

# **ABCs of Workflow: Business Event Essentials**

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## **Introduction**

Oracle defines a business event as “an occurrence in an internet or intranet application or program that might be significant to other objects in a system or to external agents.”<sup>1</sup> Introduced (and optional) in R11i.8, business events have become a vital (and required) part of the E-Business suite in R11i.9 and R11i.10.

This paper will explain how Oracle has integrated business events into the workflow technology, how workflow developers can leverage this functionality, and what techniques workflow administrators can use to ensure that their business events are functioning properly. The current workflow guides contain approximately 300 pages on business events. Therefore this paper will focus on the basics. A bibliography will be included at the end of the paper that will list where the reader may find more information.

This paper presupposes that the reader is familiar with workflow terminology and how to use the Builder tool.

## **Business Events - Terminology**

If one asks the basic questions, “who”, “what”, “when”, “where”, “why”, “which”, “how”, the event is the “what”. So a business event can be the creation of an invoice or a requisition, the receipt of an EDI transaction, and/or the need to notify someone about something. Most people will be thinking at this point that events sound much like alerts or triggers. But events will allow for a greater choice of response, and provide abilities denied to alerts and/or triggers.

Events require an Event Key, the “which”. This is a piece of data that uniquely identifies the specific occurrence of the event, i.e. which invoice, which requisition. Event keys are analogous to item keys. In fact, if the event causes a workflow to be executed, the event key becomes the item key.

“Where” the event occurs or where the action to be invoked by the event occurs is called a system. A system is “a logically isolated piece of software on which either the Oracle Workflow Business Event System is installed, or with which the Oracle Workflow Business Event System communicates”.<sup>2</sup> Events may involve multiple systems, such as when an EDI transaction is sent or received. For the purposes of this paper, we will limit ourselves to the “Local System”. If you are logged into a database, this is the local system. When you log into a different database, this is still the local system. Therefore the “Local System” is the database to which you are currently connected and operating in. It then makes sense that the name of the local system will match the name of the database.

Events happen at a specific point in time. This is part of the “when”. You can write a process to invoke or raise an event at a set time (similar to periodic alerts), or instantly as a condition is detected (similar to event alerts). The other part of the “when” is the determination of time at which the resulting action should occur.

This resulting action is defined in a subscription. Subscriptions define the “why” of an event: why is this event important, what should the system do when then event occurs. Subscriptions can

execute code, start workflows, send messages to an agent or receive messages and pass them to a workflow. One can define multiple subscriptions for each event. The execution of the subscription can be immediate or delayed.

The Oracle documentation may make reference to a 'subscriber'. For a subscription, this is "the system where you want the subscription to execute".<sup>3</sup>

Events process messages through agents or queues, tables with a data structure that is capable of handling the multi-dimensional aspects of the details that describe an event. Except for the control agent, they come in pairs; one for inbound traffic, one for outbound traffic. Inbound queues have one or more Agent Listeners to process (dequeue) the messages in the queue. An agent listener can be assigned to focus on one or more specific events or to process all traffic in the queue. Agent listeners are assigned to a container, a Java concurrent process that wakes up periodically to process any waiting data. Outbound queues are also agents, but they move data from the outbound queues through a process called propagation. Agents and Agent Listeners are the "who".

The functioning of the Event System is highly dependant on Oracle Advanced Queuing. Advanced Queuing enables formats such as IDAP (Internet Data Access Presentation) through XML, transport protocols such as HTTP(S), SMTP, and FTP. This paper will not address the details of this technology.

The rest of this paper will address "how". How are business events and subscriptions defined, how does one perform the necessary setups, and how can one manage the events and subscriptions when they don't perform as designed.

## The queues

So much of understanding business events lies in understanding the queues they move through. Oracle provides queues to process text, Java, and (in R11i.10) web services messages. As stated earlier, Oracle has defined special data types to store event messages (called the payload): WF\_EVENT\_T for text, SYS.AQ\$\_JMS\_TEXT\_MESSAGE for Java and web services.

Each queue has an underlying table with the same name to store the payloads. Just as programs run through the concurrent manager (and the resultant reports) are not kept infinitely, the data in the queue tables are periodically purged. Unlike the concurrent managers, the retention time can be (and by default is) different for each queue. This retention time is managed through the PL/SQL procedure DBMS\_AQADM.Alter\_Queue. To change the retention time, execute the procedure as follows:

```
EXECUTE DBMS_AQADM.ALTER_QUEUE (  
    queue_name => '<name of queue>',  
    retention_time => <days>);
```

Following are the queues that are delivered with the E-Business Suite, whether the queue is text (payload type WF\_EVENT\_T) or Java (payload type SYS.AQ\$\_JMS\_TEXT\_MESSAGE), the default retention time, whether the start-up mode is automatic or manual, the defined (if any or if applicable) agent listener, and a description of the queue's purpose. The underlying table name has been omitted, as it is the same as the queue name.

Queue (Agent) Name	Payload Type	Default Retention Time	Startup Mode	Default Agent Listener	Description
WF_CONTROL	Java	1 day	Automatic	N/A	Workflow internal queue – do not use or change any parameter
WF_DEFERRED	Text	1 day	Automatic	Workflow Deferred Agent Listener	Deferred subscription processing
			Automatic	Workflow Deferred Notification Agent Listener	Processes only oracle.apps.wf.notification.% events
WF_ERROR	Text	0 days	Automatic	Workflow Error Agent Listener	Error handling – event is placed here when subscription fails on database tier
WF_JAVA_DEFERRED (added in R11i.10)	Java	1 day	Automatic	Workflow Java Deferred Agent Listener	Deferred subscription processing in the middle tier
WF_JAVA_ERROR (added in R11i.10)	Java	0 days	Automatic	Workflow Java Error Agent Listener	Error handling – event is placed here when subscription fails on middle tier
WF_NOTIFICATION_IN	Java	1 day	Automatic	Workflow Inbound Notifications Agent Listener	E-mail notification responses
WF_NOTIFICATION_OUT	Java	1 day	Automatic	N/A	E-mail notifications
WF_IN	Text	7 days	User defined	user defined	Inbound text messages
WF_OUT	Text	7 days	User defined	N/A	Outbound text messages
WF_JMS_IN	Java	7 days	Manual	Workflow Inbound JMS Agent Listener	Inbound Java messages
WF_JMS_OUT	Java	7 days	Manual	N/A	Outbound Java messages
WF_WS_JMS_IN (added in R11i.10)	Java	7 days	Manual	Web Services IN Agent	Inbound web services messages
WF_WS_JMS_OUT (added in R11i.10)	Java	7 days	Manual	Web Services OUT Agent	Outbound web services messages

Note: The queues WF\_JAVA\_DEFERRED, WF\_JAVA\_ERROR, WF\_WS\_JMS\_IN and WF\_WS\_JMS\_OUT are currently used only in Oracle Applications and will not be seeded if using standalone Workflow.

Agent Listeners are not defined for outbound queues (WF\_JMS\_OUT, WF\_OUT, WF\_NOTIFICATION\_OUT, WF\_WS\_JMS\_OUT). An Agent Listener would be required, but is not defined for WF\_IN.

Oracle provides two queues, WF\_REPLAY\_IN and WF\_REPLAY\_OUT, that are not currently used, and the queue WF\_SMTP\_0\_1\_QUEUE that was used by the C based mailer and is no longer used. Listeners/propagation should not be scheduled for these queues.

Oracle also provides three queues for the XML EDI transactions: ECX\_INBOUND, ECX\_TRANSACTION, and ECX\_OUTBOUND. Discussion and use of these queues is outside the scope of this paper as they are reserved for the EDI Gateway application.

In addition there are three queues used by the background engine, WF\_DEFERRED\_QUEUE\_M (underlying table is WF\_DEFERRED\_TABLE\_M), WF\_OUTBOUND\_QUEUE, and WF\_INBOUND\_QUEUE. These queues, like WF\_CONTROL, are for internal use by Oracle and the parameters for these queues should not be adjusted unless directed by Oracle Support.

Later in the paper we will discuss methods for viewing the data in the queues and the purpose of the fields in the queue tables.

## **An analogy**

Most workflow administrators and users do not require an in-depth knowledge of the technology that comprises the whole of the business event system. They just need to know how to set it up, how to use it and how to administer it. For those individuals who need more, Oracle offers a 2-day class "Oracle 9i: Implement Advanced Queuing".

For the rest of us, consider your email system. The majority of us don't have a clue how it really works, how a laptop connected to the internet can send/receive messages through a server located in another city or building, or how the internet delivers message to the correct server. We just click "New", type our message, choose one or more recipients, and click "Send". And magically, our message is delivered. And without doing anything other than connecting to the Internet, inbound messages appear in our mailbox. And we can define rules that sort our inbox into different folders.

In our analogy, the corporate email server is a system (our local system), each user's mailbox is a queue, and we schedule or define how often our mail client listens to the corporate server for new mail or propagates (sends) outbound emails. Our rules are special listeners targeted for messages by either source or topic. And messages can be text, HTML, or contain complicated data types such as attachments. Each time we choose to read or send an email, it is an event. As a result of the event, we take action (respond, delete, laugh, etc). The decision as to what type of action to take is the subscription.

## **Setup**

Installing the database and the E-Business Suite will install the Business Event System components and the screens necessary to administer them. However, additional setups are required in order to make the system fully functional. Setups for the Business Event System are

accessed from the Workflow Administrator menus. These menus are seeded with the following responsibilities: System Administrator, Workflow Administrator Web Applications, and Workflow Administrator Web Applications (New). In order for these screens to function properly, you must also have workflow administrator rights, i.e. you must either be the user assigned to be the workflow administrator, or must have as an active responsibility, the responsibility assigned to be workflow administrator. All of the following navigation paths are from the System Administrator responsibility.

## Verify Local System

The navigation path is Workflow | Administration. This loads the global preferences page. Verify that the Local System matches the current database name (especially important for clones) and that the status is 'Enabled'. If you wish to block communications to other systems, you can change this status to 'Local Only', but for the E-Business suite, ignore the options of 'External Only' and 'Disabled'.

The screenshot shows the Oracle Workflow Configuration page. The 'Business Event Local System' section is highlighted with a red circle. It contains the following information:

- System Name:** A510VIS2 SOLUTIONBEACON.NET
- Status:** Enabled

Other sections visible include:

- LDAP:** Fields for Host, Port, Username, Old Password, New Password, Repeat Password, Change Log Base Directory, and User Base Directory.
- Global Preferences:** Notification Style, Browser Signing DLL Location.
- Jinitiator:** Class ID, Download Location, Version.

## Confirm init.ora Parameters

The navigation path is Workflow | OAM | Workflow. Below the dashboard is the section 'Related Database Parameters'. If the Parameter Value is less than the recommended value, then ask the DBA to adjust the init.ora file.

The screenshot shows the Oracle Applications Manager dashboard. The 'Related Database Parameters' section is highlighted with a red circle. It contains the following table:

Parameter Name	Parameter Value	Recommended Value	Description
job_queue_processes	10	10	number of job queue slave processes
aq_tm_processes	1	>= 1	number of AQ Time Managers to start

Other dashboard elements include 'Workflow System: a510vis2', 'Last Updated: 31-08-2005 21:06:26', and a status summary for Notification Mailers (Down), Agent Listeners (Up), and Service Components (Down).

From the same screen used to verify the init.ora parameters, click the icon next to 'Service Components' (see blue circle). This opens the list of agent listeners. Verify that the Startup Mode is 'Automatic' for all listed components (except the ECX listeners and Web Services In agent).

Oracle Applications Manager  
Applications Dashboard | Site Map  
Applications System: a159vis3 > Workflow > Service Components  
Service Components: a159vis3

Last Updated: 07:57:24 PM Nov 15 2004 CST  
Filter: Name [ ] Go

Select a Service Component and ...

Select Name	Status	Type	Startup Mode	Container Type	Container	Actions
<input type="radio"/> ECX Inbound Agent Listener	Stopped	Workflow Agent Listener	Manual	Oracle Applications GSM	Workflow Agent Listener Service	Refresh Go
<input type="radio"/> ECX Transaction Agent Listener	Stopped	Workflow Agent Listener	Manual	Oracle Applications GSM	Workflow Agent Listener Service	Refresh Go
<input type="radio"/> Workflow Deferred Agent Listener	Stopped	Workflow Agent Listener	Automatic	Oracle Applications GSM	Workflow Agent Listener Service	Refresh Go
<input type="radio"/> Workflow Deferred Notification Agent Listener	Stopped	Workflow Agent Listener	Automatic	Oracle Applications GSM	Workflow Agent Listener Service	Refresh Go
<input type="radio"/> Workflow Error Agent Listener	Stopped	Workflow Agent Listener	Automatic	Oracle Applications GSM	Workflow Agent Listener Service	Refresh Go
<input type="radio"/> Workflow Inbound Notifications Agent Listener	Stopped	Workflow Agent Listener	Automatic	Oracle Applications GSM	Workflow Agent Listener Service	Refresh Go
<input type="radio"/> Workflow Java Deferred Agent Listener	Stopped	Workflow Java Agent Listener	Manual	Oracle Applications GSM	Workflow Agent Listener Service	Refresh Go
<input type="radio"/> Workflow Java Error Agent Listener	Stopped	Workflow Java Agent Listener	Manual	Oracle Applications GSM	Workflow Agent Listener Service	Refresh Go
<input type="radio"/> Workflow Notification Mailer	Not Configured	Workflow Mailer	Automatic	Oracle Applications GSM	Workflow Mailer Service	Refresh Go

TIP GSM = Generic Service Management

Support Cart | Logout | Help

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If the 'Startup Mode' is 'Manual', select the radio button next to the affected component, then click the 'Edit' button. Change the startup mode to 'Automatic' and click the 'Next' button until you return to the list of components. If the rest of the listeners are already running, the change to the startup mode will not take effect until the 'Workflow Agent Listener Service' is stopped and re-started. (See screens below explaining how to start this Service and select 'Stop' instead of 'Start' and wait until the status says 'Deactivated'. Then follow the instructions below to start the service.)

Oracle Applications Manager  
Applications Dashboard | Site Map  
Define Details Schedule Events Review

Create Workflow Agent Listener: Define: TESTOF2

Cancel Step 1 of 4 Next

Name: Workflow JMS In Listener  
Startup Mode: Automatic  
Container Type: Oracle Applications GSM  
Inbound Agent: WF\_JMS\_IN  
Outbound Agent: [ ]  
Correlation ID: [ ]

Cancel Step 1 of 4 Next

Support Cart | Setup | Logout | Help

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If the listeners are marked 'Stopped', double-click the container link.

Oracle Applications Manager  
Applications Dashboard | Site Map  
Applications System: a159vis3 > Workflow > Service Components  
Service Components: a159vis3

Last Updated: 07:57:24 PM Nov 15 2004 CST  
Filter: Name [ ] Go

Select a Service Component and ...

Select Name	Status	Type	Startup Mode	Container Type	Container	Actions
<input type="radio"/> ECX Inbound Agent Listener	Stopped	Workflow Agent Listener	Manual	Oracle Applications GSM	Workflow Agent Listener Service	Refresh Go
<input type="radio"/> ECX Transaction Agent Listener	Stopped	Workflow Agent Listener	Manual	Oracle Applications GSM	Workflow Agent Listener Service	Refresh Go
<input type="radio"/> Workflow Deferred Agent Listener	Stopped	Workflow Agent Listener	Automatic	Oracle Applications GSM	Workflow Agent Listener Service	Refresh Go
<input type="radio"/> Workflow Deferred Notification Agent Listener	Stopped	Workflow Agent Listener	Automatic	Oracle Applications GSM	Workflow Agent Listener Service	Refresh Go
<input type="radio"/> Workflow Error Agent Listener	Stopped	Workflow Agent Listener	Automatic	Oracle Applications GSM	Workflow Agent Listener Service	Refresh Go
<input type="radio"/> Workflow Inbound Notifications Agent Listener	Stopped	Workflow Agent Listener	Automatic	Oracle Applications GSM	Workflow Agent Listener Service	Refresh Go
<input type="radio"/> Workflow Java Deferred Agent Listener	Stopped	Workflow Java Agent Listener	Manual	Oracle Applications GSM	Workflow Agent Listener Service	Refresh Go
<input type="radio"/> Workflow Java Error Agent Listener	Stopped	Workflow Java Agent Listener	Manual	Oracle Applications GSM	Workflow Agent Listener Service	Refresh Go
<input type="radio"/> Workflow Notification Mailer	Not Configured	Workflow Mailer	Automatic	Oracle Applications GSM	Workflow Mailer Service	Refresh Go

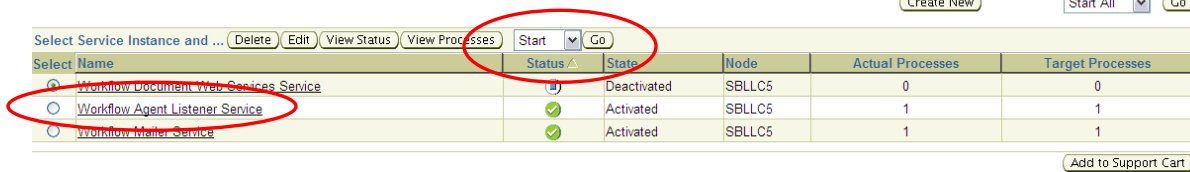
TIP GSM = Generic Service Management

Support Cart | Logout | Help

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This navigates to the Service Instances screen. Ensure that the radio button next to the 'Workflow Agent Listener Service' is selected, and then click the 'Go' button next to 'Start' (note, not next to 'Start All').

Service Instances for Generic Service Component Container:a510vis2  
 .last Updated : 31-08-2005 20:59:32



The status will change to 'Activating' and eventually 'Activated'. (Click the browser 'Refresh' button until the status is 'Activated' and there is a green check). Note that just before the listeners are fully activated, the status will say 'Activated' and there will be a red x. This is normal.

Starting the 'Workflow Agent Listener Service' will start the following listeners: Workflow Deferred Agent Listener, Workflow Error Agent Listener, Workflow Java Deferred Agent Listener, Workflow Java Error Agent Listener, Workflow Deferred Notification Agent Listener, and Workflow Inbound Notification Agent Listener. If any of these listeners does not start, then navigate to the 'Administer Concurrent Manager' screen and look at the log file for the 'Workflow Agent Listener Service' Manager and resolve the errors.

If you need to use the 'Workflow ?? (web services)' listener, then you must also start the 'Workflow Document Web Services Service' container.

## Schedule Propagation

Propagation is a process that periodically "wakes up" and determines if there are any messages on the outbound queues and if so, ensures they are dequeued and sent to the specified destination. Oracle will schedule the propagation for WF\_CONTROL, WF\_NOTIFICATION\_OUT, and WF\_WS\_JMS\_OUT, but if any of the other outbound queues will be used (WF\_OUT, WF\_JMS\_OUT), propagation must be scheduled. Propagation is done through OEM (Oracle Enterprise Manager). Since this is an optional step, it will not be covered in this paper.

## Synchronize Licenses Statuses

Oracle delivers hundreds of seeded events. Each event is registered to a product. However, if your particular installation is not using that product, then the events should be disabled. Oracle has provided a concurrent program 'Synchronize Product License and Workflow BES License' that will perform this task. However, it is not seeded to any of the request groups. Add it to the 'System Administrator Request Group'. Then run it. The parameters are hidden, so when asked if you wish to accept the default parameters, click 'OK'. This program should be run any time you install a mini-pack, family pack, cumulative patch, or point maintenance patch. If you implement a new product, this program is automatically run as part of that implementation so that the product's events will be enabled.

## Schedule 'Workflow Control Cleanup'

The control queue controls how events are queued and dequeued from all the other queues. "When a middle tier process starts up, it creates a JMS subscriber to the WF\_CONTROL 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.”<sup>4</sup> Oracle provides a program, ‘Workflow Control Cleanup’, that pings each subscriber to see if the middle tier process is still alive. If no response is received, the subscriber is deleted. Oracle recommends that this program be scheduled at least every 12 hours. Note that the 11.10.2 maintenance patch automatically schedules this program, so the task may be just to verify that there is a schedule. Obviously, Oracle will run this schedule from the user SYSADMIN, so if you wish the schedule to be moved to another user, cancel the schedule and re-create it.

## Defining Business Events

Although Oracle defines hundreds of events, if you wish to initiate custom messages or start custom workflows, chances are you will wish to define a custom business event.

### Naming Standard

Oracle recommends that business events be assigned a name that conforms with the following format (note – name is case sensitive):




<company>.<family>.<product>.<component>.<object>.<action>

It should be no surprise then that all the seeded events start with ‘oracle.apps.’ and that the third node is the 2 or 3 character short name for the product (note – it is the third node that the ‘Synchronize Product License and Workflow BES License’ uses to match to installed products). The following examples demonstrate how the remaining nodes can be utilized:

oracle.apps.fnd.profile.value.update  
oracle.apps.ap.invoice.create  
oracle.apps.hz.customer.address.update

If an event is appropriately named, one should be able to know when the event will be raised just by reading the name. So if a custom event were to be defined, then the first node would not be ‘oracle’, but the name of the company defining the event. If purpose of your custom event was to synchronize employee tables between Oracle and Peoplesoft, the second node might be ‘ps’, so that the result would be similar to ‘<your company>.ps.per.employee.sync’. If you wished to perform different functions based on whether the employee was new or updated, you would define two events ‘<your company>.ps.per.employee.new.sync’ and ‘<your company>.ps.per.employee.update.sync’.

### Query Existing Event

To query an existing event, enter all or part of the name (with ‘%’) in the Name field and click Go. To see the definition of the event click the  icon. To see the definition of the subscriptions for the event, click the  icon. To raise or test the event, click the  icon. Note that you will not be able to delete Oracle seeded events (you will not be able to click the box under ‘Select’).

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[Business Events: Events](#) >

### Events

A business event is an occurrence in an internet or intranet application or program that might be significant to other objects in a system or to external agents. An event group is a type of event composed of a set of individual member events. Event groups let you associate any events you want with each other and reference them as a group in event subscriptions.

**Search**  
Enter search criteria and select the "Go" button to find your event definitions.

Name:

Searching for "abc" returns "abcde" and "efgabc".

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**Results: Events**

Select Event(s) and ...

Select All | Select None

Select Name	Display Name	Type	Status	Subscription	Update	Test
<input type="checkbox"/> oracle.apps.ap.event.invoice.approval	Payables Invoice Approval	Event	Enabled			
<input type="checkbox"/> oracle.apps.ap.inv.invoice.rcv	Invoice Inbound Event	Event	Enabled			

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## Create New Event

Create a new event by clicking the 'Create Event' button.

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### Events

A business event is an occurrence in an internet or intranet application or program that might be significant to other objects in a system or to external agents. An event group is a type of event composed of a set of individual member events. Event groups let you associate any events you want with each other and reference them as a group in event subscriptions.

**Search**  
Enter search criteria and select the "Go" button to find your event definitions.

Name:

Searching for "abc" returns "abcde" and "efgabc".

[Show More Search Options](#)

**Results : No Search Conducted**

Select Name	Display Name	Type	Status	Subscription	Update	Test
No events found.						

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Enter the name and display name. The description is optional. The status will default to 'Enabled' (but can be changed at any time). The Owner Name and Owner Tag were optional prior to 11.1.10 but are now required. It is recommended that the Owner Name be set to an existing 'Application\_Name' in fnd\_application\_tl and that the Owner Tag be set to the corresponding 'Application\_Short\_Name' in fnd\_application.

### Create Event

A business event is an occurrence in an internet or intranet application or program that might be significant to other objects in a system or to external agents.

\* Indicates required field

\* Name

\* Display Name

Description

\* Status

Generate Function

Java Generate Function

\* Owner Name

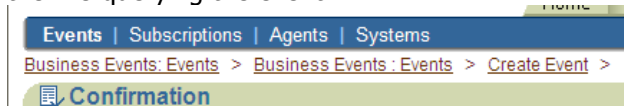
\* Owner Tag

Customization Level

If the subscription to the event requires more than the event name and key, then you can specify either a PL/SQL function (Generate Function) or a Java function (Java Generate Function) to build the other aspects of the event data structure. These functions can also be specified at the subscription level. Obviously if each subscription requires the same event data, it would be easier to specify the function at the event level. If the event data were to be different depending on the subscription, it would be better to specify the function at the subscription level.

The 'Customization Level' governs the update actions that can be performed on the event. If the level is 'Core', it is a seeded event and no changes can be made. If the level is 'Limit', it is a seeded event, but you can enable/disable the event. If the level is 'User', your company created the event and you can make any change, including deleting the event.

After filling in all the fields, click the 'Apply' button to save the definition. Unfortunately, to create the subscriptions for the new event, you must re-query the event. This is accomplished by clicking either the blue 'Events' link or the 'Business Events: Events' hyperlink (either one), and then re-querying the event.



Note that since the customization level is 'user', you could click the box next to the event and then click the 'Delete' button and delete the definition. This button will gray out once subscriptions are defined.

**Search**  
 Enter search criteria and select the "Go" button to find your event definitions.  
 Name:    
 Searching for "abc" returns "abcde" and "efgabc".  
[Show More Search Options](#)

**Results: Events**

Select Event(s) and ...

Select All | Select None

Select	Name	Display Name	Type	Status	Subscription	Update	Test
<input type="checkbox"/>	oracle.apps.po.event.supplier_change	Supplier Change, and PO is Responded	Event	Enabled			
<input type="checkbox"/>	oracle.apps.po.suppliersignature	Supplier Signature Event	Event	Enabled			
<input type="checkbox"/>	sb.apps.ap.supplier.header.create	New Supplier is created	Event	Enabled			

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## Edit/Create Subscription

If an event has subscriptions defined, the icon in the 'Subscription' column will look like . If no subscriptions exist, the icon will look like . Click the icon to navigate to the Edit/Define Subscription page. Existing subscriptions will be listed. To edit an existing subscription, click the icon. To create a new subscription, click the 'Create Subscription' button.

**Subscriptions: Event: &EventName**

An event subscription is a registration indicating that a particular event is significant to a particular system. An event subscription specifies the processing to perform when the triggering event occurs.

System	Source Type	Out Agent	To Agent	Function	Workflow	Status
A510VIS3.SOLUTIONBEACON.NET	Local			wf_rule.default_rule	POSCHORD/RECEIVE_SUP_CHANGE	Enabled

If Oracle has seeded the subscription, the 'Customization Level' will be 'Core' or 'Limit'. If 'Core', no changes can be made. If 'Limit', you can disable/enable the subscription. Subscriptions defined by your company will be assigned the 'Customization Level' of 'User' and any field can be changed. Note: there is currently no way to delete subscriptions regardless of the 'Customization Level'.

If the 'Customization Level' is 'Core' or 'Limit', the screen will show the subscription definition. 'Limit' subscriptions will allow the status to be set to 'Disabled', but not other changes are permitted.

**Update Event Subscriptions**  
 An event subscription is a registration indicating that a particular event is significant to a particular system. An event subscription specifies the processing to perform when the triggering event occurs. (Cancel) (Apply)

\* Indicates required field

**Subscriber**  
 System A510VIS3.SOLUTIONBEACON.NET

**Triggering Condition**  
 Source Type Local  
 Event Filter oracle.apps.po.event.supplier\_change  
 Source Agent

**Execution Condition**  
 Phase 99  
Subscription with a phase 1-99 are run synchronously , 100 and above are deferred.  
 \* Status Enabled  
 Rule Data Key  
 Customization Level Limit

**Action**  
 Rule Function wf\_rule\_default\_rule  
The Rule Function controls the behavior of the subscrip (Format : <Package> . <Function>)  
 Workflow Type POSCHORD  
 Workflow Process RECEIVE\_SUP\_CHANGE  
Choose a Workflow Type, before choosing the Workflow Process for that Type  
 Out Agent  
 To Agent  
 Priority Normal  
 Parameters

**Documentation**  
 Owner Name Oracle Purchasing  
 Owner Tag PO  
 Description Supplier Change

Required fields for a new subscription are marked with an asterisk. If the flashlight icon is next to the field, you can select the value by clicking the flashlight to open a Search window. In the 'Search By' window, enter part of the value and click 'Go'. You can use wildcard characters. When the results display, either click the desired row in the 'Select' column and click the 'Select' button, or just click the icon in the 'Quick Select' column.

**Search**  
 To find your item, select a filter item in the pulldown list and enter a value in the text field, then select the "Go" button.

Search By System Name A  (Go)

**Results**

Select	Quick Select	System Name	Display Name	Description
<input type="radio"/>		A510VIS3.SOLUTIONBEACON.NET	LE0003	Local System Created by Oracle

[About this Page](#) (Cancel) (Select)

For each subscription, the following fields must be entered:

- System** The system where the subscription executes. This is usually the local system
- Source Type** Defaults to 'Local' – Enter 'External' if event occurs on another system (that system must be specified in the system field), or 'Error' if this is a subscription that should be executed if the event was dequeued from the WF\_ERROR queue (which happens when the event or subscription errors out).  
If the Event is raised through a message received by an inbound agent, the source should be external, even if the entire transaction is executed on the local system
- Event Filter** The event or group to which this subscription belongs.
- Source Agent** If the event is initiated by receiving a message, the queue where the message is placed. Note: If this field is specified, the source type should be 'External'. This field is usually left blank.

Phase	Defaults to 100. This field allows the sequencing of the execution of subscriptions. If the value is < 100, the subscription is executed immediately, else it is moved to the WF_DEFERRED queue and executed based on the sleep parameters associated with this queue. The phase number should be unique per event/system/source/agent/owner name/owner tag.
Status	Defaults to 'Enabled'. Set to 'Disabled' to prevent the action defined in the subscription.
Rule Data	If the subscription can execute with only the name of the event and the event key, then specify 'Key'. If the event requires any of the other fields in the event data structure, specify 'Message'.
Action Type	Select 'Launch Workflow' to define the workflow the subscription should start, 'Custom' to execute a PL/SQL or Java procedure, 'Receive Trading Partner Message' to process the message contained in the event data (trading partner information will be contained in the parameters), 'Send Notification' to send a notification to a role, 'Send Trading Partner Message' to send a message externally (trading partner information will be contained in the parameters), or 'Send to Agent' to send the event data to another agent. This paper will explain 'Custom' and 'Launch Workflow'.
On Error	Enter the action to be taken if subscription errors. Select 'Stop and Rollback' to have event stop, rollback changes, and (if defined) execute the error subscription. Select 'Skip to Next' if there are multiple subscriptions and they should be executed regardless of the outcome of the current subscription.

An event subscription is a registration indicating that a particular event is significant to a particular system. An event subscription specifies the processing to perform when the triggering event occurs.

\* Indicates required field

**Subscriber**

\* System

---

**Triggering Event**

\* Source Type

\* Event Filter

Source Agent

---

**Execution Condition**

\* Phase   
Subscription with a phase 1-99 are run synchronously , 100 and above are deferred.

\* Status

\* Rule Data

---

**Action Type**

\* Action Type   
The Action Type controls the behavior of the subscription

On Error

Regardless of the 'Action Type', select 'Next' to continue the definition. The screen that displays will depend on the action. If 'Launch Workflow' is selected, then the Workflow Type and Top Process must be specified. Again, the 'Owner Name' and 'Owner Tag' are required. You can optionally specify parameters and values.

Cancel Back Apply

An event subscription can be routed to a Workflow process. Please specify the Workflow Type and Workflow Process to be launched.

\* Indicates required field

**Action**

\* Workflow Type

\* Workflow Process    
Choose a Workflow Type, before choosing the Workflow Process for that Type

\* Priority

Additional Options

**Subscription Parameters**

Select Name	Value
No data exists.	
<a href="#">Add Another Row</a>	

Enter parameters and their values with no spaces

**Documentation**

\* Owner Name

\* Owner Tag

Customization Level

Description

The field 'Additional Options' allows you to specify parameters that will be passed to the workflow as item attributes (option 'Add Subscription Parameters'), specify parameters that, based on the value of the parameter, conditionally start the workflow (option 'When Parameters Match'), or send the event to any and all workflows that have a receive activity with an activity attribute with the internal name '#BUSINESS\_KEY' and a value that matches the event key ('Launch when Business Key Matches').

If the selected action is 'Custom', then you can still specify a workflow and process, but you can also specify (in addition to or instead of) a PL/SQL or Java function to execute. If the function is to receive or send a message you can specify the out/to agent. If you specify both a function and a workflow, it becomes the responsibility of the function to start the workflow using the 'Send' API.

If you want to send the event message to an agent (a queue), then specify which queue in the 'To Agent', and the agent responsible for sending the message in the 'Out Agent'. Remember that the 'To Agent' must have a listener running and propagation must be scheduled for the 'Out Agent'. If you omit the 'Out Agent', Oracle selects a defined agent that matches the message type (text, Java, web services). Oracle may pick an agent that has no propagation scheduled, so it is wise to specify the agent. If you omit the 'To Agent', the out agent must be linked to a multi-consumer queue with a subscriber list, or a single subscriber queue.

Cancel Back Apply

**Create Event Subscription: Custom Subscription**

**Action**

The Rule Function controls the behavior of the subscription. Provide a Java Class name (<Package>.<Class>) for Java Rule Function and a PL/SQL stored procedure (<Package>.<Function>) for PL/SQL Rule Function.

Java Rule Function

PL/SQL Rule Function

Workflow Type

Workflow Process    
Choose a Workflow Type, before choosing the Workflow Process for that Type

Out Agent

To Agent

\* Priority

**Subscription Parameters**

Select Object: [Delete](#)

Select All | Select None

Select Name	Value
<input type="checkbox"/>	<input type="text"/>

[Add Another Row](#)

Enter parameters and their values with no spaces

**Documentation**

\* Owner Name

\* Owner Tag

Customization Level

Description

## Event Groups

Occasionally one wants the same action to occur for two or more events. Since subscriptions are the action, one would have to define the same subscription multiple times. Oracle has resolved this duplication of effort through event groups. Click the 'Create Event Group' button instead of the 'Create Event' button.

Note that even though the subscription exists at the group level, you raise the event (not the event group) to execute the subscription. Never raise an event group.

The screenshot shows the Oracle Business Events web interface. At the top, there is a navigation bar with the Oracle logo and several tabs: Home, Developer Studio, Business Events (selected), Status Monitor, Notifications, and Administration. Below the navigation bar, there is a search section with a text input field for 'Name' and a 'Go' button. The search results section displays 'Results : No Search Conducted'. At the bottom of the search results, there are two buttons: 'Create Event' and 'Create Event Group', with the latter button circled in red. Below the buttons is a table with columns: Select Name, Display Name, Type, Status, Subscription, Update, and Test. The table currently shows 'No events found.'

The resulting screen looks very similar to the 'Define Event' screen, same fields, same rules. The event name should describe the group and have 'group' as the last node. This will aide in troubleshooting. If an event fails, the message to SYSADMIN lists the event, not the group where the subscription resides. It therefore helps to be able to query all groups by specifying '%group%' and then opening the group to find the errant event.

To add events to a group, click the 'Add Event to Group' button.

The screenshot shows the 'Create Group' form in the Oracle Business Events interface. The form contains several fields: 'Name' (sb.oracle.apps.ar.HZ.group), 'Display Name' (group all HZ events), 'Description' (empty), 'Status' (Enabled), 'Owner Name' (Receivables), and 'Owner Tag' (AR). The 'Customization Level' is set to 'User'. At the bottom of the form, there is a table with columns: Select Name, Display Name, Type, Status, Owner Name, and Owner Tag. The table currently shows 'No events found.'. To the right of the table, there is a button labeled 'Add Events to Group', which is circled in red.

When the resultant search page displays, enter your criteria and click 'Go'.

**Add Events to Group: oracle.apps.fnd.bes.control.group**  
 Select which of the following events will be members of the event group.

Enter search criteria and select the "Go" button to find your event definitions.  
 Name    
Searching for "abc" returns "abcde" and "efgabc".

[▶ Show More Search Options](#)

**Results : No Search Conducted**

Select Name	Display Name	Type	Status	Owner Name	Owner Tag
No data exists.					

[Home](#) | [Developer Studio](#) | [Business Events](#) | [Status Monitor](#) | [Notifications](#) | [Administration](#) | [Diagnostics](#) | [Preferences](#) | [Help](#) | [Close Window](#)  
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Click the box next to the desired event (or 'Select All' for all listed events) and press the 'Add to Group' button.

[Business Events: Events](#) > [Business Events: Events](#) > [Update Group](#) >

**Add Events to Group: oracle.apps.fnd.bes.control.group**  
 Select which of the following events will be members of the event group.

Enter search criteria and select the "Go" button to find your event definitions.  
 Name    
Searching for "abc" returns "abcde" and "efgabc".

[▶ Show More Search Options](#)

**Add Events**

Select Event(s) and ...  ◀ Previous 1-10 Next 10 ▶

[Select All](#) | [Select None](#)

Select Name	Display Name	Type	Status	Owner Name	Owner Tag
<input type="checkbox"/> oracle.apps.wf.agent.group.create	Agent Group Member Created	Event	Enabled	Oracle Workflow	FND
<input type="checkbox"/> oracle.apps.wf.agent.group.delete	Agent Group Member Deleted	Event	Enabled	Oracle Workflow	FND
<input type="checkbox"/> oracle.apps.wf.agent.group.update	Agent Group Member Updated	Event	Enabled	Oracle Workflow	FND
<input type="checkbox"/> oracle.apps.wf.bes.control.ping	Business Event System Control Ping	Event	Enabled	Oracle Workflow	FND
<input type="checkbox"/> oracle.apps.wf.callback.delay	Future callback execution request	Event	Enabled	Oracle Workflow	FND

## Testing Events

Just as Oracle provided the Developer Studio to test workflows, Oracle provides a page to test starting business events. This page is accessed from the event definition. Query your event. Then click the 'Test' button.

**Results: Events**

Select Event(s) and ...

[Select All](#) | [Select None](#)

Select Name	Display Name	Type	Status	Subscription	Update	Test
<input type="checkbox"/> kmb.apps.ap.supplier.create.header	New Supplier is created	Event	Enabled			

Enter the Event Key. If the event subscription starts a workflow, this will also be the item key. If you wish the execution of the event to be delayed, enter a send date. If your subscription had the condition 'Launch when Parameters Match' or 'Add Subscription Parameters' or the workflow includes the activities to extract the values of the parameters, then enter the name of the parameter and the value. You can even code the Event Data (option 'Write XML') or upload an XML message (option 'Upload XML') to pass to the workflow. When all the data is entered, click 'Submit' to raise the event.



### Test Business Event

To test a business event enter an event key , a list of parameter name / value pairs ( optional ), and either paste in an XML Document or upload from the local file system and press submit.

Cancel Submit

\* Indicates required field

#### Event Identifier

\* Event Name    
\* Event Key   
Send Date    
Send Date must be in the Format: DD-MON-RRRR


#### Event Parameters

Select Object:

Select All | Select None

Select Label	Value
<input type="checkbox"/>	<input type="text"/>

#### Event Data

Upload Option  

XML Content

If XML content is greater than 4000 characters, Select "Upload XML" option.

## Programmatically Start Events.

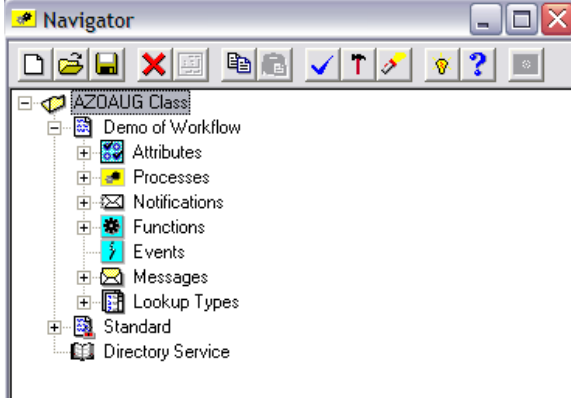
Events can be programmatically raised through the 'Raise' API. Note the following example:

```
CREATE OR REPLACE TRIGGER kmb_raise_new_supplier_event
AFTER INSERT
ON po_vendors
FOR EACH ROW
    WHEN new.vendor_type_lookup_code <> 'EMPLOYEE'
DECLARE
    match_date          VARCHAR2(20);
BEGIN
    SELECT TO_CHAR(SYSDATE, 'YYYYMMDDHH24MMSS')
    INTO match_date
    FROM DUAL;
    wf_event.raise('kmb.apps.ap.supplier.header.create',
                  :new.vendor_id || ':' ||
                  match_date);
END;
```

The parameters to the API are the name of the event, the event key, and (optionally) the send date, the event data, and/or the list of parameters (names and values). The above example passes only the event name and key. Note that uniqueness is accomplished by concatenating the current date/time to the vendor\_id.

## Using Events in Workflow

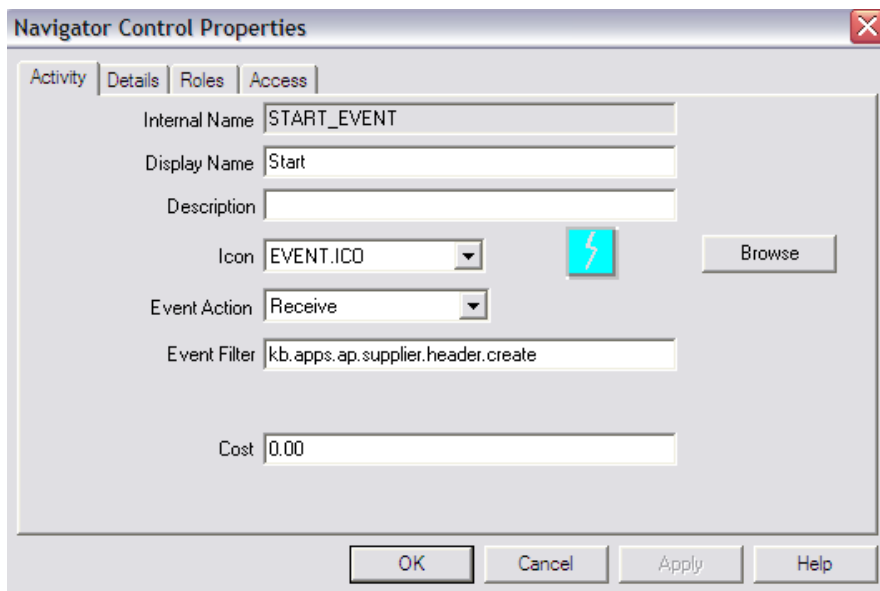
If the purpose of the event subscription is to start a workflow, the workflow must be configured to receive the event. Use the Workflow Builder tool to define an event activity (Double-click Events, or in the Diagrammer window, right click the white space and select 'New Event'.



Events require that three attributes be defined, one to store the event name, one to store the event key and one to store the event message. The first two must have a type of 'Text', and the event message must have a type of 'Event'



Like all workflow activities, enter the 'Internal Name' and 'Display Name'. In the 'Event Action', select 'Receive'. In the 'Event Filter', enter the name of the event that will be raised when you wish the workflow to start. This event must either contain the subscription that defines the workflow to start or must belong to a group that contains the subscription that defines the workflow to start.



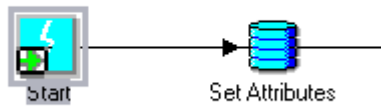
If you double-clicked the Event tree in the Navigator window, drag the new event to the Diagrammer window. This event must be a start node. So double-click the event, select the node tab, and change 'Start/End' to 'Start'.

The screenshot shows the 'Navigator Control Properties' dialog box with the 'Node' tab selected. The 'Label' field contains 'START\_EVENT'. The 'Start/End' dropdown menu is set to 'Start' and is circled in red. The 'Comment' field is empty. The 'Timeout' section has a 'Type' dropdown set to 'No Timeout'. The 'Performer' section has a 'Type' dropdown set to 'Constant' and a 'Value' dropdown set to '<None>'. There is an 'Edit' button next to the 'Value' dropdown. At the bottom, there are 'OK', 'Cancel', 'Apply', and 'Help' buttons.

Now click the Event Details tab and enter the three attributes you defined.

The screenshot shows the 'Navigator Control Properties' dialog box with the 'Event Details' tab selected. The text 'Receive message data in:' is at the top. Below it, there are three rows of input fields, each with an 'Edit' button: 'Event Name' with the value 'Event Name', 'Event Key' with the value 'Event Key', and 'Event Message' with the value 'Event Data'. At the bottom, there are 'OK', 'Cancel', 'Apply', and 'Help' buttons.

Delete the standard Start node and draw a line from the Event node to your first activity. Your workflow is now event-enabled.



It is possible for a 'Receive' event to be other than the first node, but in order to receive the event, the workflow must have transitioned to that node and be waiting (status = 'Notified').

Workflows can also use the event activity to raise other events. Set the 'Event Action' to 'Raise' and set the value of the attribute specified in 'Event Name' to the name of the event to raise and set the value of the attribute specified in 'Event Key' to the event key to be passed to the event. This type of node cannot be a start node.

Workflows can create messages and send them. In this case, the 'Event Action' is set to 'Send'. The attribute specified in 'Event Message' must contain a message, and a 'To Agent'. The 'Event Name' is the event that will process the message. 'Event Key' is also required.

### Event Standard Activities

Workflow provides the standard activities 'Compare Event Property', 'Get Event Property', and 'Set Event Property'. There are also several 'XML....' activities that the Workflow Developers Guide states are not available for the E-Business suite version of workflow.<sup>5</sup> Like most standard activities, you must configure the Node Attributes tab or the function won't work. The attributes are:

Event Property	An attribute with type of 'Event' that contains the event data
Event Parameter	Which part of the event data – uses a LOV
Item Attribute	If 'Property' is set to 'Event Parameter', which parameter – no LOV
Date, Numeric, Text Value	Either the source of the data (for 'Set'), or where the data will be placed (for 'Get')
	For the 'Compare' activity, the value to be compared with.

### **The Event Data Structure – WF\_EVENT\_T**

Oracle has created several abstract datatypes (ADTs) to contain the 'Event Data'. The two basic structures are WF\_EVENT\_T for text events and SYS.AQ\$\_JMS\_TEXT\_MESSAGE. These structures include other ADTs: WF\_AGENT\_T, WF\_PARAMETER\_T, and WF\_PARAMETER\_LIST\_T. ADTs are fully described in "User Defined Datatypes" chapter of the *Oracle Concepts* manual.

Oracle refers to the WF\_EVENT\_T and SYS.AQ\$\_JMS\_TEXT\_MESSAGE structures as the event message. As we drill down into the components of these structures, there will be a piece Oracle calls the 'Event Data', or "a set of additional details describing what occurred in the event". Other parts of the Oracle Documentation refer to the contents of the field 'Event Data' as the message, as this field contains the information that needs to be communicated when the event occurs (such as a XML document or PDF containing an invoice or PO). Usually though, the word "message" refers to the entire WF\_EVENT\_T structure.

The WF\_EVENT\_T structure is comprised of the following fields: (quotes are from the *Oracle Workflow API Reference, Release 2.6.3.5*, Part No. B12163-02, November 2004).

PRIORITY	NUMBER – “the priority with which the message recipient should dequeue the message.” 50 is normal but the smaller the number, the higher the priority.
SEND_DATE	DATE – “the date and time the message is available for dequeuing.” The default value is SYSDATE, indicating the event should be dequeued immediately. If the date is > SYSDATE, the event is placed on the WF_DEFERRED queue and waits there until SYSDATE >= SEND_DATE.
RECEIVE_DATE	DATE – “the date and time when the message is dequeued by an agent listener.”
PARAMETER_LIST	WF_PARAMETER_LIST_T – “A list of additional parameter name and value pairs.” Up to 100 parameters (NAME – VARCHAR2(30) / VALUE – VARCHAR2(2000)) can be specified.
EVENT_NAME	VARCHAR2(240) – “The internal name of the event”.
EVENT_KEY	VARCHAR2(240) – “The string that uniquely identifies the instance of the event.”
EVENT_DATA	CLOB – “A set of additional details describing what occurred in the event.”
FROM_AGENT	WF_AGENT_T – “The agent from which the event is sent. For locally raised events, this attribute is initially null.” This field contains both the NAME – VARCHAR2(30) and the SYSTEM – VARCHAR2(30).
TO_AGENT	WF_AGENT_T – “The agent to which the event should be sent (the message recipient).” This field contains both the agent name and the system name.
ERROR_SUBSCRIPTION	RAW(16) – “If an error occurs while processing this event, this is the subscription that was being executed when the error was encountered.”
ERROR_MESSAGE	VARCHAR2(4000) – “An error message that the Event Manager generates if an error occurs while processing this event.”
ERROR_STACK	VARCHAR2(4000) – “An error stack of arguments that the Event Manager generates if an error occurs while processing this event.”

Oracle provides APIs (all in the package WF\_EVENT) for the retrieval or setting of each item in the structure. The whole of the event message, or WF\_EVENT\_T field is stored in the USER\_DATA column of the queue tables.

If you are using the business event system to transmit data, and must build the WF\_EVENT\_T structure, you must call the WF\_EVENT.Initialize (new\_wf\_event\_t) API. This API initializes the WF\_EVENT\_T specified in the new\_wf\_event\_t parameter by setting the PRIORITY to 0, the EVENT\_DATA to empty, and all other attributes to NULL.

## The Event Data Structure – SYS.AQ\$\_JMS\_TEXT\_MESSAGE

JMS messages follow the standard defined by Sun Microsystems, Oracle, IBM and other vendors. The SYS.AQ\$\_JMS\_TEXT\_MESSAGE datatype contains the following attributes:

HEADER	“Header properties”
TEXT_LEN	“The size of the message payload, set automatically.”

TEXT_VC	"The message payload in VARCHAR2 format, if the payload is equal to or less than 4000 bytes."
TEXT_LOB	"The message payload in CLOB format, if the payload is greater than 4000 bytes."

The SYS.AQ\$\_JMS\_HEADER datatype contains the following attributes:

REPLYTO	"A destination supplied by a client when a message is sent."
TYPE	"The type of the message."
USERID	"The identity of the user sending the message."
APPID	"The identity of the application sending the message."
GROUPID	"The identity of the message group of which this message is a part; set by the client."
GROUPSEQ	"The sequence number of the message within the group."
PROPERTIES	"Additional message properties in the SYS.AQ\$_JMS_USERPROPARRAY datatype."

The *'Oracle Workflow API Reference, Release 2.6.3.5, Part No. B12163-02, November 2004'* contains a chart that maps the two structures. Retrieving data from this structure is described in *'Using Oracle Java message Service to Access AQ, Oracle Applications Developer's Guide – Advanced Queuing'* or *'Using Oracle Java message Service (OJMS) to Access Oracle Streams AQ, Oracle Streams Advanced Queuing User's Guide and Reference'*, and Package `oracle.jms`, *Oracle Supplied Java Packages Reference'*.

## Using SQL to Access the Data in the queues

There are several fields in the queue table that are used to administer the queues. The first is the field `'corrid'`. This field will contain the event name prefaced by `'APPS:.'`. The field `'state'` is a numeric code indicating whether the event has been processed or not. The following query can be used to see what events are passing through the queue and the current state. Substitute any queue name for `'wf_error'`:

```
select corrid,
       decode(state,
              0, '0 = Ready',
              1, '1 = Delayed',
              2, '2 = Retained',
              3, '3 = Exception',
              to_char(state)) State,
       count(*) COUNT
from wf_error
group by corrid, state;
```

Note that this query decodes the value in the state field. '0' means the event should be processed the next time the listener looks at this queue. '1' means that the `send_date` (stored in the `user_data` field) is `> SYSDATE`. '2' means the event has been processed and that the message will be removed when the queues retention days have elapsed. '3' means the event did not process successfully.

The field `user_data` contains the `wf_event_t` structure. A simple select of this field yields part of the data, but you can't see all of it. So you have to break the `wf_event_t` structure into its subparts.

```

select a.user_data.priority,
a.user_data.send_date,
a.user_data.receive_date,
a.user_data.correlation_id,
a.user_data.event_name,
a.user_data.event_key,
a.user_data.from_agent,
a.user_data.to_agent,
a.user_data.error_subscription,
a.user_data.error_message,
a.user_data.error_stack,
a.user_data.event_data,
a.user_data.parameter_list
from wf_error a

```

The fields that are most useful for troubleshooting are the send\_date (when the subscriptions to the event should execute), the event\_key, the error\_message, and the parameter\_list.

If the field starts with a `(`, such as from\_agent, to\_agent, parameter\_list, then the field is an abstract data type and may need an additional breakout. Following is the result of selecting just a.user\_data.parameter\_list:

```

((NOTIFICATION_ID, 659436), (ROLE, DGRAY), (SUB_GUID,
AAE4B3CC9583DA5EE030B98B59632591), (SUB_GUID,
C31D7C623B541465E030B98B6C637B2B), (ERROR_NAME, WFENG_EVENT_NOTFOUND),
(ERROR_TYPE, ERROR),,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
)

```

At this point, it may be easier to revert to the API's that Oracle has written. For example, to retrieve the value of the first parameter in the list, you can use:

```

select wf_event.GetValueForParameterPos(1,a.user_data.parameter_list)
from wf_error a

```

Or to get the value for the parameter 'ROLE', you can use:

```

select wf_event.GetValueForParamter('ROLE',a.user_data.parameter_list)
from wf_error a

```

Because Oracle uses abstract datatypes, you may have to upgrade your SQL tool. If you get the error message 'Data type is not supported', then you need an upgrade. Patch 4334965 "11i.ATG\_PF.H RUP 3" added a field, 'USER\_PROP', with a type of ANYDATA, to all the queues. Your editor may not be able to handle this datatype.

## Conclusion

This paper is meant to supply enough information to start using the business event system and to understand and begin to administer the business events that are moving through your system. Experiment, read the API guides. Read other articles. The workflow guides contain approximately 300 pages about Business Events. Obviously this paper only scratches the surface of this exciting topic. You can use the following list to begin your search.

## Bibliography

1. *Oracle Workflow Developer's Guide Release 2.6.4* Part No. B15853-02, July 2006
2. *Oracle Workflow API Reference Release 2.6.3.5* Part No. B12163-02, November 2004
3. *Oracle Workflow Administrator's Guide 2.6.4* Part No. B15852.03, July 2005
4. "Getting Started with the Oracle Workflow 9i/2.6.1 Business Event System and Oracle 9i Advanced Queuing", June 2001 – not currently on MetaLink – closest is note 248109.1
5. "Oracle Workflow and Java Messaging Service (JMS) – A Tutorial", April 2005 – not currently on MetaLink
6. "About Oracle Workflow Mini-pack 11i OWF.H", MetaLink note 258312.1
7. "Workflow Scripts", MetaLink note 183643.1
8. "When are Business Events raised?", MetaLink note 342452.1
9. "Oracle Workflow Cartridge Workflow Queues Setup Test", MetaLink note 248395.1
10. "Oracle Workflow Cartridge Workflow Business Event Setup Test", MetaLink note 229404.1
11. *Oracle Application Developer's Guide – Advanced Queuing*
12. *Oracle Streams Advanced Queuing User's Guide and Reference*

## About the Author

Karen Brownfield of Solution Beacon has 25+ years experience programming, installing, and managing applications used in various industries including Chemicals, Entertainment, Defense, Recruitment, and Hospitality. The past 15 years she has focused on Oracle Applications specializing in Financials and Workflow as functional specialist, programmer, team lead, and/or project manager. Karen is also a member of the OAUG board of directors, serving in multiple capacities in the last 10 years, including President, Past President, other Executive Committee roles, and has presented many papers and training sessions at the various OAUG and user group conferences locally, regionally, and internationally. Karen can be reached by email at [kbrownfield@solutionbeacon.com](mailto:kbrownfield@solutionbeacon.com).

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<sup>1</sup> *Oracle Workflow Developer's Guide Release 2.6.4* Part Number B15853-02, July 2006, p.8-50

<sup>2</sup> "Getting Started with the Oracle Workflow 9i/2.6.1 Business Event System and Oracle 9i Advanced Queuing", June 2001

<sup>3</sup> *Oracle Workflow Developer's Guide Release 2.6.4* Part Number B15853-02", July 2005, p.8-58

<sup>4</sup> *Oracle Workflow API Reference Release 2.6.3.5* Part Number B12163-02, November 2004, p. 5-97

<sup>5</sup> *Oracle Workflow Developer's Guide Release 2.6.4* Part Number B15853-02", July 2005, p.5-14, 5-15, 5-16