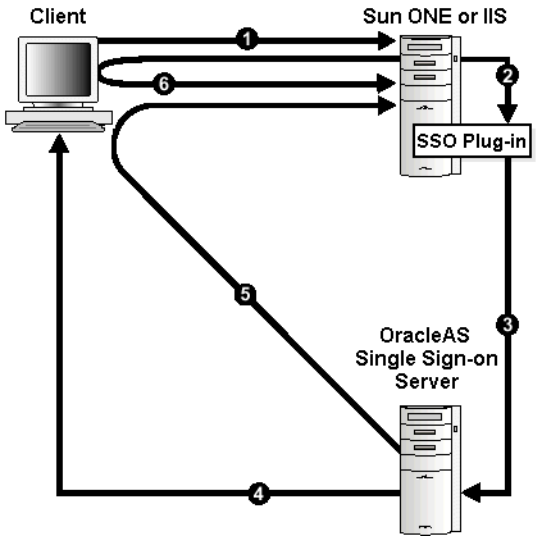
# Overview

Oracle Application Server SSO Plug-in is Oracle's single sign-on (SSO) solution for third-party listeners such as Sun ONE and IIS. The **plug-in** is designed to protect native third-party listener applications using the SSO infrastructure. With the help of the Oracle Application Server SSO Plug-in, you can be authenticated to different third-party listener applications using only one SSO password. You can integrate these SSO-protected third-party listener applications with SSO enabled Oracle HTTP Server applications or legacy Oracle SSO enabled application together as long as they are all protected on the same SSO server.

Oracle Application Server SSO Plug-in is a simple version of mod_osso, and only implements some of its basic functionality. Features such as dynamic authentication, global logout, idle timeout and global timeout, and basic authentication for legacy application are not implemented in the current Oracle Application Server SSO Plug-in release.

Figure B–1 illustrates the process involved when you request a URL protected by the Oracle Application Server SSO Plug-in.

***Figure B–1 Oracle Application Server SSO Plug-in***



1. The user requests a URL through a Web browser.
2. The Web server looks for an Oracle Application Server SSO Plug-in cookie for the user. If the cookie exists, the Web server extracts the user's information and uses it to log the user in to the requested application.
3. If the cookie does not exist, then the Oracle Application Server SSO Plug-in redirects the user to the single sign-on server.
4. The single sign-on server looks for its own cookie in the browser. If it finds none, it tries to authenticate the user with a user name and password. If authentication is successful, the single sign-on server creates a cookie in the browser as a reminder that the user has been authenticated. If a cookie exists, the single sign-on server authenticates using the cookie.
5. The single sign-on server returns the user's encrypted information to the Oracle Application Server SSO Plug-in.
6. Oracle Application Server SSO Plug-in creates its own cookie for the user in the browser and redirects the user to the requested URL.

   During the same session, if the user again seeks access to the same or to a different application, the user is not prompted for a user name and password; the application uses an HTTP header to obtain this information from the Oracle Application Server SSO Plug-in session cookie.

## Downloading SSO Plug-in

The plug-in is distributed on the OracleAS Repository Creation Assistant/Utilities CD, which is included in your Oracle Application Server CD Pack.

# Installing SSO Plug-in

Install Oracle Application Server SSO Plug-in on a machine that has an Oracle Application Server installation. This installation is required only for the network and security dependent libraries and single sign-on registration tool; it is not required to be running. After the Oracle Application Server installation on UNIX systems, add *ORACLE_HOME*/lib to the LD_LIBRARY_PATH in the listener's start script. For example, the "start" script in Sun ONE. On Windows systems, the installation automatically sets the environment variable PATH. For example, *ORACLE_HOME*\bin.

Download, or copy, the required plug-in, and place the configuration file and shared libraries in directories that the third-party listener can access. For security reasons, ensure that all the configuration files and plug-in modules are given minimum privileges.

## Installing SSO Plug-in for Sun ONE

The plug-in consists of a single shared library, oracle_proxy.so on UNIX and oracle_proxy_nes.dll on Windows. To install the plug-in into the listener, place the library in a directory to which the listener has read and execute privileges.

## Installing SSO Plug-in for IIS

The plug-in consists of a single .dll, oracle_proxy.dll. To install this plug-in, copy the .dll to a directory the listener can access.

# Registering with Single Sign-On

The **single sign-on** registration process enables the single sign-on server and the listener to share information such as server location, protocol version, and common encryption key, before they communicate. After the registration process, this information is stored on the single sign-on server side as a single sign-on partner application entry. On the listener side, a single sign-on file called `sso_conf` is created. `sso_conf` is obfuscated for security purposes. Copy it to an appropriate location so that the listener can access it.

Oracle provides a Java-based single sign-on registration tool to automatically complete this process.

## Using the Single Sign-On Registration Tool

Register the third-party listener with a single sign-on server using the following command:

```
ORACLE_HOME/jdk/bin/java -jar ORACLE_HOME/sso/lib/ossoreg.jar [arguments]
```

where *ORACLE_HOME* is the home directory of your Oracle Application Server installation.

> **Note:** You can only run this tool on the same machine where your listener resides. Also, the resulting single sign-on configuration file has to be generated directly on the same machine. Do not copy the single sign-on configuration file across different machines.

A different version `ossoreg.jar` could have very different command arguments. If needed, run the above command using "-help" first to get the complete usage information.

## Common Single Sign-On Registrar Command Arguments

Table B–1 lists some important common arguments for the single sign-on registrar.

***Table B–1 SSO Registrar Command Arguments***

| Argument | Description |
|---|---|
| `-oracle_home_path` | Absolute path to the Oracle home of the Oracle Application Server installation |
| `-site_name` | Name of the site, typically expressed as the contiguous string *`host:port`*. |
| `-ssoDBConnect` | Single sign-on database JDBC connect string. It is optional. The default is obtained from the system. |
| `-pass` | `ORASSO_PA` password. It is optional. The default is obtained from the system. |
| `-mod_osso_url` | `http://<`*`listener_hostname.domain`*`>:`*`port`* |
| `-admin_id` | User name of the third-party administrator. This argument is optional. |
| `-admin_info` | Information associated with the administrator's user name, such as e-mail address. This argument is optional. |
| `-config_ mod_osso` | Set to TRUE. This parameter indicates that the application being registered is `mod_osso`. This argument is necessary to generate the `sso_conf` file. |
| `-u` | Specifies the name of the account used to start the third-party listener. For example, use the value of `User` specified in the `magnus.conf` for Sun ONE and `SYSTEM` for IIS. The default is the user who runs the single sign-on registrar tool. |
| `-sso_server_version` | Must be set to `v1.2`. |
| `-virtualhost` | Be sure to include this argument. |
| `-config_file` | Specifies a path of the final obfuscated single sign-on configuration file. Default is set to:<br>■ UNIX: *`ORACLE_HOME`*`/Apache/Apache/conf/osso.conf`<br>■ Windows: *`ORACLE_HOME`*`/Apache\Apache\conf\osso.conf` |

***Example B–1 Using Common Single Sign-On Registrar Command Arguments***

On UNIX:

```
ORACLE_HOME/jdk/bin/java -jar ORACLE_HOME/sso/lib/ossoreg.jar \
-ssoDBConnect <host.domain>:1521:iasdb -pass your_password \
-oracle_home_path ORACLE_HOME -site_name <host.domain>:7778 \
-config_mod_osso TRUE -mod_osso_url http://<host.domain>:7778 \
-u nobody -admin_id admin_name -admin_info admin@company.com \
-sso_partner_version v1.2 \
-virtualhost \
-config_file ORACLE_HOME/Apache/Apache/conf/osso/sso_conf
```

On Windows NT:

```
ORACLE_HOME/jdk/bin/java -jar ORACLE_HOME/sso/lib/ossoreg.jar \
-ssoDBConnect <host.domain>:1521:iasdb -pass your_password \
-oracle_home_path ORACLE_HOME -site_name <host.domain>:8080 \
-config_mod_osso TRUE -mod_osso_url http://<host.domain>:8080 \
-u SYSTEM -admin_id admin_name -admin_info admin@company.com \
-sso_partner_version v1.2 \
-virtualhost \
-config_file ORACLE_HOME/Apache/Apache/conf/osso/sso_conf
```

# Configuring SSO Plug-in

Create a plug-in configuration file such as `osso_plugin.conf`. This is the file where you define all the plug-in functionality. It can also be referred as the `osso` property file. The syntax is exactly the same for all third-party listeners. This file must reside in a directory that is readable by the third-party listener. This file also contains the following:

- Plug-in directives such as `LoginServerFile` and `IpCheck`
- A set of rules that match resources to be protected.

## SSO Plug-in Configuration Directives

Table B–2 lists the configuration directives for the SSO plug-in:

***Table B–2 SSO Plug-in Configuration Directives***

| Directive Name | Function |
|---|---|
| `LoginServerFile` | Specifies the location of the Single Sign-On Server configuration file such as `sso.conf` that is attained from the SSO registration process. This directive gets its name from Login Server, which is now called Single Sign-On Server, for historical reasons.<br>This is a global parameter and should not be used on a per-resource basis. That is, you must provide one and only one Single Sign-On Server configuration file.<br>■ **Parameter Type**: string<br>■ **Allowable Values**: the full path of your Single Sign-On Server configuration file, such as `sso_conf`.<br>■ **Default Value**: None. You must provide the exact location of the Single Sign-On server configuration file to allow SSO plug-in to be functional.<br>■ **Example**: `LoginServerFile=/path/config/sso_conf` |
| `IpCheck` | Specifies whether the SSO plug-in should check the IP address of each request when it examines the cookie. Valid values are true and false. Setting `IpCheck` to true prevents cookies being stolen.<br>■ **Parameter Type**: Boolean<br>■ **Allowable Values**: true/false.<br>■ **Default Valu**e: false.<br>■ **Example**: `IpCheck=true`<br>Note: Set `IpCheck` to false if you have a proxy server or firewall between your Sun ONE server and your clients' browser. |
| `HardTimeout` | Deprecated. |

# Resource Protection

Use the following format to protect resources:

```
<OSSO url-matching-rule>
  SSO_configuration_directives
</OSSO>
```

Use the following rules to define the url-matching-rule:

| Rule Name | Description |
|---|---|
| Exact Match | This option identifies an exact file as a protected resource, for example: `/examples/Hello.html` |
| Context Match | This option identifies a directory as a protected resource, for example: `/examples/*` |
| Extension Match | This option identifies files with a certain extension in a particular directory as a protected resource, for example: `/examples/*.jsp` |

When multiple rules apply to the same URL, the following precedence applies:

1. Exact matches
2. Longest context match plus suffix match
3. Longest context match

Some examples of the precedence are:

```
/foo/bar/index.html would take precedence over /foo/bar/*
/foo/bar/*.jsp would take precedence over /foo/bar/*
/foo/bar/* would take precedence over /foo/*
```

***Example B–2 Simple Single Sign-on Configuration File, osso_plugin.conf***

```
LoginServerFile=/path/sso_conf
<OSSO /private/hello.html>
  IpCheck = false
</OSSO>
<OSSO /private1/*>
</OSSO>
<OSSO /private2/*.jsp>
  IpCheck = true
</OSSO>
```

# Configuring Sun ONE Listener for Single Sign-on

This section provides SSO plug-in configuration instructions for the Sun ONE Enterprise Server listener on UNIX and Windows NT systems.

> **Note:** If you are configuring the Sun ONE listener on Windows NT, use forward slashes (/) in all paths.

1. Open the `magnus.conf` file, version 6, or `obj.conf`, version 4, in the Sun ONE listener `/config` directory.
2. Add the load-modules line:

   On UNIX:

   ```
   Init fn="load-modules" shlib="/path/oracle_proxy.so" funcs=osso_
   init,oracle_single_sign_on,osso_redirect_service,osso_success_service"
   ```

   On Windows NT:

   ```
   Init fn="load-modules" shlib="/path/oracle_proxy_nes.dll" funcs=osso_
   init,oracle_single_sign_on,osso_redirect_service,osso_success_service"
   ```

   where `/path/` is the path to the shared library for the plug-in. This line tells the listener where the proxy shared library is, and which functions are exposed by this library.
3. Add the configuration parameters line:

   ```
   Init fn="osso_init" osso_properties="/path/osso_plugin.conf" log_
   file="/path/plugin.log" log_level=error
   ```

   where `/path/osso_plugin.conf` is the exact location of the plug-in configuration file you just created. Also this line can specify a log file and log level to log messages from the plug-in (optional).
4. Add the following line to the `<Object name=default>` section of the `obj.conf file`, before all other lines:

   ```
   AuthTrans fn="oracle_single_sign_on"
   ```

5. Add the following line to the `<Object name=default>` section before all other lines that begin with the word `Service`:

```
Service type="oracle/sso_redirect" fn="osso_redirect_service"
```

6. Add the following lines where `/path/` is the path of your document root. For example: `/home/Sun ONE/docs/` or `$docroot`.

```
<Object ppath="/path/osso_login_success">
  Service fn="osso_success_service"
</Object>
```

7. Change the `LD_LIBRARY_PATH` variable in your start script to include the location of *`ORACLE_HOME`*`/lib`, where *`ORACLE_HOME`* is the Oracle Application Server installation home directory.
8. Restart the listener.

## Usage Notes for Sun ONE Enterprise Server Version 6.0

For version 6.0, the same shared library can be used as with version 4.1. The configuration is virtually the same, but the configuration files for Sun ONE have changed slightly in version 6.0. In this version, the two lines beginning with `Init` that need to be added must be added at the end of the `magnus.conf` file rather than to the `obj.conf` file. The other two lines that should be added to `obj.conf` remain the same.

# Configuring IIS Listener for Single Sign-On

This section provides instructions on configuring the IIS Listener to use the SSO plug-in. The plug-in consists of a single `.dll`, `oracle_osso.dll`. To install the plug-in, copy the `.dll` to the host on which IIS resides and perform the following steps:

1. Edit your registry to create a new registry key named `HKEY_LOCAL_MACHINE\SOFTWARE\Oracle\IIS OSSO Adapter`.
2. Specify the exact location of your plug-in configuration file you just created. For example: `d:\osso\osso_plugin.conf`, by adding this string value with the name `cfg_file` and a value pointing to the location of your configuration file.
3. Specify a `log_file` and `log_level`. This is optional.
   a. Add a string value with the name `log_file` and the desired location of the log file. For example: `d:\ossoplugin.log`)
   b. Add a string value with the name `log_level` and a value for the desired log level. Valid values are `debug`, `inform`, `error` and `emergency`.
4. Using the IIS management console, add a new virtual directory to your IIS Web site with the same physical path as that of `oracle_osso.dll`. Name the directory `osso` and give it execute access.
5. Using the IIS management console, add `oracle_osso.dll` as a filter in your IIS Web site. The name of the filter should be osso and its executable must point to the directory containing `oracle_osso.dll`.For example, `d:\osso\oracle_osso.dll`.
6. Stop and then start the IIS Server, ensuring that the filter is marked with a green up-pointing arrow.

---

**Note:** To restart IIS, you must stop all of the IIS services through the control panel, or restart the computer. This is the only way to ensure that the `.dll` is reloaded (restarting IIS through the management console is not sufficient).

---

# Troubleshooting

This section describes common problems and possible reasons.

### Oracle Dependency Libraries Not Found

SSO plug-in could not find the libraries it needs. Possible reason would be that you do not have *ORACLE_HOME*/lib included in your LD_LIBRARY_PATH on UNIX. On Windows, you do not have *ORACLE_HOME*/bin included in your PATH.

### Single Sign-On Server Configuration File De-obfuscation Fails

Single sign-on server configuration file, for example, sso_conf, is obfuscated using a certain account and this account has to be the one being used to start your listener. For example, use the value of User specified in magnus.conf for Sun ONE and usually SYSTEM for IIS.

### IIS Oracle Application Server SSO Plug-in Does Not Work with HTML Authentication

Oracle Application Server SSO Plug-in is not designed to work in concert with other authentication modules. It is either a native listener authentication module, or third-party module.

# C

# Using Oracle Application Server Containers for J2EE Plug-in

This appendix explains how the Oracle Application Server Containers for J2EE (OC4J) plug-in enables you to use third party HTTP listeners to access servlets running in OC4J J2EE within Oracle Application Server. OC4J Plug-in works with Sun ONE Web Server Enterprise Edition, version 4.1 and 6.0, and Microsoft Internet Information Server (IIS), version 4.0 or 5.0.

It also contains information about using `mod_oc4j` in a non-Oracle Apache.

Topics discussed are:

# Overview

OC4J Plug-in provides functionality for third party HTTP listeners similar to that provided by mod_oc4j for Oracle HTTP Server. In Releases 2 (9.0.2) and 2 (9.0.3), Oracle Application Server Proxy Plug-in provided third party listener support. However, the proxy plug-in provides reverse proxy functionality where requests must pass through both the third party listener and Oracle HTTP Server before reaching OC4J. For efficiency or administrative reasons, you may choose to not run Oracle HTTP Server in addition to the third party listener.

OC4J Plug-in is a shared library that can be loaded into IIS, or Sun ONE HTTP listener. It provides functionality to route requests directly from a third party listener to OC4J in the same manner `mod_oc4j` routes requests from Oracle HTTP Server to OC4J. Thus, requests for OC4J can be directly routed from IIS or Sun ONE to one or more OC4J JVMs using the AJP or AJP over SSL protocol.

---

**Note:** Proxy Plug-in and SSO Plug-in are certified to work with the entire Oracle Application Server stack, such as Oracle Application Server Forms Services, Oracle Application Server Reports Services, and Oracle Application Server Wireless. However, OC4J Plug-in is only certified to run customer applications. For example, you cannot route requests from Sun ONE using OC4J Plug-in to an OC4J container where Oracle Application Server Forms Services is running.

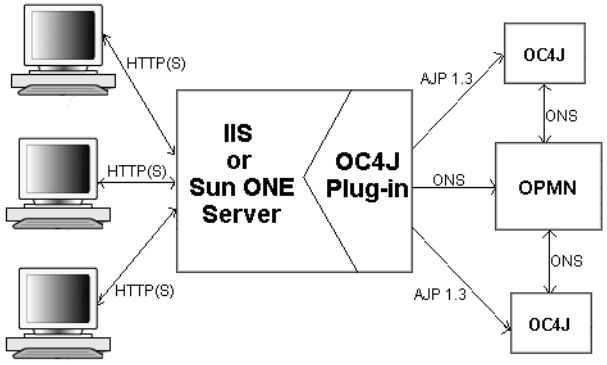
---

**See Also:**

- Appendix A, "Using Oracle Application Server Proxy Plug-in" on page A-1
- Appendix B, "Using Oracle Application Server SSO Plug-in" on page B-1
- "mod_oc4j" on page 8-20

Figure C–1 illustrates how the OC4J Plug-in routes requests directly from a third party listener to OC4J.

***Figure C–1 OC4J Plug-in for IIS and Sun ONE***




# Downloading and Installing OC4J Plug-in

The plug-in is distributed on the OracleAS Repository Creation Assistant/Utilities CD, which is included in your Oracle Application Server CD Pack.

The plug-in consists of a single shared library for either IIS or Sun ONE. The file is called `opii.dll` for IIS, and `opii.so` for Sun ONE.

# Configuring OC4J Plug-in on Sun ONE

Place the `opii.so` file in a directory such as `/sunone/opii.so`, where it is readable by the Sun ONE listener. The following examples assume that Sun ONE is installed in a directory called `/sunone`, and that the instance being configured exists under `/sunone/`*`https-mymachine`*.

1. Add the following lines at the end of `/sunone/`*`https-mymachine`*`/magnus.conf`:

```
Init fn="opii_init" log_file="/sunone/https-mymachine/logs/opii.log"
  log_level=error server_defs="/sunone/https-machine/config/opii.conf"
Init fn="opii_child_init" LateInit=yes
```

   where, `log_file` points to a file where OC4J Plug-in messages will be logged and `server_defs` points to an OC4J Plug-in configuration file.

   **See Also:** "OC4J Plug-in Configuration File" on page C-11

2. Make the following modifications to `/sunone/`*`https-mymachine`*`/obj.conf`:

   a. Add the following line before any `ObjectType` line:

```
ObjectType fn=opii_objecttype
```

   b. Add a Service line, such as:

```
Service Type="oracle/opii" fn="opii_service" UserOutPutStreamSize = 8192
```

3. If you want to enable the OC4J status page, which is equivalent to the URL `/oc4j-service` in `mod_oc4j` for Oracle HTTP Server, then make the following two changes to `obj.conf`:

   a. Add the following line at top of `obj.conf`:

```
NameTrans fn=assign-name from="/oc4j-service" name="opii-status"
```

   b. Add the following section at the end of `obj.conf`:

```
<Object name="opii-status">
  Service fn="opii_status_service" UseOutputStreamSize=8192
</Object>
```

# Configuring OC4J Plug-in for IIS

Perform the following steps to configure OC4J Plug-in for IIS:

1. Edit your registry to create a new registry key named `HKEY_LOCAL_MACHINE\SOFTWARE\Oracle\OPII`
2. Specify the exact location of your configuration file with the name `server_defs`, and a value pointing to the location of your configuration file, for example `d:\opii\opii.conf`.

   **See Also:** "OC4J Plug-in Configuration File" on page C-11

3. (Optional) Specify a `log_file` and `log_level`:
   a. Add a string value with the name `log_file`, and the desired location of the log file, for example, `d:\opii\plugin.log`.
   b. Add a string value with the name `log_level`, and a value for the desired log level. Valid values are `debug`, `inform`, `error`, and `emerg`.
   c. If you want to enable the OC4J Plug-in status page, a page equivalent to `mod_oc4j /oc4j-service` URL, add a string value with the name `status_uri` and a value like `/oc4j-service`.
4. Using the IIS management console, add a new virtual directory to your IIS Web site with the same physical path as that of `opii.dll`. Name the directory `opii` and give it execute access.
5. Using the IIS management console, add `opii.dll` as a filter in your IIS Web site. The name of the filter should be `opii` and its executable must point to the directory contain `opii.dll`, for example, `d:\opii\opii.dll`.
6. Restart IIS (stop and then start the IIS server), ensuring that the filter is marked with a green arrow pointing up.

---

**Note:** To restart IIS, you must stop all of the IIS services through the control panel, or restart the computer. This is the only way to ensure that the `.dll` is reloaded. Restarting IIS through the management console is not sufficient.

---

# Integrating Generic Apache with Oracle Application Server

In Oracle Application Server, 10*g* (9.0.4), you can integrate generic Apache with Oracle Application Server. In doing so, you can route requests from generic Apache to OC4J in the same manner as routing requests using Oracle HTTP Server and `mod_oc4j`.

Using Oracle Notification Service (ONS), the communication method utilized between `mod_oc4j` and OC4J, you can load `mod_oc4j` into a generic Apache instance and use it in a static routing configuration without requiring any other Oracle infrastructure. In combination with `mod_onsint` and ONS, `mod_oc4j` can utilize the same dynamic configuration and failover options that are available when using Oracle HTTP Server.

> **See Also:** "mod_onsint" on page 8-35

This section discusses the following topics:

- Integration Requirements
- Generic Apache Files
- Setting Up a Static Configuration with mod_oc4j
- Setting Up a Dynamic Configuration with mod_oc4j and mod_onsint
- Integrating with Oracle Process Manager and Notification Server

## Integration Requirements

`mod_oc4j` and `mod_onsint` require the following open source software packages to be included in generic Apache builds that will be integrated with Oracle Application Server:

- Enhanced API (EAPI) provided as part of `mod_ssl`. EAPI provides a context mechanism that is used extensively by `mod_onsint` and `mod_oc4j` to share information and function callbacks between modules without introducing link time dependencies. EAPI is provided by configuring Apache with `mod_ssl`.

> **Note:** `mod_ssl` does not need to be loaded at runtime as it is the integration of EAPI provided by `mod_ssl` that is important.

> **See Also:** `http://www.modssl.org`

- (UNIX only) mm shared memory library. The mm library is used on UNIX platforms to share routing information between all of the child processes that make up an Apache instance on UNIX. This library is not necessary on Windows platforms since the Apache architecture on Windows uses a single multi-threaded process instead of many single-threaded processes.

  **See Also:** `http://www.ossp.org/pkg/lib/mm/`

---

**Note:** mod_oc4j is supported in Apache versions 1.3.x only. It is not supported in Apache 2.0.x versions.

---

## Generic Apache Files

Four libraries need to be accessible by the generic Apache instance that is going to be integrated with Oracle Application Server. If `mod_oc4j` is used in a static configuration and `mod_onsint` is not used, then you need only two libraries.

On UNIX, the four files and their locations within an *ORACLE_HOME* are:

```
$ORACLE_HOME/Apache/Apache/libexec/mod_oc4j.so
$ORACLE_HOME/Apache/Apache/libexec/mod_onsint.so
$ORACLE_HOME/opmn/lib/libons.so
$ORACLE_HOME/lib/libdms2.so
```

On Windows, the four files and their locations within an *ORACLE_HOME* are:

```
%ORACLE_HOME%\Apache\Apache\modules\ApacheModuleOc4j.dll
%ORACLE_HOME%\Apache\Apache\modules\ApacheModuleOnsint.dll
%ORACLE_HOME%\opmn\bin\onsclient.dll
%ORACLE_HOME%\bin\yod.dll
```

It is easiest if the binaries for the two modules are copied into the same location as the other modules in the generic Apache installation (`libexec` on UNIX, and `modules` on Windows), although this is not a requirement. Full paths can be used if you want to place the binaries elsewhere. The `dms` and `ons` libraries do not need to be in any specific location, but they must be in the your `LD_LIBRARY_PATH` on UNIX, and the `PATH` on Windows. On UNIX, this is most easily accomplished by editing the `apachectl` script used to start the generic Apache instance to set the `LD_LIBRARY_PATH` appropriately. On Windows, this is most easily accomplished by placing the appropriate directory into the System environment variable `PATH`. However, if more than one generic Apache instance is running on the same machine, then some other mechanism might be needed.

## Setting Up a Static Configuration with mod_oc4j

A simple configuration can be constructed using generic Apache and only `mod_oc4j`. This configuration is very similar to the functionality provided by `mod_jserv`.

> **See Also:** "mod_jserv" on page 8-11

In this configuration, the host and port of all OC4J instances must be statically configured. There is no automatic registration of new JVMs, nor are failed JVMs ever removed from the routing table used by `mod_oc4j`. The advantage of this configuration is its simplicity, including the fact that it does not require the availability of other Oracle Application Server infrastructure components, such as ONS. Following is an example of such a configuration. This configuration loads `mod_oc4j` and provides routing of all requests starting with `/j2ee/` to two different JVMs, both located on the same machine, one at port 3001, and the other at port 3002:

```
LoadModule oc4j_module libexec/mod_oc4j.so
Oc4jMount /j2ee/* ajp13://localhost:3001,ajp13://localhost:3002
```

On Windows, change the line used to load `mod_oc4j` to the following:

```
LoadModule oc4j_module modules/ApacheOc4jModule.dll
```

On UNIX, this implies that the `mod_oc4j.so` file will be copied into the `libexec` directory within the Apache installation. On Windows, it means that the `ApacheOc4jModule.dll` file will be copied to the modules directory within the Apache installation.

## Setting Up a Dynamic Configuration with mod_oc4j and mod_onsint

In order to provide full `mod_oc4j` functionality including dynamic detection of new JVMs and Oracle Application Server installations, `mod_oc4j` must be combined with `mod_onsint`.

In order to utilize `mod_onsint` and `mod_oc4j`, *`ORACLE_HOME`* must be set to point to an Oracle Application Server instance where OPMN is running. On UNIX, this can be accomplished by adding the setting of *`ORACLE_HOME`* to the `apachectl` script used to start the generic Apache instance. On Windows, this is most easily accomplished by setting *`ORACLE_HOME`* as a System environment variable.

The following configuration shows how to load the modules and mount `/j2ee` to the OC4J instance, `myinstance`, running within the Oracle Application Server cluster, `mycluster`.

```
LoadModule oc4j_module libexec/mod_oc4j.so
LoadModule onsint_module libexec/mod_onsint.so
Oc4jMount /j2ee/* cluster://mycluster:myinstance
```

Any allowable `Oc4jMount` syntax available from within Oracle HTTP Server is available when used with generic Apache. This configuration supports all of the same routing and availability features that `mod_oc4j` offers when running within Oracle HTTP Server, including dynamic discovery of new OC4J processes and instances as they are added and failover of both stateless and session based requests.

## Integrating with Oracle Process Manager and Notification Server

Oracle Process Manager and Notification Server (OPMN) can be configured to provide process management, such as starting, stopping, and restart capability for a generic Apache installation. To do this, the Apache instance must have `mod_onsint` configured. It should have the standard Apache directory layout, that is, the directory structure created by doing a standard Apache 1.3 installation. To configure OPMN to manage this Apache instance, the following changes must be made to `opmn.xml`:

In the module section add the `GENERIC_APACHE` module-id to the configuration for `libopmnohs`, such as:

```
<module path="$ORACLE_HOME/opmn/lib/libopmnohs">
  <module-id id="OHS"/>
  <module-id id="GENERIC_APACHE"/>
</module>
```

In the `HTTP_Server` section, you must set the module to `GENERIC_APACHE` and set an `apache-home`, such as:

```
</ias-component>
  <ias-component id="HTTP_Server">
    <process-type id="HTTP_Server" module-id="GENERIC_APACHE">
      <module-data>
        <category id="start-parameters">
          <data id="apache-home" value="/private/my/path/to/APACHE"/>
        </category>
      </module-data>
    <process-set id="HTTP_Server" numprocs="1"/>
  </process-type>
</ias-component>
```

You can configure either an Oracle HTTP Server instance or a generic Apache instance into any `opmn.xml`. Configuring both in the same `opmn.xml` is currently not supported.

**See Also:** "opmn.xml" on page D-10

# OC4J Plug-in Configuration File

When you set up the OC4J Plug-in in the third party listener, the configuration file points at a `server_defs` file, or the OC4J Plug-in configuration file. This file defines the OC4J instances that the OC4J Plug-in communicates with. It has the same syntax as the `mod_oc4j` file for Oracle HTTP Server. For example, a configuration file that contains only the following line

```
Oc4jMount /j2ee/* ajp13://localhost:3000
```

routes any requests to URLs that begin with`/j2ee/` to the OC4J instance that has an AJP listener on the localhost interface on port 3000.

All of the `Oc4j*` directives defined for `mod_oc4j` also work for OC4J Plug-in. In additional to these directives, the OC4J Plug-in-specific directives `Oc4jOracleHome` can be used in place of setting the `ORACLE_HOME` directive in the environment for the third party listener. An `ORACLE_HOME` value is required if you want to use the dynamic functionality of the OC4J Plug-in.

> **See Also:** "mod_oc4j Configuration File and Directives" on page 8-21

The dynamic routing functionality of the OC4J Plug-in provides the same `Oc4jMount` syntax as `mod_oc4j` for routing to OC4J instances that are managed by OPMN. Accordingly, you can mount OC4J instances or clusters instead of just pointing at the host and port of a single JVM. In order to accomplish this, the OC4J Plug-in must be able to communicate with an ONS daemon on the same machine. If Oracle Application Server is installed on the same machine as the OC4J Plug-in, then this can be accomplished simply by setting either `ORACLE_HOME` in the environment, or setting the `Oc4jOracleHome` directive to point to the location of the `ORACLE_HOME`, and ensuring that the third party listener is running as the same user as Oracle Application Server, or `root` on UNIX.

> **See Also:** "Running Oracle HTTP Server as Root" on page 4-2

If Oracle Application Server is not installed on the same machine, then the standalone ONS daemon must be installed. OC4J Plug-in supports all the `mod_oc4j` functionality, including AJP over SSL and use of port tunneling.

> **See Also:** "Understanding Port Tunneling" on page 10-37

# D

# Oracle HTTP Server Configuration Files

This appendix lists commonly used Oracle HTTP Server configuration files.

Files discussed are:

- iaspt.conf
- httpd.conf
- opmn.xml

Documentation from the Apache Software Foundation is referenced when applicable.

> **Note:** Readers using this guide in PDF or hard copy formats will be unable to access third-party documentation, which Oracle provides in HTML format only. To access the third-party documentation referenced in this guide, use the HTML version of this guide and click on the hyperlinks.

# iaspt.conf

Configures the port tunneling process. Port tunneling allows all communication between Oracle HTTP Server and OC4J to happen on a single, or a small number of ports.

It is located at:

- UNIX: *ORACLE_HOME*/iaspt/conf
- Windows: *ORACLE_HOME*\iaspt\conf

**See Also:** "Understanding Port Tunneling" on page 10-37

# httpd.conf

This is a server configuration file which typically contains directives that affect how the server runs, such as user and group IDs it should use, and location of other files. Because the server configuration file is the main file that the server starts with, Oracle HTTP Server does not include any directive that says where to locate it. The location is passed on command line when the server starts.

It is located at:

- UNIX: *ORACLE_HOME*/Apache/Apache/conf/httpd.conf
- Windows: *ORACLE_HOME*\Apache\Apache\conf\httpd.conf

You should use only this file, and not `srm.conf` or `access.conf` because it is must easier to manage a single configuration file.

## httpd.conf File Structure

`httpd.conf` is arranged in the following sections:

- Global Environment
- Main Server Configuration
- Virtual Hosts Parameters

### Global Environment

This is section one of the `httpd.conf` file. It contains configuration directives dealing with Oracle HTTP Server.

**See Also:**

- "Specifying File Locations" on page 3-6
- "Limiting the Number of Processes and Connections" on page 4-6
- Chapter , "Specifying Listener Ports and Addresses" on page 5-2

### Main Server Configuration

This is section two of the `httpd.conf` file. It contains the directives of the default server.

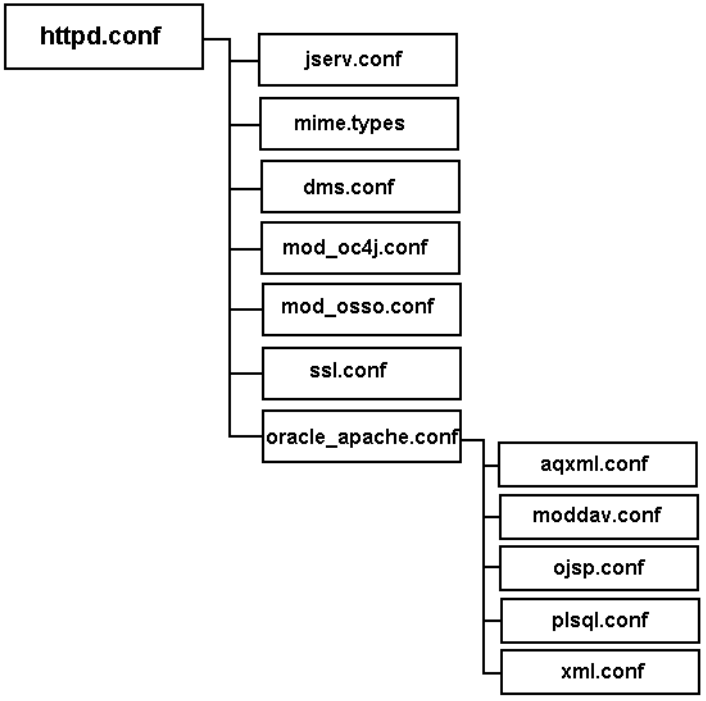
**See Also:** "Setting Server and Administrator Functions" on page 3-2.

### Virtual Hosts Parameters

This is section three of the `httpd.conf` file.It contains parameters specific to virtual hosts, which override some of the main server configuration defaults.

Figure D–1 illustrates the file structure of the `httpd.conf` file.

***Figure D–1 httpd.conf File***




**Note:** For the Oracle Application Server Infrastructure install type, another configuration file is included by `oracle_apache.conf` called `oracle_ocm.conf`. It contains configuration for Oracle Application Server Certificate Authority.

As per Figure D–1, `httpd.conf` contains directives to include configuration files such as:

- jserv.conf
- mime.types
- dms.conf
- mod_oc4j.conf
- mod_osso.conf
- oracle_apache.conf
- ssl.conf

## jserv.conf

`jserv.conf` loads the Apache JServ communication module. The module is not loaded by default.

It is located at:

- UNIX: *ORACLE_HOME*`/Apache/Jserv/etc`
- Windows: *ORACLE_HOME*`\Apache\Jserv\etc`

**See Also:** "mod_jserv" on page 8-11

## mime.types

`mime.types` controls the Multi Internet media types that are sent to the client for the given file extensions. Sending the correct media type to the client is important so that the client knows how to handle the content of the file. You can add extra types in the mime type file or add an `AddType` directive in the configuration file.

It is located at:

- UNIX: *ORACLE_HOME*`/Apache/Apache/conf`
- Windows: *ORACLE_HOME*`\Apache\Apache\conf`

**See Also:** "mod_mime" on page 8-19

## dms.conf

`dms.conf` enables you to monitor performance of site components with Oracle's Dynamic Monitoring Service (DMS).

It is located at:

- UNIX: *`ORACLE_HOME`*`/Apache/Apache/conf`
- Windows: *`ORACLE_HOME`*`\Apache\Apache\conf`

**See Also:** *Oracle Application Server 10g Performance Guide*

## mod_oc4j.conf

`mod_oc4j.conf` configures and loads the `mod_oc4j` module, and is enabled by default. It routes requests from Oracle HTTP Server to OC4J, and therefore contains routing information.

It is located at:

- UNIX: *`ORACLE_HOME`*`/Apache/Apache/conf`
- Windows: *`ORACLE_HOME`*`\Apache\Apache\conf`

**See Also:** "mod_oc4j" on page 8-20

## mod_osso.conf

`mod_osso.conf` is the configuration file for `mod_osso`, which enables single sign-on for Oracle HTTP Server.

It is located at:

- UNIX: *`ORACLE_HOME`*`/Apache/Apache/conf`
- Windows: *`ORACLE_HOME`*`\Apache\Apache\conf`

**See Also:** "mod_osso" on page 8-44

## oracle_apache.conf

`oracle_apache.conf` is included in the main configuration file to store configuration files of supported modules. It contains directives to include the following configuration files:

- aqxml.conf
- moddav.conf
- ojsp.conf
- plsql.conf
- xml.conf

### aqxml.conf

`aqxml.conf` enables and configures Advanced Queuing.

It is located at:

- UNIX: *ORACLE_HOME*`/Apache/Apache/conf`
- Windows: *ORACLE_HOME*`\Apache\Apache\conf`

### moddav.conf

`moddav.conf` configures and loads the `mod_oradav` module to enable distributed authoring and versioning of Web documents.

It is located at:

- UNIX: *ORACLE_HOME*`/Apache/oradav/conf`
- Windows: *ORACLE_HOME*`\Apache\oradav\conf`

**See Also:**

- Chapter 9, "Configuring and Using mod_oradav" on page 9-1
- "mod_oradav" on page 8-42

### ojsp.conf

`ojsp.conf` configures Java Server Pages.

It is located at:

- UNIX: *ORACLE_HOME*`/Apache/jsp/conf`
- Windows: *ORACLE_HOME*`\Apache\jsp\conf`

### plsql.conf

`plsql.conf` configures and loads the PL/SQL module.

It is located at:

- UNIX: *ORACLE_HOME*`/Apache/modplsql/conf`
- Windows: *ORACLE_HOME*`\Apache\modplsql\conf`

**See Also:** "mod_plsql" on page 8-48

### xml.conf

`xml.conf` is associated the `.xsql` extension with the XSQL servlet.

It is located at:

- UNIX: *ORACLE_HOME*`/xdk/admin`
- Windows: *ORACLE_HOME*`\xdk\admin`

***Example D–1 oracle_apache.conf file***

```
# Advanced Queuing - AQ XML
include "/private1/oracle/Apache/Apache/conf/aqxml.conf"
#
#Directives needed for OraDAV module
include "/private1/oracle/Apache/oradav/conf/moddav.conf"
include "/private1/oracle/Apache/jsp/conf/ojsp.conf"
include "/private1/oracle/Apache/modplsql/conf/plsql.conf"
#
include "/private1/oracle/xdk/admin/xml.conf"
#
```

## ssl.conf

`ssl.conf` includes the SSL definitions and virtual host container. Out of the box, it is disabled by default.

It is located at:

- UNIX: *ORACLE_HOME*`/Apache/Apache/conf`
- Windows: *ORACLE_HOME*`\Apache\Apache\conf`

# opmn.xml

`opmn.xml` describes the processes that Oracle Process Manager and Notification Server (OPMN) manages within an Oracle Application Server installation.

The `opmn.xml` file is the main configuration file for OPMN. It contains information for the ONS, the PM, and Oracle Application Server component-specific configuration.The `opmn.xml` file shows you which Oracle Application Server components OPMN is managing on your system. It contains Oracle Application Server component entries arranged in the following hierarchical structure:

```
<ias-component>
  <process-type>
    <process-set>
```

- **<ias-component>**: This entry represents the Oracle Application Server component. It enables management of the component for processes such as starting and stopping.
- **<process-type>**: This subcomponent of the `<ias-component>` entry declares the type of process to run by association with a specific PM module.
- **<process-set>**: This sub-subcomponent of the `<ias-component>` entry enables you to declare different sets of optional runtime arguments and environments for the Oracle Application Server component.

`opmn.xml` is located at:

- UNIX: *ORACLE_HOME*`/opmn/conf`
- Windows: *ORACLE_HOME*`\opmn\conf`

> **See Also:** *Oracle Process Manager and Notification Server Administrator's Guide*

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# Glossary

### Apache

Apache is a public domain HTTP server derived from the National Center for Supercomputing Applications (NCSA).

### Application Server Control

See **Oracle Enterprise Manager Application Server Control**.

### authentication

The process of verifying the identity of a user, device, or other entity in a host system, often as a prerequisite to granting access to resources in a system. A recipient of an authenticated message can be certain of the message's origin (its sender). Authentication is presumed to preclude the possibility that another party has impersonated the sender.

### availability

The percentage or amount of scheduled time that a computing system provides application service.

### CA

See **certificate authority**.

### certificate

Also called a **digital certificate**. An ITU x.509 v3 standard data structure that securely binds an identity to a public key.

A certificate is created when an entity's public **key** is signed by a trusted identity, a **certificate authority** The certificate ensures that the entity's information is correct and that the public key actually belongs to that entity.

A certificate contains the entity's name, identifying information, and public key. It is also likely to contain a serial number, expiration date, and information about the rights, uses, and privileges associated with the certificate. Finally, it contains information about the certificate authority that issued it.

### certificate authority

A trusted third party that certifies that other entities—users, databases, administrators, clients, servers—are who they say they are. When it certifies a user, the certificate authority first seeks verification that the user is not on the certificate revocation list (CRL), then verifies the user's identity and grants a certificate, signing it with the certificate authority's private **key**. The certificate authority has its own certificate and public key which it publishes. Servers and clients use these to verify signatures the certificate authority has made. A certificate authority might be an external company that offers certificate services, or an internal organization such as a corporate MIS department.

### CGI

Common Gateway Interface (CGI) is the industry-standard technique for transferring information between a Web server and any program designed to accept and return data that conforms to the CGI specifications.

### ciphertext

Data that has been encrypted. Cipher text is unreadable until it has been converted to plain text (decrypted) with a key. See **decryption**.

### cipher suite

A set of authentication, encryption, and data integrity algorithms used for exchanging messages between network nodes. During an SSL handshake, for example, the two nodes negotiate to see which cipher suite they will use when transmitting messages back and forth.

### cleartext

See **plaintext**.

### cryptography

The art of protecting information by transforming it (encrypting) into an unreadable format. See **encryption**.

### DAD

See **database access descriptor**.

### database access descriptor

A database access descriptor (DAD) is a set of values that specify how an application connects to an Oracle database to fulfill an HTTP request. The information in the DAD includes the username (which also specifies the schema and the privileges), password, connect-string, error log file, standard error message, and national language support (NLS) parameters such as NLS language, NLS date format, NLS date language, and NLS currency.

### DCM

See **Distributed Configuration Management**.

### decryption

The process of converting the contents of an encrypted message (**ciphertext**) back into its original readable format (**plaintext**).

### DES

Data Encryption Standard. A commonly used symmetric **key encryption** method that uses a 56-bit key.

### de-militarized zone

A de-militarized zone (DMZ) is a set of machines that are isolated from the internet by a firewall on one side, and from a company's intranet by a firewall on the other side. This set of machines are viewed as semi-secure. They are protected from the open internet, but are not completely trusted like machines that are inside the second firewall and part of the company's intranet. In a typical application server setup with a DMZ, only the Web listener and the static content for the Web site are placed in the DMZ. All business logic, databases, and other critical data and systems in the intranet are protected.

### Diffie-Hellman key negotiation algorithm

Diffie-Hellman key negotiation algorithm is a method that lets two parties communicating over an insecure channel to agree upon a random number known only to them. Though the parties exchange information over the insecure channel during execution of the Diffie-Hellman key negotiation algorithm, it is computationally infeasible for an attacker to deduce the random number they agree upon by analyzing their network communications. Oracle Advanced Security uses the Diffie-Hellman key negotiation algorithm to generate session keys.

### digital certificate

See **certificate**.

### digital wallet

See **wallet**.

### directory information tree

A hierarchical tree-like structure consisting of the DNs of the directory entries. See **distinguished name**.

### distinguished name

The unique name of a directory entry. It comprises all of the individual names of the parent entries back to the root in the **directory information tree**.

### Distributed Configuration Management

Distributed Configuration Management (DCM) manages configuration by propagating the cluster-wide configuration for the application server instances and its components. When you add application server instances to the cluster, it is the DCM component that automatically replicates the base configuration to all instances in the cluster. When you modify the cluster-wide configuration, DCM propagates the changes to all application server instances in the cluster.

### DIT

See **directory information tree**.

### DMZ

See **de-militarized zone**.

### DN

See **distinguished name**.

### encryption

The process of disguising a message thereby rendering it unreadable to any but the intended recipient. Encryption is performed by translating data into secret code. There are two main types of encryption: **public-key encryption** (or asymmetric-key encryption) and symmetric-key encryption.

### entry

In the context of a directory service, entries are the building blocks of a directory. An entry is a collection of information about an object in the directory. Each entry is composed of a set of attributes that describe one particular trait of the object. For example, if a directory entry describes a person, that entry can have attributes such as first name, last name, telephone number, or e-mail address.

### failover

The ability to reconfigure a computing system to utilize an alternate active component when a similar component fails.

### HTTP

See **Hypertext Transfer Protocol**.

### Hypertext Transfer Protocol

Hypertext Transfer Protocol (HTTP) is the underlying format used by the Web to format and transmit messages and determine what actions Web servers and browsers should take in response to various commands. HTTP is the protocol used between Oracle Application Server and clients.

### JServ

An open source servlet engine that can communicate with Oracle HTTP Server by configuring it to accept a servlet request from `mod_jserv`, which is an Oracle HTTP Server plug-in.

### key

A password or a table needed to decipher encoded data.

### Keystore

Keystore is a protected database that holds **key**s and **certificate**s for an enterprise. Access to a keystore is guarded by a password (defined at the time the keystore is created, by the person who creates the keystore, and changeable only when providing the current password).In addition, each **private key** in a keystore can be guarded by its own password.

### Keytool

Keytool is a **key** and **certificate** management utility.

### LDAP

See **Lightweight Directory Access Protocol**.

### Lightweight Directory Access Protocol

A standard, extensible directory access protocol. It is a common language that **LDAP** clients and servers use to communicate. The framework of design conventions supporting industry-standard directory products, such as the Oracle Internet Directory.

### MD5

A hashing algorithm intended for use on 32-bit machines to create digital signatures. MD5 is a **one-way hash function**, meaning that it converts a message into a fixed string of digits that form a **message digest**.

### message digest

Representation of text as a string of single digits. It is created using a formula called a **one-way hash function**.

### modules

Modules extend the basic functionality of the Web server and support integration between Oracle HTTP Server and other Oracle Application Server components.

### Oracle Enterprise Manager Application Server Control

Oracle Enterprise Manager Application Server Control (Application Server Control) provides Web-based management tools designed specifically for Oracle Application Server. Using the Application Server Control, you can monitor and configure the components of your application server. You can deploy applications, manage security, and create and manage Oracle Application Server clusters.

### one-way hash function

An algorithm that turns a message into a single string of digits. “One way” means that it is almost impossible to derive the original message from the string of digits. The calculated **message digest** can be compared with the message digest that is decrypted with a **public key** to verify that the message has not been tampered with.

### OPMN

See **Oracle Process Manager and Notification Server**.

### Oracle Process Manager and Notification Server

Oracle Process Manager and Notification Server (OPMN) manages Oracle HTTP Server and OC4J processes within an application server instance. It channels all events from different components to all components interested in receiving them.

### PEM

Privacy-Enhanced Electronic Mail. An **encryption** technique that provides encryption, authentication, message integrity, and **key** management.

### PL/SQL

PL/SQL is Oracle’s proprietary extension to the SQL language. PL/SQL adds procedural and other constructs to SQL that make it suitable for writing applications.

### plaintext

Also called cleartext. Unencrypted data in ASCII format.

### plug-in

A module that adds a specific feature or service to a larger system. For example, Oracle Application Server Proxy Plug-in, Oracle Application Server SSO Plug-in, or Oracle Application Server Containers for J2EE Plug-in.

### port

A port is a number that TCP uses to route transmitted data to and from a particular program.

### private key

In **public-key cryptography**, this **key** is the secret key. It is primarily used for decryption but is also used for encryption with digital signatures. See **public/private key pair**.

### proxy server

A proxy server typically sits on a network firewall and allows clients behind the firewall to access Web resources. All requests from clients go to the proxy server rather than directly to the destination server. The proxy server forwards the request to the destination server and passes the received information back to the client. The proxy server channels all Web traffic at a site through a single, secure port; this allows an organization to create a secure firewall by preventing Internet access to internal machines, while allowing Web access.

### public key

In **public-key cryptography**, this key is made public to all. It is primarily used for encryption but can be used for verifying signatures. See **public/private key pair**.

### public-key cryptography

Encryption method that uses two different random numbers (**key**s). See **public key** and **public-key encryption**.

### public-key encryption

The process where the sender of a message encrypts the message with the public **key** of the recipient. Upon delivery, the message is decrypted by the recipient using its private key.

### public/private key pair

A set of two numbers used for **encryption** and **decryption**, where one is called the **private key** and the other is called the **public key**. Public **key**s are typically made widely available, while private keys are held by their respective owners. Though mathematically related, it is generally viewed as computationally infeasible to derive the private key from the public key. Public and private keys are used only with asymmetric encryption algorithms, also called **public-key encryption** algorithms, or public-key cryptosystems. Data encrypted with either a public key or a private key from a key pair can be decrypted with its associated key from the key-pair. However, data encrypted with a public key cannot be decrypted with the same public key, and data encrypted with a private key cannot be decrypted with the same private key.

### RSA

A **public-key encryption** technology developed by RSA Data Security. The RSA algorithm is based on the fact that it is laborious to factor very large numbers. This makes it mathematically unfeasible, because of the computing power and time required to decode an RSA **key**.

### scalability

A measure of how well the software or hardware product is able to adapt to future business needs.

### SHA

See **Secure Hash Algorithm**.

### Secure Hash Algorithm

Secure Hash Algorithm assures data integrity by generating a 160-bit cryptographic message digest value from given data. If as little as a single bit in the data is modified, the Secure Hash Algorithm checksum for the data changes. Forgery of a given data set in a way that will cause the Secure Hash Algorithm to generate the same result as that for the original data is considered computationally infeasible.

An algorithm that takes a message of less than 264 bits in length and produces a 160-bit message digest. The algorithm is slightly slower than MD5, but the larger message digest makes it more secure against brute-force collision and inversion attacks.

### Secure Shell

Secure Shell (SSH) is a well known protocol and has widely available implementation that provide a secure connection tunneling solution, very similar to what port tunneling offers. SSH provides a daemon on both the client and server sides of a connection. Clients connect to the local daemon rather than connecting directly to the server. The local SSH daemon then establishes a secure connection to the daemon on the server side. Communication is then routed from the client, through the client side daemon to the server side daemon and then on to the actual server. This allows a client/server program that uses an insecure protocol to be tunneled through a secure channel. For our purposes, the disadvantage of SSH is that it requires two hops to occur and that the implementations available do not perform and scale well enough. More information on SSH can be obtained from

`http:www.ssh.org`

### Secure Sockets Layer

Secure Sockets Layer (SSL) is a standard for the secure transmission of documents over the Internet using HTTPS (secure HTTP). SSL uses digital signatures to ensure that transmitted data is not tampered with.

### single sign-on

Single sign-on enables a you to authenticate once, combined with strong authentication occurring transparently in subsequent connections to other databases or applications. It lets you access multiple accounts and applications with a single password, entered during a single connection.

### SSL

See **Secure Sockets Layer**.

### SSH

See **Secure Shell**.

### wallet

Also called a **digital wallet**. A wallet is a data structure used to store and manage security credentials for an individual entity. It implements the storage and retrieval of credentials for use with various cryptographic services. A **Wallet Resource Locator** (WRL) provides all the necessary information to locate the wallet.

### Wallet Resource Locator

A wallet resource locator (WRL) provides all necessary information to locate a wallet. It is a path to an operating system directory that contains a wallet.

### WRL

See **Wallet Resource Locator**.

### X.509

Public **key**s can be formed in various data formats. The X.509 v3 format is one such popular format.

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