

# Oracle<sup>®</sup> Workflow Administrator's Guide

**RELEASE 2.6.3**

Part No. B10283-01

April 2003

**ORACLE<sup>®</sup>**

Oracle Workflow Administrator's Guide, Release 2.6.3

Part No. B10283-01

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## Glossary

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# Preface

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## Audience for This Guide

Welcome to the *Oracle Workflow Administrator's Guide*.

This guide assumes you have a working knowledge of the following:

- The principles and customary practices of your business area.
- Oracle Workflow

If you have never used Oracle Workflow, Oracle suggests you attend one or more of the Oracle Workflow training classes available through Oracle University.

See Other Information Sources for more information about Oracle Applications product information.

The *Oracle Workflow Administrator's Guide* also assumes you have a basic understanding of operating system concepts and familiarity with Oracle database server, PL/SQL, and Oracle9i Application Server technology. If you have not yet been introduced to any of these systems, Oracle suggests you attend one or more of the training classes available through Oracle University.

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## How To Use This Guide

This guide contains the information you need to understand and administer Oracle Workflow.

- Chapter 1 provides an overview of Oracle Workflow.
- Chapter 2 describes how to implement Oracle Workflow for your site.
- Chapter 3 describes the architecture and configuration of Oracle Workflow security.
- Chapter 4 describes the Oracle Workflow home page, where administrators can centrally access all the web-based features of Oracle Workflow.
- Chapter 5 describes how to use the Workflow Monitor to administer or view the status of a workflow process.
- Chapter 6 describes the administrative SQL scripts included with Oracle Workflow.
- Appendix A describes the navigation paths to Oracle Workflow administrator web pages in the seeded Oracle Workflow responsibilities for Oracle Applications.

- Appendix B describes concepts and techniques that you can use for performance gain when running Oracle Workflow.

At the end of this guide, we include a glossary of Oracle Workflow terms.

## Documentation Accessibility

Our goal is to make Oracle products, services, and supporting documentation accessible, with good usability, to the disabled community. To that end, our documentation includes features that make information available to users of assistive technology. This documentation is available in HTML format, and contains markup to facilitate access by the disabled community. Standards will continue to evolve over time, and Oracle Corporation is actively engaged with other market-leading technology vendors to address technical obstacles so that our documentation can be accessible to all of our customers. For additional information, visit the Oracle Accessibility Program Web site at <http://www.oracle.com/accessibility/>

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### Accessibility of Code Examples in Documentation

JAWS, a Windows screen reader, may not always correctly read the code examples in this document. The conventions for writing code require that closing braces should appear on an otherwise empty line; however, JAWS may not always read a line of text that consists solely of a bracket or brace.

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### Accessibility of Links to External Web Sites in Documentation

This documentation may contain links to Web sites of other companies or organizations that Oracle Corporation does not own or control. Oracle Corporation neither evaluates nor makes any representations regarding the accessibility of these Web sites.

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## Other Information Sources

You can choose from many sources of information, including online documentation, training, and support services, to increase your knowledge and understanding of Oracle Workflow.

If this guide refers you to other Oracle Applications documentation, use only the Release 11*i* versions of those guides.

## Online Documentation

If you are using the version of Oracle Workflow embedded in Oracle Applications, note that all Oracle Applications documentation is available online (HTML or PDF).

- **Online Help** – The new features section in the HTML help describes new features in 11*i*. This information is updated for each new release of Oracle Workflow. The new features section also includes information about any features that were not yet available when this guide was printed. For example, if your administrator has installed software from a mini-pack or an upgrade, this document describes the new features. Online help patches are available on *OracleMetaLink*.
- **11*i* Features Matrix** – This document lists new features available by patch and identifies any associated new documentation. The new features matrix document is available on *OracleMetaLink*.
- **Readme File** – Refer to the readme file for patches that you have installed to learn about new documentation or documentation patches that you can download.

If you are using the standalone version of Oracle Workflow, note that this guide is available online in HTML format. The HTML documentation is available from a URL provided by your system administrator or from the help icon in the Oracle Workflow web pages.

## Related User's Guides

Oracle Workflow is used by other Oracle Applications products to provide embedded workflows. Therefore, if you are using the version of Oracle Workflow embedded in Oracle Applications, you may want to refer to other user's guides when you set up and use Oracle Workflow to learn more about the embedded workflows.

You can read the guides online by choosing Library from the expandable menu on your HTML help window, by reading from the Oracle Applications Document Library CD included in your media pack, or by using a Web browser with a URL that your system administrator provides.

If you require printed guides, you can purchase them from the Oracle Store at <http://oraclestore.oracle.com>.

## Guides Related to All Products

### **Oracle Applications User's Guide**

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This guide explains how to enter data, query, run reports, and navigate using the graphical user interface (GUI) available with this release of Oracle Workflow (and any other Oracle Applications products). This guide also includes information on setting user profiles, as well as running and reviewing reports and concurrent processes.

You can access this user's guide online by choosing "Getting Started with Oracle Applications" from any Oracle Applications help file.

## User Guides Related to This Product

### **Oracle Workflow Developer's Guide**

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This guide explains how to define new workflow business processes and customize existing Oracle Applications–embedded workflow processes. It also describes how to define and customize business events and event subscriptions.

### **Oracle Workflow User's Guide**

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This guide describes how Oracle Applications users can view and respond to workflow notifications and monitor the progress of their workflow processes.

### **Oracle Workflow API Reference**

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This guide describes the APIs provided for developers and administrators to access Oracle Workflow.

### **Oracle General Ledger User Guide**

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This guide provides information about journal entry, budgeting, and multi–company accounting and consolidation.

### **Oracle Purchasing User's Guide**

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This guide provides information about entering and managing purchase orders and requisitions.

## **Implementing Oracle Self-Service Human Resources (SSHR)**

This guide provides information about setting up the self-service human resources management functions for managers and employees. Managers and employees can then use an intranet and Web browser to have easy and intuitive access to personal and career management functionality

## **Oracle Payables User Guide**

This guide provides information about entering and managing suppliers, invoices, and payments.

## **Oracle Projects User Guide**

This guide provides information about entering and managing projects, budgets, expenditures, costing, and billing.

## **Oracle Receivables User Guide**

This guide provides information about entering and managing customers, receipts, collections, and transactions.

## **Oracle Business Intelligence System Implementation Guide**

This guide provides information about implementing Oracle Business Intelligence (BIS) in your environment.

## **BIS 11i User Guide Online Help**

This guide is provided as online help only from the BIS application and includes information about intelligence reports, Discoverer workbooks, and the Performance Management Framework.

## **Oracle Financials Open Interface Reference**

This guide is a compilation of all open interface descriptions in all Oracle Financial Applications user's guides.

## **Oracle XML Gateway User's Guide**

This guide explains how to implement the production and consumption of valid, well-formed XML messages between Oracle Applications and trading partners.

# Installation and System Administration

## **Oracle Applications Concepts**

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This guide provides an introduction to the concepts, features, technology stack, architecture, and terminology for Oracle Applications Release 11*i*. It provides a useful first book to read before an installation of Oracle Applications. This guide also introduces the concepts behind Applications-wide features such as Business Intelligence (BIS), languages and character sets, and Self-Service Web Applications.

## **Installing Oracle Applications**

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This guide provides instructions for managing the installation of Oracle Applications products. In Release 11*i*, much of the installation process is handled using Oracle Rapid Install, which minimizes the time to install Oracle Applications, the Oracle8 technology stack, and the Oracle8*i* Server technology stack by automating many of the required steps. This guide contains instructions for using Oracle Rapid Install and lists the tasks you need to perform to finish your installation. You should use this guide in conjunction with individual product user's guides and implementation guides.

## **Upgrading Oracle Applications**

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Refer to this guide if you are upgrading your Oracle Applications Release 10.7 or Release 11.0 products to Release 11*i*. This guide describes the upgrade process and lists database and product-specific upgrade tasks. You must be either at Release 10.7 (NCA, SmartClient, or character mode) or Release 11.0, to upgrade to Release 11*i*. You cannot upgrade to Release 11*i* directly from releases prior to 10.7.

## **Maintaining Oracle Applications**

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Use this guide to help you run the various AD utilities, such as AutoUpgrade, AutoPatch, AD Administration, AD Controller, AD Relink, License Manager, and others. It contains how-to steps, screenshots, and other information that you need to run the AD utilities. This guide also provides information on maintaining the Oracle applications file system and database.

## **Oracle Applications System Administrator's Guide**

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This guide provides planning and reference information for the Oracle Applications System Administrator. It contains information on how to

define security, customize menus and online help, and manage concurrent processing.

### **Oracle Alert User's Guide**

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This guide explains how to define periodic and event alerts to monitor the status of your Oracle Applications data.

### **Oracle Applications Developer's Guide**

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This guide contains the coding standards followed by the Oracle Applications development staff. It describes the Oracle Application Object Library components needed to implement the Oracle Applications user interface described in the *Oracle Applications User Interface Standards for Forms-Based Products*. It also provides information to help you build your custom Oracle Forms Developer 6i forms so that they integrate with Oracle Applications.

## **Other Implementation Documentation**

### **Oracle Applications Product Update Notes**

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Use this guide as a reference for upgrading an installation of Oracle Applications. It provides a history of the changes to individual Oracle Applications products between Release 11.0 and Release 11*i*. It includes new features, enhancements, and changes made to database objects, profile options, and seed data for this interval.

### **Multiple Reporting Currencies in Oracle Applications**

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If you use the Multiple Reporting Currencies feature to record transactions in more than one currency, use this manual before implementing Oracle Workflow. This manual details additional steps and setup considerations for implementing Oracle Workflow with this feature.

### **Multiple Organizations in Oracle Applications**

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This guide describes how to set up and use Oracle Workflow with Oracle Applications' Multiple Organization support feature, so you can define and support different organization structures when running a single installation of Oracle Workflow.

## **Oracle Applications Flexfields Guide**

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This guide provides flexfields planning, setup and reference information for the Oracle Workflow implementation team, as well as for users responsible for the ongoing maintenance of Oracle Applications product data. This manual also provides information on creating custom reports on flexfields data.

## **Oracle eTechnical Reference Manuals**

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Each eTechnical Reference Manual (eTRM) contains database diagrams and a detailed description of database tables, forms, reports, and programs for a specific Oracle Applications product. This information helps you convert data from your existing applications, integrate Oracle Applications data with non-Oracle applications, and write custom reports for Oracle Applications products. Oracle eTRM is available on *OracleMetaLink*.

## **Oracle Applications User Interface Standards for Forms-Based Products**

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This guide contains the user interface (UI) standards followed by the Oracle Applications development staff. It describes the UI for the Oracle Applications products and how to apply this UI to the design of an application built by using Oracle Forms.

## **Oracle Manufacturing APIs and Open Interfaces Manual**

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This manual contains up-to-date information about integrating with other Oracle Manufacturing applications and with your other systems. This documentation includes APIs and open interfaces found in Oracle Manufacturing.

## **Oracle Order Management Suite APIs and Open Interfaces Manual**

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This manual contains up-to-date information about integrating with other Oracle Manufacturing applications and with your other systems. This documentation includes APIs and open interfaces found in Oracle Order Management Suite.

## **Oracle Applications Message Reference Manual**

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This manual describes all Oracle Applications messages. This manual is available in HTML format on the documentation CD-ROM for Release 11i.

## Training and Support

### Training

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Oracle offers a complete set of training courses to help you and your staff master Oracle Workflow and reach full productivity quickly. These courses are organized into functional learning paths, so you take only those courses appropriate to your job or area of responsibility.

You have a choice of educational environments. You can attend courses offered by Oracle University at any one of our many Education Centers, you can arrange for our trainers to teach at your facility, or you can use Oracle Learning Network (OLN), Oracle University's online education utility. In addition, Oracle training professionals can tailor standard courses or develop custom courses to meet your needs. For example, you may want to use your organization structure, terminology, and data as examples in a customized training session delivered at your own facility.

### Support

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From on-site support to central support, our team of experienced professionals provides the help and information you need to keep Oracle Workflow working for you. This team includes your Technical Representative and Account Manager, and Oracle's large staff of consultants and support specialists with expertise in your business area, managing an Oracle database server, and your hardware and software environment.

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## Do Not Use Database Tools to Modify Oracle Applications Data

***Oracle STRONGLY RECOMMENDS that you never use SQL\*Plus, Oracle Data Browser, database triggers, or any other tool to modify Oracle Applications data unless otherwise instructed.***

Oracle provides powerful tools you can use to create, store, change, retrieve, and maintain information in an Oracle database. But if you use Oracle tools such as SQL\*Plus to modify Oracle Applications data, you risk destroying the integrity of your data and you lose the ability to audit changes to your data.

Because Oracle Applications tables are interrelated, any change you make using Oracle Applications can update many tables at once. But when you modify Oracle Applications data using anything other than

Oracle Applications, you may change a row in one table without making corresponding changes in related tables. If your tables get out of synchronization with each other, you risk retrieving erroneous information and you risk unpredictable results throughout Oracle Applications.

When you use Oracle Applications to modify your data, Oracle Applications automatically checks that your changes are valid. Oracle Applications also keeps track of who changes information. If you enter information into database tables using database tools, you may store invalid information. You also lose the ability to track who has changed your information because SQL\*Plus and other database tools do not keep a record of changes.

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## About Oracle

Oracle Corporation develops and markets an integrated line of software products for database management, applications development, decision support, and office automation, as well as Oracle Applications, an integrated suite of more than 160 software modules for financial management, supply chain management, manufacturing, project systems, human resources, and customer relationship management.

Oracle products are available for mainframes, minicomputers, personal computers, network computers and personal digital assistants, allowing organizations to integrate different computers, different operating systems, different networks, and even different database management systems, into a single, unified computing and information resource.

Oracle is the world's leading supplier of software for information management, and the world's second largest software company. Oracle offers its database, tools, and applications products, along with related consulting, education, and support services, in over 145 countries around the world.

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## Your Feedback

Thank you for using Oracle Workflow and this guide.

Oracle values your comments and feedback. At the end of this guide is a Reader's Comment Form you can use to explain what you like or

dislike about Oracle Workflow or this guide. Mail your comments to the following address or call us directly at (650) 506-7000.

Oracle Applications Documentation Manager  
Oracle Corporation  
500 Oracle Parkway  
Redwood Shores, CA 94065  
U.S.A.

Or, send electronic mail to **[appsdoc\\_us@oracle.com](mailto:appsdoc_us@oracle.com)**.

CHAPTER

# 1

## Overview of Oracle Workflow

**T**his chapter introduces you to the concept of a workflow process and to the major features of Oracle Workflow.

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# Overview of Oracle Workflow for Administrators

Oracle Workflow delivers a complete workflow management system that supports business process based integration. Its technology enables modeling, automation, and continuous improvement of business processes, routing information of any type according to user-defined business rules.

E-business is accelerating the demand for integration of applications within the enterprise as well as integration of a company's systems with trading partners and business-to-business exchanges. Oracle Workflow automates and streamlines business processes both within and beyond your enterprise, supporting traditional applications based workflow as well as e-business integration workflow. Oracle Workflow is unique in providing a workflow solution for both internal processes and business process coordination between applications.

## **Routing Information**

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Business processes today involve getting many types of information to multiple people according to rules that are constantly changing. With so much information available, and in so many different forms, how do you get the right information to the right people? Oracle Workflow lets you provide each person with all the information they need to take action. Oracle Workflow can route supporting information to each decision maker in a business process, including people both inside and outside your enterprise.

## **Defining and Modifying Business Rules**

---

Oracle Workflow lets you define and continuously improve your business processes using a drag-and-drop process designer.

Unlike workflow systems that simply route documents from one user to another with some approval steps, Oracle Workflow lets you model sophisticated business processes. You can define processes that loop, branch into parallel flows and then rendezvous, decompose into subflows, and more. Because Oracle Workflow can decide which path to take based on the result of a stored procedure, you can use the power of Java and of PL/SQL, the language of the Oracle database server, to express any business rule that affects a workflow process. See: Workflow Processes: page 1 – 6.

## **Delivering Electronic Notifications**

Oracle Workflow extends the reach of business process automation throughout the enterprise and beyond to include any e-mail or Internet user. Oracle Workflow lets people receive notifications of items awaiting their attention via e-mail, and act based on their e-mail responses. You can even view your list of things to do, including necessary supporting information, and take action using a standard Web browser.

## **Integrating Systems**

Oracle Workflow lets you set up subscriptions to business events which can launch workflows or enable messages to be propagated from one system to another when business events occur. You can communicate events among systems within your own enterprise and with external systems as well. In this way, you can implement point-to-point messaging integration or use Oracle Workflow as a messaging hub for more complex system integration scenarios. You can model business processes that include complex routing and processing rules to handle events powerfully and flexibly.

---

# **Major Features and Definitions**

## **Oracle Workflow Builder**

Oracle Workflow Builder is a graphical tool that lets you create, view, or modify a business process with simple drag and drop operations. Using the Workflow Builder, you can create and modify all workflow objects, including activities, item types, and messages. See: *Workflow Processes*: page 1 – 6.

At any time you can add, remove, or change workflow activities, or set up new prerequisite relationships among activities. You can easily work with a summary-level model of your workflow, expanding activities within the workflow as needed to greater levels of detail. And, you can operate Oracle Workflow Builder from a desktop PC or from a disconnected laptop PC.

## **Workflow Engine**

The Workflow Engine embedded in the Oracle database server implements process definitions at runtime. The Workflow Engine monitors workflow states and coordinates the routing of activities for a

process. Changes in workflow state, such as the completion of workflow activities, are signaled to the engine via a PL/SQL API or a Java API. Based on flexibly-defined workflow rules, the engine determines which activities are eligible to run, and then runs them. The Workflow Engine supports sophisticated workflow rules, including looping, branching, parallel flows, and subflows.

### **Business Event System**

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The Business Event System is an application service that uses the Oracle Advanced Queuing (AQ) infrastructure to communicate business events between systems. The Business Event System consists of the Event Manager, which lets you register subscriptions to significant events, and event activities, which let you model business events within workflow processes.

When a local event occurs, the subscribing code is executed in the same transaction as the code that raised the event. Subscription processing can include executing custom code on the event information, sending event information to a workflow process, and sending event information to other queues or systems.

### **Workflow Definitions Loader**

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The Workflow Definitions Loader is a utility program that moves workflow definitions between database and corresponding flat file representations. You can use it to move workflow definitions from a development to a production database, or to apply upgrades to existing definitions. In addition to being a standalone server program, the Workflow Definitions Loader is also integrated into Oracle Workflow Builder, allowing you to open and save workflow definitions in both a database and file.

### **Complete Programmatic Extensibility**

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Oracle Workflow lets you include your own PL/SQL procedures or external functions as activities in your workflows. Without modifying your application code, you can have your own program run whenever the Workflow Engine detects that your program's prerequisites are satisfied.

### **Electronic Notifications**

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Oracle Workflow lets you include users in your workflows to handle activities that cannot be automated, such as approvals for requisitions or

sales orders. The Notification System sends notifications to and processes responses from users in a workflow. Electronic notifications are routed to a role, which can be an individual user or a group of users. Any user associated with that role can act on the notification.

Each notification includes a message that contains all the information a user needs to make a decision. The information may be embedded in the message body or attached as a separate document. Oracle Workflow interprets each notification activity response to decide how to move on to the next workflow activity.

### **Electronic Mail Integration**

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Electronic mail (e-mail) users can receive notifications of outstanding work items and can respond to those notifications using their e-mail application of choice. An e-mail notification can include an attachment that provides another means of responding to the notification.

### **Internet-Enabled Workflow**

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Any user with access to a standard Web browser can be included in a workflow. Web users can access a Notification Web page to see their outstanding work items, then navigate to additional pages to see more details or provide a response.

### **Monitoring and Administration**

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Workflow administrators and users can view the progress of a work item in a workflow process by connecting to the Workflow Monitor using a standard Web browser that supports Java. The Workflow Monitor displays an annotated view of the process diagram for a particular instance of a workflow process, so that users can get a graphical depiction of their work item status. The Workflow Monitor also displays a separate status summary for the work item, the process, and each activity in the process.

If you are using the version of Oracle Workflow embedded in Oracle Applications and you have implemented Oracle Applications Manager, you can also use the Oracle Workflow Manager component of Oracle Applications Manager as an additional administration tool for Oracle Workflow. Oracle Applications Manager is a tool that provides administrative and diagnostic capabilities for concurrent processing, Oracle Workflow, and other functionality in Oracle Applications. For more information, please refer to the Oracle Applications Manager online help.

Also, if you are using the standalone version of Oracle Workflow, you can use the standalone Oracle Workflow Manager component available through Oracle Enterprise Manager as an additional administration tool for Oracle Workflow. For more information, please refer to the Oracle Workflow Manager online help.

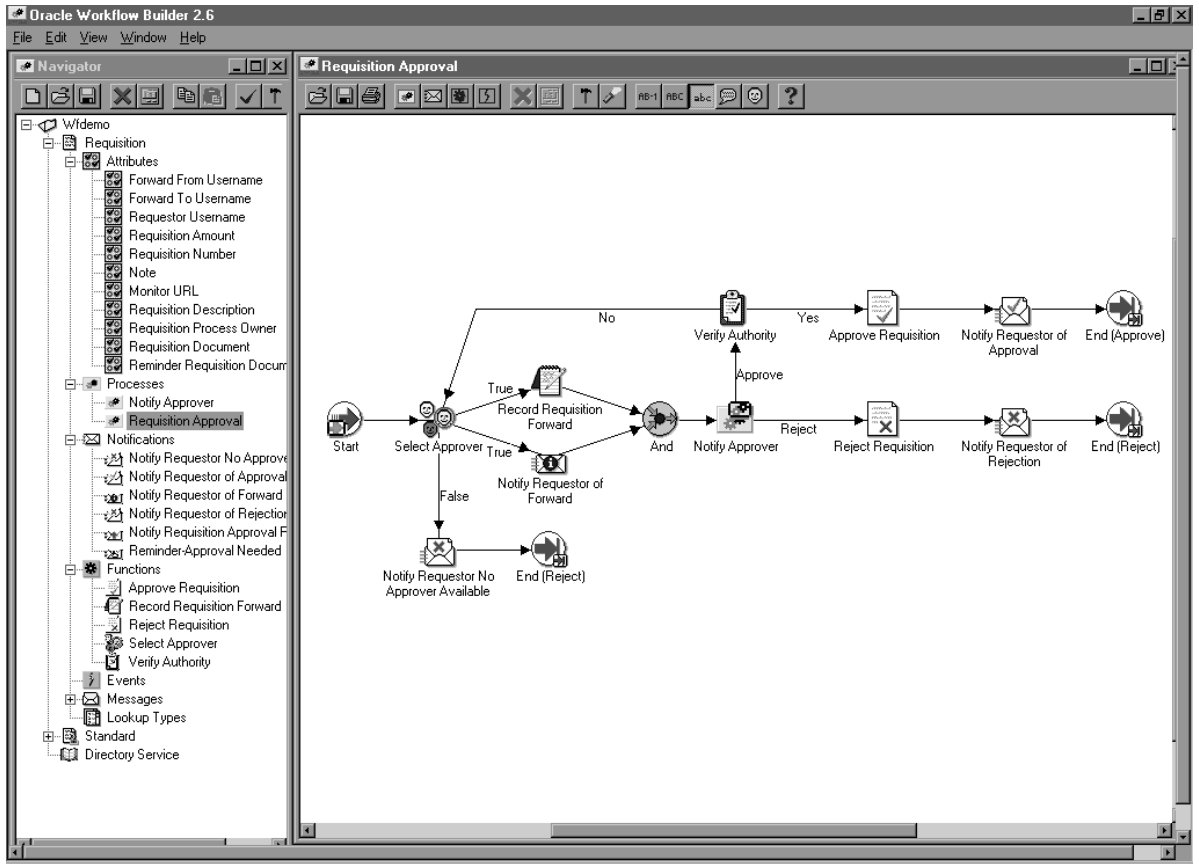
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## Workflow Processes

Oracle Workflow manages business processes according to rules that you define. The rules, which we call a workflow process definition, include the activities that occur in the process and the relationship between those activities. An activity in a process definition can be an automated function defined by a PL/SQL stored procedure or an external function, a notification to a user or role that may optionally request a response, a business event, or a subflow that itself is made up of a more granular set of activities.

A workflow process is initiated when an application calls a set of Oracle Workflow Engine APIs. The Workflow Engine takes over by driving the relevant work item defined by the application, through a specific workflow process definition. According to the workflow process definition, the Workflow Engine performs automated steps and invokes appropriate agents when external processing is required.

The following diagram depicts a simplified workflow process definition that routes a requisition to a manager or set of managers for approval.



We refer to the whole drawing as a process or process diagram. The icons represent activities, and the arrows represent the transitions between the activities. In the above example, new items are created for the process when a user creates and submits a requisition in the appropriate application.

This process contains several workflow activities implemented as PL/SQL stored procedures, including:

- Select Approver—to select, according to your business rules, who should approve the requisition.
- Verify Authority—to verify that a selected approver has the spending authority to approve the requisition.



CHAPTER

# 2

## Setting Up Oracle Workflow

**T**his chapter describes the requirements for Oracle Workflow and provides the steps necessary to set up Oracle Workflow at your site.

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## Oracle Workflow Hardware and Software Requirements

The components of Oracle Workflow require the following hardware and software configurations:

- Oracle Workflow Builder is installed using Oracle Universal Installer and requires the installation of Oracle Net Services (version 8.1.6 or higher for Oracle8i, or version 9.0.1 or higher for Oracle9i) and Required Support Files (version 8.1.6 or higher for Oracle8i, or version 9.0.1 or higher for Oracle9i). You should install Oracle Workflow Builder on an IBM, Compaq or 100% compatible personal computer with the following:
  - A 486 processor or better
  - Clock speed of 66 Mhz or greater (90 Mhz or greater is recommended)
  - Network card
  - SVGA color monitor
  - Modem configured with dial-in access for use by Oracle Worldwide Customer Support. At least one PC at your site should be configured with a modem.
  - Remote access and control software to be used by Customer Support for dial-in access through a modem to your PC. The preferred software is Symantec's Norton pcANYWHERE, or Microcom's Carbon Copy. Without some form of remote access and control software, Oracle Worldwide Customer Support will not be able to dial in to your site to diagnose problems, nor will they be able to supply patches directly to your client PC.



**Warning:** Please follow the necessary security precautions against viruses and unauthorized access when installing any software that allows remote access.

- Dual speed, ISO 9660 format CD-ROM available as a logical drive
- Microsoft Windows 98, Windows 2000, Windows XP, or Windows NT 4.0 or higher
- At least 60 Mb of available disk space to install Oracle Workflow Builder, Oracle Net Services, and Required Support Files.
- At least 32 Mb of memory, 64 Mb recommended



**Attention:** Oracle Net Services require and only support the use of Microsoft's TCP/IP drivers.

- The Oracle Workflow Server requires the following:
  - Oracle8*i* Enterprise or Standard Edition database version 8.1.6 or higher, or Oracle9*i* Enterprise or Standard Edition database version 9.0.1 or higher, along with the Oracle Objects and JServer Options, installed on a supported server machine
  - At least 40 Mb of available disk space for Oracle Workflow Server once it is installed in your Oracle Home
  - At least 128 Mb of memory, 256 Mb recommended
  - Oracle Net Services version 8.1.6 or higher for Oracle8*i*, or version 9.0.1 or higher for Oracle9*i*
  - SQL\*Plus version 8.1 or higher for Oracle8*i*, or version 9.0.1 or higher for Oracle9*i*

If you are installing Oracle Workflow Server on Microsoft Windows NT, the following additional hardware and software configurations are required:

- ISO 9660 format CD-ROM available as a logical drive
- Microsoft Windows NT 4.0 or higher



**Attention:** While the version of Oracle Workflow offered to Oracle8*i* Standard Edition customers is exactly the same as the version offered to Oracle8*i* Enterprise Edition customers, it is important to note that Oracle Workflow leverages Oracle8*i* functionality. Consequently, using an Oracle8*i* Standard Edition database limits some of the features available for use by the Oracle Workflow Business Event System.

For example:

- You cannot create any additional queues in Oracle8*i* Standard Edition beyond the default queues provided by Oracle Workflow. If you require additional queues, you should choose Oracle8*i* Enterprise Edition.
- Oracle Advanced Queuing propagation in Oracle8*i* Standard Edition does not support propagating messages outside the local database. If you require messages to be propagated to other systems, you should choose Oracle8*i* Enterprise Edition.

In Oracle9i, however, these restrictions no longer apply. Exactly the same functionality is available with Oracle Workflow in an Oracle9i Standard Edition database as in an Oracle9i Enterprise Edition database.

- To send and receive e-mail notifications, you must have an SMTP mail server set up for outbound messages and an IMAP4 compliant mail server set up for inbound messages.
- To send and respond to e-mail notifications with HTML attachments, your e-mail application should support HTML attachments and you should have a Web browser application that supports JavaScript and Frames to view the attachment.
- The Web notifications, Workflow Monitor, and Event Manager components require Oracle HTTP Server and mod\_plsql to be installed on a server machine. The Oracle HTTP Server and mod\_plsql components are included with Oracle8i Database version 8.1.7 or higher and with Oracle9i Database version 9.0.1 or higher, as well as with Oracle9i Application Server version 1.0.1 or higher.

To view notifications you need a Web browser application that supports JavaScript and Frames. To view the Workflow Monitor you need a Web browser that supports Java Development Kit (JDK), Version 1.1.8 or higher and Abstract Windowing Toolkit (AWT), such as Netscape Communicator version 4.76 or a higher version of 4.7x, or Microsoft Internet Explorer version 5.0x or 5.5x.

- To run external Java function activities and to use the Workflow XML Loader, you must have Java Runtime Environment (JRE) version 1.1.8, or a higher 1.1.x version, installed.
- To extract the HTML help for the standalone version of Oracle Workflow, you need an unzip utility.
- To implement Oracle Internet Directory integration, you must have Oracle Internet Directory Release 2 or higher installed. To implement Single Sign-On integration, you must implement Oracle Internet Directory integration, and you must have Oracle9iAS Single Sign-On Server Release 2 or higher installed and have mod\_osso installed with Oracle HTTP Server.



**Attention:** To implement single sign-on integration, you must install Oracle Workflow with Oracle9iAS Release 2 or higher, and you must use a version of the Oracle9i database server that is certified with your version of Oracle9iAS.

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## Overview of Setting Up

After you install Oracle Workflow, you implement it for your site by setting up the preferences and components appropriate for your enterprise.

---

### Overview of Required Setup Steps for the Standalone Version of Oracle Workflow

1. Set up the default Oracle Workflow user preferences for your entire enterprise using the Global Preferences web page. The Global Preferences web page also lets you define your workflow administrator role and your Workflow web agent. See: Setting Global User Preferences: page 2 – 13.
2. Ensure that a directory service is set up to provide information about the individuals and roles in your organization who may utilize Oracle Workflow functionality and receive workflow notifications. Oracle Workflow provides two predefined directory services from which you can choose. See: Setting Up an Oracle Workflow Directory Service: page 2 – 21.
3. Define an environment variable called WF\_RESOURCES if your Workflow server is installed on a UNIX platform. See: Setting the WF\_RESOURCES Environment Variable: page 2 – 57.
4. Set up background Workflow Engines to control the load and throughput of the primary Workflow Engine on your system. You can specify the cost threshold level of your primary and background engines to determine the activities an engine processes and the activities an engine defers. See: Setting Up Background Workflow Engines: page 2 – 58.
5. Set up the Business Event System to communicate business events between systems using event subscription processing and Workflow process event activities. See: Setting Up the Business Event System: page 2 – 143.

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### Overview of Required Setup Steps for the Version of Oracle Workflow Embedded in Oracle Applications

1. Set up the default Oracle Workflow user preferences for your entire enterprise using the Global Preferences web page. The Global

Preferences web page also lets you define your workflow administrator role and your Workflow web agent. See: Setting Global User Preferences: page 2 – 13.

2. Ensure that a directory service is set up to provide information about the individuals and roles in your organization who may utilize Oracle Workflow functionality and receive workflow notifications. In an Oracle Applications installation, directory service views for users and roles from the unified Oracle Applications environment are automatically implemented for you. See: Setting Up an Oracle Workflow Directory Service: page 2 – 21.
3. Set the system profile options called Socket Listener Activated and Socket Listener Port. See: Setting the Socket Listener Profile Options: page 2 – 56.
4. Set up background Workflow Engines to control the load and throughput of the primary Workflow Engine on your system. You can specify the cost threshold level of your primary and background engines to determine the activities an engine processes and the activities an engine defers. See: Setting Up Background Workflow Engines: page 2 – 58.
5. Set up the Business Event System to communicate business events between systems using event subscription processing and Workflow process event activities. See: Setting Up the Business Event System: page 2 – 143.



**Attention:** Although your Oracle Workflow installation automatically sets up the following for you, you may want to refer to their appropriate sections for additional background information:

- Directory services: page 2 – 21
- WF\_LANGUAGES view: page 2 – 51
- Path to the language-dependent resources file: page 2 – 57

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## Optional Setup Steps

1. You can partition the WF\_ITEM\_ACTIVITY\_STATUSES, WF\_ITEM\_ACTIVITY\_STATUSES\_H, WF\_ITEM\_ATTRIBUTE\_VALUES, and WF\_ITEMS tables for performance gain. See: Partitioning Workflow Tables: page 2 – 11.
2. If you are using the standalone version of Oracle Workflow with Oracle9i Database Server Release 2 or Oracle9i Application Server

(Oracle9iAS) Release 2 or higher, you can synchronize the user information in your Workflow directory service with Oracle Internet Directory (OID). Additionally, if you have installed Oracle9iAS Release 2 or higher, you can also use OID integration to implement single sign-on integration. See: Synchronizing Workflow Directory Services with Oracle Internet Directory: page 2 – 43.

3. Set up additional languages if you want to use Oracle Workflow in languages other than English. See: Setting Up Additional Languages: page 2 – 51.
4. Set up one or more notification mailers if you want to allow your users to receive notifications by e-mail. See: Implementing Notification Mailers: page 2 – 63.
5. You can modify the templates for your electronic mail notifications. See: Modifying Your Message Templates: page 2 – 85.
6. If you are using the version of Oracle Workflow embedded in Oracle Applications, you can give users access to the Worklist, Advanced Worklist, and Personal Worklist web pages from any responsibility you choose. See: Adding Worklist Functions to User Responsibilities: page 2 – 128.
7. If you are using the OA Framework-based version of the Notification Details page available with Oracle Workflow embedded in Oracle Applications, you can use the FND: Notification Reassign Mode profile option to control which reassign modes are available to users from that page. See: Setting the FND: Notification Reassign Mode Profile Option: page 2 – 129.
8. Customize the company logo that appears in Oracle Workflow's web pages. See: Customizing the Logo on Oracle Workflow's Web Pages: page 2 – 131.
9. You can include additional icons to your Oracle Workflow Icons subdirectory to customize the diagrammatic representation of your workflow processes. Use custom symbols for each activity you define. See: Adding Custom Icons to Oracle Workflow: page 2 – 132.
10. Set up the Java Function Activity Agent if you are using the standalone version of Oracle Workflow and you want to run external Java function activities. See: Setting Up the Java Function Activity Agent: page 2 – 133.
11. Set up the WF\_EVENT\_OMB\_QH queue handler if you are using the Business Event System with Oracle8i and you want to use Oracle Message Broker to propagate event messages between

systems. See: Setting Up the WF\_EVENT\_OMB\_QH Queue Handler: page 2 – 165.

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## Other Workflow Features

Before deploying Oracle Workflow and custom process definitions to other branches of your enterprise, you can protect your data from further modification by determining the level of access your users have to the data. See: Overview of Oracle Workflow Access Protection: page 2 – 166.

You can also use the Workflow Definitions Loader to load workflow process definitions from flat files to the database without using Oracle Workflow Builder. See: Using the Workflow Definitions Loader: page 2 – 174.

If you are using the Business Event System, you can use the Workflow XML Loader to load XML definitions for Business Event System objects between a database and a flat file. See: Using the Workflow XML Loader: page 2 – 179.

For details about configuring Oracle Workflow security, see: Oracle Workflow Security: page 3 – 2.

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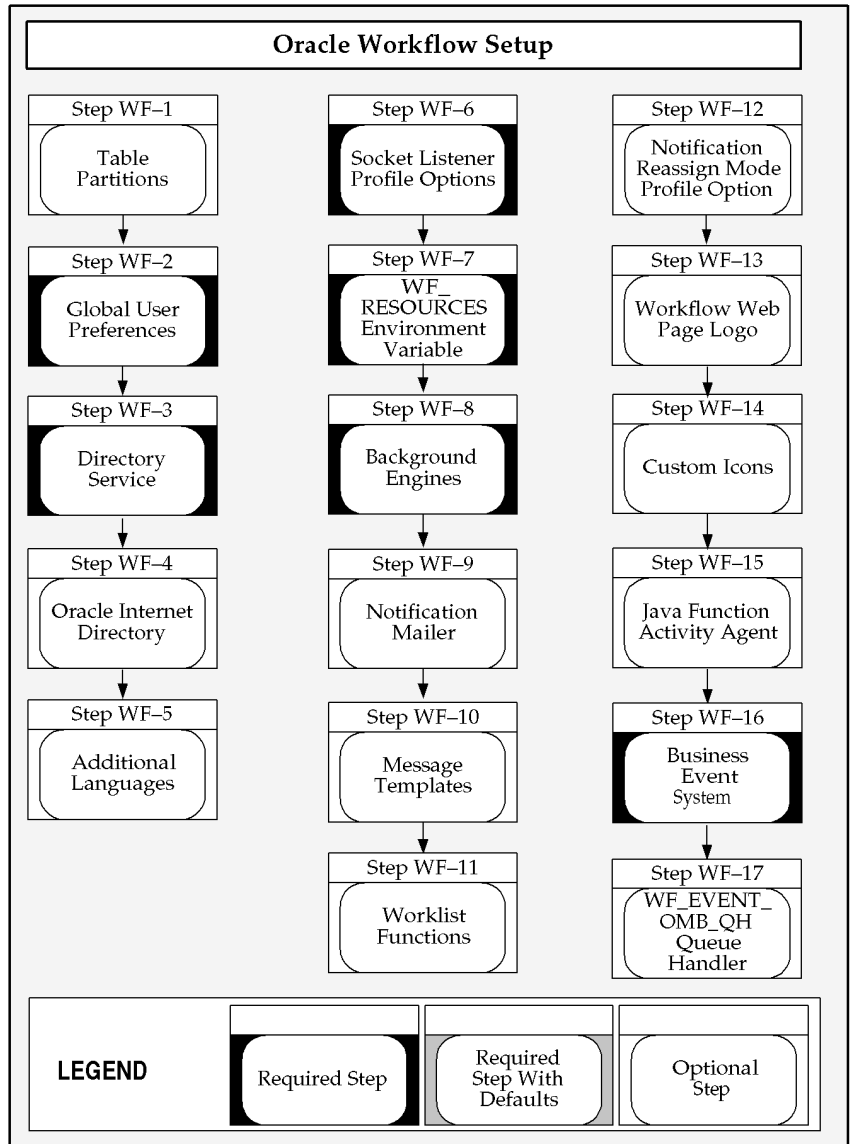
## Identifying the Version of Your Oracle Workflow Server

If you ever need to determine the version of the Oracle Workflow server you are running, you can connect to your Workflow server account using SQLPLUS and run a script called wfver.sql. See: wfver.sql: page 6 – 16.

In addition, all Oracle Workflow modules, such as the Workflow Definitions Loader, Oracle Workflow Builder, notification mailers, and the Workflow Monitor, automatically verify that the module is compatible with the version of the Oracle Workflow server that it is operating against. This version compatibility check helps to prevent problems such as running Oracle Workflow Builder 2.6.3 against an Oracle Workflow 2.0.3 database.

## Setup Flowchart

The following flowchart shows the Oracle Workflow setup steps. Some of the steps are required and some are optional. You need to perform optional steps only if you plan to use the related feature or complete certain business functions.



## Setup Checklist

The following table lists Oracle Workflow setup steps. A reference to whether the step is pertinent to the standalone or embedded version of Oracle Workflow or both and whether the step is optional or required is provided.

**Note:** For the latest documentation updates, product alerts, technical notes, and troubleshooting tips, please refer to the Oracle Workflow area on [OracleMetaLink](#).

Step No.	Required	Step	Standalone/ Embedded/ Both
Step 1	Optional	Partitioning Workflow Tables: page 2 – 11	Both
Step 2	Required	Setting Global User Preferences: page 2 – 13	Both
Step 3	Required	Setting Up an Oracle Workflow Directory Service: page 2 – 21	Both
Step 4	Optional	Synchronizing Workflow Directory Services with Oracle Internet Directory: page 2 – 43	Standalone
Step 5	Optional	Setting Up Additional Languages: page 2 – 51	Both
Step 6	Required	Setting the Socket Listener Profile Options: page 2 – 56	Embedded
Step 7	Required	Setting the WF_RESOURCES Environment Variable: page 2 – 57	Standalone
Step 8	Required	Setting Up Background Workflow Engines: page 2 – 58	Both
Step 9	Optional	Implementing Notification Mailers: page 2 – 63	Both
Step 10	Optional	Modifying Your Message Templates: page 2 – 85	Both
Step 11	Optional	Adding Worklist Functions to User Responsibilities: page 2 – 128	Embedded
Step 12	Optional	Setting the FND: Notification Reassign Mode Profile Option: page 2 – 129	Embedded
Step 13	Optional	Customizing the Logo on Oracle Workflow's Web Pages: page 2 – 131	Both
Step 14	Optional	Adding Custom Icons to Oracle Workflow: page 2 – 132	Both
Step 15	Optional	Setting Up the Java Function Activity Agent: page 2 – 133	Standalone
Step 16	Required	Setting Up the Business Event System: page 2 – 143	Both
Step 17	Optional	Setting Up the WF_EVENT_OMB_QH Queue Handler: page 2 – 165	Both

---

## Setup Steps

### Step 1 Partitioning Workflow Tables

Partitioning addresses key issues in supporting very large tables and indexes by letting you decompose them into smaller and more manageable pieces called partitions. SQL queries and DML statements do not need to be modified in order to access partitioned tables. However, once partitions are defined, DDL statements can access and manipulate individual partitions rather than entire tables or indexes. In this way, partitioning can simplify the manageability of large database objects. Also, partitioning is entirely transparent to applications.

You can optionally run a script to partition certain Workflow tables that store runtime status data. For the version of Oracle Workflow embedded in Oracle Applications, the script is called `wfupartb.sql`; for the standalone version of Oracle Workflow, the script is called `wfupart.sql`. This step is highly recommended for performance gain.

The script partitions four Workflow tables and recreates the associated indexes. The following table shows the Workflow tables and indexes on which the script runs.

Table	Index
WF_ITEM_ACTIVITY_STATUSES	WF_ITEM_ACTIVITY_STATUSES_PK, WF_ITEM_ACTIVITY_STATUSES_N1, and WF_ITEM_ACTIVITY_STATUSES_N2
WF_ITEM_ACTIVITY_STATUSES_H	WF_ITEM_ACTIVITY_STATUSES_H_N1 and WF_ITEM_ACTIVITY_STATUSES_H_N2
WF_ITEM_ATTRIBUTE_VALUES	WF_ITEM_ATTRIBUTE_VALUES_PK
WF_ITEMS	WF_ITEMS_PK, WF_ITEMS_N1, WF_ITEMS_N2, and WF_ITEMS_N3

Table 6 – 1 (Page 1 of 1)

Before running the partitioning script, you should back up these four tables so that you can restore them in case the script fails.

To run the script, you must have sufficient free space on the table and index tablespaces. During the creation of the partitioned tables, the script requires slightly more disk space than the underlying tables, in the same tablespace where the underlying tables are located. Similarly, sufficient free space is required for the index tablespace.

Additionally, you should allow sufficient time for the script to run. The amount of time needed depends on the amount of data in the tables. When the tables already contain existing data, such as after an upgrade from a previous release, the script requires more time than it does when the tables are empty, such as after a fresh installation of Oracle Workflow. To minimize the time required, run the script as early as possible in your setup process.



**Attention:** If you are running the partitioning script through Oracle Net Services, then you must set the TWO\_TASK variable before you begin.

For Oracle Workflow embedded in Oracle Applications, the wfupartb.sql script is located in the admin/sql subdirectory under \$FND\_TOP. Use the script as follows:

```
sqlplus <apps_user>/<apps_passwd> @wfupartb <fnd_user>
<fnd_passwd> <apps_user> <apps_passwd>
```

For example:

```
sqlplus apps/apps @wfupartb applsys apps apps apps
```

For standalone Oracle Workflow, the wfupart.sql script is located in the wf/admin/sql subdirectory in your Oracle Home. Use the script as follows:

```
sqlplus <wf_user>/<wf_passwd> @wfupart <wf_user> <wf_passwd>
```

For example:

```
sqlplus owf_mgr/owf_mgr @wfupart owf_mgr owf_mgr
```

If the partitioning script fails, you must perform any necessary cleanup manually. Since the script's operations are DDL operations running in nologging mode, rollback is not possible.

**Context:** You need to perform this step only once.

## See Also

Partitioning for Performance: page B – 8

## Step 2 Setting Global User Preferences

You can control how you interact with Oracle Workflow by specifying user preferences that you can set from the User Preferences web page. As a workflow administrator, you also have access to the Global Preferences web page, which you can use to globally set default user preference values for the entire enterprise. An individual user can override a default user preference at any time by changing the value of the user preference in the User Preferences web page. Both web pages are accessible from the Oracle Workflow Home page, but only a workflow administrator has access to the Global Preferences page.



**Attention:** The Language, Territory, and Notification preference settings in the Global Preferences and User Preferences web pages are valid only if your directory service views map the Language, Territory, and Notification\_Preference columns to the Oracle Workflow preferences table. If you map to some other preference source or set a hard-coded value to these columns, any changes you make to the preferences via the preferences web pages are ignored. See: *Setting Up an Oracle Workflow Directory Service*; page 2 – 21.

**Context:** You need to perform this step only once.

See: *Setting User Preferences, Oracle Workflow User's Guide*.

### ► To Set Global User Preferences

1. Use a web browser to connect to the Oracle Workflow home page, and then choose the Global Preferences link:

```
<webagent>/wfa_html.home
```

Alternatively, you can connect directly to the Global Preferences web page:

```
<webagent>/wf_pref.edit?edit_defaults=Y
```

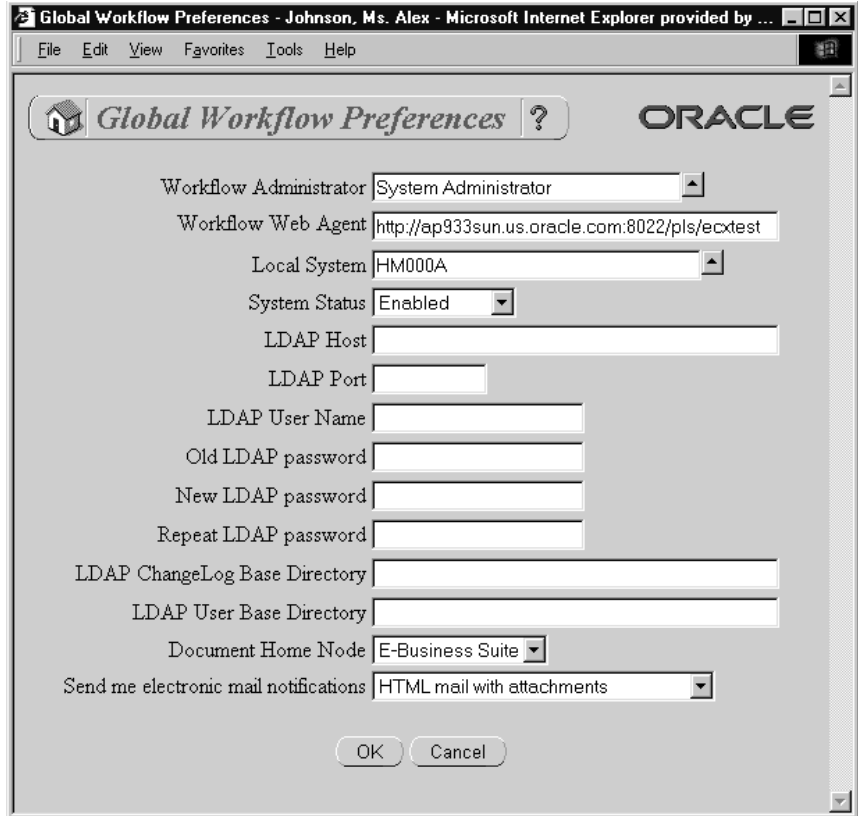
<webagent> represents the base URL of the web agent you configured for Oracle Workflow in your Web server.



**Attention:** These are secured pages, so if you have not yet logged on as a valid user in the current web session, you will be prompted to do so before the page appears.



2. The Global Preferences web page displays a summary of your current global preferences, except for the LDAP password which is not displayed for security reasons. Choose Update to modify these preferences.



3. In the Workflow Administrator field, use the list of values to select the role to which you want to assign workflow administrator privileges. Any user associated with this role can run the Oracle Workflow Find Processes web page, which provides full access to Oracle Workflow's administration features. In addition, any user in the administration role can view any other user's notifications and access the Event Manager web pages.

If you want all users and roles to have workflow administrator privileges, such as in a development environment, enter an asterisk (\*) in the Workflow Administrator field. See: Setting Up an Oracle Workflow Directory Service: page 2 – 21.

**Note:** To find out which role currently has workflow administrator privileges, without accessing the Global Workflow Preferences page, you can use the following command:

```
select text
from wf_resources
where name = 'WF_ADMIN_ROLE';
```

After installing Oracle Workflow, you should change the Workflow Administrator preference from the default setting to the role that you want to have administrator privileges.

- For the standalone version of Oracle Workflow, the default setting after installation is an asterisk (\*). You can log in as any user to access the Global Workflow Preferences page and specify the preferences you want.
- For the version of Oracle Workflow embedded in Oracle Applications, the default setting after installation is SYSADMIN. You must log in as the SYSADMIN user to access the Global Workflow Preferences page and specify the preferences you want.

**Note:** The SYSADMIN role is different than the role associated with the System Administrator responsibility in Oracle Applications. If you want to assign workflow administrator privileges to this or any other Oracle Applications responsibility, you must set the Workflow Administrator preference to the internal name of the Workflow role associated with that responsibility.

You can query the WF\_ROLES view to find the role name for a responsibility. For example, to find the role names for various administrator responsibilities in Oracle Applications, use the following command:

```
select name, display_name
from wf_roles
where display_name like '%Admin%';
```

If you set the Workflow Administrator preference to the role name of a responsibility, then any Oracle Applications user with that responsibility will have workflow administrator privileges.

4. In the Workflow Web Agent field, enter the base URL of the Oracle web agent you defined for Oracle Workflow in Oracle HTTP Server.

**Caution:** The list of values fields that are implemented in many of Oracle Workflow's web pages will not function properly unless you specify the base URL of your Oracle Workflow web agent in this field.

The base URL should look like this if you are using Oracle HTTP Server as your Web server:

```
http://<server.com:portID>/pls/<DAD_name>
```

<server.com:portID> represents the server and TCP/IP port number on which your web listener accepts requests and <DAD\_name> represents the name of the DAD you configured for the Oracle Workflow database schema.

See your Oracle HTTP Server documentation for more information.



**Attention:** If you are using the version of Oracle Workflow embedded in Oracle Applications, the value for the Workflow Web Agent is automatically set during installation to the same value as the Applications Web Agent (APPS\_WEB\_AGENT) profile option. If the Applications Web Agent profile value changes subsequently, you must manually update the value for the Workflow Web Agent preference.

5. The Local System field displays the system name for the database where this installation of Oracle Workflow is located. Oracle Workflow automatically creates the system definition for this database in the Event Manager during installation. The Business Event System treats this system as the local system and all others as external systems. See: Systems, *Oracle Workflow Developer's Guide*.

**Note:** The Local System setting is specific to this installation of Oracle Workflow and is not included when Business Event System data is replicated to other systems.

6. In the System Status field, use the list of values to select the Business Event System status that you want to assign to the local system.
  - Enabled—Subscriptions are executed on all events.
  - Local Only—Subscriptions are executed only on events raised on the local system.
  - External Only—Subscriptions are executed only on events received from external systems.
  - Disabled—No subscriptions are executed on any events.

**Note:** Oracle Workflow sets the system status to Enabled by default. After you finish setting up the Business Event System, you can change the setting to the status you want for event processing.

**Note:** The System Status setting is specific to this installation of Oracle Workflow and is not included when Business Event System data is replicated to other systems.

7. If you are implementing Oracle Internet Directory (OID) synchronization, specify the Lightweight Directory Access Protocol (LDAP) server information for the LDAP directory to which you want to connect.

- LDAP Host—The host on which the LDAP directory resides.
- LDAP Port—The port on the host.

8. If you are implementing OID synchronization, specify the LDAP user account used to connect to the LDAP server. This LDAP user account must have write privileges.

- LDAP User Name—The LDAP user. This user name is required to bind to the LDAP directory. For example:

```
cn=orcladmin
```

- Old LDAP Password—Enter your current LDAP password. Oracle Workflow validates this password before letting you change it.
- New LDAP Password—Enter the new LDAP password you want to use. The password must be at least five characters long.
- Repeat LDAP Password—Enter your new LDAP password again in this field to confirm it. You must enter exactly the same value that you entered in the New LDAP Password field.

**Note:** LDAP password values are masked as asterisks in the display and are stored in encrypted form.

9. If you are implementing OID synchronization, specify the directories for the change log and the user records.

- LDAP Changelog Base Directory—The LDAP node under which change logs are located. For example:

```
cn=changelog
```

- LDAP User Base Directory—The LDAP node under which user records can be found. For example:

```
cn=Base, cn=OracleSchemaVersion
```

10. If you are using the standalone version of Oracle Workflow, in the Language and Territory fields, use the list of values to select the NLS\_LANGUAGE and NLS\_TERRITORY combination that defines

the default language–dependent behavior and territory–dependent formatting of your users’ notification sessions.

11. If you are using the standalone version of Oracle Workflow, in the Date Format field, specify an Oracle8i–compliant date format that defines the default date format for the workflow database sessions of all users. An example of an Oracle8i–compliant date format is DD–Mon–RRRR. If you do not specify a date format, then the date format defaults to DD–MON–YYYY.

**Note:** Oracle Workflow may include a time element when relevant for certain displayed dates, even if you do not include a time format with your date format. If you specify a time format along with your date format, then in those situations when Oracle Workflow displays a time element, you will see two time elements following your date.

12. Leave the Document Home Node field blank. This functionality is reserved for future use.
13. In the ‘Send me electronic mail notifications’ field, use the list of values to select a notification preference:
  - HTML mail with attachments – Send notifications as HTML e–mail with attached links to the Notification Details page. Users must read their mail using an HTML e–mail viewer.
  - Plain text mail with HTML attachments – Send notifications as plain text e–mail but include the HTML–formatted version of the notifications and links to the Notification Details page as attachments.
  - Plain text mail – Send notifications as plain text e–mail.
  - Plain text summary mail – Send a summary of all notifications as plain text e–mail. Users must use the Worklist web page to take action on individual notifications.
  - Do not send me mail – Do not send the notifications as e–mail. Users must view the notifications and take action from the Worklist web page.
  - HTML mail – Send notifications as HTML e–mail only, without any standard attachments. If custom attachments have been defined for individual notifications in a process, however, those attachments will still be included. Users must read their mail using an HTML e–mail viewer.
14. Choose OK once you are satisfied with your changes.

**Note:** These global language, territory, document home node, and notification preferences are saved to the Oracle Workflow Preferences table for a special user name called `-WF_DEFAULTS-`. The workflow administrator role, workflow web agent, local system, and LDAP information is saved to the Workflow Resources table.

### Step 3 Setting Up an Oracle Workflow Directory Service

Oracle Workflow requires a directory service to provide information about the individuals and roles in your organization who may utilize Oracle Workflow functionality and receive workflow notifications. Oracle Workflow references this user and role information through the following three views.

- WF\_USERS – Individual users
- WF\_ROLES – Roles, which can have one or more users as members
- WF\_USER\_ROLES – Associations of users with the roles of which they are members

**Note:** A role can contain only individual users as its members. It cannot contain another role.

See: Workflow Directory Service Views: page 2 – 34.

Oracle Workflow provides predefined directory services for you that are implemented by default during installation.

- If you are using the standalone version of Oracle Workflow, you can choose one of two predefined directory services.
  - During installation, you can choose to integrate with Oracle Internet Directory (OID) as your directory repository. In this case, directory service views that support OID integration are automatically implemented for you. See: Integrating an Oracle Workflow Directory Service with Oracle Internet Directory: page 2 – 24 and Synchronizing Workflow Directory Services with Oracle Internet Directory: page 2 – 43.
  - If you do not choose to integrate with OID, directory service views that use Oracle database users and roles as your directory repository are automatically implemented for you by default. You should modify the default views to add e-mail addresses for these users if you want them to be able to receive e-mail notifications. See: Integrating an Oracle Workflow Directory Service with Oracle Database Users: page 2 – 25.
- If you are using the version of Oracle Workflow embedded in Oracle Applications, directory service views for users and roles from the unified Oracle Applications environment are automatically implemented for you. See: Setting Up a Directory

You can also create your own directory service by defining custom views with the required columns. However, note that only the predefined directory services provided by Oracle Workflow are supported by Oracle. See: Oracle Workflow Support Policy, *Oracle Workflow Developer's Guide*.

Oracle Workflow provides two local directory repository tables called WF\_LOCAL\_ROLES and WF\_LOCAL\_USER\_ROLES. These tables should always be included in any implementation of the WF\_USERS, WF\_ROLES, and WF\_USER\_ROLES views.

- WF\_LOCAL\_ROLES stores role information, including a user flag to mark those roles that also represent individual users. This table contains columns similar to those required in the WF\_USERS and WF\_ROLES views.
- WF\_LOCAL\_USER\_ROLES stores information about the associations of users with roles. This table contains columns similar to those required in the WF\_USER\_ROLES view.

For the standalone version of Oracle Workflow, if you are integrating with OID, the Workflow local tables store user information that is retrieved from and synchronized with OID, as well as Workflow role information that is entered and stored locally. If you are integrating with Oracle database users or a custom directory service repository, you can use these tables to store ad hoc users and roles not included in your existing tables. You can create such ad hoc users and roles in the Workflow local tables by calling the appropriate Workflow directory service PL/SQL APIs.

**Note:** If you implement OID integration, you must not create ad hoc users in the Workflow local tables, because you risk discrepancies in your user information and unpredictable results if you use any tool other than OID to maintain users after integrating with OID. You can still use ad hoc roles, however, since Workflow roles are not maintained through OID. See: Synchronizing Workflow Directory Services with Oracle Internet Directory: page 2 – 43.

For Oracle Workflow embedded in Oracle Applications, the Workflow local tables now store denormalized user and role information originating from various other Oracle Applications modules, so that the directory service views can access this information with good performance. You can also use these tables to store ad hoc users and roles by calling the appropriate Workflow directory service PL/SQL APIs.

In both standalone Oracle Workflow and Oracle Applications, you should periodically purge users and roles from the Workflow local tables after they have expired in order to improve performance. See: Directory, *Oracle Workflow API Reference*.

**Context:** You need to perform this step only once.

## See Also

Workflow Directory Service APIs, *Oracle Workflow API Reference*

Ad Hoc Users and Roles, *Oracle Workflow Developer's Guide*

Oracle Workflow Security: page 3 – 2

### Setting Up a Directory Service for Standalone Oracle Workflow

If you are using the standalone version of Oracle Workflow, you can choose to implement either one of the two predefined directory services. Oracle Workflow provides scripts that you can run to implement these directory service environments, creating view definitions for the WF\_USERS, WF\_ROLES, and WF\_USER\_ROLES views. See: Workflow Directory Service Views: page 2 – 34.

- If you are using the standalone version of Oracle Workflow and you have installed Oracle9i Release 2 or higher or Oracle9iAS Release 2 or higher, you can integrate your Workflow directory service with Oracle Internet Directory (OID) as your directory repository. See: Integrating Oracle Workflow Directory Services with Oracle Internet Directory: page 2 – 24 and Synchronizing Workflow Directory Services with Oracle Internet Directory: page 2 – 43.
- You can also implement a directory service that is integrated with Oracle database users. See: Integrating Oracle Workflow Directory Services with Oracle Database Users: page 2 – 25

**Note:** Additionally, you can create your own directory service by defining custom views based on the database tables that make up your directory repository, provided that you define the required columns and also map to the WF\_LOCAL\_ROLES and WF\_LOCAL\_USER\_ROLES tables for users and roles that are not stored in your repository. If you choose to do so, you can either create new view definitions, or you can edit and run a copy of one of the provided scripts. However, note that only the predefined directory service views provided by Oracle Workflow are supported by Oracle. See: Oracle Workflow Support Policy, *Oracle Workflow Developer's Guide*.

## ► Integrating an Oracle Workflow Directory Service with Oracle Internet Directory

If you are using the standalone version of Oracle Workflow and you have installed Oracle9i Release 2 or higher or Oracle9iAS Release 2 or higher, you can integrate your Workflow directory service with Oracle Internet Directory (OID) as your directory repository. In this case, Oracle Workflow provides a directory service implementation that maps the directory service views only to the Workflow local tables, because only the users in the WF\_LOCAL\_ROLES table with their user flag set to *y* will be synchronized with OID. (Only users are maintained through OID, not Workflow roles.) After implementing OID integration, you maintain your user information only through OID. See: Synchronizing Workflow Directory Services with Oracle Internet Directory: page 2 – 43.

You can also use this directory service implementation if your users and roles are not stored in any existing directory repository, and you want to enter all your user and role information directly in the Workflow local tables. In this case the WF\_LOCAL\_ROLES and WF\_LOCAL\_USER\_ROLES tables become your primary directory repository tables.

Oracle Workflow provides a script named *wfdircsv.sql* which you can run to set up the views mapped only to the Workflow local tables. The *wfdircsv.sql* script is located in the Oracle Workflow *sql* subdirectory on your server. This script creates three views, WF\_USERS, WF\_ROLES, and WF\_USER\_ROLES. See: Workflow Directory Service Views: page 2 – 34.

The originating system in the WF\_USERS view is called WF\_LOCAL\_USERS, and the originating system ID is 0.

The WF\_ROLES view includes all users and roles defined in WF\_LOCAL\_ROLES, regardless of the user flag. The originating system is WF\_LOCAL\_ROLES and the originating system ID is 0.

The WF\_USER\_ROLES view consists of the names and originating system information of both users and roles in WF\_USERS and WF\_ROLES, associating users with the roles of which they are members.

**Note:** If you do not want to implement OID integration, but you choose to define custom views, you can use the *wfdircsv.sql* script to begin your custom definitions by creating a copy of this script and editing it to incorporate your own directory repository tables in addition to the Workflow local tables. However, note that only the predefined directory service views

provided by Oracle Workflow are supported by Oracle. See: Oracle Workflow Support Policy, *Oracle Workflow Developer's Guide*.

If you implement OID integration, you must not customize the view definitions to incorporate any tables other than the Workflow local tables, because only the users in the WF\_LOCAL\_ROLES table with their user flag set to Y will be synchronized with OID.

### ► **Integrating an Oracle Workflow Directory Service with Oracle Database Users**

If you are using the standalone version of Oracle Workflow, you can map your directory service to the native users and roles in the Oracle RDBMS. In this case you base your views on the tables DBA\_USERS, DBA\_ROLES, and WF\_LOCAL\_ROLES.

Oracle Workflow provides a script named *wfdirouv.sql* which you can use to set up the views. The *wfdirouv.sql* script is located in the Oracle Workflow *sql* subdirectory on your server. This script is automatically run by the Oracle Universal Installer when you install the standalone version of Oracle Workflow. The script creates the three directory service views, WF\_USERS, WF\_ROLES, and WF\_USER\_ROLES. See: Workflow Directory Service Views: page 2 – 34.

The WF\_USERS view creates a workflow user for each DBA user and any users stored in WF\_LOCAL\_ROLES. For each DBA user, the originating system is called ORACLE, and the originating system ID is the USERNAME column in DBA\_USERS. The default notification preference for each DBA user is MAILHTML.

The WF\_ROLES view includes all users in the WF\_USERS view, all roles defined in the WF\_LOCAL\_ROLES table, and all roles in DBA\_ROLES, where *role\_name* begins with WF. For each DBA role, the originating system is ORACLE and the originating system ID is the ROLE column in DBA\_ROLES. The default notification preference for each DBA role is MAILHTML.

The WF\_USER\_ROLES view consists of the names and originating system information of both users and roles in WF\_USERS and WF\_ROLES, associating users with the roles of which they are members.

The *wfdirouv.sql* script sets each native Oracle user's e-mail address to the user's respective username. If you want users to be able to receive e-mail notifications, as a minimal setup step, you should edit the *wfdirouv.sql* script to either link your native Oracle users to an existing

mail directory store through the WF\_ROLES view definition, or, if the usernames and e-mail account names match, then simply add the domain for your organization, such as '@oracle.com', to the usernames in the WF\_USERS view definition. Typically, the columns that you change are EMAIL\_ADDRESS in WF\_USERS and EMAIL\_ADDRESS in WF\_ROLES.

## **Setting Up a Directory Service for Oracle Workflow Embedded in Oracle Applications**

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In Oracle Applications, Oracle Workflow uses a directory service model in which denormalized information is maintained in the Workflow local tables for performance gain. The WF\_LOCAL\_ROLES and WF\_LOCAL\_USER\_ROLES tables store user and role information originating from various other Oracle Applications modules, as well as ad hoc users and roles, so that the WF\_USERS, WF\_ROLES, and WF\_USER\_ROLES views can access this information with good performance. You should maintain synchronization between the user and role information stored in application tables by the source modules and the information stored in the Workflow local tables.

### **Directory Service Views for Oracle Applications**

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The predefined WF\_USERS, WF\_ROLES, and WF\_USER\_ROLES directory service views for Oracle Workflow embedded in Oracle Applications are now based solely on the Workflow local tables where the denormalized information is stored. These view definitions are automatically created for you during installation. See: Workflow Directory Service Views: page 2 – 34.

- WF\_USERS is based on WF\_LOCAL\_ROLES where the user flag is set to Y.
- WF\_ROLES is based on WF\_LOCAL\_ROLES.
- WF\_USER\_ROLES is based on WF\_LOCAL\_USER\_ROLES.

**Note:** You can customize your directory service by creating your own custom view definitions, provided that you define the required columns and map to the WF\_LOCAL\_ROLES and WF\_LOCAL\_USER\_ROLES tables. However, note that only the predefined directory service views provided by Oracle Workflow are supported by Oracle. See: Oracle Workflow Support Policy, *Oracle Workflow Developer's Guide*.

In Oracle Applications, the only roles in WF\_LOCAL\_ROLES that are marked as individual users with the user flag set to Y are roles that represent Oracle Applications users, originating from the FND\_USER

table, roles that represent Oracle Trading Community Architecture (TCA) person parties, or roles that represent ad hoc users. Records originating from other application tables are treated solely as roles, with the user flag set to N. The WF\_LOCAL\_USER\_ROLES table is used to associate users from FND\_USER or TCA person parties with roles defined by other applications.

**Note:** An Oracle Applications user may be associated with an Oracle Human Resources employee. In this case, some employee information is combined into the user's record in WF\_LOCAL\_ROLES. In such a combined record, the originating system is changed from FND\_USR to PER, and the display name is taken from Oracle Human Resources, while the internal name is the Oracle Applications user name from FND\_USER, and the user flag is still set to Y.

Each Oracle Human Resources employee is also represented in WF\_LOCAL\_ROLES as a role with the originating system PER\_ROLE and the user flag set to N. This record remains unaffected whether the employee is linked to an Oracle Applications user or not.

The following table summarizes the different ways in which Oracle Applications users and Oracle Human Resources employees are stored in WF\_LOCAL\_ROLES.

Type of Role	Orig_System	User_Flag
Oracle Applications user, not linked to an Oracle Human Resources employee	FND_USR	Y
Oracle Applications user linked to an Oracle Human Resources employee	PER	Y
Oracle Human Resources employee	PER_ROLE	N

**Table 6 – 2 (Page 1 of 1)**

To link an Oracle Applications user to an Oracle Human Resources employee, navigate to the Users window in Oracle Applications and select the appropriate employee name in the Person field for that user. See: *Users Window, Oracle Applications System Administrator's Guide*.

You should only link an Oracle Human Resources employee to one Oracle Applications user. If an employee is linked to more than one user, notifications for that employee may become inaccessible, and workflow processes may be halted while waiting for those notifications to be completed. Additionally,

assigning an employee to multiple users may cause errors in other Oracle Applications modules as well. For this reason, you must not link an Oracle Human Resources employee to more than one Oracle Applications user.

**Note:** TCA person parties, which have an originating system of HZ\_PARTY, are marked as individual users in WF\_LOCAL\_ROLES. However, note that TCA contacts, or relationship parties, which also have an originating system of HZ\_PARTY, are not individual users. The following table summarizes the different ways in which TCA parties are stored in WF\_LOCAL\_ROLES.

Type of Role	Orig_System	User_Flag
Oracle Trading Community Architecture person party	HZ_PARTY	Y
Oracle Trading Community Architecture contact (relationship party)	HZ_PARTY	N

**Table 6 – 3 (Page 1 of 1)**

The WF\_LOCAL\_ROLES and WF\_LOCAL\_USER\_ROLES tables are partitioned by the originating system within Oracle Applications that was the source of the denormalized information. This partitioning provides faster data access and also allows each originating system to be synchronized with the Workflow local tables individually. Each table also includes a separate partition that contains ad hoc users and roles as well as data from any system that does not have its own partition.

The partition information for each originating system is stored in the WF\_DIRECTORY\_PARTITIONS table. There are partitions for the following systems:

- WF\_LOCAL\_ROLES – Ad hoc users and roles, as well as data from any originating system that does not have its own partition
- FND\_USR – FND users, which may or may not be linked to Oracle Human Resources employees
- FND\_RESP – FND responsibilities
- PER\_ROLE – HR employees
- POS – HR positions
- AMV\_APPR – MarketView approvals

- AMV\_CHN – MarketView channels
- ENG\_LIST – Engineering approval list
- HZ\_GROUP – TCA groups
- HZ\_PARTY – TCA person parties and contacts
- GBX – Federal HR group boxes
- HTB\_SEC – This partition does not participate in bulk synchronization.
- PQH\_ROLES – Position Control roles. This partition will participate in bulk synchronization through a patch to be released by Oracle Public Sector Human Resources in the future. For details when the patch becomes available, please refer to MetaLink Note 171703.1, *Implementing Oracle Workflow Directory Service Synchronization*.

**Note:** Normally each partition contains only records that originate from the corresponding system. However, the FND\_USR partition can contain both roles with an orig\_system value of FND\_USR, which are unlinked Oracle Applications users, and roles with an orig\_system value of PER, which are Oracle Applications users that are linked to Oracle Human Resources employees.

See: Ad Hoc Users and Roles, *Oracle Workflow Developer's Guide*.

### **Synchronizing Workflow User and Role Information**

For each Oracle Applications module that is a source of Oracle Workflow user and role information, the information stored in the source application tables must be synchronized with the denormalized information in the Workflow local tables. The Workflow local synchronization APIs are used to perform this synchronization.

### **Incremental Synchronization**

Oracle Workflow automatically performs an initial synchronization of the user and role information in all the related originating systems during installation. Subsequently, you must continue synchronizing the user and role information from the source modules with the Workflow local tables. For each Oracle Applications module that stores user and role information in its application tables, a patch will be made available to automatically synchronize that information with the information in the Workflow local tables on an incremental basis, using the Workflow local synchronization APIs. For details on the patches that are currently

available, please refer to MetaLink Note 171703.1, *Implementing Oracle Workflow Directory Service Synchronization*.

## **Bulk Synchronization**

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Until these incremental synchronization patches are released, you can run a concurrent program named Synchronize WF LOCAL Tables to perform synchronization in bulk, periodically refreshing the information in the Workflow local tables for the affected modules. This concurrent program is provided as an interim method to synchronize the Workflow local tables with the user and role information stored in the product application tables until each affected product performs the synchronization automatically.

Oracle Workflow provides a request set named Synchronize Workflow LOCAL Tables that contains ten instances of the Synchronize WF Local Tables program, one for each originating system. You can use this request set to submit requests for all the originating systems at once. Note that because this program is incompatible with itself, each one is defined as a separate stage and the stages will run sequentially. By default, this request set is scheduled to run once a day to provide a minimal level of synchronization. You can modify the schedule for the request set to perform synchronization more frequently.

You only need to run the bulk synchronization program for products for which you do not have an incremental synchronization patch installed. After applying the patch for a product, you no longer need to run the program for originating systems owned by that product.

- After applying the patch for a product, remove the program instance for each of that product's originating systems from the Synchronize Workflow LOCAL Tables request set. See: *Defining Request Sets, Oracle Applications User's Guide*.
- Also, do not submit any further single requests for the Synchronize WF LOCAL Tables program for that product's originating systems.

### ► **To submit the Synchronize Workflow LOCAL Tables request set:**

1. Navigate to the Submit Requests form in Oracle Applications (System Administrator: Requests > Run). See: *Submitting a Request Set, Oracle Applications User's Guide*.
2. Choose to run a request set and select Synchronize Workflow LOCAL Tables as the request set to run.
3. Enter the values you want for the following parameters.

- Parallel Processes – Enter the number of parallel processes to run. The default value for this parameter is 1. However, if your hardware resources allow, you can optionally set this parameter to a higher value in order to parallelize the queries during execution of the program.
  - Logging – Select the logging mode you want. This mode determines whether redo log data is generated for database operations performed by the bulk synchronization process. The default value for this parameter is LOGGING, which generates redo log data normally. You can optionally set the logging mode to NOLOGGING to suppress redo log data, obtaining a performance gain. Without this redo log data, no media recovery is possible for the Workflow directory tables and indexes, requiring that you re-run the bulk synchronization process in the event of a media recovery scenario. One additional scenario that would require the process to be re-run is when you open a standby database, whose maintenance also depends on redo log data.
4. Select the print and run options you want to define the schedule for this request set, and choose Submit to submit the requests.

► **To submit a single request for the Synchronize WF LOCAL Tables concurrent program:**

1. Navigate to the Submit Requests form in Oracle Applications (System Administrator: Requests > Run). See: Submitting a Request, *Oracle Applications User's Guide*.
2. Choose to run a single request and select the Synchronize WF LOCAL Tables concurrent program as the request to run.
3. In the Parameters window, enter the values you want for the following parameters:
  - Orig System – Select the name of the originating system whose user and role information you want to synchronize with the WF\_LOCAL tables. These system names are stored in the FND\_WF\_ORIG\_SYSTEMS lookup type. You can select the following systems:
    - AMV\_APPR – MarketView Approvals
    - AMV\_CHN – MarketView Channels
    - ENG\_LIST – Engineering Approval List
    - FND\_RESP – FND Responsibilities
    - FND\_USR – FND Users

- GBX – Federal HR Group Boxes
  - HZ\_GROUP – TCA Groups
  - HZ\_PARTY – TCA Parties
  - PER\_ROLE – HR People
  - POS – HR Positions
  - PQH\_ROLES – Position Control Roles. This originating system will participate in bulk synchronization through a patch to be released by Oracle Public Sector Human Resources in the future. For details when the patch becomes available, please refer to MetaLink Note 171703.1, *Implementing Oracle Workflow Directory Service Synchronization*.
- Parallel Processes – Enter the number of parallel processes to run. The default value for this parameter is 1. However, if your hardware resources allow, you can optionally set this parameter to a higher value in order to parallelize the queries during execution of the program.
  - Logging – Select the logging mode you want. This mode determines whether redo log data is generated for database operations performed by the bulk synchronization process. The default value for this parameter is `LOGGING`, which generates redo log data normally. You can optionally set the logging mode to `NOLOGGING` to suppress redo log data, obtaining a performance gain. Without this redo log data, no media recovery is possible for the Workflow directory tables and indexes, requiring that you re-run the bulk synchronization process in the event of a media recovery scenario. One additional scenario that would require the process to be re-run is when you open a standby database, whose maintenance also depends on redo log data.
4. Select the print and run options you want to define the schedule for this request, and choose Submit to submit the request. You can submit multiple requests for this program to perform synchronization for different originating systems at different frequencies. However, note that because this program is incompatible with itself, only one request for the program can run at a time.

**Note:** Additionally, you must not run bulk synchronization using APIs or scripts from SQL\*Plus while you are running the Synchronize WF LOCAL Tables concurrent program or the Synchronize Workflow LOCAL Tables request set, as the two processes will interfere with each other.

## How Bulk Synchronization Is Performed

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The bulk synchronization program retrieves user and role information from an originating system through views that present the information that was formerly included in the previous implementation of the Workflow directory service views. Each originating system provides two new views.

- `WF_<origSystem>_ROLES` – Contains the same columns as `WF_ROLES`
- `WF_<origSystem>_UR` – Contains the same columns as `WF_USER_ROLES`

For example, the originating system `FND_USR` provides views named `WF_FND_USR_ROLES` and `WF_FND_USR_UR`.

For backward compatibility, the originating systems' synchronization views must present exactly the same user and role information that was included for that system in the previous implementation of the Workflow directory service views. The information must be presented in the format required by Oracle Workflow, with no duplicates. For example, the internal name for a user or role must be sourced from a column that is no longer than 320 characters. It is recommended that internal names be all uppercase. If the source table in the originating system does not have a column that meets these criteria, the internal name should be defined to be `<orig_system>:<orig_system_id>` instead, so that Oracle Workflow can reference the original base table where users or roles are stored and a unique user or role in that table.

**Note:** If internal names in all uppercase are used, the names should be initially entered in the database in all uppercase. Forcing the names to uppercase in the view definition results in poor performance when accessing these views.

**Note:** You can customize these originating system synchronization view definitions to specify the data you want to include in bulk synchronization, provided that your customized views meet the requirements listed above. However, note that the originating systems that have implemented incremental synchronization will also be propagating user and role information to the Workflow local tables automatically, so the synchronization views used for bulk synchronization are not the only source of data for Workflow. Also note that only the predefined synchronization views provided by Oracle Applications are supported by Oracle. See: Oracle Workflow Support Policy, *Oracle Workflow Developer's Guide*.

When you run the bulk synchronization program for a particular originating system, the program extracts the role and user/role association information from that system's synchronization views and loads the information into staging tables. The program then performs a partition exchange between the staging tables and the WF\_LOCAL\_ROLES and WF\_LOCAL\_USER\_ROLES tables to update the partitions for that system in the Workflow local tables.

**Note:** The bulk synchronization program does not store or modify any information in the WF\_LOCAL\_ROLES partitions within the WF\_LOCAL\_ROLES and WF\_LOCAL\_USER\_ROLES tables that contain ad hoc users and roles.

### **Workflow Directory Service Views**

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Oracle Workflow relies on three views named WF\_USERS, WF\_ROLES, and WF\_USER\_ROLES to reference user and role information. If you are using the standalone version of Oracle Workflow, you can choose to implement definitions for these views from one of two predefined directory services provided by Oracle Workflow, which let you either integrate with Oracle Internet Directory (OID) as your directory repository or use Oracle database users and roles for your directory service. If you are using the version of Oracle Workflow embedded in Oracle Applications, WF\_USERS, WF\_ROLES, and WF\_USER\_ROLES views for the unified Oracle Applications environment are automatically defined for you during installation.

**Note:** An expiration date can be assigned to each role in WF\_LOCAL\_ROLES and each user/role association in WF\_LOCAL\_USER\_ROLES. After that date, an expired role is no longer included in the seeded WF\_USERS and WF\_ROLES view, and an expired user/role association is no longer included in the seeded WF\_USER\_ROLES view.

However, note that although the expired rows no longer appear in the views, they still exist in the Workflow local tables until you purge them using the *WF\_PURGE.Directory()* API. You should periodically purge expired users and roles in order to improve performance. See: *Directory, Oracle Workflow API Reference*.

You can also create your own directory service by defining custom views with the required columns. However, note that only the predefined directory services provided by Oracle Workflow are supported by Oracle. See: *Oracle Workflow Support Policy, Oracle Workflow Developer's Guide*.

If you create your own custom view definitions:

- Each individual user identified by WF\_USERS must also appear in the WF\_ROLES view as a role.
- You should set the user flag in WF\_USERS and WF\_ROLES to Y for all the roles that also represent individual users, and set the user flag to N for all other roles.
- You should include the WF\_LOCAL\_ROLES and WF\_LOCAL\_USER\_ROLES tables in the view definitions.
- You should avoid selecting from DUAL to incorporate additional users and roles into the directory service views as this allows you to violate the unique constraint on certain columns of the views and reduces performance with unnecessary joins between the 'select from DUAL' statements.
- To take advantage of unique indexes when querying users, make sure you initially enter the usernames in your database in uppercase only. Forcing the usernames to uppercase in your view definition results in poor performance when accessing these views.
- You should run the script *wfdirchk.sql* to validate your directory service data model. This script is located on your server in the Oracle Workflow *admin/sql* subdirectory for the standalone version of Oracle Workflow or in the *sql* subdirectory under \$FND\_TOP for the version of Oracle Workflow embedded in Oracle Applications. See: *Wfdirchk.sql*: page 6 – 9.

**Note:** Avoid making a join to a view that contains a union, as this results in poor database performance. The Oracle database server is unable to preserve the indexes in that view when you make such a join. The workflow directory service views you create will most likely contain union; therefore you should not join to them directly. If you need to retrieve data from any of the three directory services views, use the appropriate directory services API. See: *Workflow Directory Service APIs, Oracle Workflow API Reference*.

## WF\_USERS

---

The WF\_USERS view references information about the individuals in your organization who may utilize Oracle Workflow functionality or receive workflow notifications.

**Note:** For Oracle Applications, this view now includes only Oracle Applications users originating from the FND\_USER

table, TCA person parties, and ad hoc users, although an Oracle Applications user record may also include information from Oracle Human Resources if the user is linked to an Oracle Human Resources employee.

The WF\_USERS view must contain the following required columns:

- Name—The internal name of the user as referenced by the Workflow Engine and Notification System. For example, an internal name for a user can be MBEECH or 009, where 009 represents the user's employee ID.



**Attention:** If you define custom views, the Name column must be sourced from a column that is no longer than 320 characters, and it is recommended that the internal name be all uppercase. If your source table does not have a column that meets these criteria, DO NOT use string functions to force these restrictions. Instead, define the Name column to be `<orig_system>:<orig_system_id>` so that Oracle Workflow can reference the original base table where users are stored and a unique user in that table. For example, "PER\_PEOPLE:009" could represent a user whose employee ID is 009 and whose record is stored in a personnel table called PER\_PEOPLE.

- Display\_Name—The display name of the user. An example of a display name can be 'Beech, Matthew'.
- Description—An optional description of the user.
- Notification\_Preference—The method by which this user prefers to receive notifications. A value of MAILTEXT, MAILHTML, MAILHTM2, or MAILATTH allows users to receive and respond to notifications by plain text e-mail, HTML-formatted e-mail with attachments, HTML-formatted e-mail without attachments, or by plain text e-mail with HTML attachments, respectively. A value of QUERY allows users to query notifications from the Worklist web page. Finally, a value of SUMMARY allows users to receive periodic e-mail summaries of their open notifications. However, to respond to the individual notifications, they must query the notification from the Worklist web page. See: Overview of Notification Handling, *Oracle Workflow User's Guide* and Notification Preferences: page 2 – 73.

**Note:** A notification preference of MAILTEXT, MAILHTML, MAILHTM2, or MAILATTH also allows users to query their notifications from the Worklist web page.

**Note:** In Oracle Applications, if no notification preference is provided by the originating system, the notification preference is set to MAILHTML by default.

**Note:** If you define custom views, you can map the Notification\_Preference column over the Oracle Workflow preferences table using the statement below. The benefit of doing so is that you can then globally set the default notification preference for all users in your enterprise using the Global Preferences web page and let individual users override that default value by changing their notification preference in the User Preferences web page. See: Setting Global User Preferences: page 2 – 13, Setting User Preferences, *Oracle Workflow User's Guide*, and get\_pref, *Oracle Workflow Developer's Guide*.

```
NVL(wf_pref.get_pref(USR.USER_NAME, 'MAILTYPE'),  
    'MAILHTML')
```

- **Language**—The value of the database NLS\_LANGUAGE initialization parameter that specifies the default language-dependent behavior of the user's notification session. The Language column is required and cannot be left null. Refer to your Oracle Database user's guide or installation manual for the list of supported language conventions.

**Note:** In Oracle Applications, for roles that are Oracle Applications users marked with an originating system of FND\_USR or PER, Oracle Workflow uses the *GetRoleInfo()* procedure to find the language for a user, rather than querying this column in the directory service views. *GetRoleInfo()* by default retrieves the language value from the ICX: Language profile option for that Oracle Applications user.

However, if the WF\_PREFERENCE resource token is defined and set to FND, then the *GetRoleInfo()* procedure obtains the language value from the Oracle Workflow preferences table instead, which can be set using the Global Preferences or User Preferences web pages in Oracle Workflow.

The WF\_PREFERENCE resource token is not used in the standalone version of Oracle Workflow.

**Note:** If you define custom views, and, if you are using Oracle Applications, the WF\_PREFERENCE resource token is set to FND, then you can map the Language column over the Oracle Workflow preferences table using the statement below. The benefit of doing so is that you can then globally set the default language for all users in your enterprise using the Global Preferences web page and let individual users override that default value by changing their language in the User Preferences web page. See: Setting Global User Preferences:

page 2 – 13, *Setting User Preferences, Oracle Workflow User's Guide*, and *get\_pref, Oracle Workflow Developer's Guide*.

```
NVL(wf_pref.get_pref(USR.USER_NAME, 'LANGUAGE'),  
<default_language>)
```



**Attention:** Make sure that the e-mail templates used by notification mailers to send notifications have been translated by Oracle to the language you wish to set. The standard e-mail templates are delivered in a file called `wfmail.wft` under the subdirectory `$ORACLE_HOME/wf/res/<lang>` for the standalone version of Oracle Workflow or `$FND_TOP/import/<lang>` for the version of Oracle Workflow embedded in Oracle Applications. You can check the appropriate language subdirectory to verify if the templates have been translated to the language you wish to set. See: *Modifying Your Message Templates: page 2 – 85*.

- **Territory**—The value of the database `NLS_TERRITORY` initialization parameter that specifies the default territory-dependent formatting used in the user's notification session. The Territory column is required and cannot be left null. Refer to your Oracle Database user's guide or installation manual for the list of supported territory conventions.

**Note:** In Oracle Applications, for roles that are Oracle Applications users marked with an originating system of `FND_USR` or `PER`, Oracle Workflow uses the *GetRoleInfo()* procedure to find the territory for a user, rather than querying this column in the directory service views. *GetRoleInfo()* by default retrieves the territory value from the `ICX: Territory profile` option for that Oracle Applications user.

However, if the `WF_PREFERENCE` resource token is defined and set to `FND`, then the *GetRoleInfo()* procedure obtains the territory value from the Oracle Workflow preferences table instead, which can be set using the Global Preferences or User Preferences web pages in Oracle Workflow.

The `WF_PREFERENCE` resource token is not used in the standalone version of Oracle Workflow.

**Note:** If you define custom views, and, if you are using Oracle Applications, the `WF_PREFERENCE` resource token is set to `FND`, then you can map the Territory column over the Oracle Workflow preferences table using the statement below. The benefit of doing so is that you can then globally set the default territory for all users in your enterprise using the Global Preferences web page and let individual users override that default value by changing their territory in the User

Preferences web page. See: Setting Global User Preferences: page 2 – 13, Setting User Preferences, *Oracle Workflow User's Guide*, and get\_pref, *Oracle Workflow Developer's Guide*.

```
NVL(wf_pref.get_pref(USR.USER_NAME, 'TERRITORY'),  
<default_territory>)
```

- **Email\_Address**—A valid electronic mail address for this user or a mail distribution list defined by your electronic mail system.
- **Fax**—A fax number for the user.
- **Orig\_System**—A code that you assign to the directory repository that this view is ultimately based on. For example, if this view is based on the personnel data stored in a Human Resource Management System, **Orig\_System** can be defined as **PER**.
- **Orig\_System\_ID**—The primary key that identifies the user in this repository system. For example, **Orig\_System\_ID** can be defined as the value stored in a column called **PERSON\_ID** in a Human Resources database table called **PER\_PEOPLE**.
- **Start\_Date**—The date at which the user becomes valid in the directory service.
- **Status**—The availability of the user to participate in a workflow process. The possible statuses are: active (**ACTIVE**), unavailable for an extended period (**EXTLEAVE**), permanently unavailable (**INACTIVE**), and temporarily unavailable (**TMPLEAVE**). These statuses are also stored in the lookup type called **WFSTD\_AVAILABILITY\_STATUS**.
- **Expiration\_Date**—The date at which the user is no longer valid in the directory service. After this date, the user will no longer appear in the seeded **WF\_USERS** view.
- **Security\_Group\_ID**—An identifier for the security group to which the user belongs. See: Overview of Security Groups, *Oracle Applications System Administrator's Guide*.
- **User\_Flag**—An indicator to determine whether this role is an individual user. Only roles with the user flag set to **Y** are included in the **WF\_USERS** view.
- **Partition\_ID**—In Oracle Applications, an identifier for the partition in which the user record is stored. In standalone Oracle Workflow, the partition ID should always be 0 (zero).

## WF\_ROLES

---

The WF\_ROLES view references information about all the roles in your organization who may utilize Oracle Workflow functionality or receive workflow notifications. This view must contain the following required columns pertaining to the roles in your repository. Those columns that are preceded by an asterisk (\*) are similar to the corresponding columns described for the WF\_USERS view.



**Attention:** Each user identified by WF\_USERS must also appear in the WF\_ROLES view as a role. This is a requirement for Oracle Workflow.

**Note:** If a user is a member of a role and the user information such as language and notification preference is different from the role information, the Expand Roles option for a notification addressed to the role determines whether the user information or the role information takes precedence. If the Expand Roles option is not checked and the Notification System delivers the notification to the role, the role information will override the user information. If Expand Roles is checked, however, then each user in the role will receive a separate copy of the notification, and the user information will override the role information.

If a user has a notification preference of 'SUMMARY', and the user is also a member of a multi-user role with a different notification preference such as 'MAILHTML', the Notification System will use the Expand Roles setting to determine whether to deliver the notification according to the role or user notification preference. However, even if Expand Roles is not checked and the notification preference of the role takes precedence, the notification will still appear in the user's summary message because the notification is part of the user's worklist.

- Name—The internal name of the role as referenced by the Workflow Engine and Notification System.



**Attention:** If you define custom views, the Name column must be sourced from a column that is no longer than 320 characters, and it is recommended that the internal name be all uppercase. If your source table does not have a column that meets these criteria, DO NOT use string functions to force these restrictions. Instead, define the Name column to be `<orig_system>:<orig_system_id>` so that Oracle Workflow can reference the original base table where roles are stored and a unique role in that table. For example, "PER\_POSITION:009"

could represent a position whose ID is 009 and whose record is stored in the personnel table called PER\_POSITION.

- \*Display\_Name
- \*Description
- \*Notification\_Preference
- \*Language
- \*Territory
- Email\_Address—If the e-mail address is null for a given role, notification mailers send an individual e-mail to each user within the role.
- \*Fax
- \*Orig\_System
- \*Orig\_System\_ID
- \*Start\_Date
- \*Status
- Expiration\_Date—The date at which the role is no longer valid in the directory service. After this date, the role will no longer appear in the seeded WF\_ROLES view.
- \*Security\_Group\_ID
- User\_Flag—An indicator to determine whether this role is an individual user. All roles are included in the WF\_ROLES view regardless of this flag.
- \*Partition\_ID

## **WF\_USER\_ROLES**

---

The WF\_USER\_ROLES view is an intersection of the users and roles in WF\_USERS and WF\_ROLES, showing which users are members of which roles.

**Note:** A role can contain only individual users as its members. It cannot contain another role.

The WF\_USER\_ROLES view must contain the following required columns:

- User\_Name—The internal name of the user as listed in the view WF\_USERS.

- **User\_Orig\_System**—A code that you assign to the user directory repository as listed in the view `WF_USERS`.
- **User\_Orig\_System\_ID**—The primary key that identifies the user in the user directory repository as listed in the view `WF_USERS`.
- **Role\_Name**—The internal name of the role as listed in the view `WF_ROLES`.
- **Role\_Orig\_System**—A code that you assign to the role directory repository as listed in the view `WF_ROLES`.
- **Role\_Orig\_System\_ID**—The primary key that identifies the role in the role directory repository as listed in the view `WF_ROLES`.
- **Start\_Date**—The date at which the association of this user with this role becomes valid in the directory service.
- **Expiration\_Date**—The date at which the association of this user with this role is no longer valid in the directory service. After this date, the user and role association will no longer appear in the seeded `WF_USER_ROLES` view.
- **Partition\_ID**—In Oracle Applications, an identifier for the partition in which the record of the association of this user with this role is stored. In standalone Oracle Workflow, the partition ID should always be 0 (zero).

## Step 4 Synchronizing Workflow Directory Services with Oracle Internet Directory

If you are using the standalone version of Oracle Workflow available with Oracle9i Release 2 or with Oracle9iAS Release 2 or higher, you can synchronize the user information in your Workflow directory service with Oracle Internet Directory (OID) using Lightweight Directory Access Protocol (LDAP). This integration is recommended because it enables you to manage and publish user information in a central location which various systems can reference.

Synchronization with OID enables Oracle Workflow to do the following:

- Assign ownership of work items and send notifications to users defined in OID.
- Synchronize with other external user directories that are synchronized with OID.
- Participate in single sign-on through LDAP external authentication with Oracle9iAS Single Sign-On Server, if you have installed Oracle9iAS Release 2 or higher. With single sign-on, a user who is logged into any participating Oracle9iAS component is automatically authenticated when accessing any other participating component and does not need to log in again.



**Attention:** To implement single sign-on integration, you must install Oracle Workflow with Oracle9iAS Release 2 or higher, and you must use a version of the Oracle9i database server that is certified with your version of Oracle9iAS.

For more information about leveraging the Oracle Identity Management infrastructure, see: Oracle Workflow Security: page 3 – 2.

**Context:** You need to perform this step only once.

### Oracle Internet Directory

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Oracle Internet Directory is a general purpose directory service that enables fast retrieval and centralized management of information about dispersed users and network resources. It combines Lightweight Directory Access Protocol (LDAP) Version 3 with the high performance, scalability, robustness, and availability of Oracle9i.

LDAP is a standard, extensible directory access protocol. It is a common language that LDAP clients and servers use to communicate. LDAP was conceived as an internet-ready, lightweight implementation of the International Standardization Organization (ISO) X.500 standard

for directory services. It requires a minimal amount of networking software on the client side, which makes it particularly attractive for internet-based, thin client applications.

The advantages of OID include:

- Scalability – Oracle Internet Directory exploits the strengths of Oracle9i, enabling support for terabytes of directory information. In addition, such technologies as multithreaded LDAP servers and database connection pooling allow it to support thousands of concurrent clients with subsecond search response times.

Oracle Internet Directory also provides data management tools, such as Oracle Directory Manager and a variety of command-line tools, for manipulating large volumes of LDAP data.

- High availability – Oracle Internet Directory is designed to meet the needs of a variety of important applications. For example, it supports full, multimaster replication between directory servers: If one server in a replication community becomes unavailable, then a user can access the data from another server. Information about changes made to directory data on a server is stored in special tables on the Oracle9i database. These are replicated throughout the directory environment by Oracle9i Replication, a robust replication mechanism.

Oracle Internet Directory also takes advantage of all the availability features of Oracle9i. Because directory information is stored securely in the Oracle9i database, it is protected by Oracle's backup capabilities. Additionally, the Oracle9i database, running with large datastores and heavy loads, can recover from system failures quickly.

- Security – Oracle Internet Directory offers comprehensive and flexible access control. An administrator can grant or restrict access to a specific directory object or to an entire directory subtree. Moreover, Oracle Internet Directory implements three levels of user authentication: anonymous, password-based, and certificate-based using Secure Socket Layer (SSL) Version 3 for authenticated access and data privacy.
- Synchronization with other directories – Oracle Internet Directory includes the Oracle Directory Integration platform that enables you to synchronize with other enterprise repositories, including third-party LDAP directories.

Oracle9iAS Single Sign-On uses Oracle Internet Directory to store user entries. It maps users for any partner application to user entries in OID entries, and authenticates them by using LDAP mechanisms.

## See Also

*Oracle Internet Directory Administrator's Guide*

### Oracle9iAS Single Sign-On

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Oracle9iAS Single Sign-On is a component of Oracle9i Application Server that provides a framework for secure single sign-on, allowing users to log in to multiple Web-based applications by entering a user name and password only once.



**Attention:** To implement single sign-on integration for Oracle Workflow, you must install Oracle Workflow with Oracle9iAS Release 2 or higher, and you must use a version of the Oracle9i database server that is certified with your version of Oracle9iAS.

Oracle9iAS Single Sign-On provides the following benefits:

- Ease of administration and reduced administrative costs, because user names and passwords can be stored and maintained outside of any particular application and shared across the enterprise
- Convenient login experience, because users do not need to maintain a separate username and password for each application they access
- Increased security, because when the password is only required once, users are less likely to use simple, easy-to-remember passwords or write them down

The core of the Oracle9iAS Single Sign-On technology is the Login Server. The Login Server authenticates users and passes their identities to the partner applications that are integrated with it.

Partner applications support a single sign-on mechanism that enables them to accept a user's username and password as validated by the Login Server. A partner application delegates its authentication to the Login Server. If a partner application is registered with the Login Server, users can log into it using the single sign-on mechanism.

With `mod_osso`, an Oracle module that enables single sign-on, Oracle HTTP Server becomes a partner application of the Login Server. Oracle

Workflow uses Oracle HTTP Server as its Web server. If you implement Oracle Internet Directory/Single Sign-On integration, Oracle Workflow participates in single sign-on by using mod\_osso to authenticate access to its secured web pages.

When a user first tries to access a secured Workflow web page, the Workflow security package WFA\_SEC checks the CGI environment variable REMOTE\_USER for user information. If the user is not already logged in to Oracle Workflow or another Oracle9iAS Single Sign-On participating application, the user will be prompted to log in before the page appears.

**Note:** The WFA\_SEC package must be loaded as a post-install step if you choose to implement Oracle Internet Directory/Single Sign-On integration. For more information, see your installation documentation.

To set the variable REMOTE\_USER, Oracle HTTP Server internally calls to mod\_osso. Acting as an Oracle9iAS Single Sign-On partner application, mod\_osso transparently redirects the user to the Login Server to obtain authentication credentials, if no application cookie is present.

The Login Server performs the following steps:

- Prompts the user for the user name and password, if no login cookie is present.
- Authenticates the user by means of the user name and password, using external repository authentication that relies on an LDAP-compliant directory, specifically Oracle Internet Directory. The Login Server binds to OID and then looks up the user credentials stored in the directory.
- Stores an encrypted login cookie on the authenticated client.
- Transparently redirects the user to the partner application, mod\_osso, by using a URL with an encrypted parameter containing the user's identity.

Oracle HTTP Server with mod\_osso then performs the following steps:

- Decrypts the parameter.
- Identifies the user.
- Establishes its own session management (for example, determining what, if any, access privileges to grant to the user).
- Sets a partner application cookie so that subsequent user access does not require a redirect to the Login Server.

- Presents the requested application page to the user.

If, during the same session, the user again seeks access to the same or to a different partner application, the Login Server does not prompt the user for a username and password. Instead, the Login Server obtains the information from the login cookie that is already on the client browser. The login cookie provides the Login Server with the user's identity and indicates that authentication has already been performed. If there is no login cookie, the Login Server presents the user with a login page.

To guard against eavesdropping, the Login Server can send the login cookie to the client browser over an encrypted SSL channel.

The login cookie expires with the session, either at the end of a time interval specified by the administrator, or when the user exits the browser. The login cookie is never written to disk.

**Note:** To log out of a partner application and log in as another user, the user must also log out of the Login Server session. Otherwise, the authentication request returns the partner application to the logged in state of the previous user.

## See Also

*Oracle9iAS Single Sign-On Administration Guide*

*Oracle9iAS Single Sign-On Application Developer's Guide*

### **Oracle Internet Directory Synchronization**

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Oracle Workflow provides APIs to synchronize the user information in your Workflow directory service with OID. These APIs are defined in a PL/SQL package called WF\_LDAP. See: Workflow LDAP APIs, *Oracle Workflow API Reference*.

**Note:** OID integration includes only individual users, not user groups. Workflow roles are not maintained through OID.

#### ► **To Synchronize Workflow Directory Services with OID**

1. During installation, use the Workflow Configuration Assistant to choose to integrate with OID. You enter LDAP preferences in the Workflow Configuration Assistant, which are then stored as global Workflow preferences. After installation, you can use the Global Preferences page to verify that the following preferences are set to

the appropriate information for your OID installation, and optionally modify these settings. See: To Set Global User Preferences: page 2 – 13.

- LDAP Host
- LDAP Port
- LDAP User Name
- LDAP Password
- LDAP Changelog Base Directory
- LDAP User Base Directory

**Note:** If you choose to integrate with OID during installation, Workflow directory service views that support this integration are automatically implemented for you. See: Integrating Oracle Workflow Directory Services with Oracle Internet Directory: page 2 – 24.

2. Ensure that the PL/SQL package named `DBMS_LDAP` is loaded in your database. This package contains the functions and procedures which can be used to access data from LDAP servers and is required for LDAP synchronization.

For the standalone version of Oracle Workflow, if you choose to integrate with OID by entering LDAP preferences in the Workflow Configuration Assistant, this package is automatically loaded for you during installation. For more information, see the *Oracle Workflow Server Installation Notes* if you installed Oracle Workflow with Oracle9i Release 2, or see the *Oracle9i Application Server Installation Guide* if you installed Oracle Workflow with Oracle9iAS Release 2.

3. For single sign-on integration, ensure that the Database Access Descriptor for Oracle Workflow is protected in the `mod_osso` configuration file. For the standalone version of Oracle Workflow, if you choose to integrate with OID by entering LDAP preferences in the Workflow Configuration Assistant, `mod_osso` configuration is automatically performed for you during installation. For more information, see the *Oracle9i Application Server Installation Guide*.



**Attention:** To implement single sign-on integration, you must install Oracle Workflow with Oracle9iAS Release 2 or higher, and you must use a version of the Oracle9i database server that is certified with your version of Oracle9iAS.

4. To begin the synchronization, run the `WF_LDAP.Synch_all()` API. This function retrieves all the existing user information from OID,

based on the LDAP directory information specified in the Global Workflow Preferences, and raises the `oracle.apps.global.user.change` event. Predefined subscriptions to this event create new users in the `WF_LOCAL_ROLES` table if necessary and load the user information into the `WF_LOCAL_ROLES` table.

Because `Synch_all()` retrieves information for all users stored in OID, you should use this function only once during setup. If necessary, however, you can also run `Synch_all()` as required for recovery or cleanup.

Use the following commands to run `Synch_all()`:

```
declare
    res boolean := FALSE;
begin

    res := wf_ldap.synch_all();
    if (res) then
        dbms_output.put_line('succeeded');
    else
        dbms_output.put_line('failed ');
    end if;
end;
/
```

5. Subsequently, you must maintain the synchronization between your Workflow directory service and OID by retrieving and loading only changed OID user information. It is recommended that you update the user information every ten minutes.

You can use either `WF_LDAP.Synch_changes()` or `WF_LDAP.Schedule_changes()` to retrieve changed user information from OID. `WF_LDAP.Synch_changes()` identifies LDAP user changes in OID, including creation, modification, and deletion, by querying the LDAP change log records. The function connects to OID based on the LDAP directory information specified in the Global Workflow Preferences. If there is a change, the function retrieves the user information from OID and raises the `oracle.apps.global.user.change` event. Predefined subscriptions to this event create new users in the `WF_LOCAL_ROLES` table if necessary and load the user information into the table. You can use `WF_LDAP.Synch_changes()` to perform a single update.

To continue updating user information periodically, use `WF_LDAP.Schedule_changes()`. This procedure submits a database job using the `DBMS_JOB` utility to run `WF_LDAP.Synch_changes()`

repeatedly at an interval that you specify. The default interval, which is also the recommended frequency to check for updates, is ten minutes.

You can create a script to run `WF_LDAP.Schedule_changes()`. For example, to run the API at an interval of ten minutes, create a SQL file with the following commands:

```
declare
begin
    wf_ldap.schedule_changes(0,0,10);
end;
/
```

Then run SQL\*Plus and load your new script to the database.

**Note:** You must terminate the running of any WF\_LDAP APIs before changing your LDAP setup, such as by migrating to a different LDAP server.



**Attention:** If you implement OID integration, you must maintain your users only through OID. You must not create ad hoc users in the WF\_LOCAL\_ROLES table, because you risk discrepancies in your user information and unpredictable results if you use any tool other than OID to maintain users after integrating with OID. Consequently, if you implement OID integration, you must not use the `CreateAdHocUser()`, `SetAdHocUserStatus()`, `SetAdHocUserExpiration()`, or `SetAdHocUserAttr()` APIs in the WF\_DIRECTORY package.

You can still use ad hoc roles, however, since Workflow roles are not maintained through OID.

## See Also

Setting Global User Preferences: page 2 – 13

Workflow LDAP APIs, *Oracle Workflow API Reference*

User Entry Has Changed Event, *Oracle Workflow Developer's Guide*

Managing Job Queues, *Oracle Administrator's Guide*

Workflow Directory Service APIs, *Oracle Workflow API Reference*

## Step 5 Setting Up Additional Languages

The Oracle Workflow web pages, your workflow definitions, and workflow notifications can be translated to the languages defined in your Oracle installation. Some of the steps for setting up other languages in addition to English differ for the standalone and embedded versions of Oracle Workflow.

**Note:** You can only display languages that require a multibyte character set if your database uses a character set that supports these languages, such as UTF8. For more information, see: *Choosing a Character Set, Oracle Database Globalization Support Guide.*

### **WF\_LANGUAGES View**

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To support additional languages, Oracle Workflow uses a view called WF\_LANGUAGES that identifies the languages defined in your Oracle installation. This view is automatically created during installation for both the standalone and the embedded versions of Oracle Workflow. Oracle Workflow uses the WF\_LANGUAGES view to create, in its translatable tables, a row for each language that maps to a row found in the corresponding non-translated base table.

The WF\_LANGUAGES view includes the following columns:

- Code—The language code.
- Display\_Name—The display name of the language.
- NLS\_Language—The value of the Oracle NLS\_LANGUAGE initialization parameter that specifies the default language-dependent behavior of a session.
- NLS\_Territory—The value of the Oracle NLS\_TERRITORY initialization parameter that specifies the default territory-dependant date and numeric formatting of a session.
- NLS\_Codeset—The character set for the language.
- Installed\_Flag—Flag to indicate if the language is installed and available for use.

See: *Oracle Database Globalization Support Guide*

### ► **To Display Oracle Workflow Web Pages in Other Languages**

- For Oracle Workflow embedded in Oracle Applications, you select and install additional languages as part of the Oracle Applications installation. Users can set their language preference

to an installed language through the Personal Homepage in order to view Oracle Applications screens in that language. See: *Selecting NLS Settings, Installing Oracle Applications* and *Setting Your Preferences through the Personal Homepage, Oracle Applications User's Guide*.

- For the standalone version of Oracle Workflow, the server installation and upgrade are available only in English. To support access to Oracle Workflow web pages in another language, you must load that language after the installation using the Oracle Workflow Configuration Assistant. See the installation documentation for your release and platform.

The Oracle Workflow Configuration Assistant performs the following tasks to set up a language:

- Runs the script `wfnlena.sql` to enable the language. See: `wfnlena.sql`: page 6 – 11.
- Runs the script `WFNLADD.sql` to create rows for the enabled language in each workflow object translation table. See: `WFNLADD.sql`: page 6 – 4.
- Loads translated resource files for the user interface using the Workflow Resource Generator, translated versions of the standard and demonstration workflow definitions using the Workflow Definitions Loader, and translated Business Event System object definitions using the Workflow XML Loader.

If you have multiple languages loaded for Oracle Workflow, as a workflow administrator, you can specify the default language that your users' web sessions display by setting the Language preference in the Global User Preferences web page. Individual users can override the default language by setting the Language preference in the User Preferences web page. See: *Setting Global User Preferences*: page 2 – 13 and *Setting User Preferences, Oracle Workflow User's Guide*.

**Note:** To display Oracle Workflow web pages properly, the character sets on the database tier and middle tier must match. The `NLS_LANG` value specified in the Database Access Descriptor (DAD) for Oracle Workflow in Oracle HTTP Server should be set to the database character set, using the following format:

```
.CHARSET
```

Note that it is important to include the period (.) before the character set name in the `NLS_LANG` value. For more

information, see the installation documentation for your release and platform.

► **To Create and View Workflow Definitions in Other Languages using Oracle Workflow Builder**

1. Set the NLS\_LANG environment variable for the new language, territory, and encoded character set that you want to use for the workflow definition. For example, for Windows NT, run the `regedit32` command and locate the NLS\_LANG setting under the `HKEY_LOCAL_MACHINE/SOFTWARE/ORACLE` hierarchy. Double click on NLS\_LANG. Then set the variable to the new value and save your work. Specify the value for NLS\_LANG in the following format:

```
LANGUAGE_TERRITORY.CHARSET
```

For more information about setting NLS\_LANG, see: Globalization Support, *Oracle Database Installation Guide*.

2. Start Oracle Workflow Builder. Create a translated version of your workflow definition and save it as a flat file (.wft), or open and view a workflow definition that is already translated.

**Note:** Although you can enter and view property values for your workflow definitions in other languages, the Oracle Workflow Builder user interface is still displayed in English.

► **To Load Workflow Definitions in Other Languages to a Database**

1. Ensure that the WF\_LANGUAGES view has been created in your workflow server. This view is automatically created during installation.
2. Ensure that the language you want is set up in the database.
  - For Oracle Workflow embedded in Oracle Applications, you select and install additional languages as part of the Oracle Applications installation. See: Selecting NLS Settings, *Installing Oracle Applications*.
  - For standalone Oracle Workflow, the server installation automatically adds all available languages to your workflow database. See the installation documentation for your release and platform.
3. Load the translated workflow definition to your workflow database using either the Workflow Definitions Loader or the Workflow Builder.

- Before running the Workflow Definitions Loader program, you must set the NLS\_LANG environment variable to the appropriate territory and character set for the workflow definition you want to load. The character set must match the character set encoding used to create the workflow definition file, which is determined by the NLS\_LANG value that was set on the client PC before the .wft file was created in the Workflow Builder. For example, if the .wft file was created in the Japanese native character set encoding JA16SJIS, then you must specify JA16SJIS in the character set portion of NLS\_LANG before loading the file, and you cannot specify a different character set such as UTF8.

To set NLS\_LANG before running the Workflow Definitions Loader, use the following format:

```
_TERRITORY.CHARSET
```

Note that it is important to include the underscore () before the territory name and the period (.) between the territory name and the character set name in the NLS\_LANG value. For example, if the .wft file was created in the Japanese native character set encoding JA16SJIS, set NLS\_LANG to the following value:

```
_JAPAN.JA16SJIS.
```

You do not need to include the language in this NLS\_LANG value because the Workflow Definitions Loader uses the language specified within the .wft file to determine the language to load. See: Using the Workflow Definitions Loader: page 2 – 174.

**Note:** If you create all your translated workflow definition files in Unicode encoding, you can simply set NLS\_LANG to .UTF8 before loading these files. In this case you will not need to reset NLS\_LANG for translated files in different languages, because the .UTF8 character set applies to all the files in Unicode encoding.

- Before using the Workflow Builder to save a translated workflow definition to the database, you must set the NLS\_LANG environment variable to the appropriate language, territory, and character set. If you are saving several workflow definitions in different languages, you must reset NLS\_LANG for each language. See: Opening and Saving Item Types, *Oracle Workflow Developer's Guide*.

**Note:** The translated versions of Oracle Workflow's standard and demonstration workflow definitions are provided in native character set encoding, not in UTF8.

► **To Send E-mail Notifications in Other Languages**

1. Determine whether Oracle has translated the e-mail notification templates to the language you wish to set by checking for the file containing the templates in the appropriate language subdirectory, `$ORACLE_HOME/wf/res/<lang>` for the standalone version of Oracle Workflow or `$FND_TOP/import/<lang>` for the version of Oracle Workflow embedded in Oracle Applications. The standard templates are delivered in a file called `wfmail.wft`. See: *Modifying Your Message Templates*: page 2 – 85.
2. If the e-mail templates are available for the desired language, Oracle Workflow uses the language preference for the notification recipient to determine the language for an e-mail notification.
  - Oracle Applications users can set their language preference through the Personal Homepage. See: *Setting Your Preferences through the Personal Homepage*, *Oracle Applications User's Guide*.
  - For standalone Oracle Workflow, as the workflow administrator, you can specify the default language setting in the Global User Preferences web page. Individual users can override the default language setting by specifying their own preferred language in the User Preferences web page. See: *Setting Global User Preferences*: page 2 – 13 and *Setting User Preferences*, *Oracle Workflow User's Guide*.

## Step 6 Setting the Socket Listener Profile Options

The Notification Details web page can display an attached form icon to support form attributes in a notification message. Oracle Applications users can launch the Oracle Workflow Notification Worklist from their Oracle Applications menus.

From the Worklist, users can select a notification link to display the contents of a notification in the Notification Details page. If the notification details display an attached form icon, users can choose that icon to launch an Oracle Applications form.

Before Oracle Workflow can launch the form from the Notification Details page, it must check for appropriate context information with Oracle Applications. To accomplish this, the socket listener on the form side must be active.

You can activate the Oracle Applications socket listener by setting the Socket Listener Activated profile option to Yes using the System Profile Values window.

You must also set the Socket Listener Port profile option to the port at which Oracle Workflow should launch attached forms. This profile option can be set to different ports for different users.

If the socket listener port is not set at user level, Oracle Workflow launches attached forms at the default port set for the site. However, if users have set different ports, Oracle Workflow launches the forms for each user at the specified port. By using different socket listener ports, two different users logged into Oracle Applications on the same machine can both launch attached forms at the same time without interference from each other.

**Context:** You need to perform this step only once.

See: Overview of Setting User Profiles: *Oracle Applications System Administrator's Guide*

## Step 7 Setting the WF\_RESOURCES Environment Variable

If you are using the standalone version of Oracle Workflow and your Workflow server is installed on a UNIX platform, you must set an environment variable called WF\_RESOURCES to point to the language-dependent Oracle Workflow resource file (*wf<language>.res*). The resource file generally resides under the *res* subdirectory of your Oracle Workflow server directory structure.



**Attention:** Do not enclose environment variable values in double quotes (" ") as this is not supported.

You do not need to set this environment variable if your Workflow server is installed on the Windows NT platform. The Workflow server installation on Windows NT automatically sets a WF\_RESOURCES environment variable that identifies the path of the *wf<language>.res* file.

You also do not need to set this environment variable if you are using the version of Oracle Workflow embedded in Oracle Applications. For Oracle Applications, the path of the language-dependent Oracle Workflow resource file is \$FND\_TOP/\$APPLRSC/*wf<language>.res*.

**Context:** You need to perform this step only once.

## Step 8 Setting Up Background Workflow Engines

When the Workflow Engine initiates and performs a process, it completes all necessary activities before continuing to the next eligible activity. In some cases, an activity can require a large amount of processing resource or time to complete. Oracle Workflow lets you manage the load on the Workflow Engine by setting up supplemental engines to run these costly activities as background tasks. In these cases, the costly activity is *deferred* by the Workflow Engine and run later by a background engine. The main Workflow Engine can then continue to the next available activity, which may occur on some other parallel branch of the process. A workflow process can also include a Wait activity, which defers the continuation of a process until a later time. This type of deferred activity is also completed by a background engine.

A background engine must also be set up to handle timed out notification activities. When the Workflow Engine comes across a notification activity that requires a response, it calls the Notification System to send the notification to the appropriate performer, and then sets the notification activity to a status of 'NOTIFIED' until the performer completes the notification activity. Meanwhile, a background engine set up to handle timed out activities periodically checks for 'NOTIFIED' activities and whether these activities have time out values specified. If a 'NOTIFIED' activity does have a time out value, and the current date and time exceeds that time out value, the background engine marks that activity as timed out and calls the Workflow Engine. The Workflow Engine then resumes by trying to execute a <Timeout> transition activity.

Additionally, a background engine must be set up to handle stuck processes. A process is identified as stuck when it has a status of ACTIVE, but cannot progress any further. For example, a process could become stuck in the following situations:

- A thread within a process leads to an activity that is not defined as an End activity but has no other activity modeled after it, and no other activity is active.
- A process with only one thread loops back, but the pivot activity of the loop has the On Revisit property set to Ignore.
- An activity returns a result for which no eligible transition exists. For instance, if the function for a function activity returns an unexpected result value, and no default transition is modeled after that activity, the process cannot continue.

The background engine sets the status of a stuck process to `ERROR:#STUCK` and executes the error process defined for it.

You can define and start up as many background engines as you like to check for deferred and timed out activities.

Background engines can be restricted to handle activities associated with specific item types, and within specific cost ranges. A background engine runs until it completes all eligible activities at the time it was initiated.

Generally, you should set the background engine up to run periodically by either using a script to restart the background engine periodically (for the standalone version of Oracle Workflow), or scheduling the Background Process concurrent program to resubmit periodically (for the version of Oracle Workflow embedded in Oracle Applications).

Ensure that you have at least one background engine that can check for timed out activities, one that can process deferred activities, and one that can handle stuck processes. At a minimum, you need to set up one background engine that can handle both timed out and deferred activities as well as stuck processes.

Generally, you should run a separate background engine to check for stuck processes at less frequent intervals than the background engine that you run for deferred activities, normally not more often than once a day. Run the background engine to check for stuck processes when the load on the system is low.

**Context:** You need to perform this step only once.

See: Activity Cost, *Oracle Workflow Developer's Guide*

See: Timeout Transitions, *Oracle Workflow Developer's Guide*

See: Deferring Activities: page B – 7

See: Wait Activity, *Oracle Workflow Developer's Guide*

### ► **To Start a Background Engine**

If you are using the standalone version of Oracle Workflow, then use the `WF_ENGINE.BACKGROUND()` API to start up a background engine. Sample scripts that repeatedly run the background engine are provided with the standalone version of Oracle Workflow. You can use the procedures in the `DBMS_JOB` package to schedule and manage the background engine as a database job. See: Background, *Oracle Workflow API Reference* and Managing Job Queues, *Oracle Administrator's Guide*.

If you are using the version of Oracle Workflow embedded in Oracle Applications, you can start a background engine by submitting the

Background Process concurrent program using the Submit Requests form. See: To Schedule Background Engines: page 2 – 60

**Note:** If you are using the version of Oracle Workflow embedded in Oracle Applications and you have implemented Oracle Applications Manager, you can use Oracle Workflow Manager to submit and manage the Workflow Background Process concurrent program. For more information, please refer to the Oracle Applications Manager online help.

If you are using the standalone version of Oracle Workflow available with Oracle9i Release 2, you can use the standalone Oracle Workflow Manager component available through Oracle Enterprise Manager to submit and manage Workflow background engine database jobs. For more information, please refer to the Oracle Workflow Manager online help.

**Note:** Make sure you have a least one background engine that can check for timed out activities, one that can process deferred activities, and one that can handle stuck processes. At a minimum, you need to set up one background engine that can handle both timed out and deferred activities as well as stuck processes.

### **To Schedule Background Engines**

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If you are using the version of Oracle Workflow embedded in Oracle Applications, you can submit the background engine procedure as a concurrent program to schedule different background engines to run at different times. Use the Submit Requests window in Oracle Applications to submit the Workflow Background Process.

**Note:** If you require a larger rollback segment for the Workflow Background Process than the default, you can use the Concurrent Programs window in the System Administrator responsibility to specify the rollback segment that you want. This rollback segment will be used instead of the default and will be used up until the first commit.

Query the Workflow Background Process concurrent program (FNDWFBG) in the Concurrent Programs window, and choose the Session Control button. Then in the Session Control window, enter the rollback segment you want in the Rollback Segment field, and save your work. See: Concurrent Programs Window, *Oracle Applications System Administrator's Guide*.

► **To Run a Workflow Background Process as a Concurrent Program**

1. Navigate to the Submit Requests form.
2. Submit the Workflow Background Process concurrent program as a request. See: Submitting a Request, *Oracle Applications User's Guide*.
3. In the Parameters window, enter values for the following parameters:

<b>Item Type</b>	Specify an item type to restrict this engine to activities associated with that item type. If you do not specify an item type, the engine processes any deferred activity regardless of its item type.
<b>Minimum Threshold</b>	Specify the minimum cost that an activity must have for this background engine to execute it, in hundredths of a second.
<b>Maximum Threshold</b>	Specify the maximum cost that an activity can have for this background engine to execute it, in hundredths of a second.  By using Minimum Threshold and Maximum Threshold you can create multiple background engines to handle very specific types of activities. The default values for these arguments are 0 and 100 so that the background engine runs activities regardless of cost.
<b>Process Deferred</b>	Specify whether this background engine checks for deferred activities. Setting this parameter to 'Yes' allows the engine to check for deferred activities.
<b>Process Timeout</b>	Specify whether this background engine checks for activities that have timed out. Setting this parameter to 'Yes' allows the engine to check for timed out activities.
<b>Process Stuck</b>	Specify whether this background engine checks for stuck processes. Setting this parameter to 'Yes' allows the engine to check for stuck processes.

**Note:** Make sure you have a least one background engine that can check for timed out activities, one that can process deferred activities, and one that can handle stuck processes. At a minimum, you need to set up one background engine that can handle both timed out and deferred activities as well as stuck processes.

4. Choose OK to close the Parameters window.
5. When you finish modifying the run options to define the schedule for the background engine, choose Submit to submit the request.

## See Also

See: Overview of Concurrent Programs and Requests, *Oracle Applications System Administrator's Guide*

### ► To Set Engine Thresholds

To set the thresholds of background engines, specify the `minthreshold` and `maxthreshold` arguments when starting the engine. The background engine then only processes activities with costs within your specifications.

The Workflow Engine threshold is set to 50 as a default. Activities with a cost higher than 50 are deferred for background engines to process.

In some cases, you may want to force the engine to defer an activity although the activity's cost is less than fifty. You can do this by altering the Workflow Engine threshold in the PL/SQL stored procedure for a function activity.

The engine threshold is set in an externalized constant called `THRESHOLD`. Include the following line in your PL/SQL procedure to set the WF Engine threshold to a different value:

```
WF_ENGINE.THRESHOLD := n;
```

You should reset the threshold value afterwards in SQLPLUS or in the next function activity so that other activities are processed as expected.

## Step 9 Implementing Notification Mailers

A notification mailer is a Java program that performs e-mail send and response processing for the Oracle Workflow Notification System, using the JavaMail API. You need to implement one or more notification mailers only if you want to have your workflow users receive their notifications by e-mail, as well as from the Worklist web pages.

**Context:** You need to perform this step only once.

See: Reviewing Notifications via Electronic Mail, *Oracle Workflow User's Guide*

See: Defining Rules for Automatic Notification Processing, *Oracle Workflow User's Guide*

See: Standard Agents, *Oracle Workflow Developer's Guide*

### Managing Notification Mailers

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The notification mailer program is defined as a service component type in the Generic Service Component Framework. This framework helps to simplify and automate the management of background Java services. For more information about managing service components, please refer to the Oracle Applications Manager online help or the Oracle Enterprise Manager online help.

Oracle Workflow provides one seeded notification mailer service component, called Workflow Notification Mailer. Most of the configuration parameters for this mailer are set to default values. You can enter several of the remaining required parameters using AutoConfig for Oracle Applications, or the Workflow Configuration Assistant for the standalone version of Oracle Workflow. After installation, you then only need to enter the e-mail inbox password in order to complete the configuration of this mailer. If the mail servers and Business Event System components used by this notification mailer are set up as well, and the service component container to which the Workflow Notification Mailer belongs is started, then the seeded notification mailer automatically starts running once its configuration is complete.

You can also optionally modify some of the default values for the seeded Workflow Notification Mailer or create additional notification mailer service components. For example, you can create a notification mailer that processes only messages that belong to a particular workflow item type. You can also configure any notification mailer

service component to process only inbound messages, or only outbound messages.

You can associate inbound and outbound mailers with each other by assigning them the same mailer node name. You can optionally assign the same node name to multiple outbound mailers, but you must not assign the same node name to more than one mailer that performs inbound processing.

- If you create an outbound-only mailer, but you still want to perform response processing for responses to the outbound messages it sends, you should create exactly one other mailer with the same node name that does perform inbound message processing. Otherwise, there will be no inbound mailer that can process incoming responses to outbound messages sent by this outbound mailer. However, if you only plan to send outbound messages for summary or For Your Information (FYI) notifications that do not require a response, then you can configure an outbound-only mailer without creating a corresponding inbound mailer.
- If you create an inbound-only mailer, you should create at least one outbound mailer with the same node name. Otherwise, no inbound response messages will be marked with that node name and this inbound mailer will have no messages to process.

**Note:** The node name for each node must be unique. However, multiple outbound mailers and one inbound mailer can share the same node. The maximum length for a node name is eight characters.

If you create custom notification mailer service components, you can assign them to the seeded container for notification mailers. In Oracle Applications, the seeded container is named Workflow Mailer Service; in standalone Oracle Workflow, the seeded container is named WFMLRSVC, within an OC4J instance named Service\_Component\_Container. In Oracle Applications, based on the volume to be handled by the seeded container, you can also choose to create your own custom containers. You create a container as a GSM service in Oracle Applications Manager. If you create a custom GSM service in OAM, you can copy the service parameters from the seeded Workflow Mailer Service to your new service in order to specify how to run the new service. For more information about notification mailer configuration options, please refer to the Oracle Applications Manager online help or the Oracle Enterprise Manager online help.

## Setting Up Notification Mailers

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Currently, Oracle Workflow supports the Simple Mail Transfer Protocol (SMTP) for outbound messages and the Internet Message Access Protocol (IMAP) for inbound messages. You must have an SMTP server and an IMAP server set up in order to send and receive Oracle Workflow notification e-mail messages from your Workflow server. Users can receive e-mail notifications using various e-mail clients, although notifications may be displayed differently in different clients, depending on the features each client supports.

**Note:** Oracle Workflow supports IMAP version 4 (IMAP4) compliant mail servers. Ensure that your mail server uses this IMAP version. For more information, see the *JavaMail API Design Specification*:

<http://java.sun.com/products/javamail/JavaMail-1.2.pdf>

**Note:** If you have certain types of software installed, you may already have the necessary mail server functionality available. For example, products such as Oracle Email, Microsoft Exchange, or Lotus Notes include IMAP services. On UNIX, you can use the Sendmail program as your SMTP server.

Additionally, you can choose to use IMAP server software that is available for download from some sources. For example, the University of Washington offers the UW IMAP Server as a public service, and Carnegie Mellon University offers the Cyrus IMAP Server. You might choose this option if your enterprise uses UNIX Sendmail e-mail accounts, for instance.

For more information, see:

<http://www.washington.edu/imap/>,

<http://asg.web.cmu.edu/cyrus/>, and <http://www.imap.org/>.

**Note:** Third party software products are mentioned as examples only. Oracle makes no recommendation or endorsement of these third party software products.

If you are using the version of Oracle Workflow embedded in Oracle Applications, you should use the Oracle Workflow Manager component of Oracle Applications Manager (OAM) to configure and run notification mailers. For more information, please refer to the Oracle Applications Manager online help.

If you are using the standalone version of Oracle Workflow, you should use the standalone Oracle Workflow Manager component available through Oracle Enterprise Manager to configure and run notification mailers. For more information, please refer to the Oracle Enterprise Manager online help.

To set up a notification mailer, you must perform the following steps.

## ► To Set Up a Notification Mailer

1. Set up an SMTP mail server to send outbound messages.
2. Set up an IMAP4 compliant mail server to receive inbound messages.
3. Set up an e-mail account for the notification mailer on your IMAP mail server, and set up three folders within that account: one to use as an inbox, one to store processed messages, and one to store discarded messages. The default values for these folders in the notification mailer configuration wizard are INBOX, PROCESS, and DISCARD. To avoid having to change these configuration parameters, name the folders within your account with these default names. Note that the values for the processed message folder and discarded message folder are case-sensitive, while the name of the inbox folder is not case-sensitive.
4. You can enter the following configuration parameters for the seeded Workflow Notification Mailer service component during installation. In Oracle Applications, you can use AutoConfig to enter these parameters. For more information about running AutoConfig, see MetaLink Note 165195.1 and AutoConfig, *Oracle Applications AD Utilities Reference Guide*. In the standalone version of Oracle Workflow, you can use the Workflow Configuration Assistant to enter these parameters. See: *Oracle Workflow Server Installation Notes*.
  - SMTP Server
  - IMAP Server
  - Inbox Username
  - Reply To E-mail Address
  - HTML Agent Name

In AutoConfig, the HTML Agent Name parameter defaults to the value you enter for the Applications Web Agent Parameter.

5. Ensure that the Business Event System status is set to Enabled in the Global Workflow Preferences page, and that the JOB\_QUEUE\_PROCESSES and AQ\_TM\_PROCESSES database initialization parameters, which are required for the Business Event System, are set to appropriate values. The Business Event System status is set to Enabled by default, and usually you do not need to change this status. If notification processing is not being completed, however, you should check this preference value.

6. Before a service component can run, the container which manages it must first be started. The seeded Workflow Notification Mailer service component belongs to a container named Workflow Mailer Service in Oracle Applications or WFMLRSVC in standalone Oracle Workflow. The seeded agent listener service components that are also required for notification mailer processing belong to a container named Workflow Agent Listener Service in Oracle Applications or WFALSNRSVC in standalone Oracle Workflow. You should ensure that these two containers are running, using Oracle Applications Manager for the version of Oracle Workflow embedded in Oracle Applications, or Oracle Enterprise Manager for the standalone version of Oracle Workflow. If you create your own custom containers in OAM for custom service components, ensure that those containers are running as well.
7. When the Workflow Agent Listener Service or WFALSNRSVC container is running, it automatically starts the seeded agent listener service components for the standard WF\_DEFERRED, WF\_ERROR, and WF\_NOTIFICATION\_IN agents in the Business Event System, which are required for notification mailer processing. Ensure that these agent listeners are running.
8. Use the notification mailer configuration wizard to configure the notification mailer service component you want. If you entered configuration parameters for the seeded Workflow Notification Mailer during installation, you only need to enter the password for the e-mail inbox in order to complete the configuration for that mailer and begin running it. If you did not enter parameters for the seeded mailer during installation, then in order to complete the configuration for that mailer you need to enter only the IMAP server, SMTP server, e-mail inbox username, e-mail inbox password, reply to e-mail address, and HTML agent name. All other configuration parameters for the seeded Workflow Notification Mailer are initially set to default values and do not need to be changed, although you can optionally do so if you choose.

**Note:** In Oracle Applications, the Send Access Key parameter in the Message Generation page of the notification mailer configuration wizard is obsolete. Users must always log in before they can access the OA Framework-based Notification Details page from the Notification Detail Link attachment in HTML-formatted notifications.

However, in the standalone version of Oracle Workflow, the Send Access Key parameter still determines whether users must

log in before accessing the Notification Details page from the Notification Detail Link attachment.

9. **(Optional)** By default, the seeded Workflow Notification Mailer has a Launch Summary Notifications event scheduled to send summary notifications once a day. You can optionally use the notification mailer configuration wizard to modify the start time and interval for this event's schedule, or to schedule the Launch Summary Notifications event at the interval you choose for any notification mailer service component. When this event is processed, a summary notification is sent to each role with a notification preference of SUMMARY, listing all the notifications that are currently open for that role.
10. **(Optional)** If you are using the version of Oracle Workflow embedded in Oracle Applications, you can optionally use the WF: Mailer Cancellation Email profile option to determine whether notification mailers send cancellation messages when previously sent notifications are canceled. Set this profile option to Enabled if you want to send cancellation messages, or to Disabled if you do not want to send cancellation messages. The WF: Mailer Cancellation Email profile option must be set at site level. The default value is Enabled. See: *Overview of Setting User Profiles, Oracle Applications System Administrator's Guide*.
11. **(Optional)** The seeded Workflow Notification Mailer uses the Automatic startup mode by default and will be started automatically when you complete its configuration. If you select the Manual startup mode for a notification mailer service component, use the Service Components page or the Component Details page in the Workflow Manager to start that notification mailer. You can also use these pages to manage any notification mailer service component.

### **Outbound Notification Mailer Processing**

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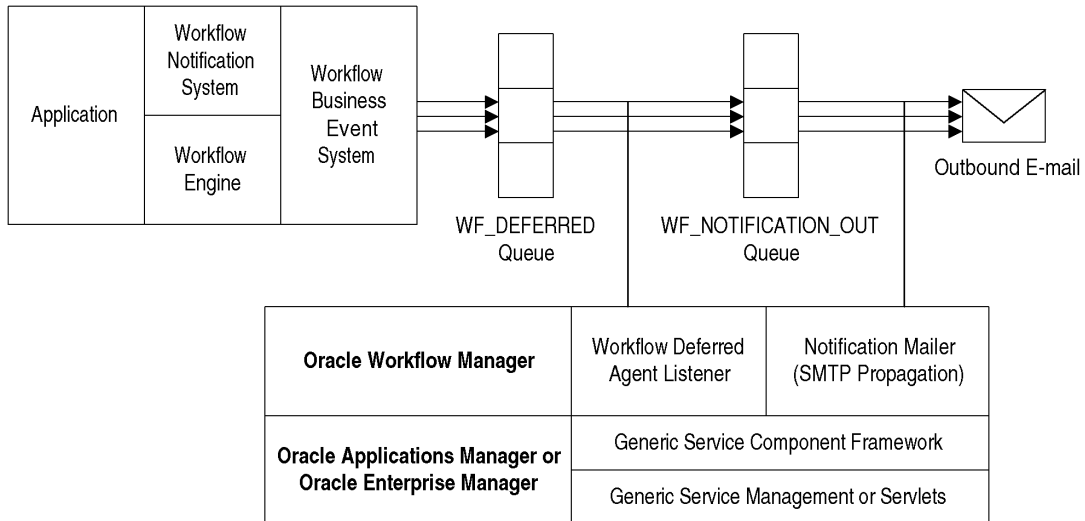
When the Workflow Engine determines that a notification message must be sent, it raises an event in the Business Event System called `oracle.apps.wf.notification.send`. Oracle Workflow provides a seeded subscription to this event, which is defined to be deferred immediately so that the workflow process that owns the notification can continue. The event is placed on the standard `WF_DEFERRED` agent. Oracle Workflow provides a seeded agent listener named Workflow Deferred Agent Listener that runs on this agent to continue notification processing.

When the event is dequeued from WF\_DEFERRED and the subscription is processed, the subscription requires the event data for the event, causing the Generate function for the event to be executed. The Generate function for this event performs the following actions:

- Resolves the notification recipient role to a single e-mail address, which itself can be a mail list.
- Checks the notification preference of the recipient to determine whether an e-mail notification is required, and in what type of format.
- Switches its database session to the recipient role’s preferred language and territory as defined in the directory service.
- Generates an XML representation of the notification message and any optional attachments using the appropriate message template.

Finally, the subscription places the event message on the standard WF\_NOTIFICATION\_OUT agent.

A notification mailer service component polls the WF\_NOTIFICATION\_OUT agent for messages that must be sent by e-mail. When the notification mailer dequeues a message from this agent, it uses a Java-based notification formatter to convert the XML representation of the notification into a MIME (Multi-purpose Internet Mail Extensions) encoded message and sends the message by the Simple Mail Transfer Protocol (SMTP).



The e-mail notifications are based on message templates defined in Oracle Workflow Builder. Oracle Workflow provides a set of standard templates in the System: Mailer item type, which are used by default. It is not recommended to modify the standard templates. However, you can customize the message templates used to send your e-mail notifications by creating your own custom message templates in the System: Mailer item type using the Workflow Builder, and assigning these templates to a particular notification mailer service component in the mailer configuration parameters. The templates assigned to a mailer override the default System: Mailer templates. See: *Modifying Your Message Templates: page 2 – 85.*

Additionally, you can create your own custom message templates in a custom item type using the Workflow Builder, and assign these templates to a particular notification in a workflow process by defining special message attributes. In this case the templates assigned to the notification override both the templates assigned to a mailer and the default System: Mailer templates. See: *Modifying Your Message Templates: page 2 – 85* and *Notification Mailer Message Template Attributes, Oracle Workflow Developer's Guide.*

### **Inbound Notification Mailer Processing**

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Notification mailers can also process e-mail responses from users, using the Internet Message Access Protocol (IMAP). A notification mailer uses a Java-based e-mail parser to interpret the text of each message and create an XML representation of it.

A notification mailer uses three folders in your response mail account for response processing: one to receive incoming messages, one to store processed messages, and one to store discarded messages.

A notification mailer does the following to process response messages:

- Logs into its IMAP e-mail account.
- Checks the inbox folder for messages. If a message exists, the notification mailer reads the message, checking for the notification ID (NID) and node identifier in the NID line.
  - If the message is not a notification response, meaning it does not contain an NID line, the notification mailer moves the message to the discard folder and sends a Workflow Warning Mail message back to the sender of the message.
  - If the message is a notification response, but for the wrong node, the notification mailer leaves the message in the inbox.

- If the message is a notification response for the current node, meaning it contains an NID line including the node identifier of the current node, the notification mailer processes the message.

The notification mailer performs the following steps for messages that belong to its node.

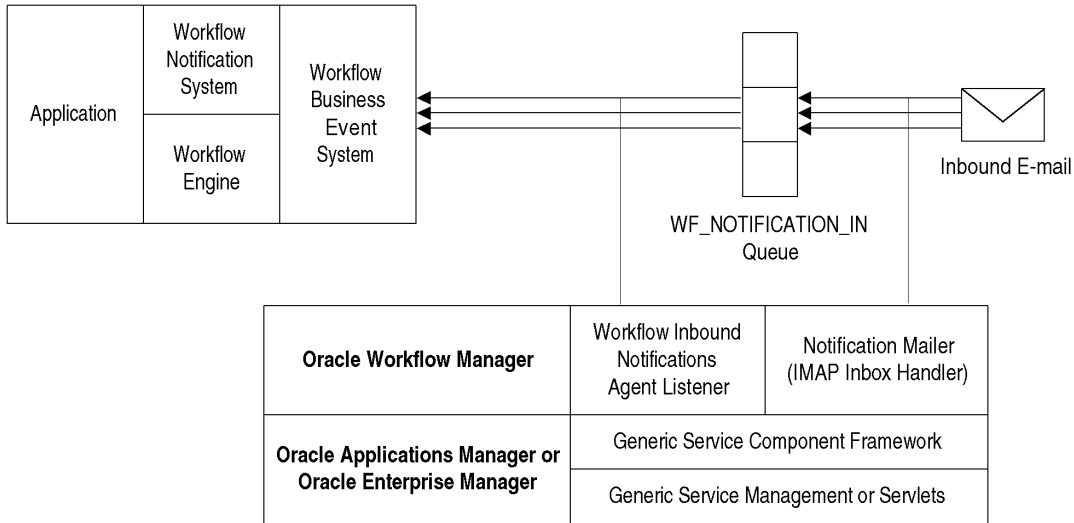
- Retrieves the notification ID.
- Checks to see if the message bounced by referring to the tags specified in the configuration parameters, if any. If the message bounced, the notification mailer reroutes it or updates the notification's status and stops any further processing, depending on the specifications of the tag list.
- Checks the Oracle Workflow database for this notification based on the NID line.
  - If the notification does not exist, meaning the notification ID or the access key in the NID line is invalid, the notification mailer moves the message to the discard folder. If the NID line is incorrectly formatted, the notification mailer moves the message to the discard folder and sends a Workflow Warning Mail message back to the sender of the message.
  - If the notification exists, but is closed or canceled, the notification mailer moves the message to the discard folder and sends a Workflow Closed Mail or Workflow Canceled Mail message to the recipient role, respectively.
  - If the notification exists and is open, the notification mailer verifies the response values with the definition of the notification message's response attributes in the database. If a response value is invalid, or if no response value is included, the notification mailer sends a Workflow Invalid Mail message to the recipient role. If the responses are valid, the notification mailer generates an XML representation of the message and places it on the standard WF\_NOTIFICATION\_IN agent as an event called oracle.apps.wf.notification.receive.message.

**Note:** If the character encoding of the response message is not compatible with the database codeset, the notification mailer may not be able to parse the response and recognize the response values. Ensure that the character encoding of messages in your mail client is compatible with the codeset of your database.

- Moves the message for the completed notification to the processed folder.

Finally, if there are no more unprocessed messages in the inbox, the notification mailer logs out of the mail and database accounts.

Oracle Workflow provides a seeded agent listener named Workflow Inbound Notifications Agent Listener that runs on the WF\_NOTIFICATION\_IN agent to continue notification processing for the valid response messages placed on that agent. When an event message is dequeued from WF\_NOTIFICATION\_IN, Oracle Workflow executes a seeded subscription that calls the appropriate notification response function to record the response and complete the notification.



See: Workflow Warning Mail Message: page 2 – 115

See: Workflow Closed Mail Message: page 2 – 112

See: Workflow Canceled Mail Message: page 2 – 104

See: Workflow Invalid Mail Message: page 2 – 107

### **Wireless Notifications**

If you are using the standalone version of Oracle Workflow available with Oracle9iAS, then you can also send wireless notifications using Oracle9iAS Wireless. Oracle9iAS Wireless integrates with Oracle Workflow by providing a subscriber to the WF\_NOTIFICATION\_OUT queue. This subscriber dequeues notification messages from the queue as JMS Text messages and can then send them to wireless devices. If a

user sends a response from a wireless device, Oracle9iAS Wireless places the response message on the WF\_NOTIFICATION\_IN queue to be processed by the Workflow Inbound Notifications Agent Listener. For more information, please refer to the *Oracle9iAS Wireless Administrator's Guide* and the *Oracle9iAS Wireless Developer's Guide*.

**Note:** You can run Oracle Workflow notification mailers concurrently with Oracle9iAS Wireless if you want to send both e-mail notifications and wireless notifications. Both components can access the same notification messages on the WF\_NOTIFICATION\_OUT queue.

## Full MIME Support

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Oracle Workflow fully supports MIME (Multi-purpose Internet Mail Extensions) encoded messages. This means that notification mailers can exchange messages with workflow users containing languages with different character sets and multi-media encoded content.

## Notification Preferences

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Oracle Workflow allows you to determine how you view notifications by setting a notification preference in the User Preferences web page. See: Setting User Preferences, *Oracle Workflow User's Guide*.

Often, the functionality of a user's mail reader determines what the user's notification preference should be. Some mail readers can only display plain text, others can display HTML formatting, while still others can only display HTML formatting in an attachment. The following notification preferences are available:

- Plain text mail (MAILTEXT) – The notification message appears as plain text, with no attachments. See: Plain Text E-mail: page 2 – 74.
- HTML mail with attachments (MAILHTML) – The notification message appears as HTML-formatted text, with at least one standard attachment that is a link to the notification in the Notification Details web page. If the notification message has 'Content-Attached' message attributes, these attributes appear as additional custom attachments to the message. See: HTML-Formatted E-mail with Attachments: page 2 – 75.
- HTML mail (MAILHTML2) – The notification message appears as HTML-formatted text, but does not include any standard attachments. If the notification message has 'Content-Attached' message attributes, however, these attributes appear as custom

attachments to the message. See: *HTML-Formatted E-mail: page 2 – 77.*



**Attention:** If you wish to view notifications with HTML formatting, but your mail reader is not able to interpret HTML formatting in the mail message body, change your notification preference to 'Plain text mail with HTML attachments' (MAILATTH). The MAILATTH preference delivers an HTML-formatted version of the notification as an attachment to the plain text notification.

- Plain text mail with HTML attachments (MAILATTH) – The notification message appears as plain text, with at least two standard attachments. One attachment is an HTML-formatted version of the message, and the other is a link to the notification in the Notification Details web page. If the notification message has 'Content-Attached' message attributes, these attributes appear as additional custom attachments to the message. See: *Plain Text E-mail with an HTML Attachment: page 2 – 79.*
- Plain text summary mail (SUMMARY) – The message is a plain text summary of all open notifications. To respond to the individual notifications in the summary, you must access the notifications from the Notifications web page.
- Do not send me mail (QUERY) – The notification mailers do not send you e-mail notifications. Instead you must query and respond to your notifications from the Notifications web page.



**Attention:** You can always query and respond to your notifications from the Notifications web page, even if you set your notification preference to send you mail.

See: *Reviewing Notifications via Electronic Mail, Oracle Workflow User's Guide*

See: *Viewing Notifications from a Web Browser, Oracle Workflow User's Guide*

See: *Reviewing a Summary of Your Notifications via Electronic Mail, Oracle Workflow User's Guide*

### **Plain Text E-mail**

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If the performer of a notification has a notification preference of plain text mail (MAILTEXT), when a notification mailer processes the notification, it generates a plain text e-mail message and sends it to the performer role. The notification mailer uses the Text Body defined for the message in the Oracle Workflow Builder message property page to

generate the plain text e-mail. It token replaces all attribute values referenced in the message body with plain text values. For example:

- PL/SQL and PL/SQL CLOB document attributes are token replaced with a plain text version of a PL/SQL document.
- URL attributes are token replaced with the display name of the URL attribute, followed by a colon and the URL:

```
<URL_Attribute_Display_Name>: <URL>
```



**Attention:** Message attributes that have Attach Content checked in their Attributes property page, are attached as plain text to their parent notification. Note that this may render some attachments unreadable if the attachment includes special formatting or your plain text e-mail reader does not recognize attachments. To view these attachments, you should display your notifications in the Worklist web page. See: *Viewing Notifications from a Web Browser, Oracle Workflow User's Guide*.

A recipient of a plain text e-mail notification responds by manually replying to the notification and entering response values following the instructions provided in the notification. See: *To Respond to a Plain Text E-mail Notification Using Templated Response, Oracle Workflow User's Guide* and *To Respond to a Plain Text E-mail Notification Using Direct Response, Oracle Workflow User's Guide*.

### **HTML-Formatted E-mail with Attachments**

---

If the performer of a notification has a notification preference of HTML mail with attachments (MAILHTML), when a notification mailer processes the notification, it generates an HTML-formatted e-mail notification and sends it to the performer role. The recipient should use an e-mail reader that can interpret and display HTML content within a message body.

**Note:** If your e-mail reader cannot interpret HTML formatting in a message body, you should set your notification preference to plain text mail with HTML Attachments (MAILATTH).

The notification mailer uses the HTML Body defined for the message in the Message Body property page to generate the HTML e-mail message. If no HTML Body is defined, it uses the Text Body to generate the HTML message. The notification mailer token replaces all message attributes referenced in the message body with HTML-formatted values. For example:

- PL/SQL and PL/SQL CLOB document attributes are token replaced with HTML text or plain text between <pre>...</pre> HTML tags.
- URL attributes are token replaced with HTML anchors. When you select such an anchor, your e-mail reader takes you to the target URL page.

**Note:** Message attributes that have Attach Content checked in their Attributes property page, are appended as HTML-formatted attachments to their parent message. For example:

- If the message attribute is a URL attribute, an attachment called Notification References is appended to the message. This attachment includes a link to each URL attribute for the message that has Attach Content checked. You can navigate to a URL by choosing its link. Notification mailers do not have any special handling of image, video, or audio URL content.
- If the message attribute is a PL/SQL, PL/SQL CLOB, or PL/SQL BLOB document attribute, the fully generated PL/SQL document is fetched and attached to the message.

You can respond to your HTML-formatted notification by clicking on a link that represents the response in the HTML message body. The response link generates a plain text e-mail response that includes a response template modified with the predefined response value that you select. See: To Respond to an HTML E-mail Notification, *Oracle Workflow User's Guide*.

If your notification preference is MAILHTML, each HTML-formatted notification always includes at least one standard attachment. The attachment is called Notification Detail Link. When you select this attachment, your e-mail reader opens a browser window that displays your notification in the Notification Details web page. You can alternatively respond directly to your notification from this web page, bypassing the need to process your response through a notification mailer.

**Note:** In the standalone version of Oracle Workflow, if the Send Access Key configuration parameter for the notification mailer that sent the message is deselected, and you are not already logged in, you will be prompted to log in when you select the Notification Detail Link before you can access the Notification Details web page. In Oracle Applications, you must always log in before you can access the OA

Framework-based version of the Notification Details page from the Notification Detail Link.

**Note:** You can use the Inline Attachment configuration parameter to set the Content-Disposition MIME header to either `inline` or `attachment` for all attachments to notification messages, including the Notification Detail Link, Notification References containing attached URLs, and attached PL/SQL, PL/SQL CLOB, or PL/SQL BLOB documents. Note, however, that some e-mail clients may not support the Content-Disposition header, or may support it in varying ways. Consequently, the Inline Attachment setting may not always have the desired effect, depending on the e-mail clients with which users read their e-mail messages.

**Note:** The file name of the Notification Detail Link attachment is determined by the text value for the `WF_URL_NOTIFICATION` resource token, or by the token name if no text value is defined. Similarly, the file name of the Notification References attachment is determined by the text value for the `WF_URLLIST_ATTACHMENT` resource token, or by the token name if no text value is defined. The default file names are "Notification Detail Link.html" and "Notification References.html", respectively. If you want to specify different file names for these attachments, you must first create a .msg source file specifying the new file names as the text values for the `WF_URL_NOTIFICATION` and `WF_URLLIST_ATTACHMENT` resource tokens. Then use the Workflow Resource Generator program to upload the new seed data from the source file to the database table `WF_RESOURCES`. See: To Run the Workflow Resource Generator, *Oracle Workflow API Reference* and Setting the `WF_RESOURCES` Environment Variable: page 2 – 57.

## HTML-Formatted E-mail

---

If the performer of a notification has a notification preference of HTML mail (`MAILHTM2`), without standard attachments, when a notification mailer processes the notification, it generates an HTML-formatted e-mail notification and sends it to the performer role. The recipient should use an e-mail reader that can interpret and display HTML content within a message body.

**Note:** If your e-mail reader cannot interpret HTML formatting in a message body, you should set your notification preference to plain text mail with HTML Attachments (`MAILATTH`).

The notification mailer uses the HTML Body defined for the message in the Message Body property page to generate the HTML e-mail message. If no HTML Body is defined, it uses the Text Body to generate the HTML message. The notification mailer token replaces all message attributes referenced in the message body with HTML-formatted values. For example:

- PL/SQL and PL/SQL CLOB document attributes are token replaced with HTML text or plain text between `<pre>...</pre>` HTML tags.
- URL attributes are token replaced with HTML anchors. When you select such an anchor, your e-mail reader takes you to the target URL page.

**Note:** Message attributes that have Attach Content checked in their Attributes property page, are appended as HTML-formatted attachments to their parent message. For example:

- If the message attribute is a URL attribute, an attachment called Notification References is appended to the message. This attachment includes a link to each URL attribute for the message that has Attach Content checked. You can navigate to a URL by choosing its link. Notification mailers does not have any special handling of image, video, or audio URL content.
- If the message attribute is a PL/SQL, PL/SQL CLOB, or PL/SQL BLOB document attribute, the fully generated PL/SQL document is fetched and attached to the message.

However, no standard attachments are included with the notification message if your notification preference is MAILHTML2.

You can respond to your HTML-formatted notification by clicking on a link that represents the response in the HTML message body. The response link generates a plain text e-mail response that includes a response template modified with the predefined response value that you select. See: To Respond to an HTML E-mail Notification, *Oracle Workflow User's Guide*.

**Note:** You can use the Inline Attachment configuration parameter to set the Content-Disposition MIME header to either `inline` or `attachment` for all attachments to notification messages, including Notification References containing attached URLs and attached PL/SQL, PL/SQL CLOB, or PL/SQL BLOB documents. Note, however, that some e-mail

clients may not support the Content-Disposition header, or may support it in varying ways. Consequently, the Inline Attachment setting may not always have the desired effect, depending on the e-mail clients with which users read their e-mail messages.

**Note:** The file name of the Notification References attachment is determined by the text value for the WF\_URLLIST\_ATTACHMENT resource token, or by the token name if no text value is defined. The default file name is "Notification References.html". If you want to specify different file names for this attachment, you must first create a .msg source file specifying the new file names as the text values for the WF\_URLLIST\_ATTACHMENT resource token. Then use the Workflow Resource Generator program to upload the new seed data from the source file to the database table WF\_RESOURCES. See: To Run the Workflow Resource Generator, *Oracle Workflow API Reference* and Setting the WF\_RESOURCES Environment Variable: page 2 – 57.

### **Plain Text E-mail with an HTML Attachment**

---

If the performer of a notification has a notification preference of plain text mail with HTML attachments (MAILATTH), when a notification mailer processes the notification, it generates a plain text e-mail notification with HTML attachments and sends it to the performer role. The recipient should use an e-mail reader that supports HTML attachments.

The notification mailer uses the Text Body defined for the message in the Message Body property page to generate the plain text body of the e-mail. It also generates an HTML version of the notification message and sends it as an attachment called HTML Message Body to the plain text e-mail. The notification mailer generates the content of the HTML attachment from the HTML Body defined for the message. If no HTML Body is defined, it uses the Text Body to generate the HTML mail. The notification mailer token replaces all message attributes referenced in the plain text message body with plain text values and token replaces all message attributes referenced in the attached HTML message with HTML-formatted values. See: Sending Plain Text E-mail: page 2 – 74 and Sending HTML-Formatted E-mail: page 2 – 75.

If your e-mail reader supports HTML-formatting in the message body, you can optionally select the Inline Attachment configuration parameter to set the Content-Disposition MIME header to `inline` for attachments. Then the HTML attachment will also appear inline in the message body. Note, however, that some e-mail clients may not

support the Content-Disposition header, or may support it in varying ways. Consequently, the Inline Attachment setting may not always have the desired effect, depending on the e-mail clients with which you read your e-mail messages.

**Note:** Message attributes that have Attach Content checked in their Attributes property page, are appended as HTML-formatted attachments. For example:

- If the message attribute is a URL attribute, an attachment called Notification References is appended to the message. This attachment includes a link to each URL attribute for the message that has Attach Content checked. You can navigate to a URL by choosing its link.
- If the message attribute is a PL/SQL, PL/SQL CLOB, or PL/SQL BLOB document attribute, the fully generated PL/SQL document is fetched and attached to the message.

The notifications received by a user whose notification preference is 'Plain text with HTML attachments' always contain at least two standard attachments. The first attachment is HTML Message Body and the other is Notification Detail Link. When you select Notification Detail Link, your e-mail reader opens a browser window that displays your notification in the Notification Details web page. You can respond directly to your notification from this web page, bypassing the need to process your response through a notification mailer. See: To Respond to a Plain Text E-mail Notification with an HTML Attachment, *Oracle Workflow User's Guide*.

**Note:** In the standalone version of Oracle Workflow, if the Send Access Key configuration parameter for the notification mailer that sent the message is deselected, and you are not already logged in, you will be prompted to log in when you select the Notification Detail Link before you can access the Notification Details web page. In Oracle Applications, you must always log in before you can access the OA Framework-based version of the Notification Details page from the Notification Detail Link.

Alternatively, a recipient of this type of notification can respond in one of two other ways:

- Manually reply to the notification and enter response values following the instructions provided in the notification. See: To Respond to a Plain Text E-mail Notification Using Templated Response, *Oracle Workflow User's Guide* and To Respond to a Plain Text E-mail Notification Using Direct Response, *Oracle Workflow User's Guide*.

- Select the HTML Message Body attachment to display the HTML-formatted version of the e-mail message, and click on the HTML link that represents the response. The response link generates a plain text e-mail response that includes a response template updated with the predefined response value you select.

**Note:** You can use the Inline Attachment configuration parameter to set the Content-Disposition MIME header to either `inline` or `attachment` for all attachments to notification messages, including the Notification Detail Link, HTML Message Body, Notification References containing attached URLs, and attached PL/SQL, PL/SQL CLOB, or PL/SQL BLOB documents. Note, however, that some e-mail clients may not support the Content-Disposition header, or may support it in varying ways. Consequently, the Inline Attachment setting may not always have the desired effect, depending on the e-mail clients with which users read their e-mail messages.

**Note:** The file name of the HTML Message Body attachment is determined by the text value for the `WF_HTML_MESSAGE` resource token, or by the token name if no text value is defined. Similarly, the file name of the Notification Detail Link attachment is determined by the text value for the `WF_URL_NOTIFICATION` resource token, or by the token name if no text value is defined; and the file name of the Notification References attachment is determined by the text value for the `WF_URLLIST_ATTACHMENT` resource token, or by the token name if no text value is defined. The default file names are "HTML Message Body.html", "Notification Detail Link.html", and "Notification References.html", respectively. If you want to specify different file names for these attachments, you must first create a .msg source file specifying the new file names as the text values for the `WF_HTML_MESSAGE`, `WF_URL_NOTIFICATION`, and `WF_URLLIST_ATTACHMENT` resource tokens. Then use the Workflow Resource Generator program to upload the new seed data from the source file to the database table `WF_RESOURCES`. See: To Run the Workflow Resource Generator, *Oracle Workflow API Reference* and Setting the `WF_RESOURCES` Environment Variable: page 2 – 57.

## **E-mail Notification Security**

---

Each individual e-mail notification message sent by a notification mailer includes a line containing a notification ID (NID), access key,

and node identifier, which are used to authenticate responses to the notification.

- The NID identifies the notification in the database.
- The notification access key is a distinct random key generated by the Notification System for each NID. The access key must be included in a response to the notification in order for a notification mailer to accept the response, thereby serving as a password that allows only users who actually received the notification containing the key to respond to that notification.
- The node identifier specifies the notification mailer node to which the message belongs.

The format of the NID line is as follows:

```
NID[NID/access_key@node_identifier]
```

### Responses by E-mail

When a user responds to a notification by e-mail, the response message must include the NID line from the original notification message. A notification mailer accepts the response only if the correct NID and access key combination is included in the response. Users can ensure that the response message contains the NID and access key either by including the entire original message when replying or by using a response template that includes the NID line.

**Note:** Some mail clients, notably early releases of Microsoft Outlook Express, may not copy the NID line properly in a reply message. When responding to a notification, users should verify that the NID line is included in full and contains the prefix `NID` and all the details between the square brackets.

A user who receives an e-mail notification message may forward the message to another user through the e-mail application. When you configure a notification mailer, you can choose whether to allow a user to respond by e-mail to an e-mail notification that has been forwarded from another role.

- If you deselect the Allow Forwarded Response configuration parameter, the notification mailer will check if the "From:" e-mail address of the notification response exactly matches the e-mail address of the recorded recipient role, or the e-mail address of a user in that role. If the two e-mail addresses match exactly, meaning the notification was not forwarded or was forwarded according to a valid routing rule, the notification mailer treats the response as a valid response. If the two e-mail addresses do not match exactly, meaning the notification was

simply forwarded using the e-mail Forward command, the notification mailer does not process the response and treats it as unsolicited mail.

- If you select the Allow Forwarded Response configuration parameter, the notification mailer that receives the notification never checks the "From:" e-mail address of the notification response and always allows the response to be processed. In this case, users can delegate notifications to other users simply by forwarding the notification message through the e-mail application, and the new recipient of a forwarded notification automatically receives the authority to respond to it.



**Warning:** Note that there are limitations when you deselect the Allow Forwarded Response parameter. For example, suppose a notification is sent to a distribution list mail alias that does not have a user/role relationship in the Oracle Workflow directory service. If any user from the distribution list responds to the notification, the notification mailer will always treat their notification response as unsolicited mail, because the "From:" e-mail address, which is an individual user's e-mail address, will never match the distribution list mail alias.

### Responses through the Notification Detail Link Attachment

HTML-formatted e-mail notifications with attachments and plain text e-mail notifications with HTML attachments include an attachment called Notification Detail Link. When this link is clicked, it displays the notification in the Notification Details web page. A user who receives a notification with a Notification Detail Link attachment can use this web page to respond directly to the notification, instead of sending an e-mail response message to be processed by a notification mailer.

In Oracle Applications, users must always log in before they can access the OA Framework-based Notification Details page from the Notification Detail Link attachment.

In the standalone version of Oracle Workflow, when you configure a notification mailer, you can choose whether to require users to log in before they can access the Notification Details web page for a notification through the Notification Detail Link.

- If you select the Send Access Key configuration parameter, the notification mailer includes the notification access key in the Notification Detail Link attachment. The access key allows users to access the Notification Details web page in standalone Oracle Workflow directly by clicking the Notification Detail Link, whether they are currently logged in or not. However, if users

are not already logged in, they cannot access any other notifications except the notification with which the attachment was sent.

- If you deselect the Send Access Key configuration parameter, the notification mailer does not include the access key in the Notification Detail Link. When users click the link without the access key, they are prompted to log in, if they have not already done so, before they can access the Notification Details web page in standalone Oracle Workflow.

### **Allowing Responses Only through the Notifications Worklist**

Ultimately, the security of e-mail notifications depends on the security of your e-mail application. If you do not want to allow responses based on e-mail, you can choose not to send e-mail notifications that enable responses. That is, do not allow users to choose MAILTEXT, MAILATTH, MAILHTML, or MAILHTM2 as their notification preference.

You can still choose to send e-mail summaries to users listing all their open notifications. To do so, schedule a Launch Summary Notifications event for a notification mailer. For the seeded Workflow Notification Mailer, the Launch Summary Notifications event is scheduled to send e-mail summary notifications once a day by default. Users can indicate that they want to receive e-mail summaries by choosing SUMMARY as their notification preference. An e-mail summary message does not enable any direct response through e-mail to the notifications it lists. Instead, to respond to the individual notifications in a summary, users must log on to Oracle Workflow and access the notifications through the Notifications Worklist web page.

You can also optionally choose not to run any notification mailers at all. In this case users must always log on to Oracle Workflow and access the Notifications Worklist web page to view and respond to their notifications.

See: Implementing Notification Mailers: page 2 – 63

See: Setting Up Notification Mailers: page 2 – 65

See: Inbound Notification Mailer Processing: page 2 – 70

See: Overview of Notification Handling, *Oracle Workflow User's Guide*

## Step 10 Modifying Your Message Templates

Notification mailers use message templates defined in Oracle Workflow Builder to generate e-mail notifications. Oracle Workflow provides a set of standard templates which are used by default, as well as some alternative templates for certain types of messages. These message templates are defined in the System: Mailer item type.

Although message templates are defined as messages in Oracle Workflow Builder, they are not true messages. Rather, they serve as outlines for e-mail messages sent by notification mailers. Message templates determine the basic format of an e-mail notification, including what header information to include, and whether and where to include details such as the message due date and priority. Message templates for notifications that require a response should also describe the syntax the reply should follow and list the information needed to confirm the notification.

It is not recommended to modify the standard templates. However, you can optionally customize the message templates used to send your e-mail notifications by either using the alternative templates provided in the System: Mailer item type by Oracle Workflow, or creating your own custom message templates in the System: Mailer item type using the Workflow Builder. You can implement alternative standard or custom templates in the following ways:

- Assign the templates you want to a particular notification mailer service component in the mailer configuration parameters. The templates assigned to a mailer override the default System: Mailer templates. See the Oracle Applications Manager online help or the Oracle Enterprise Manager online help.
- Assign the templates you want to a particular notification in a workflow process by defining special message attributes. In this case the templates assigned to the notification override both the templates assigned to a mailer and the default System: Mailer templates. See: Notification Mailer Message Template Attributes, *Oracle Workflow Developer's Guide*.

The templates in the System: Mailer item type have message attributes that represent every part of the notification message. Within the body of a template, the message attributes are token substituted to insert the specific information for a particular instance of a notification into the message outline.

**Note:** Do not modify, add new attributes to, or delete existing attributes from the standard message templates in the System: Mailer item type.

If you create new custom templates, you must name the message attributes for these templates with the same names as the message attributes for the standard templates. A notification mailer can only token substitute the attributes in the message body if you use the standard attribute names.

You can optionally omit some of the standard tokens from your custom templates, if you do not want to send the information they represent. However, you should not omit the tokens that represent the key information to be conveyed in the notification. For example, if you define a custom version of a template that includes the &BODY token, you must include the &BODY token in the custom template as well, in order to include the body text of the particular notification that is being sent into the template outline.

If you add a new token in a custom template, you must set up the necessary substitution yourself. By default, a notification mailer only performs token substitution for the standard tokens that are listed for the default templates.

**Context:** You need to perform this step only once.

### **Workflow Open Mail (Templated) Message**

If you select the templated response method, the Notification System uses the Workflow Open Mail (Templated) message as a default template for e-mail notifications that require a response. The notification template includes generic instructions on how to respond to a notification. It also includes the following information about a message: the name of the sender of the message, message priority, date that a response is due, and any comments from the sender or, if the notification is forwarded from another user, any comments from the forwarder.

**Note:** To select the templated response method, specify the `oracle.apps.fnd.wf.mailer.TemplatedEmailParser` in the E-mail Parser configuration parameter when you configure a notification mailer. For more information, see the Oracle Applications Manager online help or the Oracle Enterprise Manager online help.

The response instructions in the plain text message body describe how to reply manually using the templated response method. This message is used for notifications sent to performers with a notification preference of MAILTEXT or MAILATTH. The response instructions in the HTML-formatted message body describe how to reply using the automatically generated response template. This message is used for notifications sent to performers with a notification preference of

MAILHTML or MAILHTM2, and is also attached to notifications sent to performers with a notification preference of MAILATTH.

The Workflow Open Mail (Templated) message has the following message attributes. The values are drawn from the message definition associated with a notification activity.

<b>START_DATE</b>	The date the message is sent.
<b>TO</b>	The role the notification is sent to; the performer.
<b>SUBJECT</b>	The subject line defined in the message.
<b>BODY</b>	The text of the body defined in the message.
<b>COMMENT</b>	Comments added by the sender or the forwarder.
<b>PRIORITY</b>	The priority of the notification message.
<b>DUE_DATE</b>	The date by which a response is required, specified in the notification activity.
<b>NOTIFICATION</b>	Required notification code used to identify the information in the notification.
<b>RESPONSE</b>	The user response section as defined by the Respond message attributes in the actual notification message definition.
<b>MAILTO</b>	The content of the HTML tag that a recipient would click on to respond to a notification. This attribute is used only for HTML e-mail notifications.
<b>CLICK_HERE_RESPONSE</b>	The content of the HTML tag that a recipient would click on to access the Notification Details page to respond to a notification. This attribute is not currently used.
<b>SENDER</b>	The name of the sender of the message, as displayed in the From column in the Worklist. This attribute is not currently used.
<b>HEADER</b>	Standard header attributes and any custom header attributes defined to hold key information for the message. See: <i>Header Attributes, Oracle Workflow Developer's Guide</i> .
<b>HISTORY</b>	Any previous requests for more information about the notification and the responses to those requests.

You can customize the boilerplate text that appears in the body of the Workflow Open Mail (Templated) message, where attributes preceded

by an ampersand (&) are token substituted with runtime values when the notification is sent.

The boilerplate text for a plain text message body is as follows:

```
Oracle Workflow Notification
&COMMENT
&HISTORY
```

```
_____Start of Response Template_____
```

Response Template for &NOTIFICATION

To submit your response, reply to this message, including this response template with your reply. Copy and paste from this message if necessary to obtain an editable copy of the template. Insert your response value between the quotes following each response prompt.

```
&RESPONSE
```

```
_____End of Response Template_____
```

Notification Details:

```
&HEADER
&BODY
```

Due Date: &DUE\_DATE

The boilerplate text for a HTML-formatted message body is as follows:

```
<HTML> <HEAD> <TITLE> Oracle Workflow Notification </TITLE>
</HEAD>
<BODY BGCOLOR="#FFFFFF" >
<P>
<P><B><FONT SIZE=+1>&COMMENT</FONT> </B>
<P>&HISTORY
<P>&HEADER
<P>&BODY
<P><B>Please click on one of the following choices to
automatically generate an E-mail response. Before sending
the E-mail response to close this notification, ensure all
response prompts include a desired response value within
quotes.</B>
<P>&MAILTO
```

</BODY>

</HTML>

## Orig. Workflow Open Mail (Templated) Message

---

Oracle Workflow provides the Orig. Workflow Open Mail (Templated) message as an alternative template that you can optionally use as a template for e-mail notifications that require a response if you select the templated response method. This template does not include the header attributes that are displayed in the Workflow Open Mail (Templated) message.

The Orig. Workflow Open Mail (Templated) notification template includes generic instructions on how to respond to a notification. It also includes the following information about a message: the name of the sender of the message, message priority, date that a response is due, and any comments from the sender or, if the notification is forwarded from another user, any comments from the forwarder.

**Note:** To select the templated response method, specify the `oracle.apps.fnd.wf.mailer.TemplatedEmailParser` in the E-mail Parser configuration parameter when you configure a notification mailer. For more information, see the Oracle Applications Manager online help or the Oracle Enterprise Manager online help.

The response instructions in the plain text message body describe how to reply manually using the templated response method. This message is used for notifications sent to performers with a notification preference of MAILTEXT or MAILATTH. The response instructions in the HTML-formatted message body describe how to reply using the automatically generated response template. This message is used for notifications sent to performers with a notification preference of MAILHTML or MAILHTM2, and is also attached to notifications sent to performers with a notification preference of MAILATTH.

The Orig. Workflow Open Mail (Templated) message has the following message attributes. The values are drawn from the message definition associated with a notification activity.

<b>START_DATE</b>	The date the message is sent.
<b>TO</b>	The role the notification is sent to; the performer.
<b>SUBJECT</b>	The subject line defined in the message.
<b>BODY</b>	The text of the body defined in the message.
<b>COMMENT</b>	Comments added by the sender or the forwarder.

<b>PRIORITY</b>	The priority of the notification message.
<b>DUE_DATE</b>	The date by which a response is required, specified in the notification activity.
<b>NOTIFICATION</b>	Required notification code used to identify the information in the notification.
<b>RESPONSE</b>	The user response section as defined by the Respond message attributes in the actual notification message definition.
<b>MAILTO</b>	The content of the HTML tag that a recipient would click on to respond to a notification. This attribute is used only for HTML e-mail notifications.
<b>CLICK_HERE_RESPONSE</b>	The content of the HTML tag that a recipient would click on to access the Notification Details page to respond to a notification. This attribute is not currently used.
<b>SENDER</b>	The name of the sender of the message, as displayed in the From column in the Worklist.

The boilerplate text for a plain text message body is as follows:

```
Oracle Workflow Notification
From: &SENDER
&COMMENT
```

```
_____Start of Response Template_____
```

```
Response Template for &NOTIFICATION
```

To submit your response, reply to this message, including this response template with your reply. Copy and paste from this message if necessary to obtain an editable copy of the template. Insert your response value between the quotes following each response prompt.

```
&RESPONSE
_____End of Response Template_____
```

```
Notification Details:
&BODY
```

Due Date: &DUE\_DATE

The boilerplate text for a HTML-formatted message body is as follows:

```
<HTML> <HEAD> <TITLE> Oracle Workflow Notification </TITLE>
</HEAD>
<BODY BGCOLOR="#FFFFFF" >
<P>
<P>From: <B>&SENDER</B>
<P><B><FONT SIZE=+1>&COMMENT</FONT> </B>
<P>&BODY
<P><B>Please click on one of the following choices to
automatically generate an E-mail response. Before sending
the E-mail response to close this notification, ensure all
response prompts include a desired response value within
quotes.</B>
<P>&MAILTO
</BODY>
</HTML>
```

### **Workflow Open Mail (Direct) Message**

---

If you select the direct response method, the Notification System uses the Workflow Open Mail (Direct) message as a default template for e-mail notifications that require a response. The notification template includes generic instructions on how to respond to a notification. It also includes the following information about a message: the name of the sender of the message, message priority, date that a response is due, and any comments from the sender of the message or, if the notification is forwarded from another user, any comments from the forwarder.

**Note:** To select the direct response method, specify the oracle.apps.fnd.wf.mailer.DirectEmailParser in the E-mail Parser configuration parameter when you configure a notification mailer. For more information, see the Oracle Applications Manager online help or the Oracle Enterprise Manager online help.

The response instructions in the plain text message body describe how to reply using the direct response method. This message is used for notifications sent to performers with a notification preference of MAILTEXT or MAILATTH. The response instructions in the HTML-formatted message body describe how to reply using the automatically generated response template. This message is used for notifications sent to performers with a notification preference of

MAILHTML or MAILHTML2, and is also attached to notifications sent to performers with a notification preference of MAILATTH.

**Note:** Responses that are generated automatically from an HTML-formatted notification or attachment always use a response template, regardless of which response method you select for the e-mail parser.

The Workflow Open Mail (Direct) message has the following message attributes. The values are drawn from the message definition associated with a notification activity.

<b>START_DATE</b>	The date the message is sent.
<b>TO</b>	The role the notification is sent to; the performer.
<b>SUBJECT</b>	The subject line defined in the message.
<b>BODY</b>	The text of the body defined in the message.
<b>COMMENT</b>	Comments added by the sender or the forwarder.
<b>PRIORITY</b>	The priority of the notification message.
<b>DUE_DATE</b>	The date by which a response is required, specified in the notification activity.
<b>NOTIFICATION</b>	Required notification code used to identify the information in the notification.
<b>RESPONSE</b>	The user response section as defined by the Respond message attributes in the actual notification message definition.
<b>MAILTO</b>	The content of the HTML tag that a recipient would click on to respond to a notification. This attribute is used only for HTML e-mail notifications.
<b>CLICK_HERE_RESPONSE</b>	The content of the HTML tag that a recipient would click on to access the Notification Details page to respond to a notification. This attribute is not currently used.
<b>SENDER</b>	The name of the sender of the message, as displayed in the From column in the Worklist. This attribute is not currently used.
<b>HEADER</b>	Standard header attributes and any custom header attributes defined to hold key information for the message. See: Header Attributes, <i>Oracle Workflow Developer's Guide</i> .

**HISTORY** Any previous requests for more information about the notification and the responses to those requests.

You can customize the boilerplate text that appears in the body of the Workflow Open Mail (Direct) message, where attributes preceded by an ampersand (&) are token substituted with runtime values when the notification is sent.

The boilerplate text for a plain text message body is as follows:

```
Oracle Workflow Notification
&COMMENT
&HISTORY
```

---

Response Instructions for &NOTIFICATION

To submit your response, reply to this message, including this note with your reply. The first lines of your reply must be your responses to the notification questions. Instructions below detail exactly what should be placed on each line of your reply.

```
&RESPONSE
```

---

Notification Details:

```
&HEADER
&BODY
```

Due Date: &DUE\_DATE

The boilerplate text for a HTML-formatted message body is as follows:

```
<HTML> <HEAD> <TITLE> Oracle Workflow Notification </TITLE>
</HEAD>
<BODY BGCOLOR="#FFFFFF" >
<P>
<P><B><FONT SIZE=+1>&COMMENT</FONT> </B>
<P>&HISTORY
<P>&HEADER
<P>&BODY
<P><B>Please click on one of the following choices to
automatically generate an E-mail response. Before sending
```

```
the E-mail response to close this notification, ensure all
response prompts include a desired response value within
quotes.</B>
<P>&MAILTO
</BODY>
</HTML>
```

## **Orig. Workflow Open Mail (Direct) Message**

---

Oracle Workflow provides the Orig. Workflow Open Mail (Direct) message as an alternative template that you can optionally use as a template for e-mail notifications that require a response if you select the direct response method. This template does not include the header attributes that are displayed in the Workflow Open Mail (Direct) message.

The Orig. Workflow Open Mail (Direct) notification template includes generic instructions on how to respond to a notification. It also includes the following information about a message: the name of the sender of the message, message priority, date that a response is due, and any comments from the sender of the message or, if the notification is forwarded from another user, any comments from the forwarder.

**Note:** To select the direct response method, specify the `oracle.apps.fnd.wf.mailer.DirectEmailParser` in the E-mail Parser configuration parameter when you configure a notification mailer. For more information, see the Oracle Applications Manager online help or the Oracle Enterprise Manager online help.

The response instructions in the plain text message body describe how to reply using the direct response method. This message is used for notifications sent to performers with a notification preference of `MAILTEXT` or `MAILATTH`. The response instructions in the HTML-formatted message body describe how to reply using the automatically generated response template. This message is used for notifications sent to performers with a notification preference of `MAILHTML` or `MAILHTM2`, and is also attached to notifications sent to performers with a notification preference of `MAILATTH`.

**Note:** Responses that are generated automatically from an HTML-formatted notification or attachment always use a response template, regardless of which response method you select for the e-mail parser.

The Orig. Workflow Open Mail (Direct) message has the following message attributes. The values are drawn from the message definition associated with a notification activity.

<b>START_DATE</b>	The date the message is sent.
<b>TO</b>	The role the notification is sent to; the performer.
<b>SUBJECT</b>	The subject line defined in the message.
<b>BODY</b>	The text of the body defined in the message.
<b>COMMENT</b>	Comments added by the sender or the forwarder.
<b>PRIORITY</b>	The priority of the notification message.
<b>DUE_DATE</b>	The date by which a response is required, specified in the notification activity.
<b>NOTIFICATION</b>	Required notification code used to identify the information in the notification.
<b>RESPONSE</b>	The user response section as defined by the Respond message attributes in the actual notification message definition.
<b>MAILTO</b>	The content of the HTML tag that a recipient would click on to respond to a notification. This attribute is used only for HTML e-mail notifications.
<b>CLICK_HERE_RESPONSE</b>	The content of the HTML tag that a recipient would click on to access the Notification Details page to respond to a notification. This attribute is not currently used.
<b>SENDER</b>	The name of the sender of the message, as displayed in the From column in the Worklist.

The boilerplate text for a plain text message body is as follows:

```
Oracle Workflow Notification  
From: &SENDER  
&COMMENT
```

---

Response Instructions for &NOTIFICATION

To submit your response, reply to this message, including this note with your reply. The first lines of your reply must be your responses to the notification questions. Instructions below detail exactly what should be placed on

each line of your reply.

&RESPONSE

---

Notification Details:

&BODY

Due Date: &DUE\_DATE

The boilerplate text for a HTML-formatted message body is as follows:

```
<HTML> <HEAD> <TITLE> Oracle Workflow Notification </TITLE>
</HEAD>
<BODY BGCOLOR="#FFFFFF" >
<P>
<P>From: <B>&SENDER</B>
<P><B><FONT SIZE=+1>&COMMENT</FONT> </B>
<P>&BODY
<P><B>Please click on one of the following choices to
automatically generate an E-mail response. Before sending
the E-mail response to close this notification, ensure all
response prompts include a desired response value within
quotes.</B>
<P>&MAILTO
</BODY>
</HTML>
```

### **Workflow Open Mail for Outlook Express Message**

---

If you use an e-mail application such as Microsoft Outlook Express as your e-mail client, you should select the default Workflow Open Mail for Outlook Express message as a template for e-mail notifications that require a response, for users with a notification preference of MAILHTML, MAILHTM2, or MAILATTH. This message includes the name of the sender of the message, any comments from the sender or forwarder, and a link to the Notification Details web page to let users respond to the notification there. This template is provided to accommodate e-mail applications that cannot process the response links included in the Workflow Open Mail (Templated) and Workflow Open Mail (Direct) templates.

The response instructions in the plain text message body describe how to reply manually using the templated response method. This message

is used for notifications sent to performers with a notification preference of MAILATTH. The HTML-formatted message body includes a link called "Click here to respond" which lets users access the notification in the Notification Details web page to respond to the notification. This message is used for notifications sent to performers with a notification preference of MAILHTML or MAILHTML2, and is also attached to notifications sent to performers with a notification preference of MAILATTH.

**Note:** When users choose the "Click here to respond" link, it automatically attempts to establish a web session with the web server. Users must be able to connect to the web server to use this link to respond to a notification. See: *Reviewing Notifications via Electronic Mail, Oracle Workflow User's Guide.*

The Workflow Open Mail for Outlook Express message has the following message attributes. The values are drawn from the message definition associated with a notification activity.

<b>START_DATE</b>	The date the message is sent.
<b>TO</b>	The role the notification is sent to; the performer.
<b>SUBJECT</b>	The subject line defined in the message.
<b>BODY</b>	The text of the body defined in the message.
<b>COMMENT</b>	Comments added by the sender or the forwarder.
<b>PRIORITY</b>	The priority of the notification message.
<b>DUE_DATE</b>	The date by which a response is required, specified in the notification activity.
<b>NOTIFICATION</b>	Required notification code used to identify the information in the notification.
<b>RESPONSE</b>	The user response section as defined by the Respond message attributes in the actual notification message definition.
<b>MAILTO</b>	The content of the HTML tag that a recipient would click on to respond to a notification. This attribute is not currently used.
<b>CLICK_HERE_RESPONSE</b>	The content of the HTML tag that a recipient would click on to access the Notification Details page to respond to a notification. This attribute is used only for HTML e-mail notifications.

<b>SENDER</b>	The name of the sender of the message, as displayed in the From column in the Worklist. This attribute is not currently used.
<b>HEADER</b>	Standard header attributes and any custom header attributes defined to hold key information for the message. See: Header Attributes, <i>Oracle Workflow Developer's Guide</i> .
<b>HISTORY</b>	Any previous requests for more information about the notification and the responses to those requests.

You can customize the boilerplate text that appears in the body of the Workflow Open Mail for Outlook Express message, where attributes preceded by an ampersand (&) are token substituted with runtime values when the notification is sent.

The boilerplate text for a plain text message body is as follows:

```
Oracle Workflow Notification
&COMMENT
&HISTORY
```

```
_____Start of Response Template_____
```

```
Response Template for &NOTIFICATION
```

To submit your response, reply to this message including this response template in your reply. Insert your response value between the quotes following each response prompt.

```
&RESPONSE
```

```
_____End of Response Template_____
```

```
Notification Details:
```

```
&HEADER
&BODY
```

```
Due Date: &DUE_DATE
```

The boilerplate text for a HTML-formatted message body is as follows:

```
<HTML> <HEAD> <TITLE> Oracle Workflow Notification </TITLE>
</HEAD>
<BODY BGCOLOR="#FFFFFF" >
<P>
```

```
<P><B><FONT SIZE=+1>&COMMENT</FONT> </B>
<P>&HISTORY
<P>&HEADER
<P>&BODY
<P>&CLICK_HERE_RESPONSE
</BODY>
</HTML>
```

## **Orig. Workflow Open Mail for Outlook Express Message**

---

Oracle Workflow provides the Orig. Workflow Open Mail for Outlook Express message as an alternative template that you can optionally use as a template for e-mail notifications that require a response if you use an e-mail application such as Microsoft Outlook Express as your e-mail client. This template does not include the header attributes that are displayed in the Workflow Open Mail (Direct) message.

The Orig. Workflow Open Mail for Outlook Express message includes the name of the sender of the message, any comments from the sender or forwarder, and a link to the Notification Details web page to let users respond to the notification there. This template can be used to accommodate e-mail applications that cannot process the response links included in the Orig. Workflow Open Mail (Templated) and Orig. Workflow Open Mail (Direct) templates.

The response instructions in the plain text message body describe how to reply manually using the templated response method. This message is used for notifications sent to performers with a notification preference of MAILATTH. The HTML-formatted message body includes a link called "Click here to respond" which lets users access the notification in the Notification Details web page to respond to the notification. This message is used for notifications sent to performers with a notification preference of MAILHTML or MAILHTM2, and is also attached to notifications sent to performers with a notification preference of MAILATTH.

**Note:** When users choose the "Click here to respond" link, it automatically attempts to establish a web session with the web server. Users must be able to connect to the web server to use this link to respond to a notification. See: *Reviewing Notifications via Electronic Mail, Oracle Workflow User's Guide.*

The Orig. Workflow Open Mail for Outlook Express message has the following message attributes. The values are drawn from the message definition associated with a notification activity.

**START\_DATE**      The date the message is sent.

<b>TO</b>	The role the notification is sent to; the performer.
<b>SUBJECT</b>	The subject line defined in the message.
<b>BODY</b>	The text of the body defined in the message.
<b>COMMENT</b>	Comments added by the sender or the forwarder.
<b>PRIORITY</b>	The priority of the notification message.
<b>DUE_DATE</b>	The date by which a response is required, specified in the notification activity.
<b>NOTIFICATION</b>	Required notification code used to identify the information in the notification.
<b>RESPONSE</b>	The user response section as defined by the Respond message attributes in the actual notification message definition.
<b>MAILTO</b>	The content of the HTML tag that a recipient would click on to respond to a notification. This attribute is not currently used.
<b>CLICK_HERE_RESPONSE</b>	The content of the HTML tag that a recipient would click on to access the Notification Details page to respond to a notification. This attribute is used only for HTML e-mail notifications.
<b>SENDER</b>	The name of the sender of the message, as displayed in the From column in the Worklist. This attribute is not currently used.

The boilerplate text for a plain text message body is as follows:

```
Oracle Workflow Notification
From: &SENDER
&COMMENT
```

```
_____Start of Response Template_____
```

```
Response Template for &NOTIFICATION
```

To submit your response, reply to this message including this response template in your reply. Insert your response value between the quotes following each response prompt.

```
&RESPONSE
_____End of Response Template_____
```

Notification Details:

&BODY

Due Date: &DUE\_DATE

The boilerplate text for a HTML–formatted message body is as follows:

```
<HTML> <HEAD> <TITLE> Oracle Workflow Notification </TITLE>
</HEAD>
<BODY BGCOLOR="#FFFFFF" >
<P>
<P>From: <B>&SENDER</B>
<P><B><FONT SIZE=+1>&COMMENT</FONT> </B>
<P>&BODY
<P>&CLICK_HERE_RESPONSE
</BODY>
</HTML>
```

### **Workflow Open FYI Mail Message**

---

The Notification System uses the Workflow Open FYI Mail message as a default template for all e–mail notifications that do not require a response. The template indicates that the notification is for your information (FYI) and does not require a response. In addition to the message, the template also includes the name of the sender of the message and any comments from the sender or forwarder.

The Workflow Open FYI Mail message has the following message attributes. The values are drawn from the message definition associated with a notification activity.

<b>START_DATE</b>	The date the message is sent.
<b>TO</b>	The role the notification is sent to; the performer.
<b>SUBJECT</b>	The subject line defined in the message.
<b>BODY</b>	The text of the body defined in the message.
<b>COMMENT</b>	Comments added by the sender or the forwarder.
<b>PRIORITY</b>	The priority of the notification message.
<b>DUE_DATE</b>	The date by which a response is required, specified in the notification activity.
<b>NOTIFICATION</b>	Required notification code used to identify the information in the notification.

<b>SENDER</b>	The name of the sender of the message, as displayed in the From column in the Worklist. This attribute is not currently used.
<b>HEADER</b>	Standard header attributes and any custom header attributes defined to hold key information for the message. See: Header Attributes, <i>Oracle Workflow Developer's Guide</i> .

You can customize the text that appears in the body of the Workflow Open FYI Mail template, where attributes preceded by an ampersand (&) are token substituted with runtime values when the notification is sent. The boilerplate text for the plain text message body is as follows:

```
Oracle Workflow Notification (FYI)
&COMMENT
```

```
-----
&HEADER
&BODY
```

The boilerplate text for the HTML-formatted message body is as follows:

```
<HTML><HEAD></HEAD>
<BODY BGCOLOR="#FFFFFF"><b>Oracle Workflow Notification
(FYI)</b>
<br>
<br>&COMMENT
<hr>
<P>&HEADER
<P>&BODY
</BODY>
</HTML>
```

### **Orig. Workflow Open FYI Mail Message**

---

Oracle Workflow provides the Orig. Workflow Open FYI Mail message as an alternative template that you can optionally use as a template for e-mail notifications that do not require a response. This template does not include the header attributes that are displayed in the Workflow Open FYI Mail message.

The Orig. Workflow Open FYI Mail template indicates that the notification is for your information (FYI) and does not require a response. In addition to the message, the template also includes the

name of the sender of the message and any comments from the sender or forwarder.

The Orig. Workflow Open FYI Mail message has the following message attributes. The values are drawn from the message definition associated with a notification activity.

<b>START_DATE</b>	The date the message is sent.
<b>TO</b>	The role the notification is sent to; the performer.
<b>SUBJECT</b>	The subject line defined in the message.
<b>BODY</b>	The text of the body defined in the message.
<b>COMMENT</b>	Comments added by the sender or the forwarder.
<b>PRIORITY</b>	The priority of the notification message.
<b>DUE_DATE</b>	The date by which a response is required, specified in the notification activity.
<b>NOTIFICATION</b>	Required notification code used to identify the information in the notification.
<b>SENDER</b>	The name of the sender of the message, as displayed in the From column in the Worklist.

The boilerplate text for the plain text message body is as follows:

```
Oracle Workflow Notification (FYI)
From: &SENDER
&COMMENT
```

```
-----
&BODY
```

The boilerplate text for the HTML-formatted message body is as follows:

```
<HTML><HEAD></HEAD>
<BODY BGCOLOR="#FFFFFF"><b>Oracle Workflow Notification
(FYI)</b>
<br>
From: <B>&SENDER</B>
<br>&COMMENT
<hr>
<P>&BODY
</BODY>
</HTML>
```

## Workflow URL Attachment Message

---

The Notification System uses the Workflow URL Attachment message as a default template to create the Notification References attachment for HTML-formatted notification messages that include URL attributes with Attach Content checked. The template includes a list with links to each URL.

The Workflow URL Attachment message has the following message attribute. The value is drawn from the message definition associated with a notification activity.

**URLLIST**            The list of URLs to be included in the attachment.

You can customize the text that appears in the body of the Workflow URL Attachment template, where an attribute preceded by an ampersand (&) is token substituted with a runtime value when the notification is sent. The boilerplate text for the HTML-formatted message body is as follows:

```
<HTML> <HEAD> <TITLE> Oracle Workflow Notification
References </TITLE> </HEAD>
<BODY BGCOLOR="#FFFFFF" >
<P><B><FONT SIZE=+1>Notification References</FONT> </B>

<HR WIDTH="100%">
<BR>
&URLLIST
<BR>
<HR WIDTH="100%">
<BR>&nbsp;
</BODY>
</HTML>
```

## Workflow Canceled Mail Message

---

The default Workflow Canceled Mail message informs the recipient that a previously sent notification is canceled. If you are using the version of Oracle Workflow embedded in Oracle Applications, you can use the WF: Mailer Cancellation Email profile option to determine whether or not notification mailers should send Workflow Canceled Mail messages. See: Setting Up Notification Mailers: page 2 – 65.

The Workflow Canceled Mail message has the following message attributes, with values that are drawn from the message definition associated with the canceled notification activity:

**START\_DATE**        The date the original message was sent.

<b>TO</b>	The role the notification is sent to; the performer.
<b>SUBJECT</b>	The subject line of the original message.
<b>BODY</b>	The text of the original message.
<b>COMMENT</b>	Comments added by the sender or the forwarder.
<b>PRIORITY</b>	The priority of the notification message.
<b>DUE_DATE</b>	The date by which a response is required, specified in the notification activity.
<b>NOTIFICATION</b>	Required notification code used to identify the information in the notification.
<b>HEADER</b>	Standard header attributes and any custom header attributes defined to hold key information for the message. See: Header Attributes, <i>Oracle Workflow Developer's Guide</i> .

The boilerplate text for the plain text message body is as follows:

```
You earlier received the notification shown below. That
notification is now canceled, and no longer requires your
response. You may simply delete it along with this message.
```

```
-----
&HEADER
&BODY
```

The boilerplate text for the HTML-formatted message body is as follows:

```
<html><Head></Head><body>You earlier received the
notification shown below. That notification is now
canceled, and no longer requires your response. You may
simply delete it along with this message.
<hr>
&HEADER
<P>&BODY
</body></html>
```

### **Orig. Workflow Canceled Mail Message**

---

Oracle Workflow provides the Orig. Workflow Canceled Mail message as an alternative template that you can optionally use to inform the recipient that a previously sent notification is canceled. This template

does not include the header attributes that are displayed in the Workflow Canceled Mail message.

If you are using the version of Oracle Workflow embedded in Oracle Applications, you can use the WF: Mailer Cancellation Email profile option to determine whether or not notification mailers should send cancellation messages. See: Setting Up Notification Mailers: page 2 – 65.

The Orig. Workflow Canceled Mail message has the following message attributes, with values that are drawn from the message definition associated with the canceled notification activity:

<b>START_DATE</b>	The date the original message was sent.
<b>TO</b>	The role the notification is sent to; the performer.
<b>SUBJECT</b>	The subject line of the original message.
<b>BODY</b>	The text of the original message.
<b>COMMENT</b>	Comments added by the sender or the forwarder.
<b>PRIORITY</b>	The priority of the notification message.
<b>DUE_DATE</b>	The date by which a response is required, specified in the notification activity.
<b>NOTIFICATION</b>	Required notification code used to identify the information in the notification.

The boilerplate text for the plain text message body is as follows:

```
You earlier received the notification shown below. That notification is now canceled, and no longer requires your response. You may simply delete it along with this message.
```

```
-----  
&BODY
```

The boilerplate text for the HTML-formatted message body is as follows:

```
<html><Head></Head><body>You earlier received the notification shown below. That notification is now canceled, and no longer requires your response. You may simply delete it along with this message.  
<hr>  
&BODY  
</body></html>
```

## **Workflow Invalid Mail Message**

---

The Workflow Invalid Mail message is sent to a user by default when a user responds incorrectly to a notification. For example, if a response message from a user contains a valid notification ID (NID) line matching it with a notification, but does not contain any response value or contains an invalid response value, the notification mailer sends a Workflow Invalid Mail message to the user. This message describes how to respond to the notification correctly. The message attributes are as follows:

<b>START_DATE</b>	The date the original message was sent.
<b>TO</b>	The role the notification is sent to; the performer.
<b>SUBJECT</b>	The subject line of the original message.
<b>BODY</b>	The text of the original message.
<b>COMMENT</b>	Comments added by the sender or the forwarder.
<b>PRIORITY</b>	The priority of the notification message.
<b>DUE_DATE</b>	The date by which a response is required, specified by the notification activity.
<b>NOTIFICATION</b>	Required notification code used to identify the information in the notification.
<b>RESPONSE</b>	The user response section as defined by the Respond message attributes in the original message definition.
<b>MAIL_ERROR_MESSAGE</b>	An error message that the mail program generates if an error occurs upon processing the response.
<b>MAIL_ERROR_STACK</b>	An error stack of arguments that the mail program generates if an error occurs upon processing the response. This attribute is not currently used.
<b>CLICK_HERE_RESPONSE</b>	The content of the HTML tag that a recipient would click on to access the Notification Details page to respond to a notification. This attribute is not currently used.
<b>MAIL_VALUE_FOUND</b>	The invalid response value found in the user's response message.
<b>MAIL_EXP_VALUES</b>	Information about the expected valid response values.
<b>HEADER</b>	Standard header attributes and any custom header attributes defined to hold key information for the

message. See: Header Attributes, *Oracle Workflow Developer's Guide*.

The boilerplate text for the plain text message body is as follows:

Oracle Workflow Notification  
&COMMENT

Warning: Your previous response to this message was invalid (see error message below). Please resubmit your response.

Important: Some mail clients, notably early releases of Microsoft Outlook Express, may not copy the 'NID' line properly in your response. Please verify that the 'NID' line is included in full and contains the prefix 'NID' and all the details between the square brackets when responding.

Error Message: &MAIL\_ERROR\_MESSAGE

Value Found: &MAIL\_VALUE\_FOUND

Remarks: &MAIL\_EXP\_VALUES

-----

Response Instructions for &NOTIFICATION

To submit your response, reply to this message, including this original with your reply. This note contains a special 'NID' string that is required to process the response. The first lines of your reply must be your responses to the notification questions. You should enter one line for each response required by the notification; any additional lines will be ignored. You may leave a line blank to accept the default value for that specific response. You must supply a value or a blank line for each question asked. Instructions below detail exactly what should be placed on each line of your reply.

&RESPONSE

-----

Notification Details:

&HEADER

&BODY

Due Date: &DUE\_DATE

The boilerplate text for the HTML-formatted message body is as follows:

```
<html><Head></Head><body>Warning: Your previous response to
this message was invalid (see error message below). Please
resubmit your response.
<P>Error Message: &MAIL_ERROR_MESSAGE
<BR>
<BR>Value Found: &MAIL_VALUE_FOUND
<BR>
<BR>Remarks: &MAIL_EXP_VALUES
<HR><P><B><FONT SIZE=+1>&COMMENT</FONT> </B>
<P>&HEADER
<P>&BODY
<P><B>Please click on one of the following choices to
automatically generate an E-mail response. Before sending
the E-mail response to close this notification, ensure all
response prompts include a desired response value within
quotes.</B>
<P><B>Important:</B> Some mail clients, notably early
releases of Microsoft Outlook Express, may not copy the
'NID' line properly in your response. Please verify that the
'NID' line is included in full and contains the prefix 'NID'
and all the details between the square brackets when
responding.
<P>&MAILTO
</BODY> </HTML>
```

### **Orig. Workflow Invalid Mail Message**

Oracle Workflow provides the Orig. Workflow Invalid Mail message as an alternative template that you can optionally use when a user responds incorrectly to a notification. This template does not include the header attributes that are displayed in the Workflow Invalid Mail message.

The Orig. Workflow Invalid Mail message describes how to respond to the notification correctly. The message attributes are as follows:

<b>START_DATE</b>	The date the original message was sent.
<b>TO</b>	The role the notification is sent to; the performer.

<b>SUBJECT</b>	The subject line of the original message.
<b>BODY</b>	The text of the original message.
<b>COMMENT</b>	Comments added by the sender or the forwarder.
<b>PRIORITY</b>	The priority of the notification message.
<b>DUE_DATE</b>	The date by which a response is required, specified by the notification activity.
<b>NOTIFICATION</b>	Required notification code used to identify the information in the notification.
<b>RESPONSE</b>	The user response section as defined by the Respond message attributes in the original message definition.
<b>MAIL_ERROR_MESSAGE</b>	An error message that the mail program generates if an error occurs upon processing the response.
<b>MAIL_ERROR_STACK</b>	An error stack of arguments that the mail program generates if an error occurs upon processing the response. This attribute is not currently used.
<b>CLICK_HERE_RESPONSE</b>	The content of the HTML tag that a recipient would click on to access the Notification Details page to respond to a notification. This attribute is not currently used.
<b>MAIL_VALUE_FOUND</b>	The invalid response value found in the user's response message.
<b>MAIL_EXP_VALUES</b>	Information about the expected valid response values.

The boilerplate text for the plain text message body is as follows:

```
Oracle Workflow Notification
&COMMENT
```

```
Warning: Your previous response to this message was invalid
(see error message below). Please resubmit your response.
```

```
Important: Some mail clients, notably early releases of
Microsoft Outlook Express, may not copy the 'NID' line
properly in your response. Please verify that the 'NID' line
is included in full and contains the prefix 'NID' and all
the details between the square brackets when responding.
```

```
Error Message: &MAIL_ERROR_MESSAGE
```

Value Found: &MAIL\_VALUE\_FOUND

Remarks: &MAIL\_EXP\_VALUES

-----  
Response Instructions for &NOTIFICATION

To submit your response, reply to this message, including this original with your reply. This note contains a special 'NID' string that is required to process the response. The first lines of your reply must be your responses to the notification questions. You should enter one line for each response required by the notification; any additional lines will be ignored. You may leave a line blank to accept the default value for that specific response. You must supply a value or a blank line for each question asked. Instructions below detail exactly what should be placed on each line of your reply.

&RESPONSE

-----  
Notification Details:

&BODY

Due Date: &DUE\_DATE

The boilerplate text for the HTML-formatted message body is as follows:

```
<html><Head></Head><body>Warning: Your previous response to  
this message was invalid (see error message below). Please  
resubmit your response.
```

```
<P>Error Message: &MAIL_ERROR_MESSAGE
```

```
<BR>
```

```
<BR>Value Found: &MAIL_VALUE_FOUND
```

```
<BR>
```

```
<BR>Remarks: &MAIL_EXP_VALUES
```

```
<HR><P><B><FONT SIZE=+1>&COMMENT</FONT> </B>
```

```
<P>&BODY
```

```
<P><B>Please click on one of the following choices to  
automatically generate an E-mail response. Before sending
```

the E-mail response to close this notification, ensure all response prompts include a desired response value within quotes.</B>

<P><B>Important:</B> Some mail clients, notably early releases of Microsoft Outlook Express, may not copy the 'NID' line properly in your response. Please verify that the 'NID' line is included in full and contains the prefix 'NID' and all the details between the square brackets when responding.

<P>&MAILTO

</BODY> </HTML>

## **Workflow Closed Mail Message**

---

The default Workflow Closed Mail message informs the recipient that a previously sent notification is now closed. It has the following message attributes, with values that are drawn from the message definition associated with the closed notification activity:

<b>START_DATE</b>	The date the original message was sent.
<b>TO</b>	The role the notification is sent to; the performer.
<b>SUBJECT</b>	The subject line of the original message.
<b>BODY</b>	The text of the original message.
<b>COMMENT</b>	Comments added by the sender or the forwarder.
<b>PRIORITY</b>	The priority of the notification message.
<b>DUE_DATE</b>	The date by which a response is required, specified in the notification activity.
<b>NOTIFICATION</b>	Required notification code used to identify the information in the notification.
<b>HEADER</b>	Standard header attributes and any custom header attributes defined to hold key information for the message. See: Header Attributes, <i>Oracle Workflow Developer's Guide</i> .

The boilerplate text for the plain text message body is as follows:

You earlier received the notification shown below. That notification is now closed, and no longer requires your response. You may simply delete it along with this message.

-----  
&HEADER

&BODY

The boilerplate text for the HTML-formatted message body is as follows:

```
<html><Head></Head><body>You earlier received the
notification shown below. That notification is now closed,
and no longer requires your response. You may simply delete
it along with this message.
<hr>
&HEADER
<P>&BODY
</body></html>
```

### **Orig. Workflow Closed Mail Message**

---

Oracle Workflow provides the Orig. Workflow Closed Mail message as an alternative template that you can optionally use to inform the recipient that a previously sent notification is now closed. This template does not include the header attributes that are displayed in the Workflow Closed Mail message.

The Orig. Workflow Closed Mail message has the following message attributes, with values that are drawn from the message definition associated with the closed notification activity:

<b>START_DATE</b>	The date the original message was sent.
<b>TO</b>	The role the notification is sent to; the performer.
<b>SUBJECT</b>	The subject line of the original message.
<b>BODY</b>	The text of the original message.
<b>COMMENT</b>	Comments added by the sender or the forwarder.
<b>PRIORITY</b>	The priority of the notification message.
<b>DUE_DATE</b>	The date by which a response is required, specified in the notification activity.
<b>NOTIFICATION</b>	Required notification code used to identify the information in the notification.

The boilerplate text for the plain text message body is as follows:

```
You earlier received the notification shown below. That
notification is now closed, and no longer requires your
response. You may simply delete it along with this message.
```

-----  
&BODY

The boilerplate text for the HTML-formatted message body is as follows:

```
<html><Head></Head><body>You earlier received the
notification shown below. That notification is now closed,
and no longer requires your response. You may simply delete
it along with this message.
<hr>
&BODY
</body></html>
```

### **Workflow Summary Mail Message**

---

The Notification system uses the Workflow Summary Mail message by default as a template to send a summary of workflow notifications to users and roles that have their notification preference set to 'SUMMARY' in the Oracle Workflow directory service. The Workflow Summary Mail message summarizes all currently open notifications for a given user/role. It has the following message attributes, with values that are drawn from the message definition associated with the open notification activity:

<b>SUMMARY</b>	Summary report.
<b>USER_NAME</b>	The user/role the notification summary is sent to; the performer.
<b>SYSDATE</b>	The current date.

The boilerplate text for the plain text message body is as follows:

```
Summary of Notifications for '&USER_NAME'
(Please use the Notifications web page to see details or
respond.)
```

-----  
&SUMMARY

The boilerplate text for the HTML-formatted message body is as follows:

```
<HTML><HEAD></HEAD><BODY>
<P><FONT size=+1>Summary of Notifications for
'&USER_NAME'</FONT>
<BR><i>Please use the Notifications web page to see details
```

or respond.</i>

<HR>

&SUMMARY

</BODY>

</HTML>

## **Workflow Warning Mail Message**

---

The Notification System uses the Workflow Warning Mail message as a default template to send a message to a user if it receives unsolicited mail from that user. For example, if a message from a user does not contain a notification ID (NID) line matching it with a notification, or contains an incorrectly formatted NID line, the notification mailer sends a Workflow Warning Mail message to the user. This message has the following message attributes, with values that are drawn from the unsolicited mail:

<b>UBODY</b>	The text of the unsolicited mail message body.
<b>USUBJECT</b>	The text of the unsolicited mail subject line.
<b>UFROM</b>	The address of the user that sent the unsolicited mail.

The boilerplate text for the plain text message body is as follows:

Messages sent to this account are processed automatically by the Oracle Workflow Notification Mailer. The message you sent did not appear to be in response to a notification. If you are responding to a notification, please use the response template that was included with your notification. Take care to include the 'NID' line of the template in your reply. If you are not responding to a notification, please do not send mail to this account.

Important: Some mail clients, notably early releases of Microsoft Outlook Express, may not copy the 'NID' line properly in your response. Please verify that the 'NID' line is included in full and contains the prefix 'NID' and all the details between the square brackets when responding.

-----  
From: &UFROM

Subject: &USUBJECT

&UBODY

The boilerplate text for the HTML-formatted message body is as follows:

```
<html><head></head><body>
<b>Messages sent to this account are processed automatically
by the Oracle Workflow Notification Mailer. The message you
sent did not appear to be in response to a notification. If
you are responding to a notification, please use the
auto-generated reply created when responding to the original
message. This contains the 'NID' line which is necessary for
identification. If you are not responding to a
notification, please do not send mail to this account.</b>
<P><B>Important:</B> Some mail clients, notably early
releases of Microsoft Outlook Express, may not copy the
'NID' line properly in your response. Please verify that the
'NID' line is included in full and contains the prefix 'NID'
and all the details between the square brackets when
responding.
<hr>
<P>From: &UFROM
<BR>Subject: &USUBJECT

<P>&UBODY
</body></html>
```

### **Workflow Password Signature Mail Message**

---

The Notification System uses the Workflow Password Signature Mail message as a default template for e-mail notifications that require a password-based electronic signature in the user's response. Users can only respond to such notifications through the Notification Details web page, where they can enter their Oracle Applications user name and password to authenticate the response. The notification template informs the recipient that a password-based signature is required and that the response cannot be submitted through e-mail. Instead, the notification template directs the recipient to access the online version of the notification to submit a response. It also includes the following information about a message: the name of the sender of the message, date that a response is due, and any comments from the sender or, if the notification is forwarded from another user, any comments from the forwarder.

**Note:** Password-based electronic signatures are currently supported only for the version of Oracle Workflow embedded in Oracle Applications.

The Workflow Password Signature Mail message has the following message attributes. The values are drawn from the message definition associated with a notification activity.

<b>DUE_DATE</b>	The date by which a response is required, specified in the notification activity.
<b>BODY</b>	The text of the body defined in the message.
<b>NOTIFICATION</b>	Required notification code used to identify the information in the notification. For notifications that require a password-based signature to be entered online, this notification code does not include the access key or node identifier information that would be needed for an e-mail response.
<b>COMMENT</b>	Comments added by the sender or the forwarder.
<b>SENDER</b>	The name of the sender of the message, as displayed in the From column in the Worklist. This attribute is not currently used.
<b>SUBJECT</b>	The subject line defined in the message.
<b>HEADER</b>	Standard header attributes and any custom header attributes defined to hold key information for the message. See: Header Attributes, <i>Oracle Workflow Developer's Guide</i> .
<b>HISTORY</b>	Any previous requests for more information about the notification and the responses to those requests.

You can customize the boilerplate text that appears in the body of the Workflow Password Signature Mail message, where attributes preceded by an ampersand (&) are token substituted with runtime values when the notification is sent.

The boilerplate text for a plain text message body is as follows:

```
Oracle Workflow Notification
&COMMENT
&HISTORY
```

---

Response Instructions for &NOTIFICATION

This notification requires a password-based signature in your response. You cannot respond to this notification through e-mail. Please access the online version of the

notification to submit your response.

---

Notification Details:

&HEADER

&BODY

Due Date: &DUE\_DATE

The boilerplate text for a HTML-formatted message body is as follows:

```
<HTML> <HEAD> <TITLE> Oracle Workflow Notification </TITLE>
</HEAD>
<BODY BGCOLOR="#FFFFFF" >
<P>
<P><B><FONT SIZE=+1>&COMMENT</FONT> </B>
<P>&HISTORY
<P><B>This notification requires a password-based signature
in your response. You cannot respond to this notification
through e-mail. Please access the online version of the
notification to submit your response.</B>
<P>&HEADER
<P>&BODY
<P>
</BODY>
</HTML>
```

See: #WF\_SIG\_POLICY Attribute, *Oracle Workflow Developer's Guide*

### **Orig. Workflow Password Signature Mail Message**

---

Oracle Workflow provides the Orig. Workflow Password Signature Mail message as an alternative template that you can optionally use as a template for e-mail notifications that require a password-based electronic signature in the user's response. This template does not include the header attributes that are displayed in the Workflow Password Signature Mail message.

Users can only respond to notifications that require a password-based signature through the Notification Details web page, where they can enter their Oracle Applications user name and password to authenticate the response. The Orig. Workflow Password Signature Mail notification template informs the recipient that a password-based signature is required and that the response cannot be submitted through e-mail. Instead, the notification template directs the recipient to access the online version of the notification to submit a response. It

also includes the following information about a message: the name of the sender of the message, date that a response is due, and any comments from the sender or, if the notification is forwarded from another user, any comments from the forwarder.

**Note:** Password-based electronic signatures are currently supported only for the version of Oracle Workflow embedded in Oracle Applications.

The Orig. Workflow Password Signature Mail message has the following message attributes. The values are drawn from the message definition associated with a notification activity.

<b>DUE_DATE</b>	The date by which a response is required, specified in the notification activity.
<b>BODY</b>	The text of the body defined in the message.
<b>NOTIFICATION</b>	Required notification code used to identify the information in the notification. For notifications that require a password-based signature to be entered online, this notification code does not include the access key or node identifier information that would be needed for an e-mail response.
<b>COMMENT</b>	Comments added by the sender or the forwarder.
<b>SENDER</b>	The name of the sender of the message, as displayed in the From column in the Worklist. This attribute is not currently used.
<b>SUBJECT</b>	The subject line defined in the message.

The boilerplate text for a plain text message body is as follows:

```
Oracle Workflow Notification
From: &SENDER
&COMMENT
```

---

Response Instructions for &NOTIFICATION

This notification requires a password-based signature in your response. You cannot respond to this notification through e-mail. Please access the online version of the notification to submit your response.

---

Notification Details:

&BODY

Due Date: &DUE\_DATE

The boilerplate text for a HTML-formatted message body is as follows:

```
<HTML> <HEAD> <TITLE> Oracle Workflow Notification </TITLE>
</HEAD>
<BODY BGCOLOR="#FFFFFF" >
<P>
<P>From: <B>&SENDER</B>
<P><B><FONT SIZE=+1>&COMMENT</FONT> </B>
<P><B>This notification requires a password-based signature
in your response. You cannot respond to this notification
through e-mail. Please access the online version of the
notification to submit your response.</B>
<P>&BODY
<P>
</BODY>
</HTML>
```

See: #WF\_SIG\_POLICY Attribute, *Oracle Workflow Developer's Guide*

### **Workflow Password Signature Warning Mail Message**

---

The Workflow Password Signature Warning Mail message is sent to a user by default if that user sends an e-mail response containing the notification ID (NID) line of a notification that requires a password-based electronic signature. A valid response to such a notification can only be submitted through the Notification Details web page. The notification template informs the recipient that that a password-based signature is required and that the response cannot be submitted through e-mail. Instead, the notification template directs the recipient to access the online version of the notification to submit a response.

**Note:** Password-based electronic signatures are currently supported only for the version of Oracle Workflow embedded in Oracle Applications.

The Workflow Password Signature Warning Mail message has the following message attributes. The values are drawn from the message definition associated with a notification activity.

<b>SUBJECT</b>	The subject line of the original message.
<b>COMMENT</b>	Comments added by the sender or the forwarder.

<b>BODY</b>	The text of the original message.
<b>HEADER</b>	Standard header attributes and any custom header attributes defined to hold key information for the message. See: Header Attributes, <i>Oracle Workflow Developer's Guide</i> .

You can customize the boilerplate text that appears in the body of the Workflow Password Signature Warning Mail message, where attributes preceded by an ampersand (&) are token substituted with runtime values when the notification is sent.

The boilerplate text for a plain text message body is as follows:

```
Oracle Workflow Notification
&COMMENT
```

```
Warning: You earlier received the notification shown below.
This notification requires a password-based signature in
your response. You cannot respond to this notification
through e-mail. Please access the online version of the
notification to submit your response.
```

---

```
&HEADER
&BODY
```

The boilerplate text for a HTML-formatted message body is as follows:

```
<html><Head></Head><body>Warning: You earlier received the
notification shown below. This notification requires a
password-based signature in your response. You cannot
respond to this notification through e-mail. Please access
the online version of the notification to submit your
response.
<hr>
&HEADER
<P>&BODY
</body></html>
```

See: #WF\_SIG\_POLICY Attribute, *Oracle Workflow Developer's Guide*

### **Orig. Workflow Password Signature Warning Mail Message**

Oracle Workflow provides the Orig. Workflow Password Signature Warning Mail message as an alternative template that you can

optionally use to send a message to a user if that user sends an e-mail response containing the notification ID (NID) line of a notification that requires a password-based electronic signature. This template does not include the header attributes that are displayed in the Workflow Password Signature Warning Mail message.

A valid response to a notification that requires a password-based signature can only be submitted through the Notification Details web page. The Orig. Workflow Password Signature Warning Mail notification template informs the recipient that that a password-based signature is required and that the response cannot be submitted through e-mail. Instead, the notification template directs the recipient to access the online version of the notification to submit a response.

**Note:** Password-based electronic signatures are currently supported only for the version of Oracle Workflow embedded in Oracle Applications.

The Orig. Workflow Password Signature Warning Mail message has the following message attributes. The values are drawn from the message definition associated with a notification activity.

<b>SUBJECT</b>	The subject line of the original message.
<b>COMMENT</b>	Comments added by the sender or the forwarder.
<b>BODY</b>	The text of the original message.

The boilerplate text for a plain text message body is as follows:

```
Oracle Workflow Notification
&COMMENT
```

```
Warning: You earlier received the notification shown below.
This notification requires a password-based signature in
your response. You cannot respond to this notification
through e-mail. Please access the online version of the
notification to submit your response.
```

---

```
&BODY
```

The boilerplate text for a HTML-formatted message body is as follows:

```
<html><Head></Head><body>Warning: You earlier received the
notification shown below. This notification requires a
password-based signature in your response. You cannot
respond to this notification through e-mail. Please access
the online version of the notification to submit your
```

```
response.  
<hr>  
&BODY  
</body></html>
```

See: #WF\_SIG\_POLICY Attribute, *Oracle Workflow Developer's Guide*

### **Workflow Open Mail (More Information Request) Message**

The Notification System uses the Workflow Open Mail (More Information Request) message as a default template to send a request for more information about a notification from one user to another user. The notification template includes generic instructions on how to respond with the requested information. It also includes the following information about a message: the name of the sender of the message, the history of any previous requests for more information and responses to those requests, the date that a response is due, and any comments from the sender or, if the notification is forwarded from another user, any comments from the forwarder.

The response instructions in the plain text message body describe how to reply manually. This message is used for notifications sent to performers with a notification preference of MAILTEXT or MAILATTH. The response instructions in the HTML-formatted message body describe how to reply using the automatically generated response template. This message is used for notifications sent to performers with a notification preference of MAILHTML or MAILHTM2, and is also attached to notifications sent to performers with a notification preference of MAILATTH.

The Workflow Open Mail (More Information Request) message has the following message attributes. The values are drawn from the message definition associated with a notification activity.

<b>DUE_DATE</b>	The date by which a response is required, specified in the notification activity.
<b>BODY</b>	The text of the body defined in the message.
<b>SUBJECT</b>	The subject line defined in the message.
<b>COMMENT</b>	Comments added by the sender or the forwarder.
<b>SENDER</b>	The name of the sender of the message, as displayed in the From column in the Worklist.
<b>HISTORY</b>	Any previous requests for more information about the notification and the responses to those requests.

<b>QUESTION</b>	Details about what information is being requested.
<b>RESPONSE</b>	The user response section.
<b>NOTIFICATION</b>	Required notification code used to identify the information in the notification.
<b>HEADER</b>	Standard header attributes and any custom header attributes defined to hold key information for the message. See: Header Attributes, <i>Oracle Workflow Developer's Guide</i> .

You can customize the boilerplate text that appears in the body of the Workflow Open Mail (More Information Request) message, where attributes preceded by an ampersand (&) are token substituted with runtime values when the notification is sent.

The boilerplate text for a plain text message body is as follows:

Oracle Workflow Notification

&COMMENT

&HISTORY

\_\_\_\_\_Start of Response Template\_\_\_\_\_

More Information Template for &NOTIFICATION

User &SENDER has requested more information for the notification. Please reply to this message, including this response template with your reply. Copy and paste from this message if necessary to obtain an editable copy of the template. Insert your comments between the quotes against the prompt.

Question: &QUESTION

&RESPONSE

\_\_\_\_\_End of Response Template\_\_\_\_\_

Notification Details:

&HEADER

&BODY

Due Date: &DUE\_DATE

The boilerplate text for a HTML-formatted message body is as follows:

```

<HTML> <HEAD> <TITLE> Oracle Workflow Notification </TITLE>
</HEAD>
<BODY BGCOLOR="#FFFFFF" >
<P>
<P><B><FONT SIZE=+1>&COMMENT</FONT> </B>
<P>&HISTORY
<P>&HEADER
<P>User &SENDER has requested more information for the
following notification.
<P>&BODY
<P>Question: <B>&QUESTION</B>
<P><B>Please click on the following link to automatically
generate an E-mail response for this question. Before
sending the E-mail response, ensure desired comments within
quotes.</B>
<P>&MAILTO
</BODY>
</HTML>

```

### **Orig. Workflow Open Mail (More Information Request) Message**

Oracle Workflow provides the Orig. Workflow Open Mail (More Information Request) message as an alternative template that you can optionally use as a template to send a request for more information about a notification from one user to another user. This template does not include the header attributes that are displayed in the Workflow Open Mail (More Information Request) message.

The Orig. Workflow Open Mail (More Information Request) notification template includes generic instructions on how to respond with the requested information. It also includes the following information about a message: the name of the sender of the message, the history of any previous requests for more information and responses to those requests, the date that a response is due, and any comments from the sender or, if the notification is forwarded from another user, any comments from the forwarder.

The response instructions in the plain text message body describe how to reply manually. This message is used for notifications sent to performers with a notification preference of MAILTEXT or MAILATTH. The response instructions in the HTML-formatted message body describe how to reply using the automatically generated response template. This message is used for notifications sent to performers with a notification preference of MAILHTML or

MAILHTML2, and is also attached to notifications sent to performers with a notification preference of MAILATTH.

The Orig. Workflow Open Mail (More Information Request) message has the following message attributes. The values are drawn from the message definition associated with a notification activity.

<b>DUE_DATE</b>	The date by which a response is required, specified in the notification activity.
<b>BODY</b>	The text of the body defined in the message.
<b>SUBJECT</b>	The subject line defined in the message.
<b>COMMENT</b>	Comments added by the sender or the forwarder.
<b>SENDER</b>	The name of the sender of the message, as displayed in the From column in the Worklist.
<b>HISTORY</b>	Any previous requests for more information about the notification and the responses to those requests.
<b>QUESTION</b>	Details about what information is being requested.
<b>RESPONSE</b>	The user response section.
<b>NOTIFICATION</b>	Required notification code used to identify the information in the notification.

The boilerplate text for a plain text message body is as follows:

```
Oracle Workflow Notification
&COMMENT
```

```
History: &HISTORY
```

```
_____Start of Response Template_____
```

```
More Information Template for &NOTIFICATION
```

```
User &SENDER has requested more information for the
notification. Please reply to this message, including this
response template with your reply. Copy and paste from this
message if necessary to obtain an editable copy of the
template. Insert your comments between the quotes against
the prompt.
```

```
Question: &QUESTION
```

```
&RESPONSE
```

```
_____End of Response Template_____
```

Notification Details:

&BODY

Due Date: &DUE\_DATE

The boilerplate text for a HTML-formatted message body is as follows:

```
<HTML> <HEAD> <TITLE> Oracle Workflow Notification </TITLE>
</HEAD>
<BODY BGCOLOR="#FFFFFF" >
<P>
<P><B><FONT SIZE=+1>&COMMENT</FONT> </B>
<P>&HISTORY
<P>User &SENDER has requested more information for the
following notification.
<P>&BODY
<P>Question: <B>&QUESTION</B>
<P><B>Please click on the following link to automatically
generate an E-mail response for this question. Before
sending the E-mail response, ensure desired comments within
quotes.</B>
<P>&MAILTO
</BODY>
</HTML>
```

## Step 11 Adding Worklist Functions to User Responsibilities

If you are using the version of Oracle Workflow embedded in Oracle Applications, you can optionally give users access to the Worklist, Advanced Worklist, and Personal Worklist web pages from any responsibility you choose. To make a Worklist available from a particular responsibility, you must add the appropriate function to the menu associated with that responsibility. Then you can assign that responsibility to your users. See: *Overview of Function Security, Oracle Applications System Administrator's Guide* and *Overview of Menus and Function Security, Oracle Applications Developer's Guide*.

The following table shows the functions that correspond to each version of the Worklist.

Function	User Function Name	Description
WF_WORKLIST_SIMPLE	Workflow Worklist	Simple Workflow worklist based on the OA Framework
WF_WORKLIST	Advanced Workflow Worklist	Advanced Workflow worklist based on the OA Framework
WF_WORKLIST_CUSTOM	Personal Workflow Worklist	Advanced Workflow worklist based on the OA Framework, with options to personalize search and display

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The Worklist and the Advanced Worklist are seeded on the menu for the Workflow User Web Applications responsibility by default. You can also add these functions to other responsibilities from which you want users to access notifications.

The Personal Worklist is an optional feature that is not seeded on any Oracle Applications menu. If you want users to access this version of the Worklist, you must first add the Personal Workflow Worklist function to the menu for a responsibility assigned to those users.

### See Also

To View Notifications from the Worklist, *Oracle Workflow User's Guide*

To View Notifications from the Advanced Worklist, *Oracle Workflow User's Guide*

To View Notifications from the Personal Worklist, *Oracle Workflow User's Guide*

## Step 12 Setting the FND: Notification Reassign Mode Profile Option

If you are using the OA Framework–based version of the Notification Details page available with Oracle Workflow embedded in Oracle Applications, you can use the FND: Notification Reassign Mode profile option to control which reassign modes are available to users. Oracle Workflow provides the following reassign modes.

- **Delegate** – This mode lets users give another user authority to respond to a notification on their behalf, while still retaining ownership of the notification themselves. For example, a manager might delegate all vacation scheduling approvals to an assistant.
- **Transfer** – This mode lets users give another user complete ownership of and responsibility for a notification. For example, users might select this option if they should not have received a certain notification and they want to send it to the correct recipient or to another recipient for resolution. A transfer may have the effect of changing the approval hierarchy for the notification. For example, a manager might transfer a notification about a certain project to another manager who now owns that project.

You can specify which reassign modes users can select by setting the FND: Notification Reassign Mode profile option to one of the following values.

- **Reassign** – This setting provides users access to both the Delegate and Transfer reassign modes. With this setting, the Advanced Worklist, the Personal Worklist, and the Response section of the Notification Details page display a Reassign button. Users can select this button to navigate to a Reassign page that lets them choose to either delegate or transfer the notification to another user. The `Reassign` setting is the default value for the FND: Notification Reassign Mode profile option.
- **Delegate** – This setting provides users access only to the Delegate reassign mode. With this setting, the Advanced Worklist, the Personal Worklist, and the Response section of the Notification Details page display a Delegate button in place of the Reassign button. Users can select the Delegate button to navigate to a Reassign page that only lets them delegate the notification to another user.
- **Transfer** – This setting provides users access only to the Transfer reassign mode. With this setting, the Advanced Worklist, the Personal Worklist, and the Response section of the Notification

Details page display a Transfer button in place of the Reassign button. Users can select the Transfer button to navigate to a Reassign page that only lets them transfer the notification to another user.

You can set the FND: Notification Reassign Mode profile option in the System Profile Values window. This profile option can be set at site, application, responsibility, and user levels. The internal name for this profile option is FND\_NTF\_REASSIGN\_MODE.

**Context:** You need to perform this step only once.

See: Overview of Setting User Profiles: *Oracle Applications System Administrator's Guide*

To View Notifications from the Advanced Worklist, *Oracle Workflow User's Guide*

To View Notifications from the Personal Worklist, *Oracle Workflow User's Guide*

See: To View the Details of a Notification, *Oracle Workflow User's Guide*

See: To Reassign a Notification to Another User, *Oracle Workflow User's Guide*

### Step 13 Customizing the Logo on Oracle Workflow's Web Pages

To use Oracle Workflow's web pages and the Workflow Monitor at your site, you must have Oracle HTTP Server installed. Refer to your web server documentation for additional information.

Once your web server is installed and set up, you can customize the company logo that appears on Oracle Workflow's web pages.

Use a web browser that supports JavaScript to connect to the Notification Web page or a web browser that supports Java Development Kit (JDK), Version 1.1.8 or higher and Abstract Windowing Toolkit (AWT) to connect to the Workflow Monitor.

#### ► To Customize Oracle Workflow's Web Pages

You can customize the company logo that appears in the upper right corner of Oracle Workflow's web pages.

1. Copy or rename your company logo file (in .gif format) to **FNDLOGOS.gif** if you are using Oracle Workflow embedded in Oracle Applications or **WFLOGO.gif** if you are using the standalone version of Oracle Workflow.
2. Move the file to the physical directory that your web server's /OA\_MEDIA/ virtual directory points to.

**Note:** If you are using Oracle Workflow embedded in Oracle Applications, the mapping of /OA\_MEDIA/ is completed as part of the Oracle Applications installation and setup steps.

**Note:** If you are using the standalone version of Oracle Workflow, the mapping of /OA\_MEDIA/ is completed after you install the Oracle Workflow server and you set up the Workflow Monitor.

**Context:** You need to perform this step only once.

## Step 14 Adding Custom Icons to Oracle Workflow

Oracle Workflow Builder looks for icons in the Icon subdirectory of the Oracle Workflow area on your PC. The Icon subdirectory is defined in the registry of Oracle Workflow Builder. The Oracle Workflow area is typically the Wf subdirectory within your ORACLE\_HOME directory structure.

Workflow provides a variety of icons that you can use with your activities and processes. You can add any icon files to this area as long as they are Windows icon files with the *.ico* suffix.

If you want the custom icons that you include in your Oracle Workflow Builder process definition to appear in the Workflow Monitor when you view the process, you must do the following:

- Convert the custom icon files (*.ico*) to *gif* format (*.gif*).
- Copy the *.gif* files to the physical directory that your web server's */OA\_MEDIA/* virtual directory points to, so that the Workflow Monitor can access them:

**Note:** If you are using Oracle Workflow embedded in Oracle Applications, the mapping of */OA\_MEDIA/* is completed as part of the Oracle Applications installation and setup steps.

**Note:** If you are using the standalone version of Oracle Workflow, the mapping of */OA\_MEDIA/* is completed after you install the Oracle Workflow server and you set up the Workflow Monitor.

**Context:** You need to perform this step only once.

## Step 15 **Setting Up the Java Function Activity Agent**

To execute external Java function activities, you must set up the Java Function Activity Agent. This functionality is currently only available for the standalone version of Oracle Workflow. The Java Function Activity Agent dequeues the messages related to external Java activities from the 'Outbound' queue for external function processing, calls the appropriate Java functions, and places the results on the 'Inbound' queue for external function processing.

**Note:** These 'Outbound' and 'Inbound' queues are separate from the queues used for the Business Event System. See: *Workflow Queue APIs, Oracle Workflow API Reference*.

After a Java function completes, you must run a background engine to process the 'Inbound' queue and complete the function activity. See: *Setting Up Background Engines: page 2 – 58*.

Some standard Workflow activities are external Java function activities and require the Java Function Activity Agent. You can also define your own external Java function activities. See: *Standard Activities, Oracle Workflow Developer's Guide*, *To Create a Function Activity, Oracle Workflow Developer's Guide*, and *Standard API for Java Procedures Called by Function Activities, Oracle Workflow Developer's Guide*.

To run the Java Function Activity Agent, you must have Java Runtime Environment (JRE) Version 1.1.8, or a higher 1.1.x version, installed.

**Note:** The Java Runtime Environment is available for download from <http://www.javasoft.com>.

**Context:** You need to perform this step only once.

### **Starting the Java Function Activity Agent**

---

If you are using the standalone version of Oracle Workflow, you can run scripts provided by Oracle Workflow to start the Java Function Activity agent. You can also start the agent manually.

When you start the Java Function Activity Agent, you must specify the database connection details. You can also optionally specify the character set and the JDBC driver type that you want to use.

You use different commands to start the agent depending on whether you are running it from a script or manually, which platform you are running it on, and which options you want to specify.

## Starting the Java Function Activity Agent From a Script

---

If you are using the standalone version of Oracle Workflow, you can run scripts called `wfvlsnr.csh` or `wfvlsnr.bat` to start the Java Function Activity Agent on UNIX or on Windows NT, respectively. These scripts are located on your server in the Oracle Workflow *admin* subdirectory.

If you define your own external Java function activities, you must edit the scripts to include the path to the JAR files containing your custom Java classes. The custom class files should reside on the same platform where the Java Function Activity Agent is run. The Java Function Activity Agent does not need to reside on the same tier as the database, however.

You can use commands with different syntax to run the scripts, depending on your platform and the options you want to specify.

### Running the `wfvlsnr.csh` Script on UNIX

For example, you can use the following command to run the `wfvlsnr.csh` script on UNIX, if you want to use the default JDBC OCI8 driver:

```
wfvlsnr.csh <user_name>/<password>@<connect_string>
[<character_set>]
```

Replace the parameters in the command as follows:

- `<user_name>`—The user name of your Oracle Workflow database account.
- `<password>`—The password for your Oracle Workflow database account.
- `<connect_string>`—The connect string for the database. Since this command uses the default JDBC OCI8 driver, the connect string should be the database name as specified in its TNSNAMES entry.
- `<character_set>`—The character set to use for the database session. If you do not specify a character set, Oracle Workflow uses UTF8 by default.

You can also use the following command to run the `wfvlsnr.csh` script on UNIX, if you want to specify the JDBC driver type to use:

```
wfvlsnr.csh "<user_name> <password> <connect_string>
[<JDBC_driver>]" [<character_set>]
```

Replace the parameters in the command as follows:

- *<user\_name>*—The user name of your Oracle Workflow database account.
- *<password>*—The password for your Oracle Workflow database account.
- *<connect\_string>*—The connect string for the database. The format of the connect string depends on the JDBC driver type.
  - For a JDBC OCI8 driver, the connect string should be the database name as specified in its TNSNAMES entry, in the following format:  
*<database\_name>*
  - For a JDBC THIN driver, you can use two different types of connect string. For the first type, the connect string should include the host name, port number, and database system identifier (SID) in the following format:  
*<host\_name>:<port\_number>:<database\_SID>*  
  
For the second type, the connect string should include an Oracle Net name–value pair with the host name, protocol, port number, and SID in the following format:  
*(description=(address=(host=<host\_name>) (protocol=<protocol>) (port=<port\_number>)) (connect\_data=(sid=<database\_SID>)))*
- *<JDBC\_driver>*—The JDBC driver type you want to use to connect to the database. The JDBC driver type can be either *oci8* or *thin*. If you do not specify a character set, Oracle Workflow uses the JDBC OCI8 driver by default.
 

**Note:** The connection details, including the user name, password, connect string, and JDBC driver type, must be enclosed in double quotes to separate them from the character set parameter.
- *<character\_set>*—The character set to use for the database session. If you do not specify a character set, Oracle Workflow uses UTF8 by default.

### Running the wfjvlsnr.bat Script on Windows NT

On Windows NT, you can use the following command to run the wfjvlsnr.bat script, if you want to use the default JDBC OCI8 driver:

```
wfjvlsnr.bat <user_name>/<password>@<connect_string>
[<character_set>]
```

Replace the parameters in the command as follows:

- *<user\_name>*—The user name of your Oracle Workflow database account.
- *<password>*—The password for your Oracle Workflow database account.
- *<connect\_string>*—The connect string for the database. Since this command uses the default JDBC OCI8 driver, the connect string should be the database name as specified in its TNSNAMES entry.
- *<character\_set>*—The character set to use for the database session. If you do not specify a character set, Oracle Workflow uses UTF8 by default.

You can also use the following command to run the wfjvlsnr.bat script on Windows NT, if you want to specify the JDBC driver type to use:

```
wfjvlsnr.bat "<user_name> <password> <connect_string>
[<JDBC_driver>]" [<character_set>]
```

Replace the parameters in the command as follows:

- *<user\_name>*—The user name of your Oracle Workflow database account.
- *<password>*—The password for your Oracle Workflow database account.
- *<connect\_string>*—The connect string for the database. The format of the connect string depends on the JDBC driver type.
  - For a JDBC OCI8 driver, the connect string should be the database name as specified in its TNSNAMES entry, in the following format:  
*<database\_name>*
  - For a JDBC THIN driver, you can use two different types of connect string. For the first type, the connect string should include the host name, port number, and database system identifier (SID) in the following format:  
*<host\_name>:<port\_number>:<database\_SID>*

For the second type, the connect string should include an Oracle Net name–value pair with the host name, protocol, port number, and SID in the following format:

```
(description=(address=(host=<host_name>) (protocol=<protocol>) (port=<port_number>)) (connect_data=(sid=<database_SID>)))
```

- `<JDBC_driver>`—The JDBC driver type you want to use to connect to the database. The JDBC driver type can be either `oci8` or `thin`. If you do not specify a character set, Oracle Workflow uses the JDBC OCI8 driver by default.
 

**Note:** The connection details, including the user name, password, connect string, and JDBC driver type, must be enclosed in double quotes to separate them from the character set parameter.
- `<character_set>`—The character set to use for the database session. If you do not specify a character set, Oracle Workflow uses UTF8 by default.

### **Starting the Java Function Activity Agent Manually**

---

To start the Java Function Activity Agent manually, run JRE against `oracle.apps.fnd.wf.WFFALsnr`, specifying your CLASSPATH, the user name and password of your Oracle Workflow database account, and the database connect string. You can also optionally specify the character set and the JDBC driver type that you want to use.

The CLASSPATH must point to the Java Runtime Environment, the directory containing the Workflow JAR files, the Oracle XML parser, the Oracle JDBC implementation, and the following Workflow JAR files:

- `wfjava.jar`—The Java Function Activity Agent.
- `wfapi.jar`—Workflow Java APIs.
- The Share JAR file—Utilities referenced by the Workflow Java APIs. In the standalone version of Oracle Workflow with Oracle9i, this file is named `share-<version>.jar`, such as `share-1_1_9.jar`, or whichever version is current. In the version of Oracle Workflow embedded in Oracle Applications, this file is named `fndbalishare.jar`.
- The Ewt JAR file—Utilities referenced by the Workflow Java APIs. In the standalone version of Oracle Workflow with Oracle9i, this file is named `ewt-<version>.jar`, such as `ewt-3_3_18.jar`, or whichever version is current. In the version of Oracle Workflow embedded in Oracle Applications, this file is named `fndewt.jar`.
- The Swing JAR file—Optional additional utilities. In the standalone version of Oracle Workflow with Oracle9i, this file is named `swingall-<version>.jar`, such as `swingall-1_1_1.jar`, or whichever version is current. In the version of Oracle

Workflow embedded in Oracle Applications, this file is named `fndswing.jar`.

**Note:** In the standalone version of Oracle Workflow with Oracle9i, the Workflow JAR files are located in the `<ORACLE_HOME>/jlib` directory. In the version of Oracle Workflow embedded in Oracle Applications, the Workflow JAR files are located in the `<ORACLE_HOME>/wf/java/oracle/apps/fnd/wf/jar/` directory.

If you define your own external Java function activities, you must also include the JAR files containing your custom Java classes in the CLASSPATH. The custom class files should reside on the same platform where the Java Function Activity Agent is run. The Java Function Activity Agent does not need to reside on the same tier as the database, however.

You can use commands with different syntax to start the Java Function Activity Agent manually, depending on your platform and the options you want to specify.

### Starting the Java Function Activity Agent on UNIX

For example, you can use the following command to start the Java Function Activity Agent on UNIX, if you want to use the default JDBC OCI8 driver:

```
jre -classpath
"$<JREPATH>/rt.jar:$<Workflow_JAR_file_directory>:
$<Workflow_JAR_file_directory>/wfjava.jar:$<ORACLE_HOME>/wf/
xml/java/lib/xmlparserv2.jar:$<Workflow_JAR_file_directory>/
wfapi.jar:$<ORACLE_HOME>/jdbc/lib/classes111.zip:
$<Workflow_JAR_file_directory>/<Share_JAR_file>:
$<Workflow_JAR_file_directory>/<Ewt_JAR_file>:
$<Workflow_JAR_file_directory>/<Swing_JAR_file>:"
[-DCHARSET=<character_set>] oracle.apps.fnd.wf.WFFALsnr
<user_name>/<password>@<connect_string>
```

In this command, you can optionally use the `-DCHARSET` option to specify the character set that you want to use. If you do not specify a character set, Oracle Workflow uses UTF8 by default.

Replace the parameters in the command as follows:

- `<character_set>`—The character set to use for the database session.
- `<user_name>`—The user name of your Oracle Workflow database account.

- *<password>*—The password for your Oracle Workflow database account.
- *<connect\_string>*—The connect string for the database. Since this command uses the default JDBC OCI8 driver, the connect string should be the database name as specified in its TNSNAMES entry.

You can also use the following command to start the Java Function Activity Agent on UNIX, if you want to specify the JDBC driver type to use:

```
jre -classpath
"$<JREPATH>/rt.jar:$<Workflow_JAR_file_directory>:
$<Workflow_JAR_file_directory>/wfjava.jar:$<ORACLE_HOME>/wf/
xml/java/lib/xmlparserv2.jar:$<Workflow_JAR_file_directory>/
wfapi.jar:$<ORACLE_HOME>/jdbc/lib/classes111.zip:
$<Workflow_JAR_file_directory>/<Share_JAR_file>:
$<Workflow_JAR_file_directory>/<Ewt_JAR_file>:
$<Workflow_JAR_file_directory>/<Swing_JAR_file>:"
[-DCHARSET=<character_set>] oracle.apps.fnd.wf.WFFALsnr
<user_name> <password> <connect_string> [<JDBC_driver>]
```

In this command, you can optionally use the `-DCHARSET` option to specify the character set that you want to use. If you do not specify a character set, Oracle Workflow uses UTF8 by default.

Replace the parameters in the command as follows:

- *<character\_set>*—The character set to use for the database session.
- *<user\_name>*—The user name of your Oracle Workflow database account.
- *<password>*—The password for your Oracle Workflow database account.
- *<connect\_string>*—The connect string for the database. The format of the connect string depends on the JDBC driver type.
  - For a JDBC OCI8 driver, the connect string should be the database name as specified in its TNSNAMES entry, in the following format:  
*<database\_name>*
  - For a JDBC THIN driver, you can use two different types of connect string. For the first type, the connect string should include the host name, port number, and database system

identifier (SID) in the following format:

```
<host_name>:<port_number>:<database_SID>
```

For the second type, the connect string should include an Oracle Net name–value pair with the host name, protocol, port number, and SID in the following format:

```
(description=(address=(host=<host_name>) (protocol=
<protocol>) (port=<port_number>)) (connect_data=(sid=
<database_SID>)))
```

- *<JDBC\_driver>*—The JDBC driver type you want to use to connect to the database. The JDBC driver type can be either `oci8` or `thin`. If you do not specify a character set, Oracle Workflow uses the JDBC OCI8 driver by default.

### Starting the Java Function Activity Agent on Windows NT

On Windows NT, you can use the following command to start the Java Function Activity Agent, if you want to use the default JDBC OCI8 driver:

```
jre -classpath
";<JREPATH>\rt.jar;<Workflow_JAR_file_directory>;
<Workflow_JAR_file_directory>\wfjava.jar;<ORACLE_HOME>\wf\
xml\java\lib\xmlparserv2.jar;<Workflow_JAR_file_directory>\
wfapi.jar;<ORACLE_HOME>\jdbc\lib\classes111.zip;
<Workflow_JAR_file_directory>\<Share_JAR_file>;
<Workflow_JAR_file_directory>\<Ewt_JAR_file>;
<Workflow_JAR_file_directory>\<Swing_JAR_file>;"
-nojit [-DCHARSET=<character_set>]
oracle.apps.fnd.wf.WFFALsnr
<user_name>/<password>@<connect_string>
```

In this command, you can optionally use the `-DCHARSET` option to specify the character set that you want to use. If you do not specify a character set, Oracle Workflow uses UTF8 by default.

Replace the parameters in the command as follows:

- *<character\_set>*—The character set to use for the database session.
- *<user\_name>*—The user name of your Oracle Workflow database account.
- *<password>*—The password for your Oracle Workflow database account.
- *<connect\_string>*—The connect string for the database. Since this command uses the default JDBC OCI8 driver, the connect

string should be the database name as specified in its TNSNAMES entry.

You can also use the following command to start the Java Function Activity Agent on Windows NT, if you want to specify the JDBC driver type to use:

```
jre -classpath
";<JREPATH>\rt.jar;<Workflow_JAR_file_directory>;
<Workflow_JAR_file_directory>\wfjava.jar;<ORACLE_HOME>\wf\
xml\java\lib\xmlparserv2.jar;<Workflow_JAR_file_directory>\
wfapi.jar;<ORACLE_HOME>\jdbc\lib\classes111.zip;
<Workflow_JAR_file_directory>\<Share_JAR_file>;
<Workflow_JAR_file_directory>\<Ewt_JAR_file>;
<Workflow_JAR_file_directory>\<Swing_JAR_file>;"
-nojit [-DCHARSET=<character_set>]
oracle.apps.fnd.wf.WFFALsnr <user_name> <password>
<connect_string> [<JDBC_driver>]
```

In this command, you can optionally use the `-DCHARSET` option to specify the character set that you want to use. If you do not specify a character set, Oracle Workflow uses UTF8 by default.

Replace the parameters in the command as follows:

- `<character_set>`—The character set to use for the database session.
- `<user_name>`—The user name of your Oracle Workflow database account.
- `<password>`—The password for your Oracle Workflow database account.
- `<connect_string>`—The connect string for the database. The format of the connect string depends on the JDBC driver type.
  - For a JDBC OCI8 driver, the connect string should be the database name as specified in its TNSNAMES entry, in the following format:  
`<database_name>`
  - For a JDBC THIN driver, you can use two different types of connect string. For the first type, the connect string should include the host name, port number, and database system identifier (SID) in the following format:  
`<host_name>:<port_number>:<database_SID>`  
  
For the second type, the connect string should include an Oracle Net name–value pair with the host name, protocol,

port number, and SID in the following format:

```
(description=(address=(host=<host_name>) (protocol=
<protocol>) (port=<port_number>)) (connect_data=(sid=
<database_SID>)))
```

- *<JDBC\_driver>*—The JDBC driver type you want to use to connect to the database. The JDBC driver type can be either *oci8* or *thin*. If you do not specify a character set, Oracle Workflow uses the JDBC OCI8 driver by default.

## **Stopping the Java Function Activity Agent**

---

Normally, the Java Function Activity Agent runs as a perpetual job. However, you can stop the agent by running a script called *wfjvstop.sql*, located in the *admin/sql* subdirectory on your Oracle Workflow server. This script places a stop message on the 'Outbound' queue. See: *wfjvstop.sql*: page 6 – 11.

**Note:** If you are running more than one Java Function Activity Agent simultaneously, you must run the *wfjvstop.sql* script once for each Java Function Activity Agent.

## Step 16 Setting Up the Business Event System

The Business Event System is an application service delivered with Oracle Workflow that uses Oracle Advanced Queuing (AQ) to communicate business events between systems. You need to perform this step to use event processing. See: Overview of the Oracle Workflow Business Event System, *Oracle Workflow API Reference* and Managing Business Events, *Oracle Workflow Developer's Guide*.

To set up the Business Event System and enable message propagation, perform the following steps:

1. If you want to communicate business events between the local system and external systems, create database links to those external systems.
2. If you want to use custom queues for propagating events, set up your queues.
3. Check the Business Event System setup parameters.
4. Schedule listeners for local inbound agents.
5. Schedule propagation for local outbound agents.
6. If you are using the version of Oracle Workflow embedded in Oracle Applications, synchronize event and subscription license statuses with product license statuses.
7. Ensure that the WF\_CONTROL queue is periodically cleaned up to remove inactive subscribers.

You should recheck your setup whenever you make changes to your agents that affect the physical implementation required for propagation. See: Agents, *Oracle Workflow Developer's Guide*.



**Attention:** Oracle Workflow sets the status of the local system to Enabled by default. After you finish setting up the Business Event System, you can use the Global Workflow Preferences web page to set the system status that you want for event processing. See: Setting Global User Preferences: page 2 – 13.

**Context:** You need to perform this step only once.

### Creating Database Links

---

To propagate event messages between systems, you must create database links from your local system to the remote systems. You should fully qualify the database link name with the domain name.

You can either create database links manually, or use Oracle DBA Studio in the Oracle Enterprise Manager to perform this step. Oracle DBA Studio allows workflow administrators to quickly and easily create and administer database links, queue tables, queues, and queue propagation without requiring knowledge of the SQL DDL commands. See: *DBA Management Pack, Oracle Enterprise Manager Administrator's Guide*.

You can use the following syntax to create a database link manually:

```
CREATE DATABASE LINK <database link name> CONNECT TO
  <user> IDENTIFIED BY <password>
  USING '<connect string>';
```

For example:

```
CREATE DATABASE LINK wf817.us.oracle.com CONNECT TO
  wfuser IDENTIFIED BY welcome
  USING 'wf817';
```

If you have multiple installations of Oracle Workflow on both the local database and the remote database, and you want to use the same username and password to access both systems, you can omit the `<user> IDENTIFIED BY <password>` clause. In this case, the database link uses the username and password of the user who is connected to the database.

```
CREATE DATABASE LINK <database link name> CONNECT TO
  USING '<connect string>';
```

If you want to create a public database link available to all users, specify the parameter PUBLIC.

```
CREATE PUBLIC DATABASE LINK <database link name> CONNECT TO
  <user> IDENTIFIED BY <password>
  USING '<connect string>';
```

To verify the names of your database links, use the following syntax:

```
SELECT db_link FROM all_db_links
```

You can also use the Check Setup web page to verify that your database links are set up. See: *Checking the Business Event System Setup: page 2 – 148*.

## See Also

CREATE DATABASE LINK, *Oracle SQL Reference*

## Setting Up Queues

The Business Event System uses Oracle Advanced Queuing (AQ) to communicate event messages between systems. You must associate a queue with each agent on a Workflow-enabled system that you define in the Event Manager.

When you install Oracle Workflow, several standard queues are created automatically for the standard Workflow agents. These queues all use either the standard WF\_EVENT\_T structure or JMS Text messages as their payload type. See: *Standard Agents, Oracle Workflow Developer's Guide, Event Message Structure, Oracle Workflow API Reference, and Mapping Between WF\_EVENT\_T and SYS.AQ\$\_JMS\_TEXT\_MESSAGEE, Oracle Workflow API Reference.*

The following table lists the standard queues.

Queue Table	Queue Name	Payload Type	Description
WF_CONTROL	WF_CONTROL	SYS.AQ\$_JMS_TEXT_MESSAGE	Oracle Workflow internal queue, not for customer use
WF_DEFERRED	WF_DEFERRED	WF_EVENT_T	Standard queue for deferred subscription processing
WF_ERROR	WF_ERROR	WF_EVENT_T	Standard queue for error handling
WF_IN	WF_IN	WF_EVENT_T	Default inbound queue
WF_JMS_IN	WF_JMS_IN	SYS.AQ\$_JMS_TEXT_MESSAGE	Default inbound queue for JMS Text messages
WF_JMS_OUT	WF_JMS_OUT	SYS.AQ\$_JMS_TEXT_MESSAGE	Default outbound queue for JMS Text messages
WF_NOTIFICATION_IN	WF_NOTIFICATION_IN	SYS.AQ\$_JMS_TEXT_MESSAGE	Standard inbound queue for e-mail notification responses
WF_NOTIFICATION_OUT	WF_NOTIFICATION_OUT	SYS.AQ\$_JMS_TEXT_MESSAGE	Standard outbound queue for e-mail notifications
WF_OUT	WF_OUT	WF_EVENT_T	Default outbound queue

Table 6 – 5 (Page 1 of 1)

**Note:** Oracle Workflow also includes three additional queues named WF\_REPLAY\_IN, WF\_REPLAY\_OUT, and WF\_SMTP\_O\_1\_QUEUE, which are not currently used.

The default retention time set for consumed messages on the standard Workflow queues is seven days. You can change the retention time if

necessary using the PL/SQL procedure `DBMS_AQADM.Alter_Queue`. You must not change any other part of the setup of these queues.

You can also set up your own queues for event message propagation. You can either set up queues manually, or use Oracle DBA Studio in the Oracle Enterprise Manager to perform this step. Oracle DBA Studio allows workflow administrators to quickly and easily create and administer database links, queue tables, queues, and queue propagation without requiring knowledge of the SQL DDL commands. See: DBA Management Pack, *Oracle Enterprise Manager Administrator's Guide*.

To set up a queue manually, you must create the queue table, create the queue, and start the queue. You should perform these tasks using a schema that is appropriate for the application for which you will use the queue. You must specify the schema that owns the queue as part of the queue name when you assign the queue to a Business Event System agent.

- To create a queue table, use the PL/SQL procedure `DBMS_AQADM.Create_Queue_Table`. Use the following syntax:

```
DBMS_AQADM.Create_Queue_Table (
    queue_table => '<queue table name>',
    queue_payload_type => '<queue payload type>',
    sort_list => 'PRIORITY,ENQ_TIME',
    multiple_consumers => TRUE
    compatible => '8.1');
```

For queues that you want use the standard Workflow format, specify the queue payload type as `WF_EVENT_T`. These queues can use the standard queue handler provided with Oracle Workflow, `WF_EVENT_QH`. For queues that you want to use the JMS Text message format, specify the queue payload as `$AQ_JMS_TEXT_MESSAGE`. These queues can use the standard JMS queue handler provided with Oracle Workflow, `WF_EVENT_OJMSTEXT_QH`. If you define a queue with a different payload type, you must create a queue handler to translate between the standard Workflow format and the format required by the queue. See: Standard APIs for a Queue Handler, *Oracle Workflow Developer's Guide*.

You can also use the `storage_clause` parameter to specify the tablespace where you want to create the queue table. You may want to specify a tablespace if you expect a queue to be very large.

- To create a queue, use the PL/SQL procedure `DBMS_AQADM.Create_Queue`. Use the following syntax:

```
DBMS_AQADM.Create_Queue (  
    queue_name => '<queue name>',  
    queue_table => '<queue table name>');
```

**Note:** If you want other database users to enqueue messages onto or dequeue messages from your queue, you must grant those users the appropriate privileges using the PL/SQL procedure `DBMS_AQADM.Grant_Queue_Privilege`.

- To start a queue, use the PL/SQL procedure `DBMS_AQADM.Start_Queue`. Use the following syntax:

```
DBMS_AQADM.Start_Queue (  
    queue_name => '<queue name>');
```

Oracle Workflow provides a sample script called `wfenvquec.sql` which you can modify to set up your queues, as well as a sample script called `wfenvqued.sql` which you can modify to drop queues. These scripts are located on your server in the Oracle Workflow *sql* subdirectory for the standalone version of Oracle Workflow, or in the *sql* subdirectory under `$FND_TOP` for the version of Oracle Workflow embedded in Oracle Applications.

You can verify that your queues are set up properly using the Check Setup web page if you are using the standalone version of Oracle Workflow, or using the Oracle Workflow Manager component of Oracle Applications Manager if you are using the version of Oracle Workflow embedded in Oracle Applications. See: *Checking the Business Event System Setup: page 2 – 148* or the Oracle Applications Manager online help.

**Note:** SQL\*Plus version 8.1.6 does not allow you to select the `USER_DATA` column from queue tables. You must have SQL\*Plus version 8.1.7 or higher, which allows you to select `USER_DATA`, if you want to be able to select the event message payload from your Workflow queues.

## See Also

*Administrative Interface, Oracle Application Developer's Guide – Advanced Queuing*

*DBMS\_AQADM, Oracle Supplied PL/SQL Packages Reference*

## Checking the Business Event System Setup

---

If you are using the standalone version of Oracle Workflow, you can use the Check Setup web page to verify that the required parameters and components have been set up to enable message propagation for the Business Event System.

If you are using the version of Oracle Workflow embedded in Oracle Applications, you can use the Oracle Workflow Manager component of Oracle Applications Manager to verify some Business Event System setup information, such as the required database initialization parameters and the number of messages on local agents. For more information, please refer to the Oracle Applications Manager online help.

### ► To Check the Business Event System Setup

1. Use a web browser to connect to the following URL:

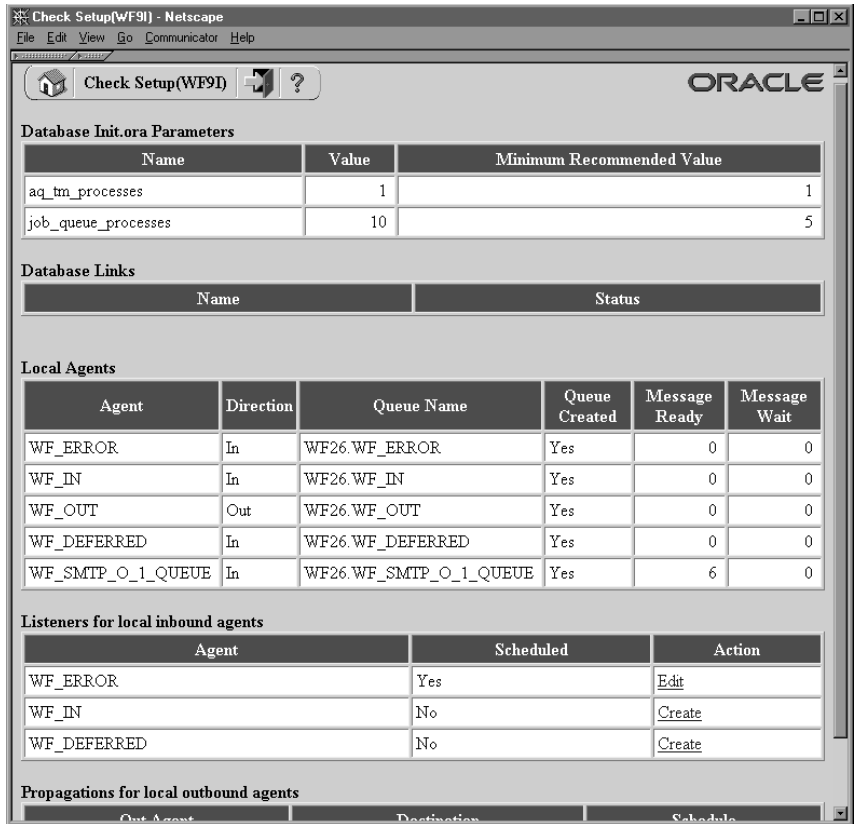
```
<webagent>/wf_setup.check_all
```

Replace *<webagent>* with the base URL of the web agent configured for Oracle Workflow in your Web server. See: Setting Global User Preferences: page 2 – 13.



**Attention:** This URL accesses a secured page, so if you have not yet logged on as valid user in the current web session, you will be prompted to do so before the page appears. You must have workflow administrator privileges to access the Event Manager web pages.

**Note:** You can also access the Check Setup web page from the Oracle Workflow home page. See: Accessing the Oracle Workflow Home Page: page 4 – 2.



- The Check Setup page appears, displaying the propagation settings and components for your local system.
- Use the Database Init.ora Parameters region to verify your settings for the database initialization parameters related to AQ. The Check Setup page displays the actual value defined for each parameter as well as the minimum recommended value for Oracle Workflow.

To modify any of these parameters when using Oracle8i, change the settings in the init.ora file for your database. Then you must restart your database to make the changes effective.

If you are using Oracle9i, you can either modify the parameters in the init.ora file and restart the database, or you can use the ALTER SYSTEM statement to dynamically modify the values for AQ\_TM\_PROCESSES and JOB\_QUEUE\_PROCESSES for the duration of the instance.

- AQ\_TM\_PROCESSES**—This parameter enables the time manager process in Oracle Advanced Queuing (AQ). The time

manager process is required by Oracle Workflow to monitor delay events in queues, as in the case of the Oracle Workflow standard Wait activity. The minimum recommended number of time manager processes for Oracle Workflow is one.

- **JOB\_QUEUE\_INTERVAL**—If you are using Oracle8*i*, specify the job queue interval to determine how frequently each SNP job queue process in your instance wakes up. Oracle Workflow requires the job queue interval to be less than or equal to the latency parameter defined for your AQ propagation schedules, to allow queues to be rechecked for messages with the specified latency. The recommended job queue interval for Oracle Workflow is five seconds.

**Note:** Because the `JOB_QUEUE_INTERVAL` parameter is desupported in Oracle9*i*, the Check Setup page does not display this parameter if you are using Oracle9*i*, and you do not need to set a value for it.

- **JOB\_QUEUE\_PROCESSES**—This parameter defines the number of SNP job queue processes for your instance. Oracle Workflow requires job queue processes to handle propagation of Business Event System event messages by AQ queues. You must start at least one job queue process to enable message propagation. The minimum recommended number of processes for Oracle Workflow is two.

**Note:** If you want to review more detailed information about AQ processing, you can optionally use another initialization parameter, `EVENT`, for detailed database level tracing of issues related to AQ. Add the following line to your `init.ora` file:

```
event = "24040 trace name context forever, level 10"
```

Then restart your database to make this change effective. Be aware that using this parameter may generate large trace files.

4. Use the Database Links region to verify your database links. The Check Setup page displays the name and status of each database link that is referenced in an agent's address. You should create any required database links that do not yet exist. See: [Creating Database Links: page 2 – 143](#).

**Note:** Ensure that the database link names used in your agents' addresses are exactly the same as the database link names specified when the database links were created.

5. Use the Local Agents region to verify the queues that are set up for the agents defined on your local system. The Check Setup web page displays the name and direction of each agent, the name of

the queue assigned to the agent, whether or not the queue has been created, how many messages on the queue have been processed and are ready to be consumed, and how many messages are still waiting to be processed. You should create any required queues that do not yet exist. See: *Agents, Oracle Workflow Developer's Guide and Setting Up Queues*: page 2 – 145.

6. Use the Listeners for Local Inbound Agents region to schedule listeners to receive inbound event messages. See: *Scheduling Listeners for Local Inbound Agents*: page 2 – 151.
7. Use the Propagations for Local Outbound Agents region to schedule propagation to send event messages. See: *Scheduling Propagation for Local Outbound Agents*: page 2 – 156.

## See Also

*Oracle Reference*

*Oracle Application Developer's Guide – Advanced Queuing*

### **Scheduling Listeners for Local Inbound Agents**

---

To communicate events between different agents, you must schedule listeners for the inbound agents on your local system. The Business Event System requires listeners to be scheduled to receive inbound event messages.

When you schedule a listener for an agent, it monitors the agent's queue, dequeuing any inbound event messages. When an event message is received, the Event Manager searches for and executes any active subscriptions by the local system to that event with a source type of External, and also any active subscriptions by the local system to the Any event with a source type of External. The listener exits after all event messages on the agent's queue have been dequeued.

The agent listener program is defined as a service component in the Generic Service Component Framework. This framework helps to simplify and automate the management of background Java services.

You can use Oracle Workflow Manager to submit and manage agent listener service components. Oracle Workflow Manager is available as a component of Oracle Applications Manager if you are using the version of Oracle Workflow embedded in Oracle Applications, or as a component of Oracle Enterprise Manager if you are using the standalone version of Oracle Workflow. For more information, please

refer to the Oracle Applications Manager online help or the Oracle Enterprise Manager online help.

Additionally, if you are using the standalone version of Oracle Workflow, you can also use the Check Setup web page to schedule listeners for your local inbound agents. When you schedule a listener through the Check Setup page, Oracle Workflow reruns the listener indefinitely, at the interval you specify. After you schedule a listener, you can modify its schedule by updating its settings. You can also stop a listener altogether by deleting it. See: To Schedule a Listener for a Local Inbound Agent: page 2 – 153 and To Update or Delete a Listener: page 2 – 156.

Oracle Workflow also provides an administrative script named *wfagtlst.sql* that you can use to run an agent listener. See *Wfagtlst.sql*: page 6 – 5.

Oracle Workflow provides three seeded agent listener service components for the standard WF\_DEFERRED, WF\_ERROR, and WF\_NOTIFICATION\_IN agents. These agent listeners are named Workflow Deferred Agent Listener, Workflow Error Agent Listener, and Workflow Inbound Notifications Agent Listener, and they support deferred subscription processing, error handling for the Business Event System, and inbound e-mail processing for notification mailers, respectively.

In Oracle Applications, Oracle XML Gateway also provides two seeded agent listener service components for the standard ECX\_INBOUND and ECX\_TRANSACTION agents. These agent listeners are named ECX Inbound Agent Listener and ECX Transaction Agent Listener, respectively. For more information, see Starting Agent Listeners, *Oracle XML Gateway User's Guide*. See: Monitor Workflow Processes, *Oracle XML Gateway User's Guide*.

You can also optionally create additional agent listener service components. For example, you can configure agent listeners for other inbound agents that you want to use for event message propagation, such as the standard WF\_IN and WF\_JMS\_IN agents, or any custom agents. You can also configure an agent listener service component that only processes messages on a particular agent that are instances of a specific event.

If you create custom agent listener service components, you can assign them to the seeded container for agent listeners. In Oracle Applications, the seeded container is named Workflow Agent Listener Service; in standalone Oracle Workflow, the seeded container is named WFALSNRSVC, within an OC4J instance named Service\_Component\_Container. In Oracle Applications, based on the

volume to be handled by the seeded container, you can also choose to create your own custom containers. You create a container as a GSM service in Oracle Applications Manager. If you create a custom GSM service in OAM, you can copy the service parameters from the seeded Workflow Agent Listener Service to your new service in order to specify how to run the new service.

Before agent listener service components can run, the container which manages them must first be started. In order to run the seeded agent listeners, you should ensure that the Workflow Agent Listener Service container is running using Oracle Applications Manager for the version of Oracle Workflow embedded in Oracle Applications, or ensure that the WFALSNRSVC container is running using Oracle Enterprise Manager for the standalone version of Oracle Workflow. If you create your own custom containers in OAM for custom service components, ensure that those containers are running as well.

## See Also

Agents, *Oracle Workflow Developer's Guide*

Listen, *Oracle Workflow API Reference*

Wfagtlst.sql: page 6 – 5

### ► To Schedule a Listener for a Local Inbound Agent

1. Use a web browser to connect to the following URL:

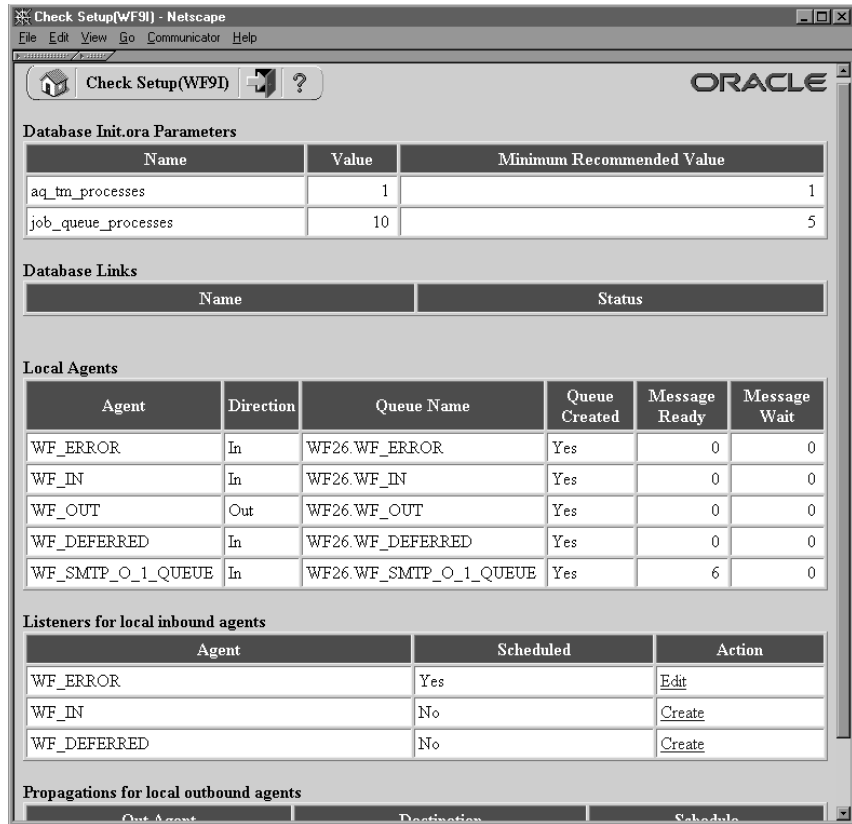
```
<webagent>/wf_setup.check_all
```

Replace *<webagent>* with the base URL of the web agent configured for Oracle Workflow in your Web server. See: Setting Global User Preferences: page 2 – 13.



**Attention:** This URL accesses a secured page, so if you have not yet logged on as valid user in the current web session, you will be prompted to do so before the page appears. You must have workflow administrator privileges to access the Event Manager web pages.

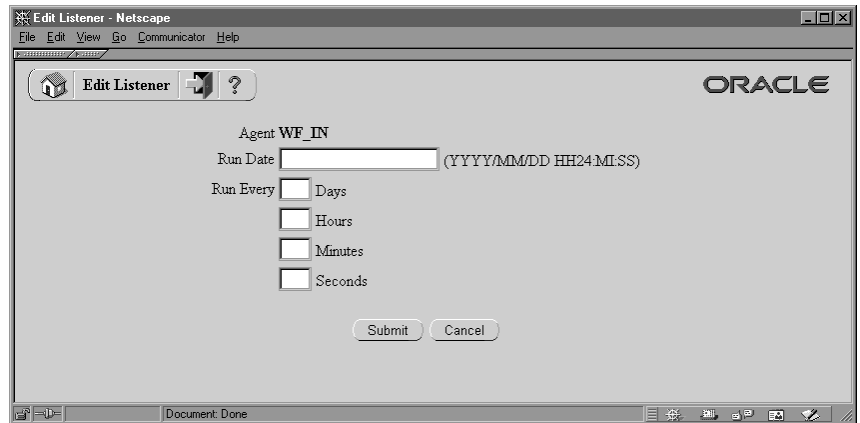
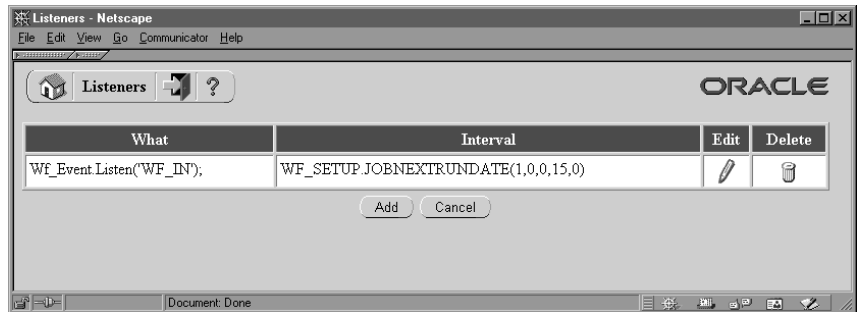
**Note:** You can also access the Check Setup web page from the Oracle Workflow home page. See: Accessing the Oracle Workflow Home Page: page 4 – 2.



2. The Check Setup page appears, displaying the propagation settings and components for your local system.
3. Locate the agent you want in the Listeners for Local Inbound Agents region. The Check Setup page summarizes the agent name and Scheduled status for each local inbound agent.
4. If no listeners are scheduled for the agent yet, the Scheduled status for the agent is No. Choose the Create link in the Action column for that agent to create the first listener for the agent. The Edit Listener page appears, displaying the name of the selected agent.

If at least one listener is already scheduled for the agent, the Scheduled status for the agent is Yes. Choose the Edit link in the Action column for that agent to create an additional listener. The Listeners page appears, displaying a list of existing listeners for the agent. The Listeners page summarizes each Listen procedure that runs for the agent as well as the interval at which the procedure is resubmitted.

Choose the Add button. The Edit Listener page appears, displaying the name of the selected agent. You can also choose the Cancel button to return to the Check Setup page without creating a new listener.



- In Edit Listener page, enter the date on which you want to start running the listener in the Run Day field. To start the listener on the current system date, leave this field blank.

**Note:** If you have set your user preferences to a date format that includes a time setting, then you can specify the time when you want to start the listener, as well as the date. Otherwise, you can only specify a date. See: *Setting User Preferences, Oracle Workflow User's Guide.*

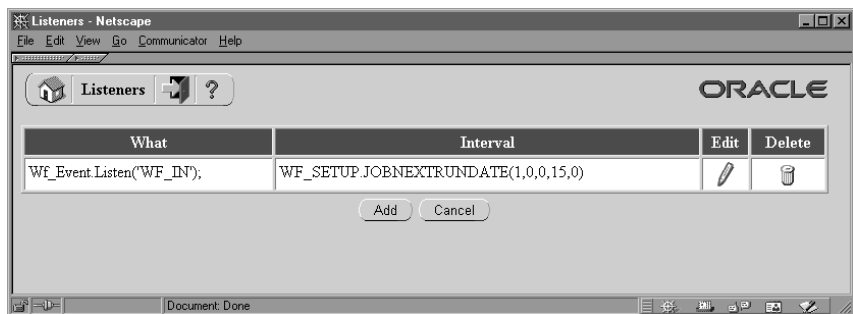
- In the Run Every fields, enter an interval to specify how often you want the listener to be run. You can specify the interval in days, hours, minutes, and seconds. Oracle Workflow reruns the listener indefinitely, at the interval you specify.

- Choose the Submit button to save the listener schedule. If you are scheduling the first listener for the agent, the Check Setup page appears, displaying an updated Scheduled status. If you are scheduling an additional listener, the Listeners page appears, displaying an updated list of listeners.

You can also choose the Cancel button to return to the Check Setup page or the Listeners page without saving the listener.

► **To Update or Delete a Listener**

- Use the Listeners for Local Inbound Agents region of the Check Setup page to locate the inbound agent that you want. See: To Schedule a Listener for a Local Inbound Agent: page 2 – 153.
- If the Scheduled status for the agent is Yes, at least one listener is already scheduled for the agent. Choose the Edit link in the Action column to open the Listeners page, displaying a list of existing listeners.



- To update a listener, choose the pencil icon in the Edit column for that listener. The Edit Listener page appears. Make your changes to the listener schedule and save your work. See: To Schedule a Listener for a Local Inbound Agent: page 2 – 153.
- To delete a listener, choose the trash icon in the Delete column for that listener, and choose OK in the confirmation window that appears. You can also choose Cancel in the confirmation window to return to the Listeners page without deleting the listener.

### **Scheduling Propagation for Local Outbound Agents**

To communicate events between different agents, you must schedule propagation for the outbound agents on your local system. The

Business Event System requires propagation to be scheduled to send outbound event messages.

When you send an event message to an agent, the Event Manager places the message on the queue associated with the outbound agent. The message is then asynchronously delivered to the inbound agent by propagation.

You can use Oracle Enterprise Manager to schedule AQ propagation for agents that use the SQLNET protocol. See: Oracle Enterprise Manager Support, *Oracle Application Developer's Guide – Advanced Queuing* and Distributed Management, *Oracle Enterprise Manager Administrator's Guide*.

If you are using the standalone version of Oracle Workflow, you can also use the Check Setup web page to schedule propagation for your local outbound agents. The Check Setup page lets you verify whether the required propagation is scheduled and schedule AQ propagation for agents that use the SQLNET protocol. See: To Schedule Propagation for a Local Outbound Agent: page 2 – 158 and To Update or Delete a Propagation Schedule: page 2 – 160.

You can use the Oracle Workflow Manager component to review the propagation schedules for your local outbound agents. Oracle Workflow Manager is available as a component of Oracle Applications Manager if you are using the version of Oracle Workflow embedded in Oracle Applications, or as a component of Oracle Enterprise Manager if you are using the standalone version of Oracle Workflow. For more information, please refer to the Oracle Applications Manager online help or the Oracle Enterprise Manager online help.

If you want to use the standard WF\_OUT and WF\_JMS\_OUT agents or custom agents for event message propagation, ensure that you schedule propagation for those agents. You do not need to schedule propagation for the WF\_CONTROL and WF\_NOTIFICATION\_OUT agents, however, because the middle tier processes that use WF\_CONTROL dequeue messages directly from its queue, and notification mailers send messages placed on the WF\_NOTIFICATION\_OUT queue.

For agents that use protocols other than the SQLNET protocol, you must provide external propagation logic. See: Agents, *Oracle Workflow Developer's Guide*.

## See Also

Agents, *Oracle Workflow Developer's Guide*

► **To Schedule Propagation for a Local Outbound Agent**

1. Use a web browser to connect to the following URL:

`<webagent>/wf_setup.check_all`

Replace `<webagent>` with the base URL of the web agent configured for Oracle Workflow in your Web server. See: Setting Global User Preferences: page 2 – 13.



**Attention:** This URL accesses a secured page, so if you have not yet logged on as valid user in the current web session, you will be prompted to do so before the page appears. You must have workflow administrator privileges to access the Event Manager web pages.

**Note:** You can also access the Check Setup web page from the Oracle Workflow home page. See: Accessing the Oracle Workflow Home Page: page 4 – 2.

**Check Setup(WF91) - Netscape**

Name	Value	Minimum Recommended Value
aq_tm_processes	1	1
job_queue_processes	10	5

**Database Links**

Name	Status

**Local Agents**

Agent	Direction	Queue Name	Queue Created	Message Ready	Message Wait
WF_ERROR	In	WF26.WF_ERROR	Yes	0	0
WF_IN	In	WF26.WF_IN	Yes	0	0
WF_OUT	Out	WF26.WF_OUT	Yes	0	0
WF_DEFERRED	In	WF26.WF_DEFERRED	Yes	0	0
WF_SMTP_O_1_QUEUE	In	WF26.WF_SMTP_O_1_QUEUE	Yes	6	0

**Listeners for local inbound agents**

Agent	Scheduled	Action
WF_ERROR	Yes	<a href="#">Edit</a>
WF_IN	No	<a href="#">Create</a>
WF_DEFERRED	No	<a href="#">Create</a>

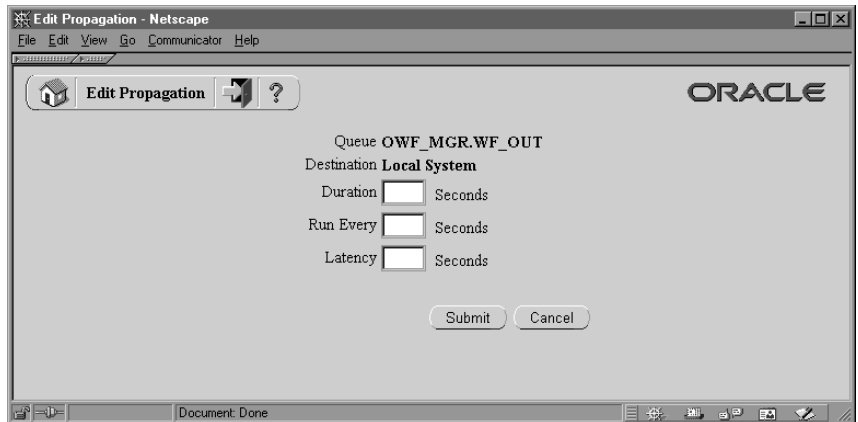
**Propagations for local outbound agents**

Out Agent	Destination	Schedule
WF_OUT	Local	<a href="#">Create</a>

2. The Check Setup page appears, displaying the propagation settings and components for your local system.
3. The Propagations for Local Outbound Agents region displays a list of the combinations of local outbound agents and database links that may require propagation. This list matches each of your local outbound agents with each database link to a remote system that appears in the addresses of the inbound agents you have defined. Each local outbound agent is also listed with a Local destination in the Database Link column for propagation to inbound agents on the local system. See: *Agents, Oracle Workflow Developer's Guide*.

Locate the outbound agent and database link combination for which you want to schedule propagation.

4. If no propagation is scheduled yet for the agent and database link you want, choose the Create link in the Schedule column to schedule the propagation. The Edit Propagation page appears, displaying the name of the outbound agent's queue, as well as the database link name for a remote destination or Local System for a local destination.



5. In the Duration field, enter the duration of the propagation window, in seconds.
6. In the Run Every field, enter an interval in seconds to specify how often you want a propagation window to occur.

**Note:** The run interval must be longer than the duration of the propagation window.

7. In the Latency field, enter a latency time in seconds to specify how long you want to wait, after all messages have been propagated, before rechecking the queue for new messages to the destination.

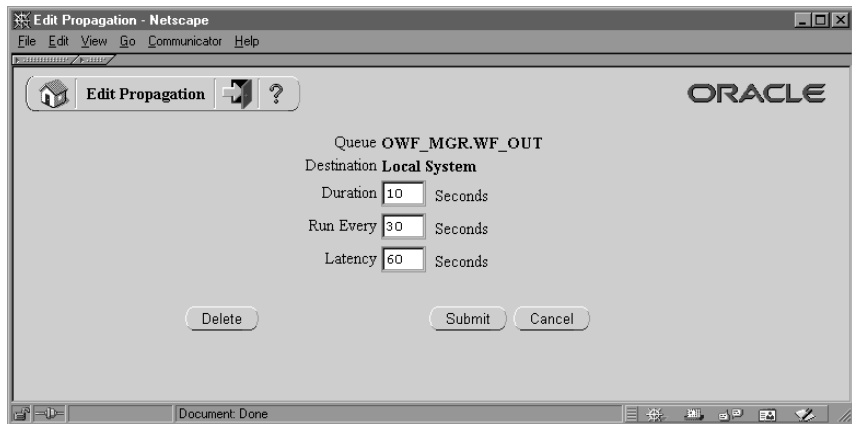
The latency represents the maximum wait time during the propagation window for a message to be propagated after it is enqueued. To propagate messages as soon as possible after they are enqueued, enter a latency of zero. The default latency is 60 seconds.

**Note:** To enable AQ to enforce the latency time, the job queue interval setting in your database initialization parameters must be less than or equal to the latency value. See: *Checking the Business Event System Setup*: page 2 – 148.

8. Choose the Submit button to save the propagation schedule and return to the Check Setup page. You can also choose the Cancel button to return to the Check Setup page without saving the propagation.

### ► To Update or Delete a Propagation Schedule

1. Use the Propagations for Local Outbound Agents region of the Check Setup page to locate the outbound agent and database link combination that you want. See: *To Schedule Propagation for a Local Outbound Agent*: page 2 – 158.
2. If propagation is already scheduled, choose the Edit link in the Schedule column to open the Edit Propagation page, displaying the propagation settings.



3. To update the propagation schedule, make your changes to the settings and save your work. See: *To Schedule Propagation for a Local Outbound Agent*: page 2 – 158.

4. To delete the propagation schedule, choose the Delete button. You can also choose the Cancel button to return to the Check Setup page without changing or deleting the propagation schedule.

**Note:** You may not be able to delete a propagation schedule until the propagation window closes.

### **Synchronizing License Statuses**

---

This step is required only for the version of Oracle Workflow embedded in Oracle Applications. Some Oracle Applications products provide seeded events and subscriptions. In these cases, Oracle Workflow executes subscriptions only if the triggering event and the subscription are both owned by products that you have licensed with a status of Installed or Shared.

You can use the License Manager AD utility to review which products you currently have licensed. See: License Manager, *Oracle Applications AD Utilities Reference Guide*.

To ensure that the license status of the seeded events and subscriptions in the Business Event System is updated according to the status of the products you currently have licensed, you can run the Synchronize Product License and Workflow BES License concurrent program. Use the Submit Requests form in Oracle Applications to submit this concurrent program.

If you upgrade from an Oracle Applications release earlier than Release 11.5.9, you should run the Synchronize Product License and Workflow BES License concurrent program once after the upgrade to update the license status of the existing events and subscriptions in your Event Manager. Otherwise, subscriptions may not be correctly processed after the upgrade. Subsequently, when you license a product, Oracle Workflow automatically updates the license status for all the events and subscriptions owned by that product.

**Note:** Any events and subscriptions that you define with a customization level of User are always treated as being licensed.

► **To submit the Synchronize Product License and Workflow BES License concurrent program:**

1. Navigate to the Submit Requests form in Oracle Applications to submit the Synchronize Product License and Workflow BES License concurrent program. When you install and set up Oracle Applications and Oracle Workflow, your system administrator needs to add this concurrent program to a request security group

for the responsibility that you want to run this program from. The executable name for this concurrent program is "Synchronize Product License and Workflow BES License" and its short name is FNDWFLIC. See: Overview of Concurrent Programs and Requests, *Oracle Applications System Administrator's Guide*.

2. Select the Synchronize Product License and Workflow BES License concurrent program as the request to run. This program does not require any parameters. See: Submitting a Request, *Oracle Applications User's Guide*.
3. When you finish modifying the print and run options to define the schedule for this request, choose Submit to submit the request.

## See Also

Events (for Oracle Applications), *Oracle Workflow Developer's Guide*

Event Subscriptions (for Oracle Applications), *Oracle Workflow Developer's Guide*

### Cleaning Up the Workflow Control Queue

---

Oracle Workflow contains a standard Business Event System agent named WF\_CONTROL, which is associated with a standard queue that is also named WF\_CONTROL. This queue has a payload type of JMS Text message. The WF\_CONTROL agent is used for internal processing only, and is not meant for customer use. You should not place custom event messages on this queue.

The Generic Service Component Framework uses WF\_CONTROL to handle control events for containers and service components, such as notification mailer or agent listener service components. In Oracle Applications, WF\_CONTROL is also used for other Oracle Applications internal processing.

You do not need to schedule propagation for the WF\_CONTROL agent, because the middle tier processes that use WF\_CONTROL dequeue messages directly from its queue.

However, the subscribers to the WF\_CONTROL queue need to be cleaned up periodically.

- In the standalone version of Oracle Workflow, you can use an API called *WF\_BES\_CLEANUP.Cleanup\_Subscribers()* to perform this cleanup.

- In Oracle Applications, a concurrent program named Workflow Control Queue Cleanup is automatically scheduled to perform this cleanup for you.

When a middle tier process for Oracle Applications or for standalone Oracle Workflow starts up, it creates a JMS subscriber to the queue. Then, when an event message is placed on the queue, a copy of the event message is created for each subscriber to the queue. If a middle tier process dies, however, the corresponding subscriber remains in the database. For more efficient processing, you should ensure that `WF_CONTROL` is periodically cleaned up by removing the subscribers for any middle tier processes that are no longer active.

The `WF_BES_CLEANUP.Cleanup_Subscribers()` procedure sends an event named `oracle.apps.wf.bes.control.ping` to check the status of each subscriber to the `WF_CONTROL` queue. If the corresponding middle tier process is still alive, it sends back a response. The next time the cleanup procedure runs, it checks whether responses have been received for each ping event sent during the previous run. If no response was received from a particular subscriber, that subscriber is removed. See: *Cleanup\_Subscribers, Oracle Workflow API Reference*.

The recommended frequency for performing cleanup is every twelve hours. In order to allow enough time for subscribers to respond to the ping event, the minimum wait time between two cleanup runs is thirty minutes. If you run the procedure again less than thirty minutes after the previous run, it will not perform any processing.

### **Standalone Oracle Workflow**

If you are using the standalone version of Oracle Workflow, then use the `WF_BES_CLEANUP.Cleanup_Subscribers()` API to clean up the `WF_CONTROL` queue. You can use the procedures in the `DBMS_JOB` package to schedule and manage the `WF_BES_CLEANUP.Cleanup_subscribers()` procedure as a database job. See: *Managing Job Queues, Oracle Administrator's Guide*.

### **Oracle Workflow Embedded in Oracle Applications**

If you are using the version of Oracle Workflow embedded in Oracle Applications, Oracle Workflow provides a concurrent program named Workflow Control Queue Cleanup, which uses the `WF_BES_CLEANUP.Cleanup_Subscribers()` API to perform the necessary cleanup. This concurrent program is scheduled to run every twelve hours by default, which is the recommended frequency for performing cleanup. You can optionally run this program with a different schedule if you want to perform cleanup at a different frequency.

- ▶ **To submit the Workflow Control Queue Cleanup concurrent program:**
  1. Navigate to the Submit Requests form in Oracle Applications to submit the Workflow Control Queue Cleanup concurrent program. When you install and set up Oracle Applications and Oracle Workflow, your system administrator needs to add this concurrent program to a request security group for the responsibility that you want to run this program from. The executable name for this concurrent program is "Workflow Control Queue Cleanup" and its short name is FNDWFBES\_CONTROL\_QUEUE\_CLEANUP. See: *Overview of Concurrent Programs and Requests, Oracle Applications System Administrator's Guide*.
  2. Select the Workflow Control Queue Cleanup concurrent program as the request to run. This program does not require any parameters. See: *Submitting a Request, Oracle Applications User's Guide*.
  3. When you finish modifying the print and run options to define the schedule for this request, choose Submit to submit the request.

## See Also

Workflow Control Events, *Oracle Workflow Developer's Guide*

Standard Agents, *Oracle Workflow Developer's Guide*

Business Event System Cleanup API, *Oracle Workflow API Reference*

## Step 17 Setting Up the WF\_EVENT\_OMB\_QH Queue Handler

You need to perform this step only if you are using the Business Event System with Oracle8i and you want to use Oracle Message Broker (OMB) to propagate event messages between systems. The WF\_EVENT\_OMB\_QH queue handler translates between the standard Workflow event message structure, WF\_EVENT\_T, and the structure required by OMB queues, OMBAQ\_TEXT\_MSG.

After you set up WF\_EVENT\_OMB\_QH, you can assign this queue handler to Business Event System agents that use propagation protocols you have implemented through OMB. See: *Agents, Oracle Workflow Developer's Guide*.

**Note:** You do not need to perform this step if you are using Oracle9i. In Oracle9i, you can use the Messaging Gateway and Internet access features of Oracle Advanced Queuing to propagate event messages, in place of Oracle Message Broker.

**Context:** You need to perform this step only once.

### ► To Set Up WF\_EVENT\_OMB\_QH

1. Use OMB to create the AQ queues that you want to use for event message propagation. The queues should be single-consumer queues created in your Oracle Workflow schema. You should create at least one inbound and one outbound queue. For example, create queues called WF\_OMB\_IN and WF\_OMB\_OUT.
2. Run the script wfquhdos.pls to create the PL/SQL spec for the WF\_EVENT\_OMB\_QH package. This script is located in the *wf/sql* subdirectory in your Oracle Home.
3. Run the script wfquhdob.pls to create the PL/SQL body for the WF\_EVENT\_OMB\_QH package. This script is located in the *wf/sql* subdirectory in your Oracle Home.

## See Also

Standard APIs for a Queue Handler, *Oracle Workflow Developer's Guide*

Event Message Structure, *Oracle Workflow API Reference*

Mapping Between WF\_EVENT\_T and OMBAQ\_TEXT\_MSG, *Oracle Workflow API Reference*

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## Overview of Oracle Workflow Access Protection

Access protection is a feature that prevents workflow seed data created by a 'seed data provider' from being modified by a 'seed data consumer'. Here, a 'seed data provider' is any organization that creates 'seed data' for other organizations ('seed data consumers') to use in defining and customizing a workflow process. In Oracle Workflow, seed data refers to either of the following:

- Workflow object definitions that can and should be customized to meet a certain consumer's needs.
- Workflow object definitions protected against customization because they represent standards that may also be upgraded in the future by the provider.

For example, the Oracle Workflow development team is a provider of seed data called the Standard item type. The Standard item type contains standard activities that can be dropped into any custom workflow process. The development team at your organization's headquarters may create a custom workflow process definition that references activities from the Standard item type. This makes the headquarters team a consumer of the Standard item type seed data.

Now suppose the headquarters team wants to deploy the custom workflow definition that it created to teams at other regional offices. The headquarters team, as seed data providers, may want to do the following:

- Identify certain workflow objects in its custom workflow definition as corporate standards that the regional teams should adhere to and not modify.
- Designate certain objects in its deployed process as customizable for the regional offices to alter to their offices' needs.

The headquarters team can satisfy both requirements using the access protection feature in Oracle Workflow. Access protection lets seed data providers protect certain data as 'read-only', while allowing other data to be customized. Also during a seed data upgrade, access protection lets the seed data provider overwrite any existing protected seed data with new versions of that seed data, while preserving any customizations made to customizable seed data.

Oracle Workflow assigns a protection and customization level to every workflow object definition stored in the database and requires every user of Oracle Workflow to operate at a certain access level. The combination of protection, customization, and access levels makes up the access protection feature and determines whether a user can

modify a given workflow object. The level, in all three cases, is a numeric value ranging from 0 to 1000 that indicates the relationship between different organizations as providers and consumers of seed data.

The following range of levels are presumed by Oracle Workflow:

<b>0–9</b>	Oracle Workflow
<b>10–19</b>	Oracle Application Object Library
<b>20–99</b>	Oracle Applications development
<b>100–999</b>	Customer organization. You can determine how you want this range to be interpreted. For example, 100 can represent headquarters, while 101 can represent a regional office, and so on.
<b>1000</b>	Public

### Access Level

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Each user of Oracle Workflow operates the system at a certain access level according to the range of levels listed above. A “user of Oracle Workflow” in this case, represents someone who is operating Oracle Workflow Builder, or the Workflow Definitions Loader program, which loads workflow process definitions from a file into a database. As a seed data provider, you should always operate Oracle Workflow Builder at the same consistent access level because the level you work at affects the protection level of the seed data you create.

You can view your access level as follows:

- In Oracle Workflow Builder, select About Workflow from the Help menu.
- If you are going to run the Workflow Definitions Loader program to download workflow process definitions from the database to a file, check the value for the environment variable `WF_ACCESS_LEVEL` on your workflow server. See: Using the Workflow Definitions Loader: page 2 – 174.

**Note:** The Workflow Definitions Loader program references the access level stored in the environment variable called `WF_ACCESS_LEVEL`, which you must define when you install Oracle Workflow on your server. If you do not define this environment variable, the Workflow Definitions Loader simply assumes a default access level of 1.

**Note:** When you install the version of Oracle Workflow embedded in Oracle Applications, you need to define this

variable in an environment file. The default environment file is APPLSYS.env. If you do not define this environment variable, the Workflow Definitions Loader simply assumes a default access level of 1. Refer to your Oracle Applications installation manual for more information about environment files.

### **Protection Level**

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Whenever you create a workflow object in Oracle Workflow Builder, you have the option of protecting the object at a certain level. An object's protection level helps control whether other users can modify the object based on their access levels, by allowing only users with an access level equal to or lower than the object's protection level to modify the object.

**Note:** The range of access levels allowed to modify the object may be further restricted by the object's customization level.

To set the protection level of an object, display the Access tab of the object's property page and either check or clear the Lock at this Access Level check box. The protection level that you set for an object is dependent on the setting of the Lock at this Access Level check box and on your current access level.

- If you check the Lock at this Access Level check box, the protection level for the object is set to your current access level. Users with an access level higher than your current access level will not be able to modify the object. These users will see a small lock on the workflow object's icon, indicating that the object can be used but not modified. For users with an access level equal to or lower than your current access level, the customization level for the object will determine whether they can modify the object.
- If you do not check the Lock at this Access Level check box, the protection level for the object is set to 1000. In this case all users who are not restricted by the customization level can modify the object.

### **Customization Level**

---

Every workflow object, in addition to having a protection level, also records a customization level when you modify the object and save it to a database or file. An object's customization level helps control whether other users can modify the object based on their access levels, by allowing only users with an access level equal to or higher than the object's customization level to modify the object.

**Note:** The range of access levels allowed to modify the object may be further restricted by the object's protection level.

Setting the customization level ensures that a customizable object that has been customized never gets overwritten during a seed data upgrade, because the upgrade always occurs with the Workflow Definitions Loader operating at an access level below the customized object's customization level.

To set the customization level of an object, display the Access tab of the object's property page and either check or clear the Preserve Customizations check box. The customization level that you set for an object is dependent on the setting of the Preserve Customizations check box and on your current access level.

- If you check the Preserve Customizations check box, the customization level for the object is set to your current access level. Users with an access level lower than your current access level will not be able to modify the object. These users will see a small lock on the workflow object's icon, indicating that the object can be used but not modified. For users with an access level equal to or lower than your current access level, the protection level for the object will determine whether they can modify the object.
- If you do not check the Preserve Customizations check box, the customization level for the object is set to 0. In this case all users who are not restricted by the protection level can modify the object.

### **Combining Protection and Customization Levels to Control Access**

You control access to an object by the combined settings of the protection level and the customization level. You can set the Preserve Customizations and Lock at this Access Level check boxes for an object in one of four ways to specify the type of access you want to allow:

- **Allow access to everyone**—By default, all users are allowed access to an object if the Preserve Customizations and the Lock at this Access Level check box are both not checked. That is, the protection level is 1000 and the customization level is 0.
- **Limit access to users with access levels equal to your own or higher**—If you check the Preserve Customizations check box but do not check the Lock at this Access Level check box, you designate the object as being customizable by anyone with an access level equal to or higher than your current access level. However, users with a lower access level will not be able to

modify the object. That is, the protection level is 1000 and the customization level is your current access level. You should only mark objects as customizable in this way if you are sure that you will not be providing upgraded versions of this object in the future that would overwrite other users' customizations to it.

- **Limit access to users with access levels equal to your own or lower**—If you check the Lock at this Access Level check box but do not check the Preserve Customizations check box, you protect the object and ensure that the object can only be modified by users with an access level equal to or lower than your current access level. Users with a higher access level will not be able to modify the object. That is, the protection level is your current access level and the customization level is 0. Protect any objects that you want to define as standard components that will not change unless you provide a global upgrade. For this reason, it is important that you always operate at the same consistent access level.
- **Limit access to users with access levels equal to your own**—If you check both the Lock at this Level and Preserve Customizations check boxes, you ensure that the object cannot be modified by anyone other than users operating at your current access level. That is, the protection level and customization level are both set to your current access level.


The following table summarizes which access levels can access an object under different settings of the Preserve Customizations and Lock at this Access Level options.

Preserve Customizations	Lock at this Access Level	Access Level applied to Object
Cleared	Cleared	Object may be updated by any access level.
Checked	Cleared	Object may only be updated by users with access levels equal to or higher than your current access level.


Table 6 – 6 (Page 1 of 2)

Preserve Customizations	Lock at this Access Level	Access Level applied to Object
Cleared	Checked	Object may only be updated by users with access levels equal to or lower than your current access level.
Checked	Checked	Object cannot be updated by any access level except for your current access level.

Table 6 – 6 (Page 2 of 2)

 **Attention:** If you have installed the beta version of Microsoft's Internet Explorer on your PC, which automatically installs an early version of a file called *comctl32.dll*, you may not see the lock icons appear on the locked objects in Oracle Workflow Builder. To correct this problem, install the production version of Microsoft's Internet Explorer to replace *comctl32.dll* with the latest copy.

The protection and access levels in Oracle Workflow are present to remind you that certain workflow objects should not be modified or should only be modified by someone accessing the tool at an authorized access level. This feature is not intended as a means of securing or source controlling your workflow objects.

 **Attention:** Most workflow objects provided by Oracle Workflow have a protection level of 0, which means the objects can only be modified by the Oracle Workflow team, operating at an access level of 0. If you attempt to alter your access level to 0 and modify the data anyway, your customizations will not be supported, especially if Oracle Workflow provides an upgrade to the seed data that may overwrite the modifications you make to the originally protected data.

---

## Setting Up a Default Access Level

When you install Oracle Workflow Builder on a Microsoft Windows 98, Windows 2000, Windows XP, or Windows NT PC, Oracle Universal Installer assigns a default access level that is global to the PC and the operating system you are installing on. After installing Oracle Workflow Builder, you can have individual users on the PC change their access level to a new setting which overrides the default access level set for the PC. If a user does not define an access level, Oracle Workflow Builder assumes the value of the default access level for the PC. The access levels are stored in the Microsoft Windows registry.

If you are deploying Oracle Workflow Builder and workflow seed data to users in other parts of your organization, and you wish to discourage those users from modifying the seed data that you provide, you can have them operate Oracle Workflow Builder at an access level that is higher than the data's protection level. For example if you, as a seed data provider, are operating at an access level of 100 and the seed data you create is protected at a level of 100, then you should require the access level for your users or seed data consumers to be 101 or higher.

You can set a user's access level in Oracle Workflow Builder by having them choose About Oracle Workflow Builder... from the Help menu. In the About Oracle Workflow Builder window, change the Access Level field to a number higher than your seed data protection level, then choose OK.

You can also set the access level directly in the Microsoft Windows registry by using a registry editor such as regedit to edit the decimal value under  
HKEY\_LOCAL\_MACHINE\SOFTWARE\ORACLE\Workflow\Level.

For the Workflow Definitions Loader program, you set the default access level that the program operates at for downloading process definitions to a file, by defining an environment variable called WF\_ACCESS\_LEVEL and setting its value using the appropriate operating system command.

**Caution:** Although you can modify your access level, Oracle Workflow does not support any customizations to seed data originally protected at a level 99 or lower. We STRONGLY RECOMMEND that you not change your access level to an unauthorized level for modifying protected data.

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## Access Protection for Business Event System Data

Oracle Workflow also provides access protection for business event and event subscription definitions, in order to protect Oracle seed data and preserve your customizations in an upgrade. In the Business Event System, access protection is based on a customization level assigned to each event and subscription. The customization level determines who can update the event or subscription definition.

An event or subscription can have one of the following customization levels:

- Core – This level is used only for events and subscriptions seeded by Oracle. At this level, you cannot make any changes to the event or subscription definition. However, any property in the definition can be changed by an Oracle seed data upgrade.
- Limit – This level is used only for events and subscriptions seeded by Oracle. At this level, you can update the event or subscription status to Enabled or Disabled, but you cannot make any other changes to the object definition. Conversely, an Oracle seed data upgrade cannot change the status setting, but can change any other property in the definition.
- User – This level is automatically set for events and subscriptions that you define. At this level, you can change any property in the event or subscription definition. However, an Oracle seed data upgrade cannot make any changes in the definition.

During an Oracle Workflow or Oracle Applications seed data upgrade, the Workflow XML Loader loads Business Event System object definitions in normal upload mode, preserving any customized data according to these customization levels. See: Using the Workflow XML Loader: page 2 – 179.

## See Also

Events, *Oracle Workflow Developer's Guide*

Events (for Oracle Applications), *Oracle Workflow Developer's Guide*

Event Subscriptions, *Oracle Workflow Developer's Guide*

Event Subscriptions (for Oracle Applications), *Oracle Workflow Developer's Guide*

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## Using the Workflow Definitions Loader

Rather than use the File Save or File Open menu options in Oracle Workflow Builder, you can also run a program called Workflow Definitions Loader to save or load process definitions from a database or flat file.

Before you upgrade your database, you can use the Workflow Definitions Loader to preserve and back up your process definitions to a flat file. After the database upgrade is complete, you can use the Loader program again to upload the definitions back into your database if you need to reload your saved definitions for any reason. You can also use the Loader program to upgrade your database with a newer version of a process definition or to transfer process definitions to other databases.

When you upload or upgrade a process definition, the Workflow Definitions Loader automatically validates the process definition to ensure that it conforms to specific process design rules. It performs the same validation as the Oracle Workflow Builder Verify feature. See: To Validate a Process Definition, *Oracle Workflow Developer's Guide*.



**Attention:** When you upload or upgrade a workflow definition onto an existing definition in a database, it is possible that an object in the upload/upgrade definition has a Display Name that is already in use by a different object in the target database. If this occurs, the Workflow Definition Loader automatically resolves the display name conflict by adding a '@' character to the beginning of conflicting display names in the target database. The upload/upgrade definition is then applied as is and a warning message is generated.

**Note:** You can use the Workflow Definitions Loader Release 2.6.3 to upload and download process definitions from all versions of the Oracle Workflow Server embedded in Oracle Applications Release 11i, as well as Release 2.6.3, Release 2.6.2, Release 2.6.1, base Release 2.6, and Release 2.5 of the standalone version of the Oracle Workflow Server. However, when you use the Workflow Definitions Loader to upload process definitions to an earlier Oracle Workflow Server version, those processes cannot include any new features introduced in later releases. For more details about which features you must not use with earlier versions, see: Using Oracle Workflow Builder with Different Server Versions, *Oracle Workflow Developer's Guide*.

► **To run the Workflow Definitions Loader for the standalone version of Oracle Workflow**

1. The Workflow Definitions Loader program is located on your server in the *bin* subdirectory of the Oracle Home directory structure.
2. Run the program from your operating system prompt as follows (replacing *<username/password@database>* with the username, password and Oracle Net connect string or alias to your database):

- To apply a seed data upgrade to a database from an input file, type:

```
wfload <username/password@database> <input_file>
```

By using the default upgrade behavior, the Workflow Definitions Loader assumes the access level of the file's creator (seed data provider) and overwrites any objects protected at a level equal to or above the upgrade file's access level. During an upgrade, the Loader program preserves any customizations made to customizable seed data in the database. *<input\_file>* represents the name and full path of the upgrade file you are loading.

- To upload process definitions from an input file to a database, type:

```
wfload -u <username/password@database> <input_file>
```

The upload mode is useful to someone who is developing a workflow process. It allows the developer to save definitions to the database without concern that accidental customizations to existing objects might prevent the upload of some process definition elements. The Workflow Definitions Loader uses the access level specified in the input file. *<input\_file>* represents the name and full path of the input file you want to upload from.

- To force an upload of the process definitions from an input file to a database regardless of an object's protection level, type:

```
wfload -f <username/password@database> <input_file>
```

*<input\_file>* represents the name and full path of the input file you want to upload from. When using the force option, you should be certain that the process definition in the file is correct as it overwrites the entire process stored in the database. The force option is useful for fixing data integrity problems in a database with a known, reliable file backup. The force option is

also useful for loading .wft files from Oracle Workflow Release 1.0 or 1.0.1, which reflect an older data model.

**Note:** When using the force option to load a .wft file from Oracle Workflow Release 1.0 or 1.0.1 into a database, you must also complete a manual step once the .wft file is loaded. You must associate the lookup types that you load with an item type. To do this, in the Navigator window of Oracle Workflow Builder, drag the lookup types from the independent Lookup Types branch to a Lookup Types branch associated with an item type.

- To download the process definition of one or more item types from a database to an output file, type:

```
wfload [-d <date>] <username/password@database>  
<output_file> <item_type1> <item_type2> ...<item_typeN>
```

<output\_file> represents the name and full path of the output file you want to write to, and <item\_typeN> represents the internal name of each item type you want to download. You can also replace <item\_typeN> with '\*' to represent all item types (make sure you enclose the asterisk in single quotes). If you specify the -d option with a date (omitting the square brackets), you can download the process definition that was effective at that date. The date must be supplied in the following format: YYYY/MM/DD HH24:MI:SS.

Your output file should have the extension .wft. When you download a process definition, the Loader program sets the output file's access level to be the value stored in the WF\_ACCESS\_LEVEL environment variable.

### ► To run the Workflow Definitions Loader for the version of Oracle Workflow embedded in Oracle Applications

1. Navigate to the Submit Requests form in Oracle Applications to submit the Workflow Definitions Loader concurrent program. When you install and set up Oracle Applications and Oracle Workflow, your system administrator needs to add this concurrent program to a request security group for the responsibility that you want to run this program from. See: Overview of Concurrent Programs and Requests, *Oracle Applications System Administrator's Guide*.
2. Submit the Workflow Definitions Loader concurrent program as a request. See: Submitting a Request, *Oracle Applications User's Guide*.

3. In the Parameters window, enter values for the following parameters:

<b>Mode</b>	<p>Specify "Download" to download a process definition from the database to a flat file.</p> <p>Specify "Upgrade" to apply a seed data upgrade to a database from an input file. The Workflow Definitions Loader assumes the access level of the file's creator (seed data provider) and overwrites any objects protected at a level equal to or above the upgrade file's access level. The Loader program preserves any customizations made to customizable seed data in the database.</p> <p>Specify "Upload" to load a process definition from a flat file into the database. The upload mode is useful to someone who is developing a workflow process. It allows the developer to save definitions to the database without concern that accidental customizations to existing objects might prevent the upload of some process definition elements. The Workflow Definitions Loader uses the access level defined by the input file to upload the process definitions from the file and therefore will overwrite objects in the database that are protected at a level equal to or higher than that file's access level.</p> <p>Specify "Force" to force an upload of the process definitions from an input file to a database regardless of an object's protection level. You should be certain that the process definition in the file is correct as it overwrites the entire process stored in the database. The Force mode is useful for fixing data integrity problems in a database with a known, reliable file backup.</p>
<b>File</b>	<p>Specify the full path and name of the file that you want to download a process definition to, or upgrade or upload a process definition from.</p>
<b>Item Type</b>	<p>If you set Mode to "Download", use the List button to choose the item type for the process definition you want to download.</p>

**Note:** When you submit the Workflow Definitions Loader from the Submit Requests form to download process definitions to a file, you can only specify to download one item

type at a time. If you wish to download multiple or all item types simultaneously, you should submit the Workflow Definitions Loader concurrent program from the command line. See Step 6 below for details.

4. Choose OK to close the Parameters window.
5. When you finish modifying the print and run options for this request, choose Submit to submit the request.
6. Rather than use the Submit Requests form, you can also run the Workflow Definitions Loader concurrent program from the command line by entering the following commands:

To upgrade— `WFLOAD apps/pwd 0 Y UPGRADE file.wft`

To upload— `WFLOAD apps/pwd 0 Y UPLOAD file.wft`

To force— `WFLOAD apps/pwd 0 Y FORCE file.wft`

To download— `WFLOAD apps/pwd 0 Y DOWNLOAD file.wft  
ITEMTYPE1 [ITEMTYPE2 ...ITEMTYPEN]`

Replace *apps/pwd* with username and password to the APPS schema, replace *file.wft* with the file specification of a workflow process definition file, and replace *ITEMTYPE1*, *ITEMTYPE2*, ... *ITEMTYPEN* with the one or more item type(s) you want to download. You can also download all item types simultaneously by replacing *ITEMTYPE1* with '\*' (make sure you enclose the asterisk in single quotes).

A file specification is specified as:

```
@<application_short_name>:[<dir>/.../]file.ext
```

or

```
<native path>
```

---

## Using the Workflow XML Loader

The Workflow XML Loader is a command line utility that lets you upload and download XML definitions for Business Event System objects between a database and a flat file. When you download Business Event System object definitions from a database, Oracle Workflow saves the definitions as an XML file. When you upload object definitions to a database, Oracle Workflow loads the definitions from the source XML file into the Business Event System tables in the database, creating new definitions or updating existing definitions as necessary.

The XML definitions for Business Event System objects are structured according to the following document type definitions (DTDs):

- Events—WF\_EVENTS DTD, *Oracle Workflow API Reference*
- Event group members—WF\_EVENT\_GROUPS DTD, *Oracle Workflow API Reference*
- Event subscriptions—WF\_EVENT\_SUBSCRIPTIONS DTD, *Oracle Workflow API Reference*
- Systems—WF\_SYSTEMS DTD, *Oracle Workflow API Reference*
- Agents—WF\_AGENTS DTD, *Oracle Workflow API Reference*
- Agent group members—WF\_AGENT\_GROUPS DTD, *Oracle Workflow API Reference*

**Note:** Agent groups are currently only available for the version of Oracle Workflow embedded in Oracle Applications.

XML files uploaded or downloaded by the Workflow XML Loader should have the extension `.wfx` to identify them as Workflow object XML definitions.

You can download Business Event System object definitions in either normal download mode or exact download mode.

- Normal download mode lets you save a generic copy of object definitions from one system that you can use to create similar definitions in other systems. In this mode, the Workflow XML Loader replaces certain system-specific data within the object definitions with tokens. Choose normal download mode, for example, when you want to save Business Event System object definitions from a development system as seed data that can be uploaded to a production system.
- Exact download mode lets you save object definitions exactly as they are specified in the database. In this mode, the Workflow

XML Loader does not convert any data to tokens; instead, all values, including system-specific values, are copied to the XML file. Choose exact download mode, for example, when you want to save Business Event System object definitions from one production system so that you can replicate them to another production system that communicates with the first.

In normal download mode, the Workflow XML Loader uses the following tokens to replace system-specific data within Business Event System object definitions. The tokens are prefixed by #.

- #NEW—Replaces the global unique identifier for an agent within an agent definition, or for an event subscription within a subscription definition.
- #LOCAL—Replaces the global unique identifier for the local system wherever it appears within an agent or subscription definition.
- #OWNER—Replaces the name of the schema that owns a queue when the schema appears as part of the queue name and agent address within an agent definition.
- #SID—Replaces the database system identifier (SID) when it appears as part of the agent address within an agent definition.
- #WF\_IN—Replaces the global unique identifier for the WF\_IN agent on the local system when it appears as the Source Agent, Out Agent, or To Agent within an event subscription definition.
- #WF\_OUT—Replaces the global unique identifier for the WF\_OUT agent on the local system when it appears as the Source Agent, Out Agent, or To Agent within an event subscription definition.
- #WF\_ERROR—Replaces the global unique identifier for the WF\_ERROR agent on the local system when it appears as the Source Agent, Out Agent, or To Agent within an event subscription definition.

By converting these system-specific values to tokens, the loader produces template definitions that you can use to create similar objects in other systems. When you upload object definitions that contain tokens to a database, Oracle Workflow replaces the tokens with the appropriate values for that system.

You can upload Business Event System object definitions in either normal upload mode or force upload mode.

- In normal upload mode, the Workflow XML Loader loads the object definitions from the source XML file into the Business Event System tables in the database, but does not update any event or subscription definition with a customization level of User. Oracle Workflow uses this mode to preserve your customizations during upgrades.
- In force upload mode, the Workflow XML Loader loads the object definitions from the source XML file into the Business Event System tables in the database and overwrites any existing definitions, even for events or subscriptions with a customization level of User. Use this mode when you want to update the definitions for your own custom events and subscriptions.

## See Also

Managing Business Events, *Oracle Workflow Developer's Guide*

### ► To Download Business Event System XML Definitions from a Database

To download Business Event System object definitions from a database to a flat XML file, you can either run the Workflow XML Loader manually, or, if you are using the standalone version of Oracle Workflow, you can use a script to run the loader.

To run the Workflow XML Loader manually, run JRE against `oracle.apps.fnd.wf.WFXLoad`. You must specify your `CLASSPATH` pointing to the Java Runtime Environment, the directory containing the Workflow JAR files, the Oracle JDBC implementation, and the following Workflow JAR files:

- `wfjava.jar`—Workflow Java utilities
- `wfapi.jar`—Workflow Java APIs

**Note:** If you are using the standalone version of Oracle Workflow with Oracle9i, the Workflow JAR files are located in the `<ORACLE_HOME>/jlib` directory. If you are using the version of Oracle Workflow embedded in Oracle Applications, the Workflow JAR files are located in the `<ORACLE_HOME>/wf/java/oracle/apps/fnd/wf/jar/` directory.

For example, on UNIX, use the following command to run the Workflow XML Loader:

```

jre -classpath
"$<JREPATH>/rt.jar:<Workflow_JAR_file_directory>:
<Workflow_JAR_file_directory>/wfjava.jar:
<Workflow_JAR_file_directory>/wfapi.jar:
<ORACLE_HOME>/jdbc/lib/classes111.zip:"
oracle.apps.fnd.wf.WFXLoad -d[e] <user> <password>
<connect_string> <protocol> <lang> <output_file> <object>
<key> OWNER_TAG <owner_tag>

```

On Windows NT, use the following command:

```

jre -classpath
";<JREPATH>\rt.jar;<Workflow_JAR_file_directory>;
<Workflow_JAR_file_directory>\wfjava.jar;
<Workflow_JAR_file_directory>\wfapi.jar;
<ORACLE_HOME>\jdbc\lib\classes111.zip;"
oracle.apps.fnd.wf.WFXLoad -d[e] <user> <password>
<connect_string> <protocol> <lang> <output_file> <object>
<key> OWNER_TAG <owner_tag>

```

If you are using the standalone version of Oracle Workflow, you can use sample scripts called wfxload for UNIX or wfxload.bat for Windows NT to run the Workflow XML Loader. These scripts are located on your server in the Oracle Workflow *admin* subdirectory. For example, on UNIX, use the following command:

```

wfxload -d[e] <user> <password> <connect_string> <protocol>
<lang> <output_file> <object> <key> OWNER_TAG <owner_tag>

```

On Windows NT, use the following command:

```

wfxload.bat -d[e] <user> <password>
<connect_string> <protocol> <lang> <output_file> <object>
<key> OWNER_TAG <owner_tag>

```

When running the Workflow XML Loader, use either the `-d` option or the `-de` option to specify the download mode that you want.

- `-d` —Normal download mode. The loader converts system-specific data within the object definitions to tokens prefixed with #, where appropriate.
- `-de` —Exact download mode. The loader copies the object definitions exactly and does not convert any data to tokens.

Additionally, replace the variables in the download command with your parameters as follows:

- `<user>`—The user name of your database account.

- `<password>`—The password for your database account.
- `<connect_string>`—The connect string for the database. The format of the connect string depends on the JDBC driver type.
  - For a JDBC OCI8 driver, the connect string should be the database name as specified in its TNSNAMES entry, in the following format:  
`<database_name>`
  - For a JDBC THIN driver, you can use two different types of connect string. For the first type, the connect string should include the host name, port number, and database system identifier (SID) in the following format:  
`<host_name>:<port_number>:<database_SID>`  
  
 For the second type, the connect string should include an Oracle Net name–value pair with the host name, protocol, port number, and SID in the following format:  
`(description=(address=(host=<host_name>)(protocol=<protocol>)(port=<port_number>))(connect_data=(sid=<database_SID>)))`
- `<protocol>`—The JDBC driver type you want to use to connect to the database. The JDBC driver type can be either `oci8` or `thin`.
- `<lang>`—The abbreviation for the language of the XML file. This parameter is case insensitive. Use the standard language abbreviations for the Oracle database server, such as `US` for American or `JA` for Japanese. For a list of the standard language abbreviations, see: *Locale Data, Oracle National Language Support Guide*.
- `<output_file>`—The name and full path of the output file to which you want to save the definitions. The output file should have the extension `.wfx`.
- `<object>`—The type of object definitions you want to download.
  - `EVENTS`—Event and event group member definitions
  - `SUBSCRIPTIONS`—Event subscription definitions
  - `AGENTS`—Agent and system definitions, and, for Oracle Applications, agent group member definitions

**Note:** The Workflow XML Loader only downloads event subscription, agent, agent group member, and system definitions that belong to the local system.
- `<key>`—An optional key to restrict the definitions that are downloaded. If you specify a key, the loader retrieves definitions

only for those objects whose internal names include that key. The key value is case sensitive and cannot contain any spaces. To retrieve all object definitions of the specified type, you can omit this parameter.

- `OWNER_TAG <owner_tag>`—An optional program ID code for the program or application that owns the object definitions you want to download. This value is case sensitive and cannot contain any spaces. If you pass this parameter, you must include the `OWNER_TAG` marker before the owner tag value to identify the parameter.

**Note:** To report more extensive debugging information in the program output, you can run the Workflow XML Loader in debug mode by including the `DebugMode` argument just before the `-d` or `-de` option. For example, use the following command:

```
jre -classpath <classpath> oracle.apps.fnd.wf.WFXLoad
DebugMode -d[e] <user> <password> <connect_string>
<protocol> <lang> <output_file> <object> <key>
OWNER_TAG <owner_tag>
```



**Attention:** To use the Workflow XML Loader in download mode, you must have a version 8.1.7 or higher database. The download utility is not supported for earlier versions of Oracle8i. To replicate Business Event System objects from one system to another for earlier database versions, you should follow the steps to synchronize systems using predefined subscriptions provided with the Business Event System. See: *Synchronizing Systems, Oracle Workflow Developer's Guide*.

You can, however, use the Workflow XML Loader in upload mode with versions of Oracle8i earlier than 8.1.7.

## ► To Upload Business Event System XML Definitions to a Database

To upload Business Event System object definitions from an XML file to a database, you can either run the Workflow XML Loader manually, or, if you are using the standalone version of Oracle Workflow, you can use a script to run the loader.

To run the Workflow XML Loader manually, run JRE against `oracle.apps.fnd.wf.WFXLoad`. You must specify your `CLASSPATH` pointing to the Java Runtime Environment, the directory containing the Workflow JAR files, the Oracle JDBC implementation, and the following Workflow JAR files:

- `wfjava.jar`—Workflow Java utilities

- wfapi.jar—Workflow Java APIs

**Note:** If you are using the standalone version of Oracle Workflow with Oracle9i, the Workflow JAR files are located in the `<ORACLE_HOME>/jlib` directory. If you are using the version of Oracle Workflow embedded in Oracle Applications, the Workflow JAR files are located in the `<ORACLE_HOME>/wf/java/oracle/apps/fnd/wf/jar/` directory.

For example, on UNIX, use the following command to run the Workflow XML Loader:

```
jre -classpath
"$<JREPATH>/rt.jar:$<Workflow_JAR_file_directory>:
$<Workflow_JAR_file_directory>/wfjava.jar:
$<Workflow_JAR_file_directory>/wfapi.jar:
$<ORACLE_HOME>/jdbc/lib/classes111.zip:"
oracle.apps.fnd.wf.WFXLoad -u[f] <user> <password>
<connect_string> <protocol> <lang> <source_file>
```

On Windows NT, use the following command:

```
jre -classpath
";<JREPATH>\rt.jar;<Workflow_JAR_file_directory>;
<Workflow_JAR_file_directory>\wfjava.jar;
<Workflow_JAR_file_directory>\wfapi.jar;
<ORACLE_HOME>\jdbc\lib\classes111.zip;"
oracle.apps.fnd.wf.WFXLoad -u[f] <user> <password>
<connect_string> <protocol> <lang> <source_file>
```

If you are using the standalone version of Oracle Workflow, you can use sample scripts called wfxload for UNIX or wfxload.bat for Windows NT to run the Workflow XML Loader. These scripts are located on your server in the Oracle Workflow *admin* subdirectory. For example, on UNIX, use the following command:

```
wfxload -u[f] <user> <password> <connect_string> <protocol>
<lang> <source_file>
```

On Windows NT, use the following command:

```
wfxload.bat -u[f] <user> <password> <connect_string>
<protocol> <lang> <source_file>
```

When running the Workflow XML Loader, use either the `-u` option or the `-uf` option to specify the upload mode that you want.

- `-u` —Normal upload mode. The Workflow XML Loader loads the object definitions from the source XML file into the Business

Event System tables in the database, but does not make any updates to events or subscriptions with a customization level of User.

- `-uf` —Force upload mode. The Workflow XML Loader loads the object definitions from the source XML file into the Business Event System tables in the database and overwrites any existing definitions, even for events or subscriptions with a customization level of User.

Additionally, replace the variables with your parameters as follows:

- `<user>`—The user name of your database account.
- `<password>`—The password for your database account.
- `<connect_string>`—The connect string for the database. The format of the connect string depends on the JDBC driver type.
  - For a JDBC OCI8 driver, the connect string should be the database name as specified in its TNSNAMES entry, in the following format:  
`<database_name>`
  - For a JDBC THIN driver, the connect string should include the host name, port number, and database system identifier (SID) in the following format:  
`<host_name>:<port_number>:<database_SID>`
- `<protocol>`—The JDBC driver type you want to use to connect to the database. The JDBC driver type can be either `oci8` or `thin`.
- `<lang>`—The abbreviation for the language of the XML file. This parameter is case insensitive. Use the standard language abbreviations for the Oracle database server, such as `US` for American or `JA` for Japanese. For a list of the standard language abbreviations, see: *Locale Data, Oracle National Language Support Guide*.
- `<source_file>`—The name and full path of the source file from which you want to upload definitions. The source file should have the extension `.wfx`.

**Note:** Each subscription definition that you want to upload must include a phase number, owner name, and owner tag. The Workflow XML Loader cannot upload a source file containing subscription definitions that are missing this information.

**Note:** To report more extensive debugging information in the program output, you can run the Workflow XML Loader in

debug mode by including the `DebugMode` argument just before the `-u` option. For example, use the following command:

```
jre -classpath <classpath> oracle.apps.fnd.wf.WFXLoad  
DebugMode -u[f] <user> <password> <connect_string>  
<protocol> <lang> <source_file>
```



CHAPTER

# 3

## Oracle Workflow Security

**T**his chapter describes the architecture and configuration of security for Oracle Workflow.

---

## Oracle Workflow Security

The ability to control user access to Web and application content and to protect your site against people breaking into your system is critical. This chapter describes the architecture and configuration of security for Oracle Workflow.

### See Also

For additional information about security, refer to the following documents:

- The *Oracle9i Application Server Security Guide* provides an overview of Oracle9i 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.
- The *Oracle9i Security Overview* provides information about Oracle9i database security.
- The *Oracle Applications System Administrator's Guide* provides an overview of Oracle Applications security.

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## About Oracle Workflow Security

This section describes the Oracle Workflow security model.

### Oracle Workflow Security Model

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Oracle Workflow uses a password-based security model to protect Web and application content.

- The standalone version of Oracle Workflow leverages the security architecture of Oracle9i Application Server (Oracle9iAS) and the Oracle9i database.
- The version of Oracle Workflow embedded in Oracle Applications is part of the Oracle Applications security model in which users' privileges and access to functionality are based on responsibilities.

## **Classes of Users and Their Privileges**

---

For purposes of accessing Oracle Workflow web pages, Oracle Workflow defines two classes of users: Workflow administrators and Workflow users.

- Workflow administrators – The workflow administrator role is defined in the Global Workflow Preferences page. Users associated with this role can:
  - Access the administrator version of the Oracle Workflow Home page in standalone Oracle Workflow or the Oracle Workflow Administrator Home page in Oracle Applications.
  - Set global Workflow preferences and their own individual user preferences.
  - View and respond to their own notifications through the Worklist pages.
  - Access any user’s notifications through the Worklist pages in standalone Oracle Workflow. In Oracle Applications users must have the Personal Worklist added to the menu for one of their responsibilities in order to search for notifications sent to another user.
  - View and update any user’s processes in the Workflow Monitor in standalone Oracle Workflow, or in the administrator Status Monitor in Oracle Applications.
  - View Workflow item type definitions and launch test processes.
  - Launch demonstration processes, in standalone Oracle Workflow.
  - Access the Business Event System pages.
- Workflow users – Workflow users who are not associated with the workflow administrator role have more limited access to Oracle Workflow features. These users can:
  - Access the user version of the Oracle Workflow Home page in standalone Oracle Workflow or the Oracle Workflow Self-service Home page in Oracle Applications.
  - Set their own individual user preferences.
  - View and respond to their own notifications through the Worklist pages.

- View their own processes in the Workflow Monitor in standalone Oracle Workflow, or in the self-service Status Monitor in Oracle Applications.
- View Workflow item type definitions, in standalone Oracle Workflow.

In addition to being associated with the role specified in the Workflow Administrator global preference, administrators who manage Oracle Workflow must have the Oracle9iAS administrator role to access the Workflow Manager component within Oracle Enterprise Manager for standalone Oracle Workflow, or have the Oracle Applications System Administrator responsibility to access the Workflow Manager component within Oracle Applications Manager for Oracle Applications.

Also, administrators and developers who need to run Oracle Workflow scripts and programs or save workflow item type definitions to the database must have the password for the Oracle Workflow schema in the database.

### **Resources Protected**

---

Oracle Workflow provides security to protect the following resources.

- Oracle Workflow web pages – Standalone Oracle Workflow users must log in using Oracle HTTP Server authentication before they can access Oracle Workflow web pages. Oracle Applications users must log into Oracle Applications before they can access Oracle Workflow web pages.
- Workflow Manager – An Oracle9iAS or Oracle9i administrator must log into Oracle Enterprise Manager in order to access the Workflow Manager component. Similarly, an Oracle Applications system administrator must log into Oracle Applications in order to access the Workflow Manager component.
- Oracle Workflow Builder – No login is required to run the Oracle Workflow Builder development tool on a client PC. However, in order to view or save item type definitions in the database using Oracle Workflow Builder, a developer must provide the Oracle Workflow schema name and password.
- Administrative scripts and programs – An administrator must provide the Oracle Workflow schema name and password before running Oracle Workflow administrative scripts, the Workflow Definitions Loader, the Workflow XML Loader, or the standalone

Java Function Activity Agent. Additionally, an Oracle Applications system administrator must log into Oracle Applications before running Oracle Workflow concurrent programs.

- E-mail notifications – Oracle Workflow supports sending e-mail notifications to users and processing e-mail responses to update workflow processes. Ultimately, the security of e-mail notifications and responses depends on the security of your e-mail application. Oracle Workflow also provides several features to validate e-mail responses and protect application content from unauthorized updates. For more information, see: E-mail Notification Security: page 2 – 81.

### **Authorization and Access Enforcement**

---

Users are prompted for a username and password in order to access Oracle Workflow web pages and Oracle Enterprise Manager or Oracle Applications Manager. In Oracle Applications, users must additionally be assigned a responsibility that includes Oracle Workflow web pages before they can access these pages.

Users must provide the Oracle Workflow database schema username and password to run administrative scripts and programs and to access workflow definitions in the database through Oracle Workflow Builder.

For information about authorization and validation of e-mail notification responses, see: E-mail Notification Security: page 2 – 81.

### **Leveraging Oracle9i Application Server Security Services**

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Oracle Workflow leverages Oracle HTTP Server authentication to control access to Oracle Workflow web pages. In standalone Oracle Workflow, a PL/SQL Database Access Descriptor (DAD) is created for the Oracle Workflow web pages during installation. You can use either the HTTP or HTTPS protocol. HTTPS is recommended.

For information about use of Oracle HTTP Server by Oracle Applications, see: *Administering Oracle HTTP Server, Oracle Applications System Administrator's Guide*.

### **Leveraging Oracle Identity Management Infrastructure**

---

For standalone Oracle Workflow, you can choose one of two predefined directory service implementations during installation.

- You can integrate with Oracle Internet Directory (OID) as your directory repository. This option is recommended in order to leverage OID management tools and to support single sign-on through LDAP external authentication with Oracle9iAS Single Sign-On Server.
- If you do not choose integrate with OID, you can use Oracle database users and roles as your directory repository, with login authentication through Oracle HTTP Server.

In Oracle Applications, an Oracle Workflow directory service based on users and roles from the unified Oracle Applications environment is automatically implemented for you during installation. For information about setting up Oracle Applications to use Oracle Internet Directory and single sign-on, see: *Implementing Single Sign-on for Oracle Applications 11i with Login Server Authentication Using Oracle Internet Directory, Oracle Applications System Administrator's Guide.*

---

## Configuring Oracle9iAS Security Framework for Oracle Workflow

This section describes configuration considerations in Oracle HTTP Server for standalone Oracle Workflow. For Oracle Applications, see: *Oracle9i Application Server and Oracle Applications, Oracle Applications System Administrator's Guide.*

### Configuring Oracle9iAS Security Framework Options for Oracle Workflow

---

If you choose to implement OID and single sign-on integration in the Workflow Configuration Assistant, the DAD created for Oracle Workflow in Oracle HTTP Server is automatically protected in the `mod_osso` configuration file during installation. For more information, see the *Oracle9i Application Server Installation Guide.*

---

## Configuring Oracle Workflow Security

You can configure the following options in Oracle Workflow to take advantage of the security features you want.

## **Configuring Oracle Workflow Security Options**

---

You can set the following global workflow preferences related to security.

- Workflow Administrator, which defines the role that has administrator privileges in accessing Oracle Workflow web pages.
- LDAP preferences, if you are integrating with Oracle Internet Directory. LDAP preferences include LDAP host, LDAP port, LDAP password, LDAP changelog base directory, and LDAP user base directory. LDAP password values are masked as asterisks in the display and are stored in encrypted form.

See: Setting Global User Preferences: page 2 – 13.

For information about configuring e-mail notification security options, see: E-mail Notification Security: page 2 – 81.

## **Configuring Standalone Oracle Workflow Options for Oracle9iAS Security Framework**

---

During installation of standalone Oracle Workflow, the Workflow Configuration Assistant lets you enter LDAP preferences in order to integrate with OID. If you do choose to integrate with OID, the Workflow Configuration Assistant automatically installs the appropriate version of the Workflow PL/SQL security package, called WFA\_SEC, and a directory service implementation based on OID.

OID integration also enables Oracle Workflow to participate in Oracle9iAS single sign-on.

If you choose to integrate with OID, you must perform the following steps:

1. Perform an initial synchronization of the user information in your Workflow directory service with OID.
2. Schedule synchronization periodically between your Workflow directory service and OID.

See: Integrating an Oracle Workflow Directory Service with Oracle Internet Directory: page 2 – 24 and Synchronizing Workflow Directory Services with Oracle Internet Directory: page 2 – 43.

## Configuring Standalone Oracle Workflow Options for Database Security

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If you do not enter LDAP preferences in the Workflow Configuration Assistant during installation, then a directory service implementation based on Oracle database users and roles is automatically installed, along with the appropriate version of the Workflow PL/SQL security package, called WFA\_SEC.

In this case, you should modify the default directory service views to add e-mail addresses for the database users if you want them to be able to receive e-mail notifications. See: Integrating an Oracle Workflow Directory Service with Oracle Database Users: page 2 – 25.

**Note:** You can also implement a custom version of the WFA\_SEC security package, if you want to implement your own application-specific security. However, note that only the predefined versions of the WFA\_SEC security package provided by Oracle Workflow are supported by Oracle. See: Oracle Workflow Support Policy, *Oracle Workflow Developer's Guide*.

## Configuring Oracle Workflow Options for Oracle Applications Security

---

If you are using the version of Oracle Workflow embedded in Oracle Applications, directory service views for users and roles from the unified Oracle Applications environment are automatically implemented for you during installation. In Oracle Applications, Oracle Workflow uses a directory service model in which denormalized information is maintained in the Workflow local tables for performance gain. The local Workflow directory service tables store user and role information originating from various other Oracle Applications modules, as well as ad hoc users and roles, so that the Workflow directory service views can access this information with good performance. You should maintain synchronization between the user and role information stored in application tables by the source modules and the information stored in the Workflow local tables. See: Setting Up a Directory Service for Oracle Workflow Embedded in Oracle Applications: page 2 – 26.

Also, in Oracle Applications, you can optionally give users access to the Worklist, Advanced Worklist, and Personal Worklist web pages from any responsibility you choose. To make a Worklist available from a particular responsibility, you must add the appropriate function to the menu associated with that responsibility. Then you can assign that

responsibility to your users. See: [Adding Worklist Functions to User Responsibilities](#): page 2 – 128.



CHAPTER

# 4

## Oracle Workflow Home Page

**T**his chapter discusses the Oracle Workflow home page, where administrators can centrally access all the web-based features of Oracle Workflow.

---

## Accessing the Oracle Workflow Home Page

Use the Oracle Workflow home page to link to all of Oracle Workflow's web-based features. This page centralizes your access to the features so you do not have to remember individual URLs.

**Note:** If Oracle Internet Directory/Single Sign-On integration has been implemented for your installation of Oracle Workflow, you can use single sign-on when accessing Oracle Workflow's web-based features. With single sign-on, a user who is logged into any participating Oracle*iAS* component is automatically authenticated when accessing any other participating component and does not need to log in again. See: Synchronizing Workflow Directory Services with Oracle Internet Directory: page 2 – 43.

**Note:** For information about the administrator home page in the OA Framework user interface format, currently available with the version of Oracle Workflow embedded in Oracle Applications, see: Accessing the Oracle Workflow Administrator Home Page: page 4 – 7.

### ► To Access the Oracle Workflow Home Page

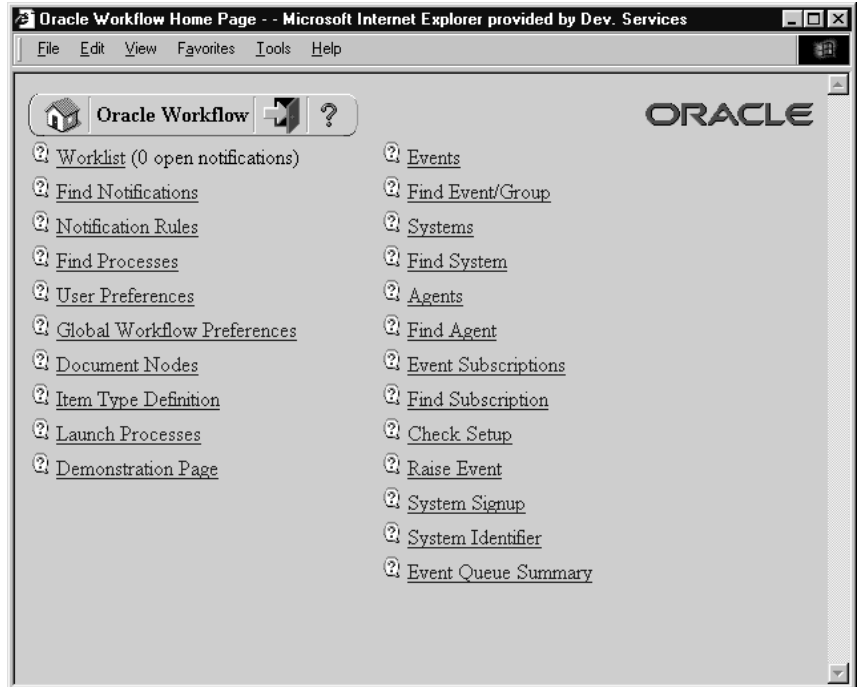
1. Use a web browser to connect to the URL for the home page:

```
<webagent>/wfa_html.home
```

*<webagent>* represents the base URL of the web agent configured for Oracle Workflow in your Web server. See: Setting Global User Preferences: page 2 – 13.



**Attention:** This is a secured page, so if you have not yet logged on as a valid user in the current web session, you will be prompted to do so before the page appears.



2. The web page identifies the current version of Oracle Workflow.
3. A toolbar appears in the upper left corner of the Oracle Workflow home page, as well as on every other Oracle Workflow web page. The Home icon returns you to the Oracle Workflow home page. The name of the current page appears in the middle of the toolbar. The Logout icon logs you out of your current Oracle Workflow web session and the Help icon displays online help for the current screen. Some of the Event Manager web pages also include a Query icon that lets you enter query details to search for Event Manager objects.
4. Choose the Worklist link to display your list of workflow notifications. You can close or reassign your notifications directly from the Worklist or you can drill down to the details of each specific notification and close, reassign, or respond to them individually. See: *To View Notifications from the Worklist, Oracle Workflow User's Guide.*
5. Choose the Find Notifications link to locate notifications that match specific criteria and act on those notifications. See: *To Find Notifications, Oracle Workflow User's Guide.*

6. Choose the Notification Rules link to view and define your automatic notification routing rules. If you are logged in as a role with workflow administrator privileges, the Find Automatic Notification Processing Rules web page appears, letting you first display the routing rules for the role you specify. See: To Define a Rule for Automatic Notification Routing, *Oracle Workflow User's Guide*.
7. Choose the Find Processes link to query for a list of workflow process instances that match certain search criteria. Once you find a specific process instance, you can view its status details in the Workflow Monitor. See: Using the Find Processes Web Page: page 5 – 10.
8. Choose the User Preferences link to set the preferences that control how you interact with Oracle Workflow. See: Setting User Preferences, *Oracle Workflow User's Guide*.
9. If you are logged in as a role with workflow administrator privileges, you can choose the Global Preferences link to set global preferences that control how users interact with Oracle Workflow. See: Setting Global User Preferences: page 2 – 13.
10. If you are logged in as a role with workflow administrator privileges, the Document Nodes link appears. This functionality is reserved for future use. You do not need to perform any actions with this link.
11. Choose the Item Type Definition link to access the Find Item Type web page. Use the Find Item Type web page to query for a specific item type definition to display in the Item Type Definition page. See: Item Type Definition Page, *Oracle Workflow Developer's Guide*.
12. If you are logged in as a role with workflow administrator privileges, you can choose the Launch Processes link to test a specific workflow process definition. See: Testing Workflow Definitions, *Oracle Workflow Developer's Guide*.
13. If you are logged in as a role with workflow administrator privileges, you can choose the Demonstration Page link to access the Demonstration home page. You can use the Demonstration home page to launch any of the demonstration workflow processes provided with Oracle Workflow. See: Sample Workflow Processes, *Oracle Workflow Developer's Guide*.
14. If you are logged in as a role with workflow administrator privileges, you can choose the Events link to view and define Business Event System events. See: To Define an Event, *Oracle Workflow Developer's Guide*.

15. If you are logged in as a role with workflow administrator privileges, you can choose the Find Event/Group link to query for events and event groups that match certain search criteria. See: To Find Events, *Oracle Workflow Developer's Guide*.
16. If you are logged in as a role with workflow administrator privileges, you can choose the Systems link to view and define Business Event System systems. See: To Define a System, *Oracle Workflow Developer's Guide*.
17. If you are logged in as a role with workflow administrator privileges, you can choose the Find System link to query for systems that match certain search criteria. See: To Find Systems, *Oracle Workflow Developer's Guide*.
18. If you are logged in as a role with workflow administrator privileges, you can choose the Agents link to view and define Business Event System agents. See: To Define an Agent, *Oracle Workflow Developer's Guide*.
19. If you are logged in as a role with workflow administrator privileges, you can choose the Find Agent link to query for agents that match certain search criteria. See: To Find Agents, *Oracle Workflow Developer's Guide*.
20. If you are logged in as a role with workflow administrator privileges, you can choose the Event Subscriptions link to view and define Business Event System subscriptions. See: To Define an Event Subscription, *Oracle Workflow Developer's Guide*.
21. If you are logged in as a role with workflow administrator privileges, you can choose the Find Subscription link to query for subscriptions that match certain search criteria. See: To Find Event Subscriptions, *Oracle Workflow Developer's Guide*.
22. If you are logged in as a role with workflow administrator privileges, you can choose the Check Setup link to check your Business Event System setup and schedule listeners and propagations for local agents. See: Setting Up the Business Event System: page 2 – 143.
23. If you are logged in as a role with workflow administrator privileges, you can choose the Raise Event link to raise a business event to the Event Manager. See: Raising Events, *Oracle Workflow Developer's Guide*.
24. If you are logged in as a role with workflow administrator privileges, you can choose the System Signup link to sign up one

system with another to receive business events. See: *Signing Up Systems, Oracle Workflow Developer's Guide.*

25. If you are logged in as a role with workflow administrator privileges, you can choose the System Identifier link to retrieve the system identifier information required for signing up systems. See: *To Retrieve System Identifier Information, Oracle Workflow Developer's Guide.*
26. If you are logged in as a role with workflow administrator privileges, you can choose the Event Queue Summary link to review the local queues used by the Business Event System. See: *Reviewing Local Queues, Oracle Workflow Developer's Guide.*

# Accessing the Oracle Workflow Administrator Home Page

**Note:** The Oracle Workflow web pages are being converted to the OA Framework user interface format. Depending on your version of Oracle Workflow and which patches you have applied, you may see Oracle Workflow web pages in the new format as well as in the previous format. The administrator home page is currently available for the version of Oracle Workflow embedded in Oracle Applications.

Use the Oracle Workflow administrator home page to link to Oracle Workflow's web-based administration features. This page centralizes your access to the features.

## ► To Access the Oracle Workflow Administrator Home Page

1. Use a web browser to navigate to the administrator home page, using a responsibility and navigation path specified by your system administrator. See: Oracle Workflow Administrator Navigation Paths: page A – 2.

You can navigate to the administrator home page from other Oracle Workflow administrator web pages by choosing the Home tab or selecting the Home link at the bottom of the page.

Oracle Workflow - Microsoft Internet Explorer provided by Dev. Services

File Edit View Favorites Tools Help

ORACLE Workflow

Return to Portal Logout Preferences Help

Home Developer Studio Business Events Status Monitor Notifications

Welcome Johnson, Ms. Alex  
to Oracle Workflow

Notifications at a Glance

Below is a list of your most important notifications. Select the subject to respond or select "Full List" to see all your notifications. (Full List)

From	Type	Subject	Sent	Due
Walker, Mr. Kenneth (Ken)	Requisition	Requisition 7554, Office equipment for 1,200,00 requires...	31-Mar-2003	31-Mar-2003
Walker, Mr. Kenneth (Ken)	Requisition	Requisition 7559, Software licenses for 800,00 require...	31-Mar-2003	31-Mar-2003
Walker, Mr. Kenneth (Ken)	Requisition	More Information Requested, Requisition 7556, Computer equipment...	31-Mar-2003	31-Mar-2003

TIP: Redirect or auto-respond to notifications using Routing Rules

Error Workflows

The most recent workflows with errors are shown below. Select "Full List" to see all error workflows started within the last week. (Full List)

Status	Workflow Type	Item Key	User Key	Started
✘	Error System: Error	27939		03-Apr-2003 14:05:40
✘	Error System: Error	27938		03-Apr-2003 13:55:34
✘	Error GL XML Data Transfer Send	GL_4		03-Apr-2003 12:57:38
✘	Error GL XML Data Transfer Send	GL_3		03-Apr-2003 12:50:40
✘	Error GL XML Data Transfer Send	GL_2		03-Apr-2003 12:46:46

Home | Developer Studio | Business Events | Status Monitor | Notifications | Return to Portal | Logout | Preferences | Help

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2. Global navigation buttons appear in the upper right corner of the home page, as well as on every other Oracle Workflow web page.
  - To return to the Oracle E–Business Suite portal page, select the Return to Portal button.
  - To log out of the Oracle E–Business Suite, select the Logout button.
  - To set your Oracle E–Business Suite general preferences, select the Preferences button. See: Preferences, *Oracle Applications User's Guide*.
  - To view online help for the current page, select the Help button.

You can also access these pages by selecting the corresponding links at the bottom of the current page.

**Note:** The OA Personalization Framework provides the ability to customize Oracle self–service web application pages. If you are logged in as a user or with a responsibility for which the Personalize Self–Service Defn profile option is set to Yes, a global Personalize button appears on each self–service web application page, and Personalize Region links appear for every personalizable region on each self–service web application page. You can choose the Personalize button or Personalize Region links to create your personalizations. For more information, please refer to the OA Personalization Framework online help.

3. The Notifications at a Glance region of the home page lists your five highest priority notifications, ordered by priority and then by date. For each notification, the list displays the from role, workflow item type, subject, sent date, and due date. Select the From, Type, Subject, Sent, or Due column heading to sort the list by that column.
  - To view and respond to a notification, select the notification subject link in the Subject column. See: To View the Details of a Notification, *Oracle Workflow User's Guide*.
  - To view the complete list of all your notifications in the Advanced Worklist, select the Full List button. See: To View Notifications from the Advanced Worklist, *Oracle Workflow User's Guide*.
4. The Error Workflows region displays the five most recent errored workflows started within the last week. If you have workflow administrator privileges, the list shows workflows owned by any user; if you do not have workflow administrator privileges, the list

shows only workflows that you own. For each workflow, the list displays the status, workflow item type, item key, user key, and start date.

- To view the error details for a workflow, select the error icon or the error link in the Status column. See: Viewing Error Information for a Workflow: page 5 – 36.
  - To view the activity history for a workflow, select the item key link in the Item Key column. See: Viewing Activity History: page 5 – 23.
  - To view a list of all errored workflows that were started within the last week, select the Full List button. See: Viewing Workflows in the Status Monitor: page 5 – 17.
5. To view workflow definitions and run test workflow processes, choose the Developer Studio tab, or select the Developer Studio link at the bottom of the page. See: Testing Workflow Definitions Using the Developer Studio, *Oracle Workflow Developer's Guide*.
  6. To manage Business Event System events, subscriptions, systems, and agents, choose the Business Events tab, or select the Business Events link at the bottom of the page. See: Event Manager for Oracle Applications, *Oracle Workflow Developer's Guide*.
  7. To view the Workflow Monitor, choose the Status Monitor tab, or select the Status Monitor link at the bottom of the page. See: Accessing the Administrator Monitor: page 5 – 17.
  8. To view notifications in the Notifications Worklist, choose the Notifications tab, or select the Notifications link at the bottom of the page. See: To View Notifications from the Advanced Worklist, *Oracle Workflow User's Guide*.



CHAPTER

# 5

## Monitoring Workflow Processes

**T**his chapter discusses how to monitor an instance of a workflow process.

---

## Overview of Workflow Monitoring

Once a workflow has been initiated for a work item, it may be necessary to check on its status to ensure that it is progressing forward, or to identify the activity currently being executed for the work item. Oracle Workflow provides a Java-based Workflow Monitor tool, and a view called WF\_ITEM\_ACTIVITY\_STATUSES\_V to access status information regarding for an instance of a workflow process.

**Note:** If you are using the version of Oracle Workflow embedded in Oracle Applications and you have implemented Oracle Applications Manager, you can use Oracle Workflow Manager as an additional administration tool to review and manage work items. For more information, please refer to the Oracle Applications Manager online help.

Also, if you are using the standalone version of Oracle Workflow, you can use the standalone Oracle Workflow Manager component available through Oracle Enterprise Manager as an additional administration tool to review and manage work items. For more information, please refer to the Oracle Workflow Manager online help.

**Note:** For information about the Status Monitor in the OA Framework user interface format, currently available with the version of Oracle Workflow embedded in Oracle Applications, see: *Accessing the Administrator Monitor: page 5 – 17* and *Accessing the Self-Service Monitor, Oracle Workflow User's Guide*.

### See Also

Oracle Workflow Views, *Oracle Workflow API Reference*

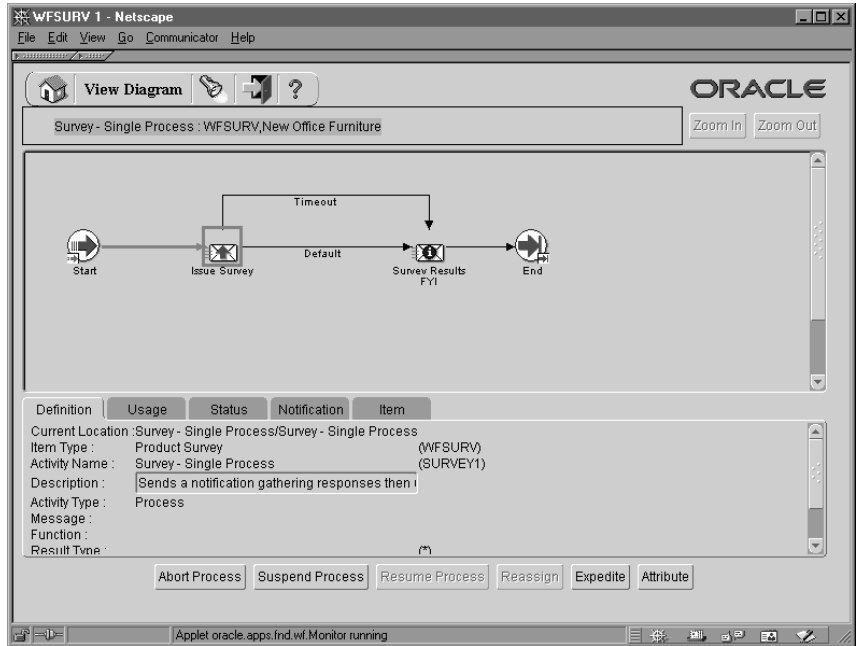
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## Workflow Monitor

The Workflow Monitor is a tool that allows you to view and administer the status of a specific instance of a workflow process. You can use the point-and-click interface to display detailed status information about activities in the process as well as about the process as a whole. The Workflow Monitor can be run in 'USER' or 'ADMIN' mode, where 'ADMIN' mode provides additional details and functionality pertinent only to a workflow administrator. See: *Workflow Monitor Access: page 5 – 7*.

The Workflow Monitor consists of the following sections:

- Process Title
- Process Diagram Window
- Detail Tab Window
- Administration Buttons



## Process Title

The process title appears in the upper left of the Workflow Monitor and displays the name of the workflow process and the name of the item type and user key that uniquely identify a running instance of that process in the process diagram window. If no user key has been set, then the item key is displayed instead. If you drill down into a subprocess in the process diagram window, the process title updates to display the subprocess name.

Click on any empty space in the process diagram window to deselect any selected activity in the process diagram window and to direct the detail tab window to display information about that process or subprocess as a whole.

## Process Diagram Window

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The process diagram window is a scrolling canvas that displays the diagram of the workflow process or subprocess currently listed in the process title. This diagram is identical to the diagram created in Oracle Workflow Builder. Note, however, that you cannot use the Workflow Monitor to edit this diagram.

The process diagram window provides graphical cues about the status of the process and its activities:

- An activity icon may be highlighted with a colored box to indicate that it is in an "interesting" state. The following table shows what state each color indicates.

Color of Box	State	Possible Status Code
Red	Error	ERROR
Green	Active/In Progress	ACTIVE, NOTIFIED, DEFERRED
Yellow	Suspended	HOLD
<none>	Normal	COMPLETE, WAITING, NULL

Table 9 – 1 (Page 1 of 1)

- Any transition (arrow) that has been traversed appears with a thick green line, while an untraversed transition appears with a thin black line.
- Click on an activity icon in the diagram to select it and update the detail tab window to display information about the activity.
- Click on any empty space in the process diagram to deselect the currently selected activity icon and to refresh the detail tab window to display information about the current process as a whole.
- Double-click on an activity icon that represents a subprocess to drill down to the subprocess' diagram. This action automatically updates the process title to reflect the name of the subprocess and updates the detail tab window to display information about the subprocess as a whole.

Alternatively, you can select the subprocess activity and choose Zoom In to drill down to the subprocess' diagram. Choose Zoom Out to navigate back to the process at the previous level.

## Detail Tab Window

---

The detail tab window, which appears below the process diagram, is a vertically scrollable display area that provides information about a selected process or activity.

The information appears as follows for each tab, where rows preceded by an asterisk (\*) or values shown in bold parentheses ( ) appear only when the monitor is run in 'ADMIN' mode:

### Definition Tab

Current Location: Process Display Name/Activity Display Name  
Item Type: Item Type display name (internal name)  
Activity Name: Activity display name (internal name)  
Description: Activity description  
Activity Type: Process, Notice, Event, or Function  
Message: Message internal name  
Function: Name of PL/SQL procedure called by activity  
Result Type: Result type display name (internal name)  
\*Cost: Function activity cost in seconds  
\*On Revisit: IGNORE, LOOP, or RESET  
\*Error Process: Error Item Type and Error Process internal name assigned to activity, if any

### Usage Tab

Current Location: Activity Display Name  
Start/End: No, Start, or End (process result)  
Performer: Role name or item attribute internal name  
\*Comment: Comments for the process activity node  
Timeout: N minutes or item attribute internal name

### Status Tab

Current Location: Activity Display Name  
Status: Activity status  
Result: Activity result (result code)  
Begin Date: Date activity begins  
End Date: Date activity ends  
Due Date: Date activity is due to timeout  
\*Notification: Notification ID  
Assigned User: Role name or item attribute internal name (shown only if Activity Status is 'ERROR')  
\*Error Name: Name of error  
Error Message: Error message  
\*Error Stack: Error stack

### Notification Tab

Current Location: Activity Display Name  
\*ID: Notification ID  
Recipient: Recipient of notification  
Status: Notification status  
Begin Date: Date notification is delivered  
End Date: Date notification is closed  
Due Date: Date activity is due to timeout

(If the selected activity is a notification that requires a response, then instead of displaying the above information, this tab displays the message response attributes as `<message_attribute> <type (Format)> <value>`. If the selected activity is a polling-type notification activity, where Expand Roles is checked and a response is required, then this tab displays the message response attributes as described above for each recipient. If the selected activity is a notification activity, where Expand Roles is on, but no response is required, then the recipient shown is simply the role, rather than the individual users in the role.)

### Item Tab

Process Display Name: Item Type, Item Key (or User Key, if set)  
Owner: Owner of the item, not implemented yet  
Begin Date: Date workflow process instance is created  
End Date: Date workflow process instance is completed  
`<Item Attribute>: <type(format)> <value>`  
...

### Administration Buttons

---

The administration buttons appear beneath the detail tab window only when the Workflow Monitor is run in 'ADMIN' mode. Each button allows you to perform a different administrative operation by calling the appropriate Workflow Engine API. The buttons and their behavior are as follows:

- **Abort Process**—Available only if you select the process title or a process activity. Calls `WF_ENGINE.AbortProcess` to abort the selected process and cancel any outstanding notifications. Prompts for a result to assign to the process you are about to abort. The process will have a status of Complete, with the

result you specify. See: *AbortProcess, Oracle Workflow API Reference*.

- **Suspend Process**—Available only if you select the process title or a process activity. Calls *WF\_ENGINE.SuspendProcess* to suspend the selected process so that no further activities can be transitioned to. See: *SuspendProcess, Oracle Workflow API Reference*.
- **Resume Process**—Available only if you select a suspended process. Calls *WF\_ENGINE.ResumeProcess* to resume the suspended process to normal execution status. Activities that were transitioned to when the process was suspended are now executed. See: *ResumeProcess, Oracle Workflow API Reference*.
- **Reassign**—Available only if you select a notification activity. Calls *WF\_ENGINE.AssignActivity* to reassign a notification activity to a different performer. Prompts for a role name. See: *AssignActivity, Oracle Workflow API Reference*.
- **Expedite**—Available if you select the process title, or an activity. Calls *WF\_ENGINE.HandleError* to alter the state of an errored activity, or to undo the selected activity and all other activities following it to rollback part of the process. Prompts you to select *Skip*, to skip the activity and assign it a specified result, or *Retry*, to reexecute the activity. See: *HandleError, Oracle Workflow API Reference*.
- **Attribute**—Always available so that you can change the value of an item type attribute. The current values appear for each item type attribute. After changing a value, choose *OK* to apply the change.

---

## Workflow Monitor Access

You can control a user's access to the Workflow Monitor in one of two ways. You can either depend on the workflow-enabled application to control access to the Workflow Monitor or provide direct access to the Find Processes web page.

### Application-controlled Access to the Workflow Monitor

Identify within the logic of your application code, the workflow process instance(s) that a user is allowed to view, and whether to run the monitor in 'ADMIN' or 'USER' mode for that user. You must also provide a means in your application's user interface to call a web

browser application that supports Java 1.1.8 and AWT and pass it the Workflow Monitor URL that gets returned from the function `WF_MONITOR.GetDiagramURL()`. The returned URL will have a hidden password attached that provides the user access to the Workflow Monitor in either 'ADMIN' or 'USER' mode. See: `GetDiagramUrl`, *Oracle Workflow API Reference*.

### **Provide Access to the Find Processes Web Page**

Another way to access the Workflow Monitor is to pass the Find Processes URL to a web browser that supports Java 1.1.8 and AWT. The Find Processes page requires user authentication before access. Depending on whether Oracle Workflow is configured to use Oracle Self-Service Web Applications or Oracle HTTP Server security, the user must log in using the appropriate username and password if he or she has not done so for the current browser session. If the user has workflow administrator privileges, the Find Processes web page that appears lets the user search for any workflow process instance. If the user does not have workflow administrator privileges, the Find Processes web page lets the user search for only processes that the user owns, as set by a call to the Workflow Engine `SetProcessOwner` API. The user can then display the notifications or the process diagram for any of those process instances in the Workflow Monitor.

The Find Processes URL looks similar to the following:

```
<webagent>/wf_monitor.find_instance
```

`<webagent>` is the web agent string that you can retrieve from the `WF_WEB_AGENT` token in the `WF_RESOURCES` table by calling `WF_CORE.TRANSLATE()`. See: `TRANSLATE`, *Oracle Workflow API Reference*.

**Note:** You can also access the Find Processes web page from the Oracle Workflow home page. See: `Accessing the Oracle Workflow Home Page`: page 4 – 2.

### **Access to the Workflow Monitor from Oracle Applications**

For Oracle Applications only, you can add access to the Workflow Monitor to your application by using the Oracle Applications function `FND_FNDWFIAS`. This function calls the web page `wf_monitor.show`.

You can add this function to the Navigate menu of a user's responsibility or call the function from an Oracle Applications form. See: `Menus Window`, *Oracle Applications Developer's Guide* and

Overview of Form Development Steps, *Oracle Applications Developer's Guide*.

If you call FND\_FNDWFIAS without passing any parameters in the call, then wf\_monitor.show displays the Find Processes web page.

If you want to specify a process instance to display, you must pass the function the following parameters:

- ITEM\_TYPE—A valid item type.
- ITEM\_KEY—A string derived from the application object's primary key. The string uniquely identifies the item within an item type. The item type and key together identify the process.
- ADMIN\_MODE—YES to run the monitor in 'ADMIN' mode, or NO to run the monitor in 'USER' mode.
- ACCESS\_KEY—The access key password to run the monitor in the selected mode. Use the Workflow Monitor API *GetAccessKey()* to retrieve the appropriate access key. See: *GetAccessKey, Oracle Workflow API Reference*.

When you pass these parameters, wf\_monitor.show displays the Workflow Monitor Notifications List web page for the specified process instance.

You can call the function FND\_FUNCTION.EXECUTE to execute FND\_FNDWFIAS specifying your parameters. See: FND\_FUNCTION.EXECUTE, *Oracle Applications Developer's Guide*. Use the following syntax:

```
fnd_function.execute(  
    FUNCTION_NAME=>'FND_FNDWFIAS',  
    OTHER_PARAMS=>'ITEM_TYPE=' || <item_type> ||  
    ' ITEM_KEY=' || <item_key> || ' ADMIN_MODE=' || <admin_mode> ||  
    ' ACCESS_KEY=' || (wf_monitor.GetAccessKey('<item_type>',  
    '<item_key>', '<admin_mode>' ));
```

The function FND\_FNDWFIAS uses Oracle Applications function security to control user access. See: Overview of Function Security, *Oracle Applications System Administrator's Guide* and Overview of Menus and Function Security, *Oracle Applications Developer's Guide*.

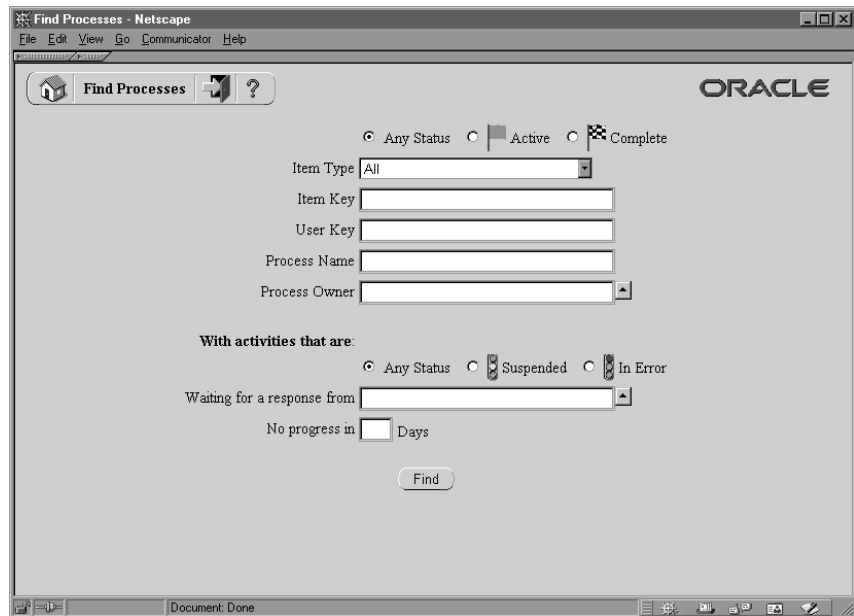
**Note:** In Oracle Applications, you can also call the function FND\_UTILITIES.OPEN\_URL to open a web browser and have it connect to a specified URL, such as the Find Processes URL or a Workflow Monitor diagram URL. However, this function does not use Oracle Applications function security. See:

## Using the Find Processes Web Page

The Oracle Workflow Find Processes web page allows you to query for a list of workflow process instances that match certain search criteria. From the Process List that appears, you can select a single process instance to review in more detail.

You can view details about the completed notification activities in the Notifications List web page that appears, or choose Advanced Options to display details about other activities in the Activities List web page. You can also navigate to the Workflow Monitor from the Notifications List to administer the process or see a graphical representation of the process and its status.

### ► To Specify Search Criteria in the Find Processes Page

The screenshot shows a Netscape browser window titled "Find Processes - Netscape". The browser's menu bar includes "File", "Edit", "View", "Go", "Communicator", and "Help". The page content features the Oracle logo in the top right corner. Below the logo, there are search criteria options: "Any Status" (selected), "Active", and "Complete". There are five input fields: "Item Type" (set to "All"), "Item Key", "User Key", "Process Name", and "Process Owner". Below these is a section titled "With activities that are:" containing "Any Status" (selected), "Suspended", and "In Error" options. Further down, there are two more input fields: "Waiting for a response from" and "No progress in" followed by a "Days" label. A "Find" button is located at the bottom of the form area. The browser's status bar at the bottom indicates "Document: Done".

1. You can enter search criteria using any combination of the following fields to find a subset of workflow process instances:
  - Process Status—Specify Any Status, Active, or Complete.

- Item Type—Select the item type of the workflow process instances you want to find, or select All to find workflow process instances for all item types.
  - Item Key or User Key—Specify an item key or a user key. An item key presents the internal identifier of an item whereas a user key is an end-user identifier assigned to an item. A user key may not necessarily be unique to an item. See: *SetItemUserKey, Oracle Workflow API Reference..*
  - Process Name—Specify the display name of a process activity.
2. If you log on as a user with Workflow Administrator privileges, you can search for and display any process instance, even if you do not own the process. In the Process Owner field, enter the internal name of any role defined in WF\_ROLES to list only processes owned by that role. Alternatively, leave the field blank to list all process instances that match your search criteria regardless of the process owner.

If you do not have Workflow Administrator privileges, then the Process Owner field reflects the internal name of the role you are logged in as for the current web session and you are allowed to search and display only processes that you initiated or are the primary participant of.

- Note:** You can set the owner of a process by making a call to the WF\_ENGINE.SetItemOwner API. The owner of a process is the person who initiated the process or is the primary participant of the process.
3. Optionally, you can also find workflow process instances with activities that are Suspended, In Error, or that have Any Status.
  4. You can find workflow process instances that have activities waiting for a response from a particular user or role.
  5. You can also identify workflow process instances that have not progressed for a specified number of days.
  6. When you finish entering your search criteria, choose Find to display all matching process instances in the Process List web page.

► **To Review the Process List**

Item Type	Item Key	User Key	Process Name	Complete	In Error	Suspended	Begin Date
Requisition	1950	Telecommuting Software	<a href="#">Requisition Approval</a>				04-DEC-2000 16:54:03
Requisition	6547	Telecommuting Hardware	<a href="#">Requisition Approval</a>	☑			04-DEC-2000 16:28:47

1. The Process List provides a summary of all workflow process instances that match your search criteria as specified in the Find Processes web page.
2. The process instances are listed in ascending order first by item type, then by item key.
3. The Process List summarizes the status of each process instance, as indicated by the Complete, In Error, and Suspended columns.
4. Choose a process link in the Process Name column to display the Notifications List for that process instance.

► **To Review the Notifications List**

Requisition Approval: Requisition, Telecommuting Software  
Started: 04-DEC-2000 ( 0 Days )

Done	Who	Activity	Started	Duration	Result
☑	<a href="#">KWALKER</a>	<a href="#">Notify Requisition Approval Required</a>	04-DEC-2000 16:54:04	58 Seconds	Approve
	<a href="#">CDOUGLAS</a>	<a href="#">Notify Requisition Approval Required</a>	04-DEC-2000 16:55:03	14 Seconds	

[View Diagram](#) [Advanced Options](#)

1. The Notifications List shows for the selected process instance, all the current notifications that have been sent that require a special Result response. In other words, these are the notification activities that allow the process to branch based on the recipient's response.
2. The Notification List summarizes what each notification activity is, who it is assigned to, when it was sent, whether it has been completed, how many days have passed before completion, as well as what its result is.

**Note:** If the process itself is in an error state, and the cause of the error was from a notification, the result of that notification may appear as a link in the Result column. Choose that link to display the cause of the error.

3. Choose a user link in the Who column if you want to send e-mail to the user that a notification has been assigned to.

**Note:** You can display a helpful hint about any link on the Notifications List web page by placing your cursor over the link. The hint appears in your web browser's status bar.

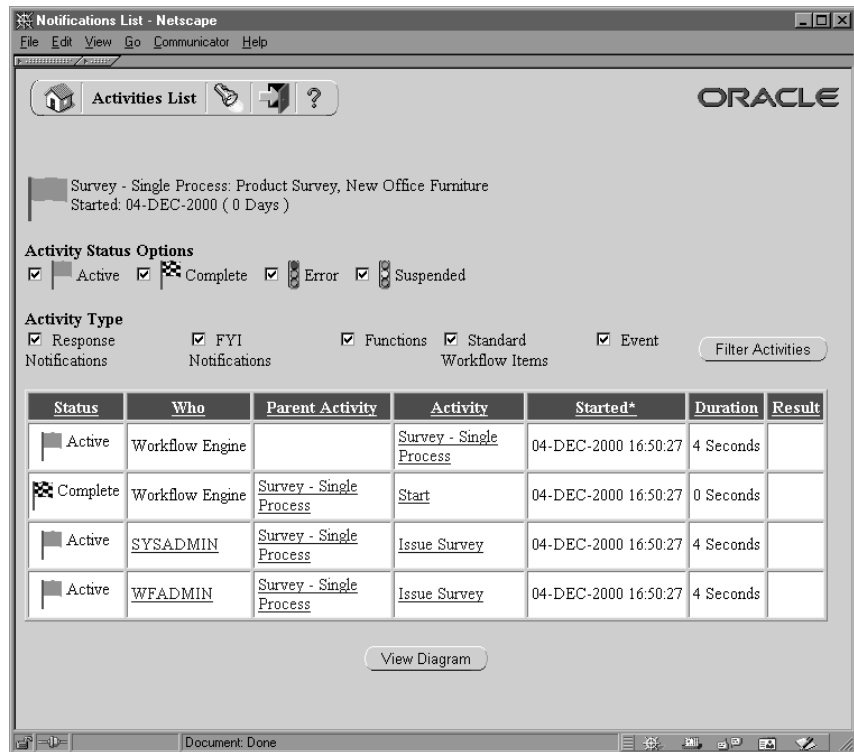
4. Choose a notification activity link in the Activity column if you want to view the full definition of a notification activity.
5. If a notification activity is still open and requires a response, and you are logged on with workflow administrator privileges, an icon will appear after the notification activity name in the Activity column. You can click on this icon to go to the Notification Details page where you can directly respond to this notification. When complete your response, choose the browser Back button to return to the Notifications List.
6. Choose Advanced Options to go to the Activities List web page where you can specify advanced criteria to search and display specific activities of interest for the process. See: To Filter Activities in the Activities List: page 5 – 14.
7. You can also choose the View Diagram button to display the selected process instance in the Workflow Monitor for a graphical representation of the process status. If you connected to the current web session as a user with Workflow Administrator privileges, the Workflow Monitor displays the process in 'ADMIN' mode, otherwise the process is displayed in 'USER' mode. See: Workflow Monitor: page 5 – 2.



**Attention:** If the process you select is a member of a parent/child process, a parent/child hierarchy list appears on the left hand side. The hierarchy list show links to corresponding parent and child instances of the current process

instance. The links invoke the Notifications List on the selected parent or child instance.

► **To Filter Activities in the Activities List**



1. The Activities List web page lets you specify various criteria to filter for specific activities of interest.
2. Use the Activity Status Options check boxes to specify any activity status of interest. A status of Active also includes activities that are in the Notified, Deferred and Waiting state.
3. Use the Activity Type check boxes to specify the types of activities you want to view. You can choose to display notification activities that require a response, notification activities that do not require a response, function activities, activities that belong to the Standard item type, and/or event activities.
4. Once you finish selecting your criteria, choose Filter Activities to display the activities that match your criteria.

5. The resulting activities summary list includes the following columns of information:
  - Status—the status of the activity, which is either Active, Complete, Error or Suspend.
  - Who—the performer of the activity. If the activity is a function activity, the Workflow Engine is the performer. If the performer is a person, you can click on the link to that person’s name to send mail to that individual. Note that if an activity is a notification activity that has Expand Roles on, multiple rows of that same activity appear in the summary, with the individual members of the role listed in the Who column.
  - Parent Activity—the process activity that this activity belongs to, unless the activity itself is the top level process. The parent activity provides a link to the details of its definition.
  - Activity—the name of the activity. This activity provides a link to the details of its definition.
  - Started—the date and time when the activity was initiated.
  - Duration—the amount of time taken to complete the activity, shown as one unit lower than the most significant unit of time taken. If the activity took only seconds to complete, then only seconds are shown.
  - Result—the result of the activity. If the activity has a status of Error, then the result provides a link to the error name, error message, and error stack associated with the error.

**Note:** You can display a helpful hint about any link on the Activities List web page by placing your cursor over the link. The hint appears in your web browser’s status bar.
6. You can sort the activities summary list based on any column by clicking on a column header. An asterisk (\*) appears next to the column title to indicate that it is being used for sorting. If the asterisk is to the left of the column title, the sort order is ascending. If the asterisk is to the right of the column title, the sort order is descending. Clicking multiple times on the same column title reverses the sort order.
7. You can also choose the View Diagram button to display the process instance in the Workflow Monitor for a graphical representation of the process status. If you connected to the current web session as a user with Workflow Administrator privileges, the Workflow Monitor displays the process in ‘ADMIN’

mode, otherwise the process is displayed in 'USER' mode. See:  
Workflow Monitor: page 5 – 2.

## **See Also**

Setting Up an Oracle Workflow Directory Service: page 2 – 21

Setting Global User Preferences: page 2 – 13

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## Accessing the Administrator Monitor

**Note:** The Oracle Workflow web pages are being converted to the OA Framework user interface format. Depending on your version of Oracle Workflow and which patches you have applied, you may see Oracle Workflow web pages in the new format as well as in the previous format. The Administrator Monitor pages are currently available for the version of Oracle Workflow embedded in Oracle Applications.

The Administrator Monitor lets you view and administer runtime workflows. You can use the monitor to review the activities performed for a workflow, check the status of the workflow by viewing the status diagram, examine participant responses to notifications sent by the workflow, and review details about the workflow definition and attributes.

If you have workflow administrator privileges, you can also perform administrative operations within the monitor to control the processing performed for a workflow or handle an error. For example, you can update workflow attributes, suspend and resume a workflow, cancel a workflow, or rewind the workflow to an earlier activity stage. You can also skip or retry an individual activity within a workflow, reassign a notification activity, or suspend and resume a process activity. Workflow administrator privileges are assigned in the Global Workflow Preferences page. See: *To Set Global User Preferences: page 2 – 13.*

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## Viewing Workflows in the Status Monitor

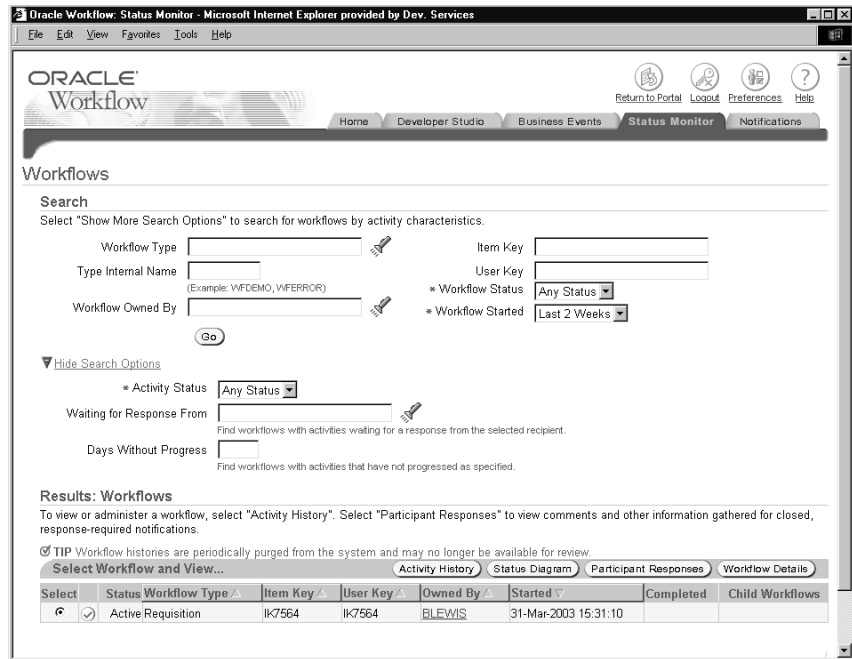
When you access the Status Monitor, you can search for the workflows you want to review.

**Note:** If you have workflow administrator privileges, you can search for workflows owned by any user. If you do not have workflow administrator privileges, you can only search for workflows that you own.

► **To Search for Workflows in the Status Monitor**

1. Use a web browser to navigate to the administrator Status Monitor, using a responsibility and navigation path specified by your system administrator. When you initially navigate to the Status Monitor, the Workflows page is displayed by default. See: *Oracle Workflow Administrator Navigation Paths: page A – 2.*

You can navigate to the administrator Status Monitor from other Oracle Workflow administrator web pages by choosing the Status Monitor tab or selecting the Status Monitor link at the bottom of the page.



2. To locate specific workflows, enter search criteria in the Search region. The search criteria are:

- **Workflow Type** – Select the workflow item type you want to review. Select the field’s search icon to display a list of values from which to choose. You can search by the workflow type display name, internal name, or description. The display name for the workflow type you select populates the Workflow Type field, and the internal name for the workflow type you select populates the Type Internal Name field. See: Using a List of Values: page 5 – 21.
- **Type Internal Name** – Enter the internal name of the workflow type you want to review, if you want to enter the internal name directly instead of selecting a value.
- **Workflow Owned By** – If you have workflow administrator privileges, select the user who owns the workflows you want to review. Select the field’s search icon to display a list of values

from which to choose. You can search by the user display name, internal name, or e-mail address. See: Using a List of Values: page 5 – 21.

If you do not have workflow administrator privileges, you can only search for workflows that you own. In this case, Oracle Workflow displays your name as a non-editable value in the Workflow Owned By field.

- **Item Key** – Enter the item key that uniquely identifies the workflow you want to review. You can enter a partial value to search for workflows whose item keys begin with that value.
- **User Key** – Enter the user key that identifies the workflow you want to review. You can enter a partial value to search for workflows whose user keys begin with that value.
- **Workflow Status** – Choose the status of the workflows you want to review, or choose Any Status to display workflows in any status.
  - In Process – Workflows that do not have an end date (including errored workflows)
  - Complete – Workflows that have an end date
  - Error – Workflows that do not have an end date and have at least one errored activity
- **Workflow Started** – Choose Today, This Week (last seven days), Last 2 Weeks (last fourteen days), Last 30 Days, Last 60 Days, or Any Time to specify the start date of the workflows you want to review. All the start date ranges include the current date; for example, Last 2 Weeks includes today as well as the previous thirteen days.

**Note:** You must enter at least one of the following criteria when you search in order to limit the size of the results list.

- Workflow Type
  - Type Internal Name
  - Workflow Owned By
  - Workflow Started – If you search only by this option, you must select a specific start date range. You cannot use Workflow Started with the Any Time value as your only search option.
3. You can also enter additional search criteria to search for workflows by activity characteristics. To show the additional

options if they are hidden, select the Show More Search Options link. To hide these options if they are shown, select the Hide Search Options link. The additional search criteria are:

- Activity Status – Select an activity status to display workflows with one or more activities in that status, or select Any Status to display workflows with activities in any status. You can choose the following statuses:
    - Active
    - Complete
    - Deferred
    - Error
    - Notified
    - Suspended
    - Waiting
  - Waiting for Response From – Enter a role to display workflows with activities that are waiting for a response from the specified recipient. Select the field’s search icon to display a list of values from which to choose. You can search by the user display name, internal name, or e-mail address. See: Using a List of Values: page 5 – 21.
  - Days Without Progress – Enter a number of days to display in-process workflows with activities that have not progressed in the specified time.
4. Select the Go button to perform your search.
  5. The Results region displays the workflows that match your search criteria. For each workflow, the list displays the status, workflow type, item key, user key, owner, start date, completion date, and whether this workflow is a parent of any child workflows.
    - Select the Workflow Type, Item Key, User Key, Owned By, or Started column heading to sort the list by that column.
    - To view the error details for an errored workflow, select the error icon or the error link in the Status column.
    - To send e-mail to the owner of a workflow, select the user link in the Owned By column.
    - To view child workflows for a workflow, select the child icon in the Child Workflows column.

6. You can use the monitor buttons to drill down to additional information for a workflow.
  - To review the activities executed within a workflow, select the workflow and select the Activity History button.
  - To view the status diagram for a workflow, select the workflow and select the Status Diagram button.
  - To view comments and other information gathered for closed response–required notifications in a workflow, select the workflow and select the Participant Responses button.
  - To view details for a workflow, including the workflow type definition and current workflow attribute values, select the workflow and select the Workflow Details button.

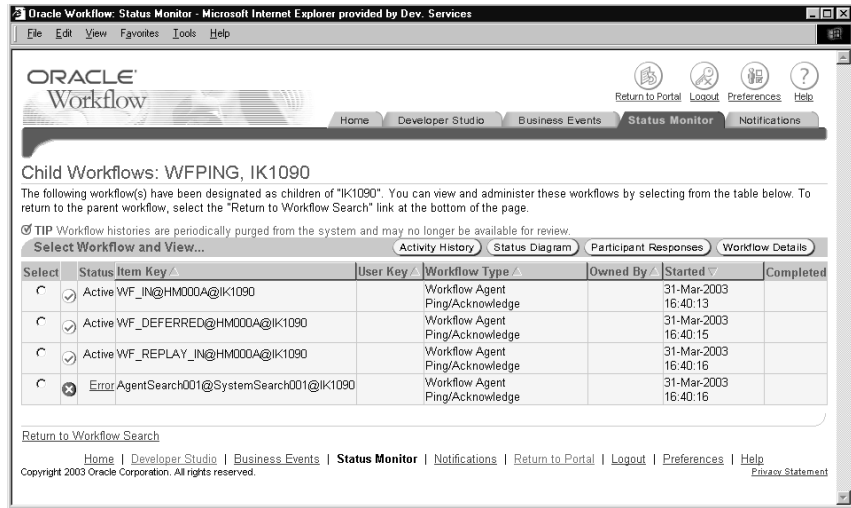
► **Using a List of Values**

1. For a field that supports a list of values, select the field’s search icon to display a Search and Select page.
2. In the Search region, select the filter to search by, depending on the type of value you are searching for. Then enter a search value in the text field and select the Go button. If you do not specify a search value, Oracle Workflow retrieves the complete list of values.
3. The Results region displays the list of values that match your search criteria. Select the value you want and choose the Select button. The value you selected populates the original field. You can also choose the Cancel button in the Search and Select page to return to the previous page without selecting a value.

---

## Viewing Child Workflows

The Child Workflows page shows the workflows that are designated as children of a particular workflow.



The page displays the workflow type internal name and item key of the selected parent workflow. For each child workflow, the list displays the status, item key, user key, workflow item type, owner, start date, and completion date.

- Select the Item Key, User Key, Workflow Type, Owned By, or Started column heading to sort the list by that column.
- To view the error details for an errored workflow, select the error icon or the error link in the Status column.
- To send e-mail to the owner of a workflow, select the user link in the Owned By column.

You can use the monitor buttons to drill down to additional information for a workflow.

- To review the activities executed within a workflow, select the workflow and select the Activity History button.
- To view the status diagram for a workflow, select the workflow and select the Status Diagram button.
- To view comments and other information gathered for closed response-required notifications in a workflow, select the workflow and select the Participant Responses button.
- To view details for a workflow, select the workflow and select the Workflow Details button.

You can also select the Return link to return to the Workflows search page.

## Viewing Activity History

The Activity History page shows information about the activities executed for a workflow.

The screenshot shows the Oracle Workflow Status Monitor interface. The main content area displays the Activity History for workflow APEXP, IK11680. The workflow type is AP Expense Report, and it is currently Active. The search section allows filtering by Activity Type (Response Notifications, FYI Notifications, Functions and Processes, Standard Workflow, Events) and Activity Status (Active, Complete, Error, Suspended). The results table shows the following activities:

Select	Status	Activity	Parent Activity	Performer	Started	Completed	Activity Result	Reassign	Suspend / Resume
<input type="radio"/>	<input checked="" type="radio"/>	Notified Inform Sys Admin of Payables Validation Failure	Server Side Validation Process	SYSADMIN	03-Apr-2003 15:22:06				
<input type="radio"/>	<input checked="" type="radio"/>	Active Server Side Validation Process	AP Standard Expense Report Process		03-Apr-2003 15:21:53				
<input type="radio"/>	<input checked="" type="radio"/>	Active AP Standard Expense Report Process			03-Apr-2003 15:21:31				

The page displays the workflow type internal name and item key as well as the following details for the selected workflow:

- Workflow Type – The workflow item type.
- Status – The status of the workflow.
- Started – The start date and time for the workflow.
- Completed – The completion date and time for the workflow.

The Search region lets you specify the activity type and activity status of the activities you want to view. The activity type options include:

- Response Notifications
- FYI Notifications
- Functions and Processes
- Standard Workflow
- Events

The activity status options include:

- Active
- Complete
- Error
- Suspended

All activity types and statuses are selected by default. To search for specific activities, deselect any activity types and statuses you do not want to view and select the Go button. At least one activity type and one activity status must be selected for a search to be performed.

The Results region displays the activities that match your search criteria. For each activity, the list displays the status, activity name, parent activity, performer, start date, completion date, and activity result.

- To view details about the definition and current status of an activity, select the activity name link in the Activity column.
- To send e-mail to the performer of a notification, select the user link in the Performer column.

If you have workflow administrator privileges, you can use the activity administration icons to perform administrative operations on notification or process activities that are not yet complete.

- To reassign a notification activity that is not yet complete, select the reassign icon in the Reassign column. In the Reassign page, select the new recipient for the notification and select the Apply button. You can also select the Cancel button to return to the previous page without reassigning the notification.

**Note:** When you reassign a notification from the Status Monitor, Oracle Workflow transfers complete ownership and responsibility for the notification to the new recipient. If you want to delegate authority to respond to the notification but retain ownership of the notification yourself, or if you want to enter comments to the new recipient, you must use the Notifications Worklist to reassign the notification. See: *To Reassign a Notification to Another User, Oracle Workflow User's Guide.*

**Note:** The reassign icon appears only for notification activities that are not yet complete. Additionally, you cannot reassign a notification if the Expand Roles option is selected for the notification.

Additionally, you cannot reassign a voting notification that tallies the recipients' responses. See: *Voting Activity, Oracle Workflow Developer's Guide*.

- To suspend a process activity that is not yet complete, select the suspend icon in the Suspend/Resume column. In the Suspend page, select the Apply button. All further processing for the process is suspended until the process is resumed. You can also select the Cancel button to return to the previous page without suspending the process.

**Note:** If you suspend the root process for a workflow, all subprocesses for the workflow are suspended as well.

**Note:** The suspend icon appears only for process activities that are not yet complete.

- To resume a suspended process activity, select the resume icon in the Suspend/Resume column. In the Resume page, select the Apply button. Processing for the process is resumed and any activities that were transitioned to while the process was suspended are now executed. You can also select the Cancel button to return to the previous page without resuming the process.

**Note:** If you resume the root process for a workflow, all subprocesses for the workflow are resumed as well.

**Note:** The resume icon appears only for process activities that are suspended.

If you have workflow administrator privileges, you can use the activity administration buttons to perform administrative operations on any activities that are not yet complete.

- To skip an activity and force the workflow to transition to the next activity, select the activity and select the Skip button. In the Skip page, enter the result value to assign to the activity if required, and select the Apply button. You can also select the Cancel button to return to the previous page without skipping the activity.

**Note:** You cannot skip a suspended process activity. You must resume the process before you can skip it.

- To retry an activity, select the activity and select the Retry button. In the Retry page, select the Apply button. You can also select the Cancel button to return to the previous page without retrying the activity.

**Note:** You cannot retry a suspended process activity. You must resume the process before you can retry it.

If you have workflow administrator privileges and you are viewing a workflow that is not yet complete, you can use the workflow administration buttons to perform administrative operations on the workflow.

- To change the values of any item attributes, select the Update Attributes button. In the Update Workflow Attributes page, enter the new values you want and select the Apply button. You can also select the Cancel button to cancel the changes or select the Return link to return to the previous page.

After you select the Apply button, Oracle Workflow displays the Update Workflow Attributes page showing a confirmation message as well as the new attribute values. You can continue making further changes in this page if necessary.

**Note:** You cannot update attributes of type event. However, you can select the event message link to view the event message details.

- To rewind the workflow to an earlier activity stage, select the Rewind button. In the Rewind page, select the activity you want from the list of activities that the Workflow Engine has reached and select the Apply button. Oracle Workflow stops processing at the current activity and resumes processing at the specified activity. You can also select the Cancel button to return to the previous page without rewinding the workflow.

**Note:** You cannot rewind a suspended workflow. You must resume the workflow before you can rewind it.

- To suspend the workflow, select the Suspend Workflow button. In the Suspend page, select the Apply button. All further processing for the workflow is suspended until the process is resumed, and all subprocesses are suspended as well. You can also select the Cancel button to return to the previous page without suspending the workflow.
- To resume the workflow if it is suspended, select the Resume Workflow button. In the Resume page, select the Apply button. Processing for the workflow is resumed, and all subprocesses are resumed as well. Any activities that were transitioned to while the workflow was suspended are now executed. You can also select the Cancel button to return to the previous page without resuming the workflow.

- To cancel the workflow, select the Cancel Workflow button. In the Cancel page, select Apply. The Workflow Engine sets the status of the workflow to #FORCE, and all processing for the workflow is canceled and cannot be restarted. You can also select the Cancel button to return to the previous page without canceling the workflow.

You can also select the Return link to return to the Workflows search page, or choose Status Diagram, Participant Responses, or Workflow Details in the side navigation to navigate to the corresponding Status Monitor page.

## Viewing a Status Diagram

The Status Diagram page shows the process diagram for a workflow, including graphical cues about the status of the workflow and its activities.

The screenshot displays the Oracle Workflow Status Monitor interface in a Microsoft Internet Explorer browser. The page title is "Oracle Workflow: Status Monitor - Microsoft Internet Explorer provided by Dev. Services". The browser's address bar shows the URL. The page has a navigation menu with "Home", "Developer Studio", "Business Events", "Status Monitor", and "Notifications". The "Status Monitor" tab is active.

The main content area is titled "Status Diagram: WFPING, IK1090". It shows the following details:

- Workflow Type: **Workflow Agent Ping/Acknowledge**
- Status: **Suspended**
- Started: 31-Mar-2003 16:40:12
- Completed: (blank)

Below this information is a "Current Status" section with a search box containing "Master Ping Process : WFPING,IK1090" and "Zoom In" and "Zoom Out" buttons. The status diagram itself shows a linear flow of four activities: "Start", "Spawn Detail Processes", "WaitForFlow", and "End". The "WaitForFlow" activity is highlighted with a red box, indicating it is the current status of the workflow.

At the bottom of the diagram area, there are tabs for "Definition", "Usage", "Status", and "Notification". The "Status" tab is selected, showing the following details:

- Current Location: Master Ping Process/Master Ping Process
- Item Type: Workflow Agent Ping/Acknowledge
- Activity Name: Master Ping Process
- Description: Launches Detail Ping Processes
- Activity Type: Process
- Result Type: (blank)

At the bottom of the page, there are several buttons: "Return to Workflow Search", "Update Attributes", "Rewind", "Resume Workflow", and "Cancel Workflow". The footer of the page contains the navigation menu: "Home | Developer Studio | Business Events | Status Monitor | Notifications | Return to Portal | Logout | Preferences | Help".

The page displays the workflow type internal name and item key as well as the following details for the selected workflow:

- Workflow Type – The workflow item type.

- Status – The status of the workflow.
- Started – The start date and time for the workflow.
- Completed – The completion date and time for the workflow.

The Current Status region displays the process title, diagram, and detail tabs for the workflow. Beneath the detail tabs, the administration buttons are displayed.

### Process Title

---

The process title appears in the upper left of the Current Status region and displays the workflow process name, type, and user key. If no user key has been set, then the item key is displayed instead. If you drill down into a subprocess in the process diagram, the process title displays the subprocess name.

### Process Diagram Window

---

The process diagram window is a scrolling canvas that displays the diagram of the workflow process or subprocess currently listed in the process title. This diagram is identical to the diagram created in Oracle Workflow Builder. Note, however, that you cannot use the Workflow Monitor to edit this diagram.

The process diagram window provides graphical cues about the status of the process and its activities.

- An activity icon may be highlighted with a colored box to indicate that it is in an “interesting” state. The following table shows what state each color indicates.

Color of Box	State	Possible Status Code
Red	Error	ERROR
Green	Active/In Progress	ACTIVE, NOTIFIED, DEFERRED
Yellow	Suspended	SUSPEND
<none>	Normal	COMPLETE, WAITING, NULL

Table 9 – 2 (Page 1 of 1)

- Any transition (arrow) that has been traversed appears as a thick green line, while an untraversed transition appears as a thin black line.

- Click an activity icon in the diagram to select it and update the detail tab window to display information about the activity.
- Click any empty space in the diagram to deselect the currently selected activity icon and to refresh the detail tab window to display information about the current process as a whole.
- Double-click an activity icon that represents a subprocess to drill down to the diagram for the subprocess. This action automatically updates the process title to reflect the name of the subprocess and updates the detail tab window to display information about the subprocess as a whole.

Alternatively, you can select the subprocess activity and choose Zoom In to drill down to the diagram for the subprocess. Choose Zoom Out to navigate back to the higher level process.

### **Detail Tab Window**

---

The detail tab window, which appears below the process diagram, is a vertically scrollable display area that provides information about a selected process or activity. The information appears as follows for each tab.

#### **Definition Tab**

- Current Location – Process display name/activity display name
- Item Type – Workflow type display name
- Activity Name – Activity display name
- Description – Activity description
- Activity Type – Process, Notice, Event, or Function
- Result Type – Result type display name

#### **Usage Tab**

- Current Location – Process display name/activity display name
- Start/End – No, Start, or End
- Performer – Role name or item attribute internal name
- Timeout – Timeout value in minutes or item attribute internal name

#### **Status Tab**

- Current Location – Process display name/activity display name
- Status – Activity status

- Result – Activity result
- Begin Date – Date activity begins
- End Date – Date activity ends
- Due Date – Date activity is due to time out
- Assigned User – Role name or item attribute internal name
- Error Message – Error message (shown only if activity status is 'Error')

### **Notification Tab**

- Current Location – Process display name/activity display name
- Recipient – Recipient of notification
- Status – Notification status
- Begin Date – Date notification is delivered
- End Date – Date notification is closed
- Due Date – Date activity is due to time out

**Note:** If the selected activity is a notification activity where Expand Roles is selected, but no response is required, then the recipient shown is simply the role, rather than the individual users in the role.

### **Administration Buttons**

---

If you have workflow administrator privileges and you are viewing a workflow that is not yet complete, you can use the administration buttons to perform administrative operations on the workflow.

- To change the values of any item attributes, select the Update Attributes button. In the Update Workflow Attributes page, enter the new values you want and select the Apply button. You can also select the Cancel button to cancel the changes or select the Return link to return to the previous page.

**Note:** You cannot update attributes of type event. However, you can select the event message link to view the event message details.

- To rewind the workflow to an earlier activity stage, select the Rewind button. In the Rewind page, select the activity you want from the list of activities that the Workflow Engine has reached and select the Apply button. Oracle Workflow stops processing at the current activity and resumes processing at the specified

activity. You can also select the Cancel button to return to the previous page without rewinding the workflow.

**Note:** You cannot rewind a suspended workflow. You must resume the workflow before you can rewind it.

- To suspend the workflow, select the Suspend Workflow button. In the Suspend page, select the Apply button. All further processing for the workflow is suspended until the process is resumed, and all subprocesses are suspended as well. You can also select the Cancel button to return to the previous page without suspending the workflow.
- To resume the workflow if it is suspended, select the Resume Workflow button. In the Resume page, select the Apply button. Processing for the workflow is resumed, and all subprocesses are resumed as well. Any activities that were transitioned to while the workflow was suspended are now executed. You can also select the Cancel button to return to the previous page without resuming the workflow.
- To cancel the workflow, select the Cancel Workflow button. In the Cancel page, select Apply. The Workflow Engine sets the status of the workflow to #FORCE, and all processing for the workflow is canceled and cannot be restarted. You can also select the Cancel button to return to the previous page without canceling the workflow.

You can also select the Return link to return to the Workflows search page, or choose Activity History, Participant Responses, or Workflow Details in the side navigation to navigate to the corresponding Status Monitor page.

---

## Viewing Participant Responses

The Participant Responses page shows information about closed response-required notifications for a workflow. For example, you can use this page to view individual responses to a voting activity.



The page displays the workflow type internal name and item key as well as the following details for the selected workflow:

- Workflow Type – The workflow item type.
- Status – The status of the workflow.
- Started – The start date and time for the workflow.
- Completed – The completion date and time for the workflow.

The Notification Responses region lists the closed response–required notifications for the workflow. For each notification, the list displays the notification subject, respondent, comment, and response value.

- To send e–mail to the respondent for a notification, select the user link in the Respondent column.
- To view details about a response, select the details icon in the View Response Details column.

You can also select the Return link to return to the Workflows search page, or choose Activity History, Status Diagram, or Workflow Details in the side navigation to navigate to the corresponding Status Monitor page.

**Note:** The Participant Responses page lists only closed response–required notifications. To view information–only (FYI) notifications or unanswered response–required notifications, view the complete activity history for the workflow. See: Viewing Activity History: page 5 – 23.

## Viewing Notification Response Details

---

The Notification Response Details page displays the following details about the selected response:

- Notification Subject – The subject line of the notification.
- Respondent – The user who responded to the notification. To send e-mail to the respondent, select the user link.
- Original Recipient – The user to whom the notification was originally sent. If the original recipient is different than the respondent, then the original recipient reassigned responsibility for replying to the respondent. To send e-mail to the original recipient, select the user link.
- Notification Sent – The date and time when the notification was sent.
- Response Received – The date and time when the response was received.
- Response – The response value that is the result of the notification.

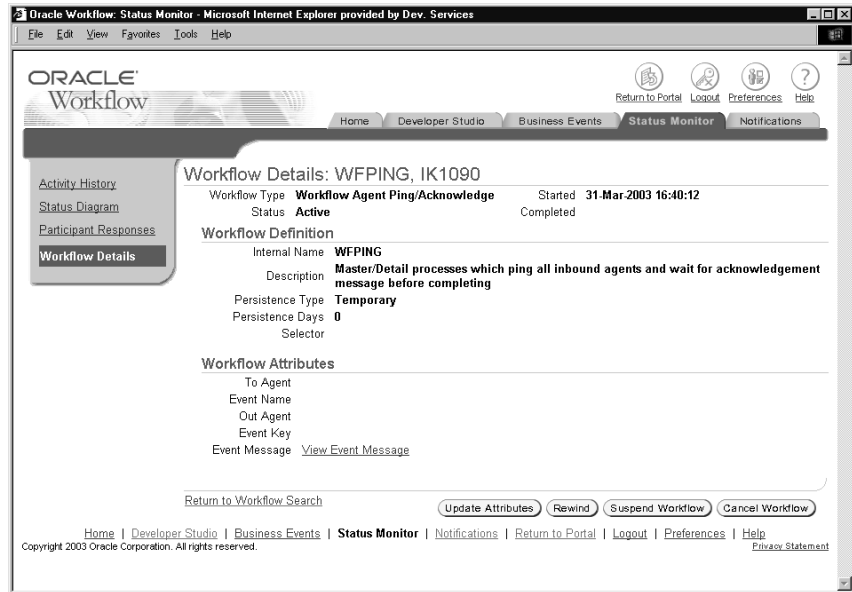
The Additional Response Information region lists any further response values requested in the notification in addition to the result response.

Select the Return link to return to the previous page, or choose Activity History, Status Diagram, or Workflow Details in the side navigation to navigate to the corresponding Status Monitor page.

---

## Viewing Workflow Details

The Workflow Details page shows information about a selected workflow.



The page displays the workflow type internal name and item key as well as the following details:

- Workflow Type – The workflow item type.
- Status – The status of the workflow.
- Started – The start date and time for the workflow.
- Completed – The completion date and time for the workflow.

The Workflow Definition region displays the following information about the workflow type:

- Internal Name – The workflow type internal name.
- Description – The workflow type description.
- Persistence Type – The persistence type, either Permanent if the runtime status information is maintained indefinitely until it is specifically purged, or Temporary if the runtime status information is maintained for a specified number of days after the workflow completion date before it can be purged.
- Persistence Days – If the persistence type is Temporary, the number of days from the time a workflow of this workflow type completes before its status audit trail can be purged.

- Selector – The selector/callback function that determines which process activity to run for the workflow type in a particular situation.

The Workflow Attributes region lists the names and values of the item attributes for the workflow. For an attribute of type event, select the event message link to view the event message details.

If you have workflow administrator privileges and you are viewing a workflow that is not yet complete, you can use the administration buttons to perform administrative operations on the workflow.

- To change the values of any item attributes, select the Update Attributes button. In the Update Workflow Attributes page, enter the new values you want and select the Apply button. You can also select the Cancel button to cancel the changes or select the Return link to return to the previous page.

After you select the Apply button, Oracle Workflow displays the Update Workflow Attributes page showing a confirmation message as well as the new attribute values. You can continue making further changes in this page if necessary.

**Note:** You cannot update attributes of type event. However, you can select the event message link to view the event message details.

- To rewind the workflow to an earlier activity stage, select the Rewind button. In the Rewind page, select the activity you want from the list of activities that the Workflow Engine has reached and select the Apply button. Oracle Workflow stops processing at the current activity and resumes processing at the specified activity. You can also select the Cancel button to return to the previous page without rewinding the workflow.

**Note:** You cannot rewind a suspended workflow. You must resume the workflow before you can rewind it.

- To suspend the workflow, select the Suspend Workflow button. In the Suspend page, select the Apply button. All further processing for the workflow is suspended until the process is resumed, and all subprocesses are suspended as well. You can also select the Cancel button to return to the previous page without suspending the workflow.
- To resume the workflow if it is suspended, select the Resume Workflow button. In the Resume page, select the Apply button. Processing for the workflow is resumed, and all subprocesses are resumed as well. Any activities that were transitioned to while the workflow was suspended are now executed. You can also

select the Cancel button to return to the previous page without resuming the workflow.

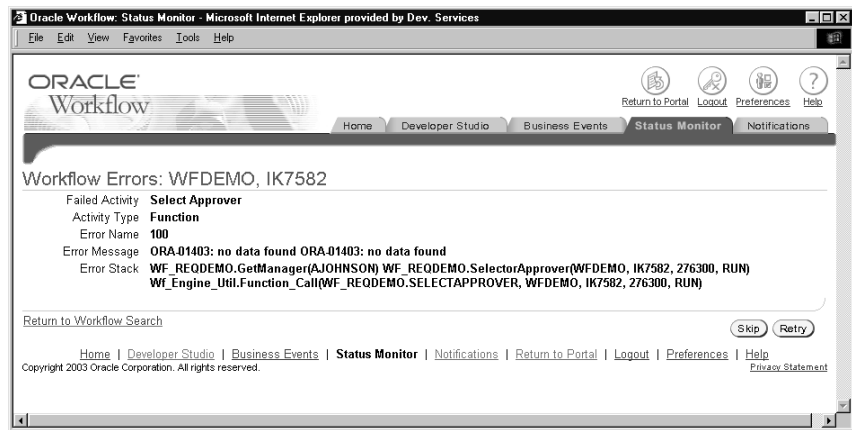
- To cancel the workflow, select the Cancel Workflow button. In the Cancel page, select Apply. The Workflow Engine sets the status of the workflow to #FORCE, and all processing for the workflow is canceled and cannot be restarted. You can also select the Cancel button to return to the previous page without canceling the workflow.

You can also select the Return link to return to the Workflows search page, or choose Activity History, Status Diagram, or Participant Responses in the side navigation to navigate to the corresponding Status Monitor page.

---

## Viewing Error Information for a Workflow

The Workflow Errors page shows error information for an errored workflow.



The page displays the workflow type internal name and item key as well as the following details for the selected workflow:

- Failed Activity – The name of the activity that encountered an error.
- Activity Type – The activity type, either Function, Notification, Event, or Process.
- Error Name – The internal name of the error.

- Error Message – The error message describing the error.
- Error Stack – Context information to help you locate the source of the error.

**Note:** If you navigated to the Workflow Errors page from an error status link for a workflow, the page shows details for each errored activity within the workflow. If you navigated to the page from an error status link for a single errored activity, the page shows details for only that activity.

If the Workflow Errors page shows only one errored activity, and you have workflow administrator privileges, you can use the activity administration buttons to respond to the error.

- To reassign an errored notification activity, select the Reassign button. In the Reassign page, select the new recipient for the notification and select the Apply button. You can also select the Cancel button to return to the previous page without reassigning the notification.

**Note:** When you reassign a notification from the Status Monitor, Oracle Workflow transfers complete ownership and responsibility for the notification to the new recipient. If you want to delegate authority to respond to the notification but retain ownership of the notification yourself, or if you want to enter comments to the new recipient, you must use the Notifications Worklist to reassign the notification. See: *To Reassign a Notification to Another User, Oracle Workflow User's Guide.*

**Note:** You cannot reassign a notification if the Expand Roles option is selected for the notification. The Reassign button appears only for an errored notification activity.

Additionally, you cannot reassign a voting notification that tallies the recipients' responses. See: *Voting Activity, Oracle Workflow Developer's Guide.*

- To suspend an errored process activity, select the Suspend button. In the Suspend page, select the Apply button. All further processing for the process is suspended until the process is resumed. You can also select the Cancel button to return to the previous page without suspending the process.

**Note:** If you suspend the root process for a workflow, all subprocesses for the workflow are suspended as well. The Suspend button appears only for an errored process activity.

- To resume an errored process activity that is suspended, select the Resume button. In the Resume page, select the Apply button.

Processing for the process is resumed and any activities that were transitioned to while the process was suspended are now executed. You can also select the Cancel button to return to the previous page without resuming the process.

**Note:** If you resume the root process for a workflow, all subprocesses for the workflow are resumed as well. The Resume button appears only for an errored process activity that is suspended.

- To skip the errored activity and force the workflow to transition to the next activity, select the Skip button. In the Skip page, enter the result value to assign to the activity if required, and select the Apply button. You can also select the Cancel button to return to the previous page without skipping the activity.

**Note:** You cannot skip a suspended process activity. You must resume the process before you can skip it.

- To retry the errored activity, select the Retry button. In the Retry page, select the Apply button. You can also select the Cancel button to return to the previous page without retrying the activity.

**Note:** You cannot retry a suspended process activity. You must resume the process before you can retry it.

You can also select the Return link to return to the previous page.

CHAPTER

# 6

## Workflow Administration Scripts

**T**his chapter describes the SQL scripts that workflow administrators can run against an Oracle Workflow server installation.

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## Miscellaneous SQL Scripts

You can use any of the following administrative scripts to help set up and maintain various features in Oracle Workflow. For the standalone version of Oracle Workflow, the scripts are located on your server in the Oracle Workflow *admin/sql* subdirectory. For the version of Oracle Workflow embedded in Oracle Applications, the scripts are located in the *sql* subdirectory under `$FND_TOP`.

- Update translation tables—WFNLADD.sql: page 6 – 4.
- Enable/disable a language—wfnlena.sql: page 6 – 11
- Run a workflow process—wfrun.sql: page 6 – 15.
- Start a background engine—wfbkg.sql: page 6 – 5.
- Show activities deferred for the next background engine execution—wfbkgchk.sql: page 6 – 6.
- Display a status report for an item
  - wfstatus.sql: page 6 – 15.
  - wfstat.sql: page 6 – 15.
- Show a notification's status—wfntfsh.sql: page 6 – 11.
- Reset the protection level for objects—wfprot.sql: page 6 – 12.
- Handle errored activities—wfretry.sql: page 6 – 13.
- Check for version and process definition errors
  - wfverchk.sql: page 6 – 16.
  - wfverupd.sql: page 6 – 16.
  - wfstdchk.sql: page 6 – 15.
- Check for invalid hanging foreign keys—wfrefchk.sql: page 6 – 12.
- Check the directory service data model—wfdirchk.sql: page 6 – 9.
- Clean up Workflow Queues in the system tables—wfaqclean.sql: page 6 – 12.
- Change the internal name of a workflow object

**Note:** Generally, you cannot update the internal name of a workflow object in Oracle Workflow Builder. However, if you load your process definition to a database, you can use one of these scripts to update a workflow object's internal name if no

runtime data exists for the object. You should only use these scripts to correct errors in an object's internal name during design time. Do not use these scripts to rename objects that are involved in running instances of processes.

- wfchact.sql: page 6 – 6.
- wfchacta.sql: page 6 – 7.
- wfchita.sql: page 6 – 7.
- wfchitt.sql: page 6 – 7.
- wfchluc.sql: page 6 – 8.
- wfchlut.sql: page 6 – 8.
- wfchmsg.sql: page 6 – 8.
- wfchmsga.sql: page 6 – 9.
- Remove data from Oracle Workflow tables
  - wfrmall.sql: page 6 – 13.
  - wfrmitms.sql: page 6 – 14.
  - wfrmitt.sql: page 6 – 14.
  - wfrmtime.sql: page 6 – 14.
  - wfrmita.sql: page 6 – 13.

**Note:** In Oracle Applications, a standard concurrent program called "Purge Obsolete Workflow Runtime Data" is also available. See: FNDWFPR: page 6 – 4.

If you are using the standalone version of Oracle Workflow, you can use the standalone Oracle Workflow Manager component available through Oracle Enterprise Manager to submit and manage Workflow purge database jobs. For more information, please refer to the Oracle Workflow Manager online help.

- Display the version of the Oracle Workflow server—wfver.sql: page 6 – 16.
- Stop the Java Function Activity Agent—wfjvstop.sql: page 6 – 11.
- Enqueue an event message on a queue using an override agent—wfevtmq.sql: page 6 – 10.
- Run a listener to monitor an agent for inbound event messages—wfagtlst.sql: page 6 – 5.

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## FNDWFPR

For Oracle Workflow embedded in Oracle Applications, use the standard concurrent program FNDWFPR "Purge Obsolete Workflow Runtime Data" to purge old data from the Oracle Workflow runtime tables regularly.

Navigate to the Submit Requests form in Oracle Applications to submit the Purge Obsolete Workflow Runtime Data concurrent program. When you install and set up Oracle Applications and Oracle Workflow, your system administrator needs to add this concurrent program to a request security group for the responsibility that you want to run this program from. See: *Overview of Concurrent Programs and Requests*, *Oracle Applications System Administrator's Guide* and *Submitting a Request*, *Oracle Applications User's Guide*.

You can supply the following parameters for the Purge Obsolete Workflow Runtime Data concurrent program:

- Item Type—The item type to purge. Leaving this field blank defaults to purging the runtime data for all item types.
- Item Key—The item key to purge. Leaving this field blank defaults to purging the runtime data for all item keys.
- Age—Minimum age of data to purge, in days.
- Persistence Type—The persistence type to be purged, either 'TEMP' for Temporary or 'PERM' for Permanent. The default is 'TEMP'.

**Note:** If you are using the version of Oracle Workflow embedded in Oracle Applications and you have implemented Oracle Applications Manager, you can use Oracle Workflow Manager to submit and manage the Purge Obsolete Workflow Runtime Data concurrent program. For more information, please refer to the Oracle Applications Manager online help.

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## WFNLADD.sql

If you enable a new language in your Oracle installation, use WFNLADD.sql to add the missing rows for that language to the Oracle Workflow translation tables. See: *Setting Up Additional Languages*: page 2 – 51 and *wfnlena.sql*: page 6 – 11.

Use the script as follows:

```
sqlplus <user/pwd> @WFNLADD
```

**Note:** The wfmlena.sql and WFNLADD.sql scripts prepare the database for loading workflow definitions in another language. However, these scripts by themselves do not enable displaying Oracle Workflow web pages in other languages. See: Setting Up Additional Languages: page 2 – 51.

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## Wfagtlst.sql

Use wfagtlst.sql to run a listener to monitor an agent for inbound event messages. When a message is received, the Event Manager searches for and executes any active subscriptions by the local system to the event with a source type of External, and also any active subscriptions by the local system to the Any event with a source type of External.

Use the script as follows:

```
sqlplus <user/pwd> @wfagtlst <agent_name>
```

Replace *<agent\_name>* with the internal name of the agent that you want to monitor for inbound event messages.

**Note:** You should use this script primarily for debugging purposes.

## See Also

Listen, *Oracle Workflow API Reference*

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## Wfbkg.sql

If you are using the standalone version of Oracle Workflow, you can use wfbkg.sql to start a background engine. This script calls the WF\_ENGINE Background API to run a background engine for the indicated number of minutes. On completing its current set of eligible activities to process, the background process waits for the specified number of seconds before launching another background engine. This cycle continues until the indicated number of minutes have elapsed.

Use the script as follows:

```
sqlplus <user/pwd> @wfbkg <minutes> <seconds>
```

Replace *<minutes>* with the number of minutes you want the background engine to run, and replace *<seconds>* with the number of seconds you want the background engine to wait between queries.

## See Also

Background, *Oracle Workflow API Reference*

Setting up Background Workflow Engines: page 2 – 58

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## Wfbkgchk.sql

Use `wfbkgchk.sql` to get a list of all activities waiting to be processed by the background engine the next time it runs.

Use the script as follows:

```
sqlplus <user/pwd> @wfbkgchk
```

## See Also

Background, *Oracle Workflow API Reference*

Setting up Background Workflow Engines: page 2 – 58

---

## Wfchact.sql

Use `wfchact.sql` to change the internal name of an activity and update all references to the activity. See: Change the internal name of a workflow object: page 6 – 2.

Use the script as follows:

```
sqlplus <user/pwd> @wfchact <act_type> <old_act> <new_act>
```

Replace *<act\_type>* with the item type that the activity you wish to update is associated with, replace *<old\_act>* with the current internal name of the activity, and replace *<new\_act>* with the new internal name of the activity.

---

## Wfchacta.sql

Use wfchacta.sql to change the internal name of an activity attribute and update all references to the activity attribute. See: Change the internal name of a workflow object: page 6 – 2.

Use the script as follows:

```
sqlplus <user/pwd> @wfchacta <act_type> <old_acta> <new_acta>
```

Replace *<act\_type>* with the item type that the activity attribute you wish to update is associated with, replace *<old\_acta>* with the current internal name of the activity attribute, and replace *<new\_acta>* with the new internal name of the activity attribute.

---

## Wfchita.sql

Use wfchita.sql to change the internal name of an item attribute and update all references to the item attribute. See: Change the internal name of a workflow object: page 6 – 2.

Use the script as follows:

```
sqlplus <user/pwd> @wfchita <item_type> <old_attr> <new_attr>
```

Replace *<item\_type>* with the item type that the item attribute you wish to update is associated with, replace *<old\_attr>* with the current internal name of the item attribute, and replace *<new\_acta>* with the new internal name of the item attribute.

---

## Wfchitt.sql

Use wfchitt.sql to change the internal name of an item type and update all references to the item type. See: Change the internal name of a workflow object: page 6 – 2.

Use the script as follows:

```
sqlplus <user/pwd> @wfchitt <old_type> <new_type>
```

Replace *<old\_type>* with the current internal name of the item attribute, and replace *<new\_type>* with the new internal name of the item attribute.

---

## Wfchluc.sql

Use wfchluc.sql to change the internal name of a lookup code and update all references to the lookup code. See: Change the internal name of a workflow object: page 6 – 2.

Use the script as follows:

```
sqlplus <user/pwd> @wfchluc <lookup_type> <old_luc> <new_luc>
```

Replace *<lookup\_type>* with the lookup type of the lookup code you wish to update, replace *<old\_luc>* with the current internal name of the lookup code, and replace *<new\_luc>* with the new internal name of the lookup code.

---

## Wfchlut.sql

Use wfchlut.sql to change the internal name of a lookup type and update all references to the lookup type. See: Change the internal name of a workflow object: page 6 – 2.

Use the script as follows:

```
sqlplus <user/pwd> @wfchlut <old_lut> <new_lut>
```

Replace *<old\_lut>* with the current internal name of the lookup type, replace *<new\_lut>* with the new internal name of the lookup type.

---

## Wfchmsg.sql

Use wfchmsg.sql to change the internal name of a message and update all references to the message. See: Change the internal name of a workflow object: page 6 – 2.

Use the script as follows:

```
sqlplus <user/pwd> @wfchmsg <msg_type> <old_msg> <new_msg>
```

Replace *<msg\_type>* with the item type of the message you wish to update, replace *<old\_msg>* with the current internal name of the message, replace *<new\_msg>* with the new internal name of the message.

---

## Wfchmsga.sql

Use wfchmsga.sql to change the internal name of a message attribute. This script does not update the message subject/body references to the message attribute. You must manually update the message attribute references. See: Change the internal name of a workflow object: page 6 – 2.

Use the script as follows:

```
sqlplus <user/pwd> @wfchmsga <msg_type> <msg_name> <old_attr>  
<new_attr>
```

Replace *<msg\_type>* with the item type of the message attribute you wish to update, replace *<msg\_name>* with the internal name of the message that the message attribute belongs to, replace *<old\_attr>* with the current internal name of the message attribute, and replace *<new\_attr>* with the new internal name of the message attribute.

---

## Wfdirchk.sql

Use wfdirchk.sql to check for the following conditions in your directory service data model:

- Invalid internal names that contain the characters '#', ':', or '/' in WF\_USERS.
- Invalid compound names in WF\_USERS or WF\_ROLES.
- Duplicate names in WF\_USERS or WF\_ROLES.
- Multiple names in WF\_USERS or WF\_ROLES linked to the same row in the original repository.
- Missing display names in WF\_USERS or WF\_ROLES.
- Invalid notification preference or null e-mail address if the notification preference is set in WF\_USERS or WF\_ROLES to receive e-mail.
- Invalid Status in WF\_USERS.
- Rows in WF\_USERS that do not have a corresponding row in WF\_ROLES.
- Invalid internal names in WF\_ROLES that contain the characters '#' or '/' or have a length greater than 30 characters.
- Invalid user/role foreign key in WF\_USER\_ROLES.

- Missing user/role in WF\_USER\_ROLES (every user must participate in its own role).
- Duplicate rows in WF\_USER\_ROLES.

Wfdirchk.sql should return no rows to ensure that your directory service data model is correct.

Use the script as follows:

```
sqlplus <user/pwd> @wfdirchk
```

---

## Wfevtmq.sql

Use wfevtmq.sql to enqueue an event message on a local queue using an override agent. This script constructs an event message using the event name, event key, event data, From Agent, and To Agent you specify. Then the event message is enqueued on the queue associated with the override agent you specify, which can be different than the From Agent listed inside the event message. If no override agent is specified, the event message is enqueued on the message's From Agent by default.

**Note:** This script can only enqueue an event message onto a queue for an agent on the local system.

Use the script as follows:

```
sqlplus <user/pwd> @wfevtmq <overrideagent> <overridesystem>
<fromagent> <fromsystem> <toagent> <tosystem> <eventname>
<eventkey> <message>
```

Replace the variables with your parameters as follows:

- *<overrideagent>*—The agent on whose queue you want to enqueue the event message
- *<overridesystem>*—The system where the override agent is located
- *<fromagent>*—The From Agent that you want to list in the event message
- *<fromsystem>*—The system where the From Agent is located
- *<toagent>*—The To Agent that receives the event message
- *<tosystem>*—The system where the To Agent is located
- *<eventname>*—The internal name of the event

- *<eventkey>*—The event key that uniquely identifies the instance of the event
- *<message>*—The event data

---

## Wfjvstop.sql

Use wfjvstop.sql to stop the Java Function Activity Agent by placing a stop message on the 'Outbound' queue.

Use the script as follows:

```
sqlplus <user/pwd> @wfjvstop
```

---

## Wfnlena.sql

If you define a new language in your Oracle installation, use wfnlena.sql to enable or disable that language in Oracle Workflow. See: WFNLADD.sql: page 6 – 4.

Use the script as follows:

```
sqlplus <user/pwd> @wfnlena <language_code> <enable_flag>
```

Replace *<language\_code>* with a valid language code, and replace *<enable\_flag>* with Y to enable and N to disable the specified language.

**Note:** The wfnlena.sql and WFNLADD.sql scripts prepare the database for loading workflow definitions in another language. However, these scripts by themselves do not enable displaying Oracle Workflow web pages in other languages. See: Setting Up Additional Languages: page 2 – 51.

---

## Wfntfsh.sql

Use wfntfsh.sql to display status information about a particular notification, given its notification ID.

Use the script as follows:

```
sqlplus <user/pwd> @wfntfsh <notification_id>
```

---

## Wfprot.sql

Use wfprot.sql to reset the protection level of all objects associated with a specified item type.



**Attention:** If you reset the protection level for all objects in an item type, then none of those objects in the item type will be customizable by users operating at an access level higher than the new protection level.

Use the script as follows:

```
sqlplus <user/pwd> @wfprot <item_type> <protection_level>
```

Replace *<Item\_type>* with the item type that you want to reset the protection level for, and replace *<protection\_level>* with the new protection level.

---

## Wfqclean.sql

Use wfqclean.sql to clean up Workflow queues in the system tables.



**Attention:** This script is only necessary if you are using a version of Oracle8 prior to 8.1.5 and you drop your user or tablespace without previously dropping the workflow queues using wfqued.sql. The wfqued.sql script is located in the Oracle Workflow *sql* subdirectory. The DROP USER CASCADE and DROP TABLESPACE INCLUDING CONTENTS commands in these prior versions of Oracle8 leave queue data in your system tables that result in an ORA-600 error when you recreate the queues. To avoid this case, you should always run wfqued.sql to drop the queues prior to dropping the user or tablespace.

Use the wfqclean.sql script as follows:

```
sqlplus system/manager @wfqclean <un>
```

Replace *<un>* with username of the schema that experiences the ORA-600 error.

---

## Wfrefchk.sql

Use wfrefchk.sql to check for invalid workflow data that is missing primary key data for a foreign key.

```
sqlplus <user/pwd> @wferfchk
```

---

## Wfretry.sql

Use wfretry.sql to display a list of activities that have encountered an error for a given process instance and then specify whether to skip, retry, or reset any one of those errored activities.

Use the script as follows:

```
sqlplus <user/pwd> @wfretry <item_type> <item_key>
```

Provide an item type and item key to uniquely identify an item or process instance. The script first returns the list of errored activities by label name. The script then prompts you for the label name of an activity that you wish to skip, retry, or reset. If you choose skip, then you must also specify the result that you want the skipped activity to have.



**Attention:** This script calls the WF\_ENGINE HandleError API, so you can actually specify the label name of any activity associated with the specified item type and item key to perform a rollback. See: HandleError, *Oracle Workflow API Reference*.

---

## Wfrmall.sql

Use wfrmall.sql to delete all data in all Oracle Workflow runtime and design time tables.

Use the script as follows:

```
sqlplus <user/pwd> @wfrmall
```



**Warning:** This script deletes **ALL** workflow definitions. Do not use this script unless you are absolutely sure you want to remove all workflow data from your runtime and design time tables.

Once you run this script, you should also reload the workflow definitions for the Standard, System:Mailer, and System:Error item types stored in the files wfstd.wft, wfmail.wft, and wferror.wft, respectively.

---

## Wfrmita.sql

Use wfrmita.sql to delete all workflow data for a specified item type attribute. This script prompts you for the item type and the name of

the attribute to delete. Alternatively, you can use Oracle Workflow Builder to delete an item type attribute from a workflow definition stored in a file or a database.

Use the script as follows:

```
sqlplus <user/pwd> @wfrmita
```

---

## Wfrmitms.sql

Use wfrmitms.sql to delete status information in Oracle Workflow runtime tables for a particular item. This script prompts you to choose between deleting all data associated with a specified item type and item key or deleting only data for the completed activities of the specified item type and item key.

Use the script as follows:

```
sqlplus <user/pwd> @wfrmitms <item_type> <item_key>
```

---

## Wfrmitt.sql

Use wfrmitt.sql to delete all data in all Oracle Workflow design time and runtime tables for a particular item type. This script prompts you for an item type from a list of valid item types.

Use the script as follows:

```
sqlplus <user/pwd> @wfrmitt
```



**Warning:** This script deletes **ALL** workflow data for a specified item type.

---

## Wfrmtype.sql

Use wfrmtype.sql to delete runtime data associated with a given item type. This script prompts you for an item type to purge from a list of valid item types, then asks you to choose between deleting all runtime data associated with the specified item type or deleting only runtime data for the completed activities and items of the specified item type.

Use the script as follows:

```
sqlplus <user/pwd> @wfrmtype
```

---

## Wfrun.sql

Use wfrun.sql to create and start a specified process.

Use the script as follows:

```
sqlplus <user/pwd> @wfrun <item_type> <item_key> <process_name>
```

**Note:** The item key for a process instance can only contain single-byte characters. It cannot contain a multibyte value.

---

## Wfstat.sql

Use wfstat.sql to display a developer status report for an indicated item. The output is 132 characters per line.

Use the script as follows:

```
sqlplus <user/pwd> @wfstat <item_type> <item_key>
```

---

## Wfstatus.sql

Use wfstatus.sql to display an end user status report for an indicated item. The output is 132 characters per line.

Use the script as follows:

```
sqlplus <user/pwd> @wfstatus <item_type> <item_key>
```

---

## Wfstdchk.sql

Use wfstdchk.sql to check and report any problems found in the Oracle Workflow data model. For example, this script will report any function activities that reference invalid functions and scan the tables of each workflow process definition object to verify that each row has a valid internal name and display name.

Use the script as follows:

```
sqlplus <user/pwd> @wfstdchk
```

---

## Wfver.sql

Use wfver.sql to display the version of the Oracle Workflow server, the status and version of the Oracle Workflow PL/SQL packages, and the version of the Oracle Workflow views installed.

Use the script as follows:

```
sqlplus <user/pwd> @wfver
```

---

## Wfverchk.sql

Use wfverchk.sql if you suspect that problems arising in your workflow process are due to multiple versions of an activity being active simultaneously. This script identifies errors in versions of activities that cause multiple versions to appear to be active at once.

Use the script as follows:

```
sqlplus <user/pwd> @wfverchk
```

---

## Wfverupd.sql

Use wfverupd.sql to correct problems arising in your workflow process that are due to multiple versions of an activity being active simultaneously. This script identifies and corrects errors in versions of activities that cause multiple versions to appear to be active at once.

Use the script as follows:

```
sqlplus <user/pwd> @wfverupd
```

APPENDIX

A

# Oracle Workflow Administrator Navigation Paths

This appendix lists the navigation paths to Oracle Workflow administrator web pages in the seeded Oracle Workflow responsibilities for Oracle Applications.

## Oracle Workflow Administrator Navigation Paths

This table shows the navigation paths to Oracle Workflow administrator web pages in the seeded Oracle Workflow responsibilities for Oracle Applications. Your system administrator may have customized the responsibilities, menus, and navigation paths in your installation.

Web Page	Standard Navigation Path
Global Workflow Preferences: page 2 – 13	Workflow Administrator Web Applications: Global Preferences <i>or</i> Workflow Administrator Event Manager: Global Preferences
Administrator Home: page 4 – 7	Workflow Administrator Web Applications: Home <i>or</i> Workflow Administrator Web (New): Home <i>or</i> Workflow Administrator Event Manager: Home
Administrator Status Monitor: page 5 – 17	Workflow Administrator Web Applications: Status Monitor <i>or</i> Workflow Administrator Web (New): Status Monitor <i>or</i> Workflow Administrator Event Manager: Status Monitor

Table A – 1 (Page 1 of 1)

**Note:** The Workflow Administrator Web (New) responsibility is provided for reference to highlight the OA Framework-based functionality that has been added in Oracle Workflow. The same functionality is also available on the previously existing responsibilities, Workflow Administrator Web Applications and Workflow Administrator Event Manager.

APPENDIX

# B

## Oracle Workflow Performance Concepts

**T**his appendix describes concepts and techniques that you can use for performance gain when running Oracle Workflow.

---

## Oracle Workflow Performance Concepts

The performance of Oracle Workflow depends on several different factors. You can enhance performance in your workflow process design through effective use of synchronous, asynchronous, and forced synchronous processes, item attributes, message attributes, subprocesses, and deferred activities. You can also use partitioning and purging techniques to address performance issues associated with large quantities of runtime data.

### See Also

*The Oracle Applications Tuning Handbook* by Andy Tremayne and Steve Mayze (Oracle Press, ISBN 0-07-212549-7)

*Oracle Database Concepts*

---

## Designing Workflow Processes for Performance

You can enhance the performance of your workflow processes through effective process design.

### Synchronous, Asynchronous, and Forced Synchronous Workflows

When designing a workflow process, you must decide whether you want it to be executed as a synchronous, asynchronous, or forced synchronous process. The process design impacts the amount of time it takes for the Workflow Engine to return control to the calling application that initiates the process.

- **Synchronous**—A synchronous process contains only activities that can be executed immediately, so that the Workflow Engine executes the process without interruption from start to finish. The Workflow Engine does not return control to the calling application until it completes the process. With a synchronous process, you can immediately check for process results that were written to item attributes or directly to the database. However, the user must wait for the process to complete. If the process takes a long time, the application may appear to hang. In this case, you should change the process to an asynchronous process.
- **Asynchronous**—An asynchronous process is a process that the Workflow Engine cannot complete immediately because it contains activities that interrupt the flow. Examples of activities that force an asynchronous process include deferred activities,

notifications with responses, blocking activities, and wait activities. Rather than waiting indefinitely when it encounters one of these activities, the Workflow Engine sets the audit tables appropriately and returns control to the calling application. The workflow process is left in an unfinished state until it is started again, usually by the Notification System, Business Event System, or the background engine. With an asynchronous process, the user does not have to wait for the process to complete to continue using the application. However, the results of the process are not available until the process is completed at a later time.

- **Forced synchronous**—A forced synchronous process completes in a single SQL session from start to finish and never inserts into or updates any database tables. As a result, the execution speed of a forced synchronous process is significantly faster than a typical synchronous process. The process results are available immediately upon completion. However, no audit trail is recorded. You may want to use a forced synchronous process if your application needs to generate a specific result quickly and recording an audit trail is not a concern. To create a forced synchronous process, you must set the item key of your process to #SYNCH and follow certain restrictions in designing your process, such as not including any notification activities.

## See Also

Overview of the Workflow Engine, *Oracle Workflow API Reference*  
Synchronous, Asynchronous, and Forced Synchronous Processes, *Oracle Workflow API Reference*

### **Item Attributes**

---

Item attributes act as global variables that can be referenced or updated by any activity within a workflow process. The number of item attributes directly affects the startup time for work items, because the Workflow Engine creates runtime copies of all item attributes when a new work item is created. For this reason, item attributes should be kept to a minimum.

Item attributes should be used for:

- Storing working information for the work item.
- Token replacement for messages. For messages where the number of lines may vary, such as in repeating groups, do not create individual item attributes for each line. Instead, use item

and message attributes of type Document to combine the lines together.

- Storing primary key values so that functions can look up all necessary values from the database.
- Temporary placeholders to set activity attributes dynamically. For example, the performer of a notification may only be known at runtime, so you can reference an item attribute and seed the desired value just before executing the notification.

Item attributes should reference static values or values that are not in the database so that there are no concerns about keeping the values synchronized. (Primary key values, however, do not change.) Do not implement every column within a table as an item attribute.

Item attribute types that can help you reduce the number of attributes you need include the following:

- Document—The attribute value is an attached document, which enables a complex structure to be rendered inline, or attached to notifications. You can specify the following types of documents:
  - PL/SQL document—A document representing data from the database as a character string, generated from a PL/SQL procedure.
  - PL/SQL CLOB document—A document representing data from the database as a character large object (CLOB), generated from a PL/SQL procedure.
  - PL/SQL BLOB document—A document representing data from the database as a binary large object (BLOB), generated from a PL/SQL procedure.
- Role—The attribute value is the internal name of a role. If a message attribute of type role is included in a notification message, the attribute automatically resolves to the role's display name, eliminating the need for you to maintain separate attributes for the role's internal and display names. Also, when you view the notification from a web browser, the role display name is a hypertext link to the e-mail address for that role.

Whenever multiple item attributes will be created, or multiple item attribute values will be set during workflow processing, use the array versions of the Add Item Attribute and Set Item Attribute workflow engine APIs (AddItemAttributeArray and SetItemAttributeArray, respectively). These APIs will significantly decrease the number of calls to Workflow Engine APIs, which can have a measurable impact on performance during batch processing. See: AddItemAttributeArray,

*Oracle Workflow API Reference and SetItemAttributeArray, Oracle Workflow API Reference.*

## See Also

*Item Type Attributes, Oracle Workflow Developer's Guide*

*Attribute Types, Oracle Workflow Developer's Guide*

### **Message Attributes**

---

To enhance performance, message attributes should be kept to a minimum. For messages where the number of lines may vary, such as in repeating groups, do not create individual item and message attributes for each line (LINE\_INFO1, LINE\_INFO2, etc.). Instead, use item and message attributes of type Document to combine the lines together.

## See Also

*Attribute Types, Oracle Workflow Developer's Guide*

*Send and Respond Message Attributes, Oracle Workflow Developer's Guide*

### **Subprocesses**

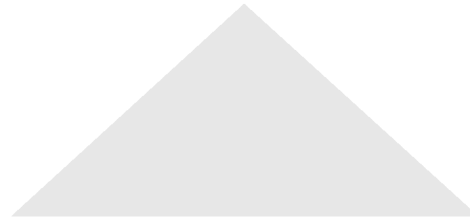
---

When you design a workflow process, you can group a collection of activities together in a process activity which represents a subprocess within the main process. Using subprocesses judiciously can help make workflow diagrams clearer and easier to read and can simplify workflow monitoring and maintenance. However, subprocesses also result in additional DML operations and additional state information stored in Workflow tables. Consequently, you should avoid unnecessary use of subprocesses when there is no functional benefit.

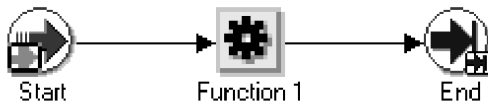
For example, the following two processes, Process 1 and Process 2, are functionally identical, both performing a function called Function 1. However, they result in different numbers of state rows being stored in Workflow tables.

Process 1 contains a Start activity, a Subprocess activity, and an End activity. The subprocess contains a Start activity, the Function 1 activity, and an End activity. This process stores 7 state rows in Workflow tables.

### Process 1

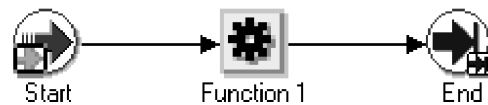


### Subprocess



Process 2 simply contains a Start activity, the Function 1 activity, and an End activity. This process stores only 4 state rows in Workflow tables.

### Process 2



Because more rows are stored in Workflow tables, the kind of design shown in the Process 1 diagram will result in slower workflow throughput and a need to purge Workflow runtime tables more frequently than what should be necessary with the Process 2 design.

**Note:** This guideline is not meant to imply that subprocesses should not be used at all. Collapsing all subprocesses can make workflow diagrams unreadable and difficult to maintain. This recommendation merely highlights that unnecessary overuse of subprocesses can have a negative performance impact.

## See Also

To Create a Process Activity, *Oracle Workflow Developer's Guide*

## Deferring Activities

---

The simplest and most effective way to improve the online user's response time is to defer function activities. You may want to defer activities that require a large amount of processing resource or time to complete. Oracle Workflow lets you manage the load on the Workflow Engine and the response time for the user by setting up supplemental engines to run these costly activities as background tasks. In these cases, the costly activity is deferred by the Workflow Engine and run later by a background engine.

When an activity is deferred, the main Workflow Engine can then continue to the next available activity, which may occur on some other parallel branch of the process. If no other activity is available to be executed, the Workflow Engine returns control immediately to the calling application. The user remains unaware that processing is still taking place, rendering a faster execution time.

To defer an activity, set the activity's cost above the default threshold cost at design time. The threshold cost is a PL/SQL package variable with a default value of 50 hundredths of a second. Set a cost above this threshold for all activities that you don't want the user to wait for.

At runtime, the Workflow Engine defers any thread to the background as soon as it encounters an activity with a cost higher than the threshold. Then the background engine later identifies the process as deferred and continues its execution.

In addition to deferred activities, background engines also handle timed out activities and stuck processes. You can run as many background engines as you want. You must have at least one background engine that can check for timed out activities, one that can process deferred activities, and one that can handle stuck processes. At a minimum, you need to set up one background engine that can handle both timed out and deferred activities as well as stuck processes.

Generally, you should run a separate background engine to check for stuck processes at less frequent intervals than the background engine that you run for deferred activities, normally not more often than once a day. Run the background engine to check for stuck processes when the load on the system is low.

### See Also

Deferred Processing, *Oracle Workflow API Reference*

Setting Up Background Workflow Engines: page 2 – 58

To Set Engine Thresholds: page 2 – 62

---

## Managing Runtime Data for Performance

When the Workflow Engine executes any type of workflow other than forced synchronous processes, status information is stored in runtime tables. The amount of data stored in these tables will grow depending on the complexity and number of workflows being executed.

Performance issues associated with large quantities of runtime data can be addressed by:

- Partitioning
- Purging

---

### Partitioning for Performance

Partitioning addresses key issues in supporting very large tables and indexes by letting you decompose them into smaller and more manageable pieces called partitions. SQL queries and DML statements do not need to be modified in order to access partitioned tables. However, once partitions are defined, DDL statements can access and manipulate individual partitions rather than entire tables or indexes. In this way, partitioning can simplify the manageability of large database objects. Also, partitioning is entirely transparent to applications.

You can optionally run a script to partition certain Workflow tables that store runtime status data. This step is highly recommended for performance gain. Before running the script, you should ensure that you have backed up the tables that will be partitioned and that you have allowed sufficient free space and time for the script to run. For the version of Oracle Workflow embedded in Oracle Applications, the script is called `wfupartb.sql` and is located in the `admin/sql` subdirectory under `$FND_TOP`. For the standalone version of Oracle Workflow, the script is called `wfupart.sql` and is located in the `wf/admin/sql` subdirectory in your Oracle Home. See: [Partitioning Workflow Tables: page 2 – 11](#).

---

### Purging for Performance

You can use the Workflow purge APIs to purge obsolete runtime data for completed items and processes, and to purge information for obsolete activity versions that are no longer in use. You may want to periodically purge this obsolete data from your system to increase performance. The Workflow purge APIs are defined in the PL/SQL package called `WF_PURGE`.

The availability of runtime data for purging depends on the persistence type of the item type. The persistence type controls how long a status audit trail is maintained for each instance of the item type.

- If you set an item type's Persistence to Permanent, the runtime status information is maintained indefinitely until you specifically purge the information by calling the procedure `WF_PURGE.TotalPerm()`.
- If you set an item type's Persistence to Temporary, you must also specify the number of days of persistence ('n'). The status audit trail for each instance of a Temporary item type is maintained for at least 'n' days of persistence after its completion date. After the 'n' days of persistence, you can then use any of the WF\_PURGE APIs to purge the item type's runtime status information. See: *WF\_PURGE, Oracle Workflow API Reference*.
- If you set an item type's Persistence to Synchronous, Oracle Workflow expects instances of that item type to be run as forced synchronous processes with an item key of #SYNCH. Forced synchronous processes complete in a single SQL session from start to finish and never insert into or update any database tables. Since no runtime status information is maintained, you do not normally need to perform any purging for a process with the Synchronous persistence type. However, if you run the process with a unique item key in asynchronous mode for testing or debugging purposes, Oracle Workflow does maintain runtime status information for that process instance. You can purge this information by changing the item type's Persistence to Temporary and running any of the WF\_PURGE APIs. Then change the item type's Persistence back to Synchronous. See: *Synchronous, Asynchronous, and Forced Synchronous Processes, Oracle Workflow API Reference*.

Additionally, the administration script `wfrmtype.sql` is provided to delete runtime data for a particular item type. This script prompts you for an item type to purge from a list of valid item types, then asks you to choose between deleting all runtime data associated with the specified item type or deleting only runtime data for the completed activities and items of the specified item type. See: `wfrmtype.sql`: page 6 – 14.

## See Also

`WF_PURGE`, *Oracle Workflow API Reference*

Persistence Type, *Oracle Workflow Developer's Guide*



# Glossary

**Access Level** A numeric value ranging from 0 to 1000. Every workflow user operates at a specific access level. The access level defines whether the user can modify certain workflow data. You can only modify data that is protected at a level equal to or higher than your access level.

**Activity** A unit of work performed during a business process.

**Activity Attribute** A parameter that has been externalized for a function activity that controls how the function activity operates. You define an activity attribute by displaying the activity's Attributes properties page in the Activities window. You assign a value to an activity attribute by displaying the activity node's Attribute Values properties page in the Process window.

**Agent** A named point of communication within a system.

**Agent Listener** A type of service component that processes event messages on inbound agents.

**Attribute** See Activity Attribute, Item Type Attribute, or Message Attribute.

**Background Engines** A supplemental Workflow Engine that processes deferred or timed out activities.

**Business Event** See Event.

**Cost** A relative value that you can assign to a function or notification activity to inform the Workflow Engine how much processing is required to complete the activity. Assign a higher cost to longer running, complex activities. The Workflow Engine can be set to operate with a threshold cost. Any activity with a cost above the Workflow Engine threshold cost gets set to 'DEFERRED' and is not processed. A background engine can be set up to poll for and process deferred activities.

**Directory Services** A mapping of Oracle Workflow users and roles to a site's directory repository.

**Event** An occurrence in an internet or intranet application or program that might be significant to other objects in a system or to external agents.

**Event Activity** A business event modelled as an activity so that it can be included in a workflow process.

**Event Data** A set of additional details describing an event. The event data can be structured as an XML document. Together, the event name, event key, and event data fully communicate what occurred in the event.

**Event Key** A string that uniquely identifies an instance of an event. Together, the event name, event key, and event data fully communicate what occurred in the event.

**Event Message** A standard Workflow structure for communicating business events, defined by the datatype WF\_EVENT\_T. The event message contains the event data as well as several header properties, including the event name, event key, addressing attributes, and error information.

**Event Subscription** A registration indicating that a particular event is significant to a system and specifying the processing to perform when the triggering event occurs. Subscription processing can include calling custom code, sending the event message to a workflow process, or sending the event message to an agent.

**External Functions** Programs that are executed outside of the Oracle database server.

**External Java Functions** Java programs that are executed outside of the Oracle database server by the Java Function Activity Agent.

**Function** A PL/SQL stored procedure that can define business rules, perform automated tasks within an application, or retrieve application information. The stored procedure accepts standard arguments and returns a completion result.

**Function Activity** An automated unit of work that is defined by a PL/SQL stored procedure.

**Generic Service Component Framework** A facility that helps to simplify and automate the management of background Java services.

**Item** A specific process, document, or transaction that is managed by a workflow process. For example, the item managed by the Requisition Approval Process workflow is a specific requisition created by Oracle Internet Commerce's Web Requisitions page.

**Item Attribute** See Item Type Attribute.

**Item Type** A grouping of all items of a particular category that share the same set of item attributes. For example, PO Requisition is an item type used to group all requisitions created by Oracle Internet Commerce's Web Requisitions page. Item type is also used as a high level grouping for processes.

**Item Type Attribute** A feature associated with a particular item type, also known as an item attribute. An item type attribute is defined as a variable whose value can be looked up and set by the application that maintains the item. An item type attribute and its value is available to all activities in a process.

**Lookup Code** An internal name of a value defined in a lookup type.

**Lookup Type** A predefined list of values. Each value in a lookup type has an internal and a display name.

**Message** The information that is sent by a notification activity. A message must be defined before it can be associated with a notification activity. A message contains a subject, a priority, a body, and possibly one or more message attributes.

**Message Attribute** A variable that you define for a particular message to either provide information or prompt for a response when the message is sent in a notification. You can use a predefined item type attribute as a message attribute. Defined as a 'Send' source, a message attribute gets replaced with a runtime value when the message is sent. Defined as a 'Respond' source, a message attribute prompts a user for a response when the message is sent.

**Node** An instance of an activity in a process diagram as shown in the Process window.

**Notification** An instance of a message delivered to a user.

**Notification Activity** A unit of work that requires human intervention. A notification activity sends a message to a user containing the information necessary to complete the work.

**Notification Mailer** A type of service component that sends e-mail notifications to users through a mail application, and processes e-mail responses.

**Notification Web Page** A Web page that you can view from any Web browser to query and respond to workflow notifications.

**Performer** A user or role assigned to perform a human activity (notification). Notification activities that are included in a process must be assigned to a performer.

**Process** A set of activities that need to be performed to accomplish a business goal.

**Process Definition** A workflow process as defined in Oracle Workflow Builder.

**Process Activity** A process modelled as an activity so that it can be referenced by other processes.

**Protection Level** A numeric value ranging from 0 to 1000 that represents who the data is protected from for modification. When workflow data is defined, it can either be set to customizable (1000), meaning anyone can modify it or it can be assigned a protection level that is equal to the access level of the user defining the data. In the latter case, only users operating at an access level equal to or lower than the data's protection level can modify the data.

**Result Code** The internal name of a result value, as defined by the result type.

**Result Type** The name of the lookup type that contains an activity's possible result values.

**Result Value** The value returned by a completed activity.

**Role** One or more users grouped by a common responsibility or position.

**Service Component Container** An instance of a service or servlet that manages the running of the individual service components that belong to it. The container monitors the status of its components and handles control events for itself and for its components.

**Service Component** An instance of a Java program which has been defined according to the Generic Service Component Framework standards so that it can be managed through this framework.

**Subscription** See Event Subscription.

**System** A logically isolated software environment such as a host machine or database instance.

**Timeout** The amount of time during which a notification activity must be performed before the Workflow Engine transitions to an error process or an alternate activity if one is defined.

**Transition** The relationship that defines the completion of one activity and the activation of another activity within a process. In a process diagram, the arrow drawn between two activities represents a transition.

**Workflow Definitions Loader** A concurrent program that lets you upload and download workflow definitions between a flat file and a database.

**Workflow Engine** The Oracle Workflow component that implements a workflow process definition. The Workflow Engine manages the state of all activities for an item, automatically executes functions and sends notifications, maintains a history of completed activities, and detects error conditions and starts error processes. The Workflow Engine is implemented in server PL/SQL and activated when a call to an engine API is made.

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