Care and Feeding of Workflow – What's New

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Stand-alone workflow for the Oracle database has been de-supported and will not be available in the 11*g* database. Workflow will continue to be a vital part of E-Business Suite Release 12 and Release 11*i*.10. Support for workflow for these releases continues as part of the E-Business Suite Application Technology Group, which has the short-name ATG. Thus this paper will explain features as they function within E-Business Suite Release 12 and Release 11*i*.10.

There have been six major patches (rollups) released for E-Business Suite Release 11*i* that contain significant updates to workflow and a seventh is announced but not released. The code in these patches is part of the base functionality in Release 12. The fourth patch, RUP 4, was released August 6, 2006 and is required to install security patches and Diagnostics (from July 2007 through January 2008).

This paper will discuss most of the functionality released in 11i.ATG_PF.H.delta.5 (RUP 5) and 11i.ATG_PF.H.delta.6 and include some significant one-off patches and MetaLink Doc. IDs. As a bonus, this paper will also explain how to set up worklist flexfields, a feature introduced in 11i.ATG_PF.H.delta.3 (RUP 3).

Background

E-Business Suite Release 11i.10 has been available since December 2004 and Release 12 has been available since January 2007. Release Update Packs for Release 12 (there are four) contain bug-fixes and performance improvements, not new functionality. Rollups for Release 11i.10 contain new functionality as well as bug-fixes and performance improvements. This new functionality for Release 11i.10 allows customers of this release to enjoy the same features that are native to Release 12.

11i.ATG_PF.H.delta.5 (RUP 5) was released April 30, 2007 and 11i.ATG_PF.H.delta.6 (RUP 6) was released October 11, 2007. The Release 12 Release Update Packs apply to all products, however Oracle has released patches for just ATG. These Release Update Packs are released quarterly in January, April, July, and October.

ATG patches include the following products: Application Object Library (FND), Oracle Applications Manager (AOM), Workflow (OWF), Oracle Applications Framework (FWK), CRM Technical Foundation (JTT), Oracle Common Application Components (JTA), Oracle Applications Technology Stack (TXK), BI Publisher (formerly XML Publisher) (XDO), Oracle XML Gateway (ECX), Oracle e-Commerce Gateway (EC), Application Install (AK), Oracle Alert (ALR), Oracle User Management (UMX), Web ADI (BNE), and Oracle Report Manager (FRM).

As one can see from this list, these patches affect the underlying structure of all the applications, and thus when applied, require testing of all the applications. Oracle has also instituted a policy for Release 11i.10 which requires at least ATG_PF.H.delta.<n-1> as the basis to apply security patches. An exception to this policy was made for the January 2008 patches. There is no formal policy to date for Release 12.

Workflow is also dependant on patches found in HR and AME (Approvals Management Engine). Even if running HR as a shared product, these patches are critical to the smooth operation of workflow as they contain patches necessary to sync employee changes into the workflow directory services tables. The current patch for HR in Release 11i.10 is 11i.HR.K.2. The latest AME patch, 11i.AME.B.2, is included in the HR patch. However, AME also requires two additional one-off patches, 4629194 and 5305176.

Although not required to run workflow, Oracle Diagnostics provides many scripts that enhance the ability to administer workflow. These scripts do not perform any updates, so application of these patches does not require testing. Diagnostic patches are released at least quarterly. The latest Release 11i patch is 2.5 RUP 1 September 2007 (6329356). The latest Release 12 patch is R12.IZU.A.delta.4 January 2008 (6497339).

MetaLink provides scripts to test what patches you have installed in your environment. These scripts do not test for many of the one-offs, however. If you are responsible for administering these applications, you should visit the knowledge browser and peruse the new notes for each product. You can also configure your headlines to display new notes for these products. The scripts are found in the following notes:

- 461431.1 – "Script to Check What Workflow Related Patches Are Installed in EBusiness Suite R12"
- 3366843.1 or 275379.1 – "Oracle Workflow Diagnostic Script wfreleases.sql (Release 11*i*)", "Script to Check What Workflow Related Patches Are Installed In Ebusiness Suite 11*i*"
- 368280.1 – "How Can Version of AME Be Determined?"
- 342459.1 – "eBusiness Support Diagnostics Overview"
  - Click 'R12 Catalog' or 'R11*i* Catalog' to get the current patch
- 135266.1 – "Oracle HRMS Product Family – Release 11*i* and 12 Information"

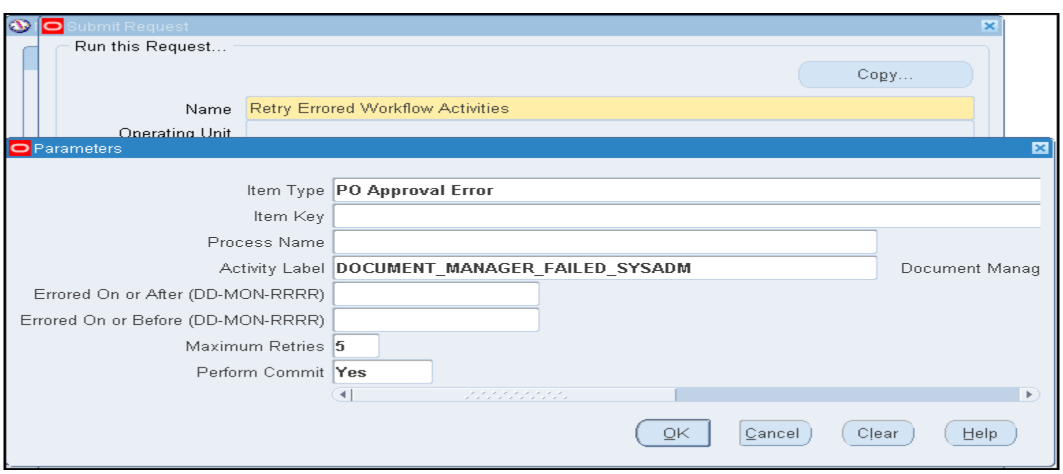
Information about the features discussed in this paper can be found in the *Oracle Workflow Administrator's Guide*, Release 12, Part No. B31431-02, June 2007, and the following MetaLink Doc. IDs:

- 412709.1 – "Oracle Workflow Documentation Updates for 11i.ATG.PF.H.delta.5 (RUP 5)"
- 431219.1 - "Oracle Workflow Documentation Updates for 11i.ATG.PF.H.delta.6 (RUP 6)"
- 444524.1 – "About Oracle Applications Technology ATG_PF.H Rollup 6"
  - Lists all changes to workflow (New Features, New/Changed Programs, New/Changed Profile Options, New/Changed Public APIs, New Business Events, New/Changed User Interfaces, New/Changed Scripts) from CU1 through RUP 6

This paper will show screen shots from Release 12 unless the screen is markedly different in Release 11i.10, then screen shots from both releases will be used. Unless otherwise indicated, the functionality discussed is available in both releases (assuming that Release 11i.10 is patched through 11i.ATG_PF.H.delta.6 (RUP 6)).

Retry Errored Workflow Activities

11i.ATG_PF.H.delta.6 (RUP 6) introduced a new concurrent program "Retry Errored Workflow Activities". This program can be run as a one-time program or scheduled periodically.



The program utilizes the following parameters:

- Item Type – the display name of the errored workflow
- Item Key – this parameter only displays if Item Type is specified and is used to retry a specific workflow
- Process Name – this parameter only displays if Item Type is specified and is used to limit retries to a specific process containing an errored activity
- Activity Label – this parameter only displays if Item Type is specified and is used to limit retries to a specific activity. If the activity occurs in multiple processes, specify the Process Name to further limit the retries. Although the Activity Label is the same as the Internal Name of the activity in most cases, the Activity Label is actually the value found on the Node tab of the Properties page of the activity in the Diagrammer window in Workflow Builder. This field is used to uniquely identify an activity (such as multiple End nodes)
- Errored On or After (DD-MON-RRRR) – this parameter allows you to limit retries to activities that errored on or after a specific date (and thus avoid restarting old workflows)
- Errored On or Before (DD-MON-RRRR) – this parameter allows you to limit retries to activities that errored before a specific date
- Maximum Retries – the number of times the program should retry this activity. The maximum value is 99
- Perform Commit – whether to issue a commit after each retry (Yes) or wait until all retries for all workflows are attempted (No). Choosing 'Yes' reduces rollback size and increases performance

Junior Administrator

Oracle refers to this feature as "Granting Restricted Access to Workflow Monitoring Data". This feature allows companies to set up administration of workflow by item type or by item attribute name and value. In addition companies can also restrict the actions performed on the allowed workflows. An additional restriction is that users accessing this feature cannot administer workflows they own. Ownership is determined by the field WF_ITEMS.OWNER_ROLE. Some workflows, such as APINV (AP Invoice), may not set an owner, so no "cannot administer workflows they own" restriction would exist for these workflows.

To enable this feature requires the following "one-time" setups:

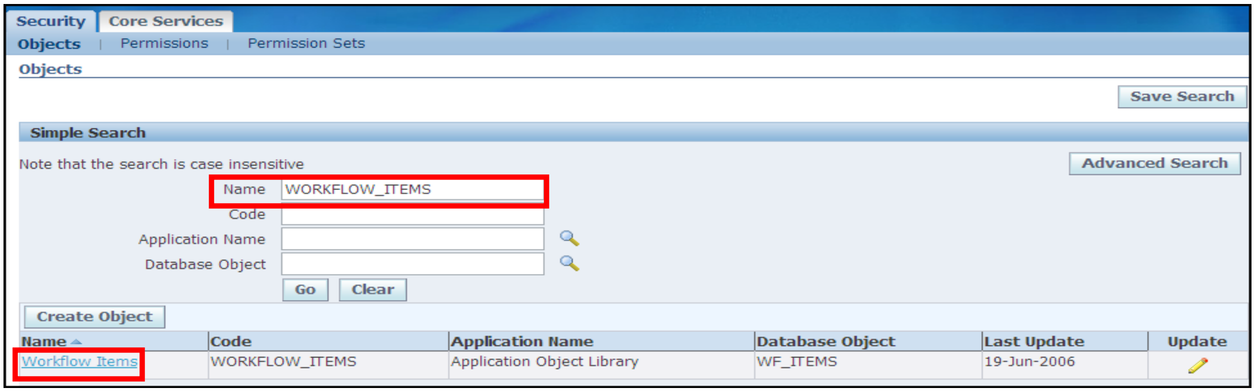
- Create Object Instance Set for Item Types
- Create Object Instance Set for Item Attributes
- Create Permission Sets for Workflow Actions
- Create Roles for Workflow Actions and Assign Permission Sets

Once these setups are finished, grants and role assignments must be created for each user, responsibility, or organization. These grants include:

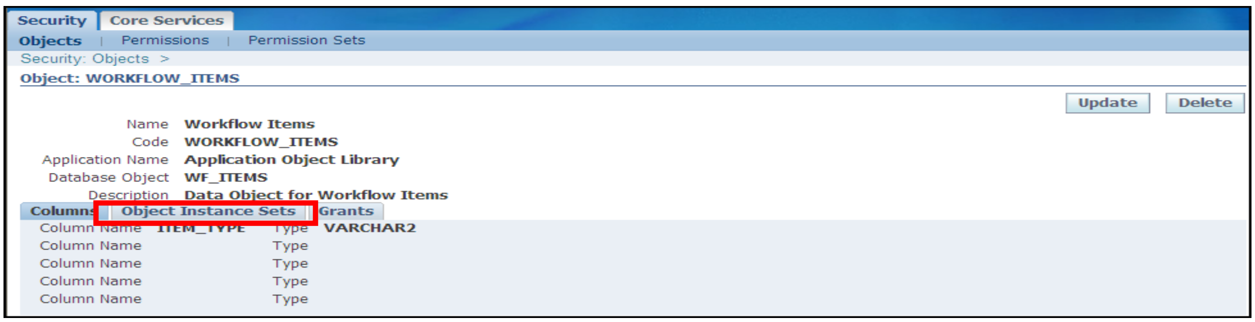
- *G*rant Object Instance Set values for Item Types and/or Item Attribute Values
- Assign Roles for Workflow Actions

Jr. Admin One-Time Setup – Restrict by Item Type – Create Object Instance Set

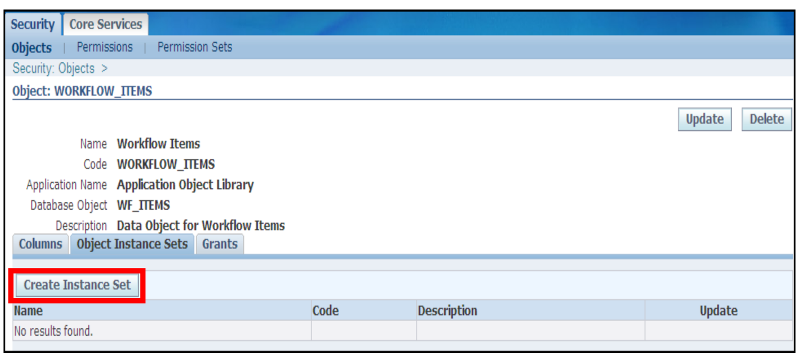
This step creates an Object Instance Set that allows the restriction of workflow access by Item Type. It must be performed from the 'Functional Developer' responsibility. When the form opens, enter 'WORKFLOW_ITEMS' in the Name field and click 'Go'. When the result of the query is returned, click on the '<u>Workflow Items</u>' link. Do not click the pencil in the Update column.



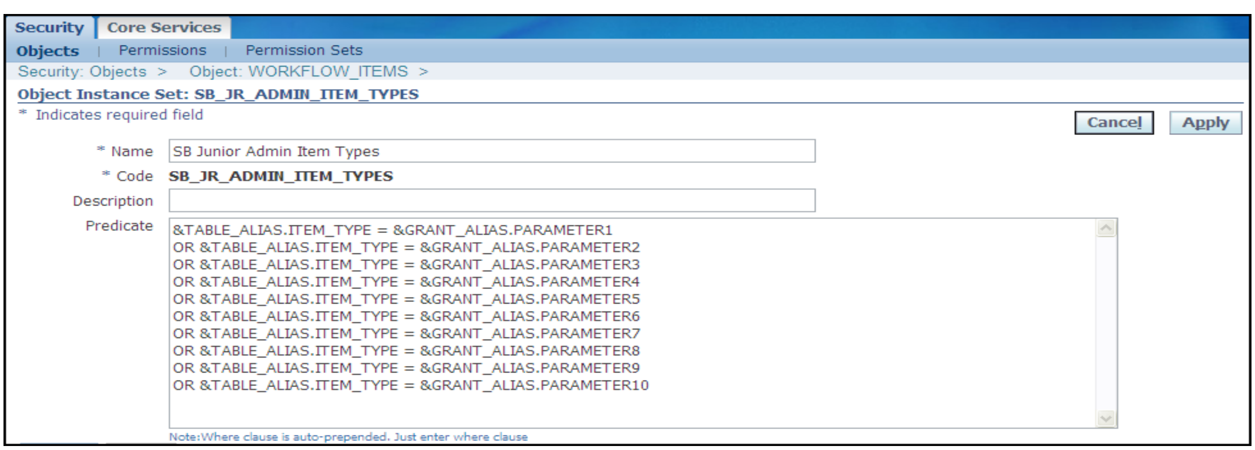
When the following screen appears, click on the ‘Object Instance Sets’ tab.



When the following screen appears, click the ‘Create Instance Set’ button.



When the next screen displays, enter the following information:



- Name – Enter text to identify this instance set
- Code – Enter an internal name to identify this instance set. This field cannot be updated once saved. Limit characters to alphabetics, numbers, hyphens, and underscores
- Predicate – Enter the following text exactly as it is shown in the above diagram. The Oracle documentation only lists '&TABLE_ALIAS.ITEM_TYPE = &GRANT_ALIAS.PARAMETER1', but if typed like this, then you can only grant access to a single workflow. Typed like the picture above allows granting access to 1-10 workflows (10 is the number of allowable parameters for this definition)

  &TABLE_ALIAS.ITEM_TYPE = &GRANT_ALIAS.PARAMETER1
  OR &TABLE_ALIAS.ITEM_TYPE = &GRANT_ALIAS.PARAMETER2
  OR &TABLE_ALIAS.ITEM_TYPE = &GRANT_ALIAS.PARAMETER3
  OR &TABLE_ALIAS.ITEM_TYPE = &GRANT_ALIAS.PARAMETER4
  OR &TABLE_ALIAS.ITEM_TYPE = &GRANT_ALIAS.PARAMETER5
  OR &TABLE_ALIAS.ITEM_TYPE = &GRANT_ALIAS.PARAMETER6
  OR &TABLE_ALIAS.ITEM_TYPE = &GRANT_ALIAS.PARAMETER7
  OR &TABLE_ALIAS.ITEM_TYPE = &GRANT_ALIAS.PARAMETER8
  OR &TABLE_ALIAS.ITEM_TYPE = &GRANT_ALIAS.PARAMETER9
  OR &TABLE_ALIAS.ITEM_TYPE = &GRANT_ALIAS.PARAMETER10

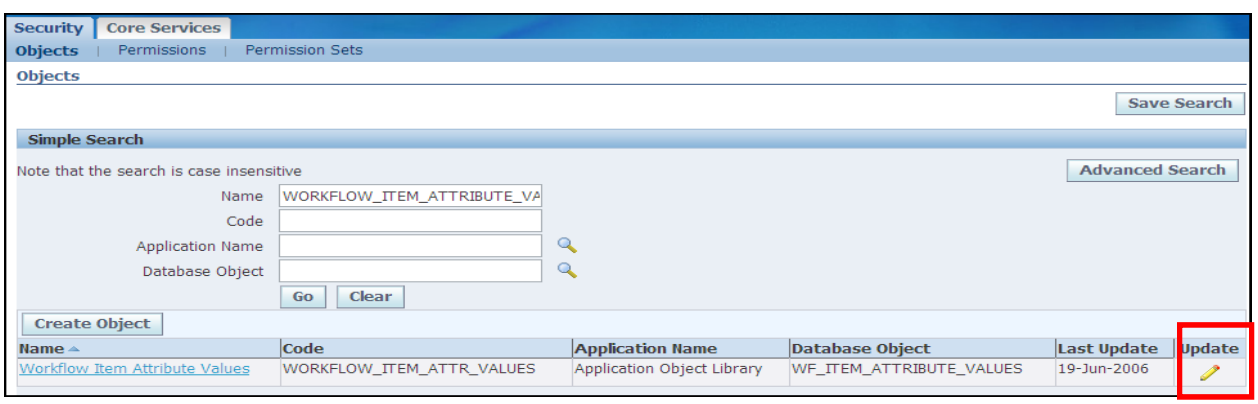
Click Apply. Note that Object Instance Sets may not be deleted.

Jr. Admin One-Time Setup – Restrict by Item Attribute Value – Create Object Instance Set

This step creates an Object Instance Set that allows the restriction of workflow access by the value of a specific Item Attribute. Item Attributes are specific to a particular item type. There are no universal Item Attributes. Even ORG_ID only appears in 130 out of over 1000 workflows. There are over 10,000 distinct Item Attributes. Thus restricting access by Item Attribute value has limited value. In addition, if access by item type is granted to a user as well as access by item attribute, the combination of the grants may produce no viewable workflows.

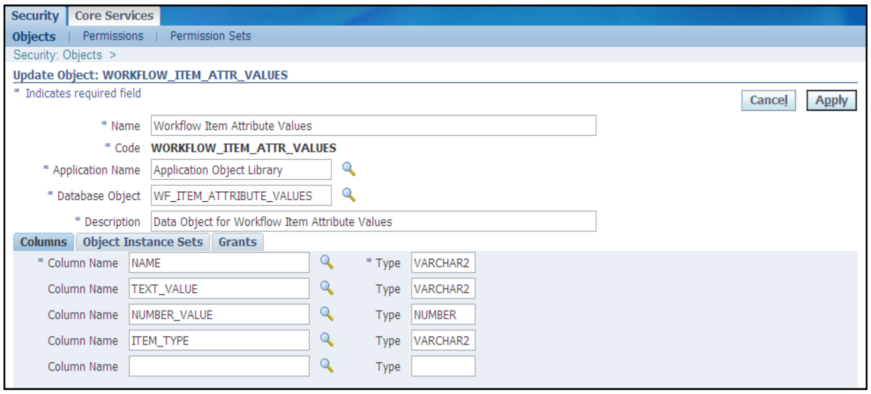
An example: access is granted to the workflows APEXP and APINV. Access is also granted to workflows with the attribute ORG_ID = 204. APINV does not use this attribute and thus the user will be unable to see any APINV workflows.

Like the previous Object Instance Set, the work must be performed from the 'Functional Developer' responsibility. When the form opens, enter 'WORKFLOW_ITEM_ATTRIBUTE_VALUES' in the Name field and click 'Go'. When the result of the query is returned, click on the 'Workflow Item Attribute Values' link.

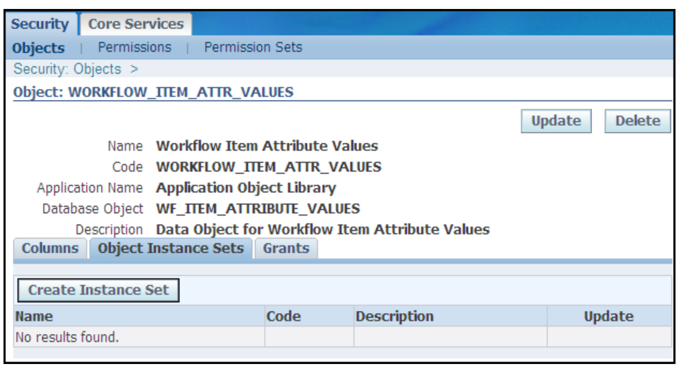


This seeded Object Instance Set allows referencing two columns from the table ITEM_ATTRIBUTE_VALUES: NAME (the internal name of the item attribute) and TEXT_VALUE (the value of the item attribute when the type is not DATE, NUMBER, or EVENT. The columns ITEMTYPE and NUMBER_VALUE are not included. Thus the Predicate cannot limit by item type nor can any attribute declared NUMBER be referenced (like ORG_ID). However additional columns can be added. Click the pencil icon in the Update column

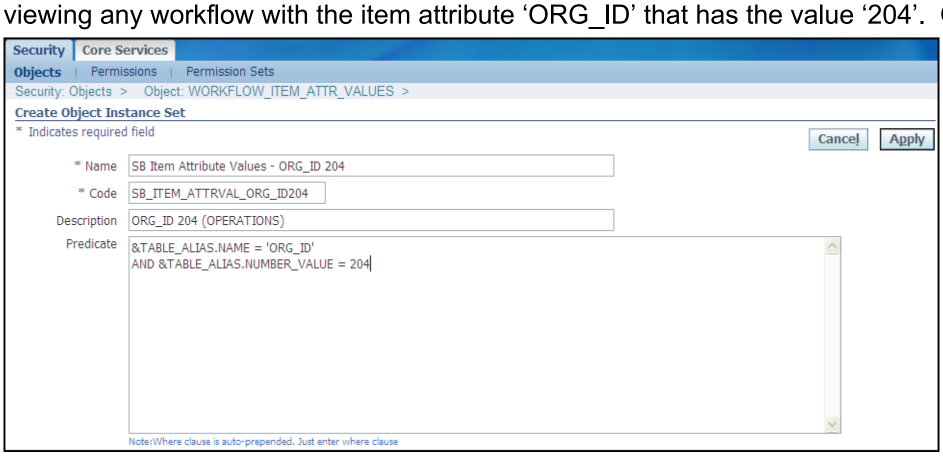
When the Update screen appears, add the columns ITEM_TYPE and NUMBER_VALUE. The Type column autofills based on the definition of the column in the table WORKFLOW_ITEM_ATTRIBUTE_VALUES.



When finished, click Apply. This returns you to the screen where you can now click the ‘Workflow Item Attribute Values’ link. Click the ‘Object Instance Sets’ tab. When the following screen appears, click the ‘Create Instance Set’ button.



When the next screen displays, enter the Name and Code. In this example the Predicate allows for viewing any workflow with the item attribute ‘ORG_ID’ that has the value ‘204’. Click Apply.



Notice that the predicate for the Item Attribute Object Instance Set did not include any &TABLE_ALIAS.<column>=&GRANT_ALIAS.PARAMETER<n> statements. This construct is not available for these Object Instance Sets. Thus unlike the Item Type Object Instance Set where one instance set is defined and the restricting values will be defined as the grant is made, all restricting values must be part of the definition. This can result in the requirement to define multiple Item Attribute Object Instance Sets.

The Oracle documentation provides two examples of coding this predicate. The example for ORG_ID is incorrect as the value for ORG_ID is stored in NUMBER_VALUE, not TEXT_VALUE. The Oracle examples (corrected) are[AJJ1]:

```
&TABLE_ALIAS.NAME = 'CURRENT_PERSON_ID'
AND EXISTS (SELECT 'Y' FROM per_people_f
WHERE person_id = &TABLE_ALIAS.NUMBER_VALUE
AND TRUNC(SYSDATE) BETWEEN effective_start_date
AND effective_end_date
```

```
&TABLE_ALIAS.NAME = 'ORG_ID'
AND &TABLE_ALIAS.NUMBER_VALUE IN (204,1731,2541)
```

There is only one workflow, HRSSA, which utilizes the item attribute CURRENT_PERSON_ID. Thus assigning this Object Instance Set would restrict someone to administering HRSSA workflows for active employees.

The second example restricts access to all workflows (130 of them) that utilize the attribute ORG_ID and ORG_ID is set to any of the values in the IN clause.

There is no limit to the number of Item Attribute Object Instance Sets that can be created.

Jr. Admin One-Time Setup – Restrict by Action – Create Action Permission Sets

After defining the Object Instance Sets, which limit which workflows can be administered, Action Permission Sets must be created. Action Permission Sets limit what actions can be performed on the workflows. Oracle has predefined the following actions.

Action	Permission Name	Permission Code
Skip	Skip Workflow Activity	WF_SKIP
Retry	Retry Activity	WF_RETRY
Rewind	Rewind Workflow	WF_REWIND
Suspend	Suspend Workflow	WF_SUSPEND
Cancel	Cancel Workflow	WF_CANCEL
Update	Update Workflow Item Attributes	WF_UPDATE_ATTR
Monitor	Monitor Data	WF_MON_DATA

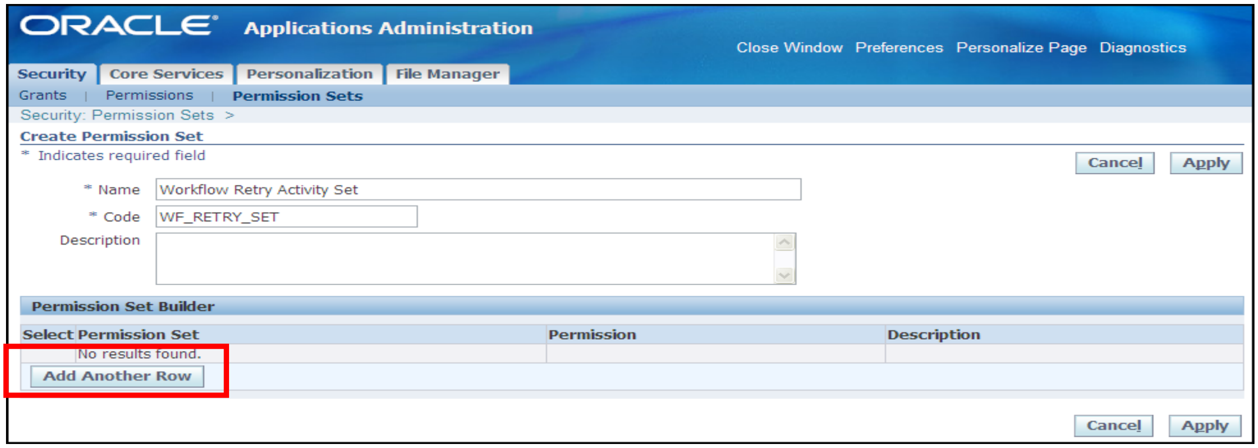
Oracle has pre-seeded the Role 'Workflow Admin Role' that has access to all of the above actions, so if you only need to limit which workflows can be administered and not the actions, skip to the next section.

In order to be able to view the workflows, the action Monitor must be allowed. Since you have to be able to view the workflow to perform any other action, 'Monitor' is the minimum permission that can be assigned. Now companies only need to consider what other actions will be permitted.

It is certainly possible to create Action Permission Sets that contain any combination of the above actions. This leaves 720 possible combinations of the other 6 actions. Rather than try to create that many Action Permission Sets, Solution Beacon recommends creating a Permission Action Set that contains a single permission. This results in the need for only 7 sets. Then per user (or responsibility) companies can decide which Action Permission Sets to assign.

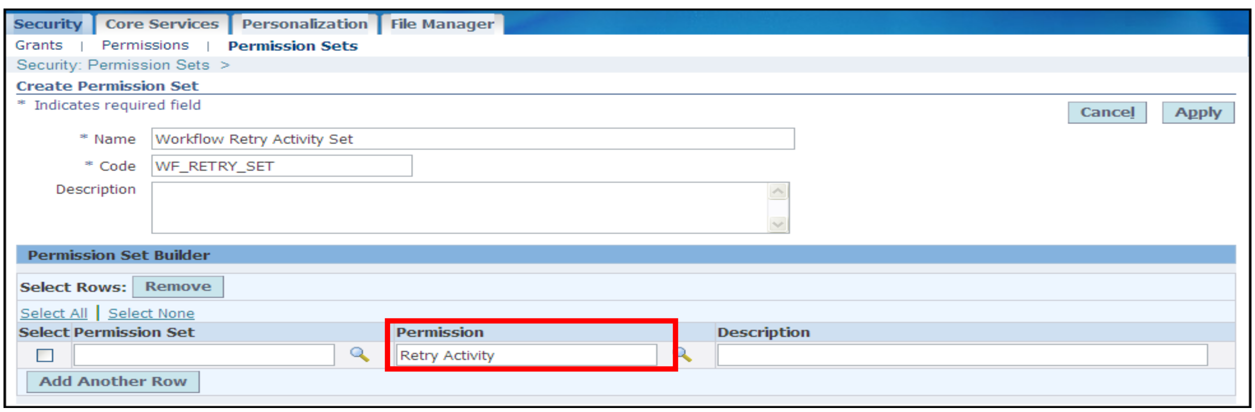
Unlike Grant Object Sets, assigning multiple Action Permission Sets results in the ability to perform the actions contained in all sets.

Action Permission Sets are created using the Functional Administrator responsibility. This responsibility contains a single form. When the form opens, enter the following data:



- Name – Enter text to identify this instance set
- Code – Enter an internal name to identify this instance set. This field cannot be updated once saved. Limit characters to alphabetics, numbers, hyphens, and underscores

Click 'Add Another Row'



Use the LOV to pick the appropriate Permission. Use the values from the column 'Permission Name' in the chart on the previous page.

Click Apply.

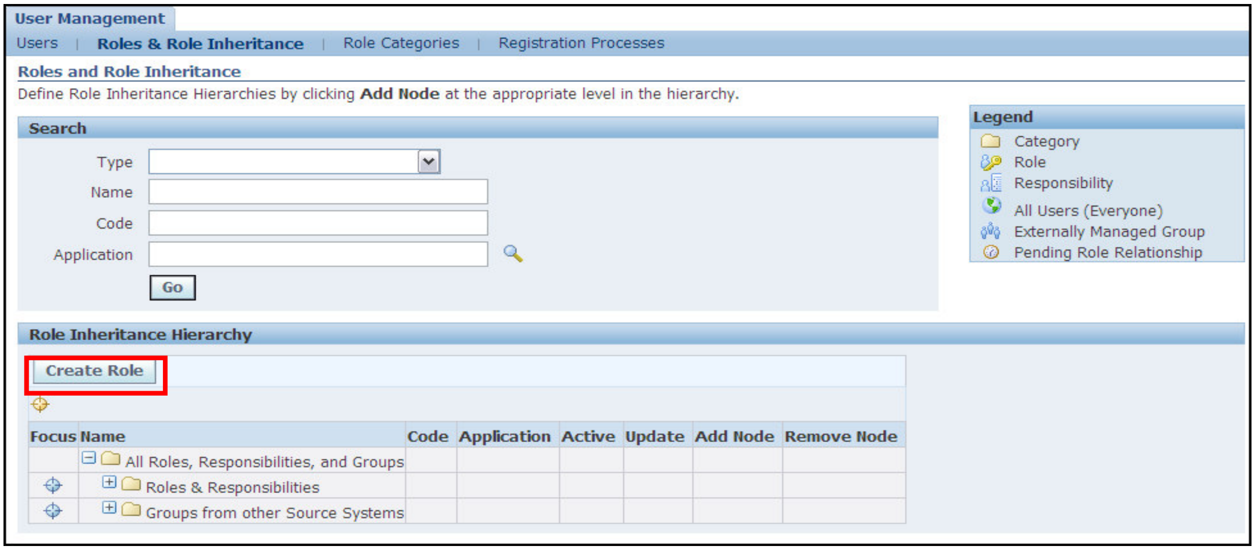
Repeat process until a Permission Set is created for all 7 actions.

Jr. Admin One-Time Setup – Restrict by Action – Create Role

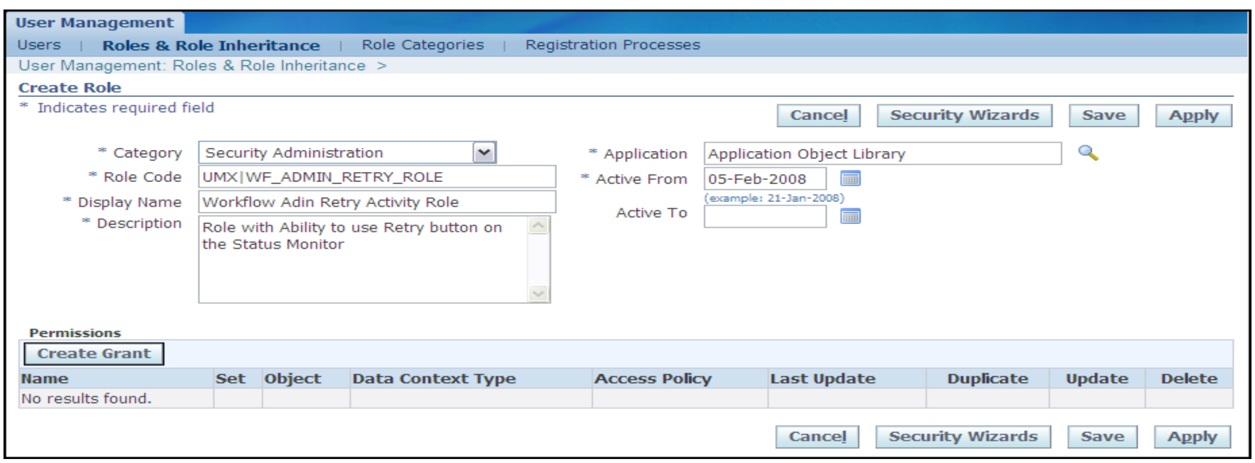
Now that the Permission Sets are created, Roles must be created that contain these permission sets. Solution Beacon recommends creating 7 roles, one for each Permission Set.

Roles must be created from the responsibility 'User Management'. This responsibility can be assigned to anyone, but it will only function if the user has been assigned the role 'Security Administrator'. And to grant the role 'Security Administrator', the responsibility 'User Management' must be used. Since initially the only user that has the role ‘Security Administrator’ is the user SYSADMIN, the first step is to log in as SYSADMIN and grant the role ‘Security Administrator’ to other users.

Once the ‘Security Administrator’ role and the responsibility ‘User Management’ is assigned to a user, login as that user and choose the ‘User Management’ responsibility. This responsibility has four menu options, but only has one screen. Select ‘Roles and Role Inheritance’. When the screen opens, verify you are on the ‘Roles and Role Inheritance’ tab, then click ‘Create Role’.



Enter the following information:



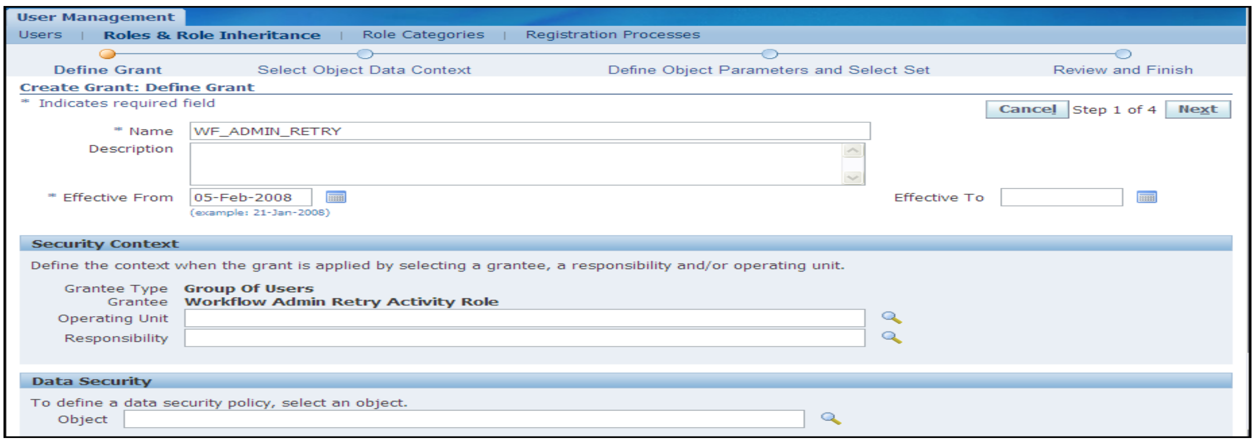
- Category – Required – Use the LOV to select a category. Since this role will restrict access, the category ‘Security Administration’ was selected. If desired the Role Category tab can be used to create a custom category
- Application – Required – Use the LOV to select an application. Since security belongs to Application Object Library, this value was selected
- Role Code – Required – The value entered cannot contain any spaces. Characters should be restricted to alpha, numbers, hyphen, underscore and the pipe characters. The value created will be added to WF_LOCAL_ROLES with partition_id set to 13. This partition belongs to the application User Management (UMX) and all roles already there start with ‘UMX|’. Therefore it is recommended to continue this naming convention.

- Display Name – Required – Enter the name of the role. Any characters can be used
- Description – Required – Enter a description for the role
- Active From – Required – Defaults to current date but can be changed
- Active To – Optional – This field is only used to end-date a role

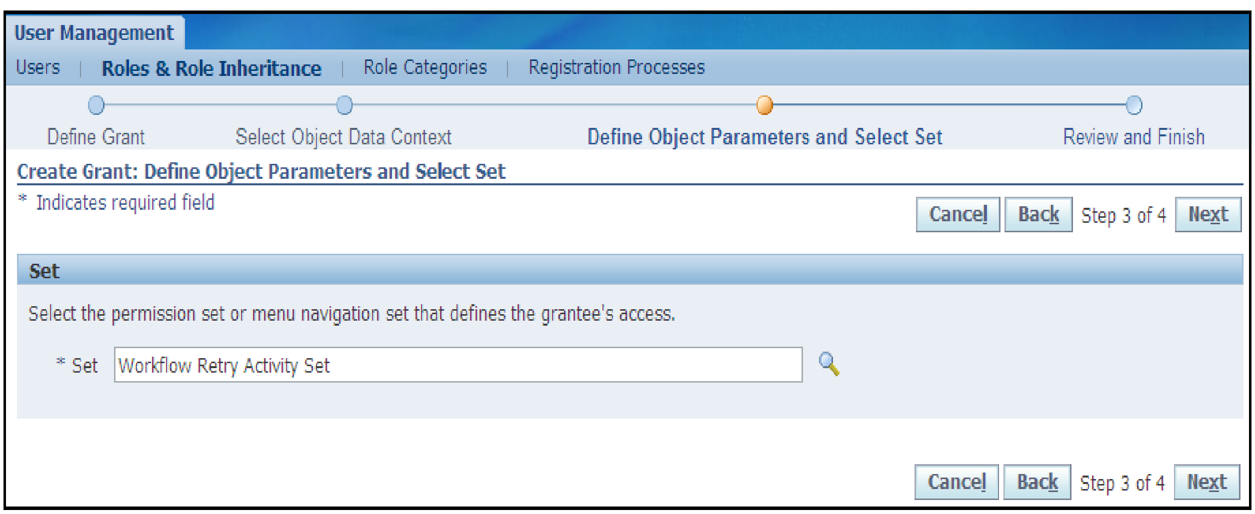
After all the fields are entered, click 'Save' (not 'Apply'). If 'Apply' is clicked the form returns blank and you will have to re-query the role to create the grants.

Once the top of the form is saved, click 'Create Grant'. This opens a 4-step form.

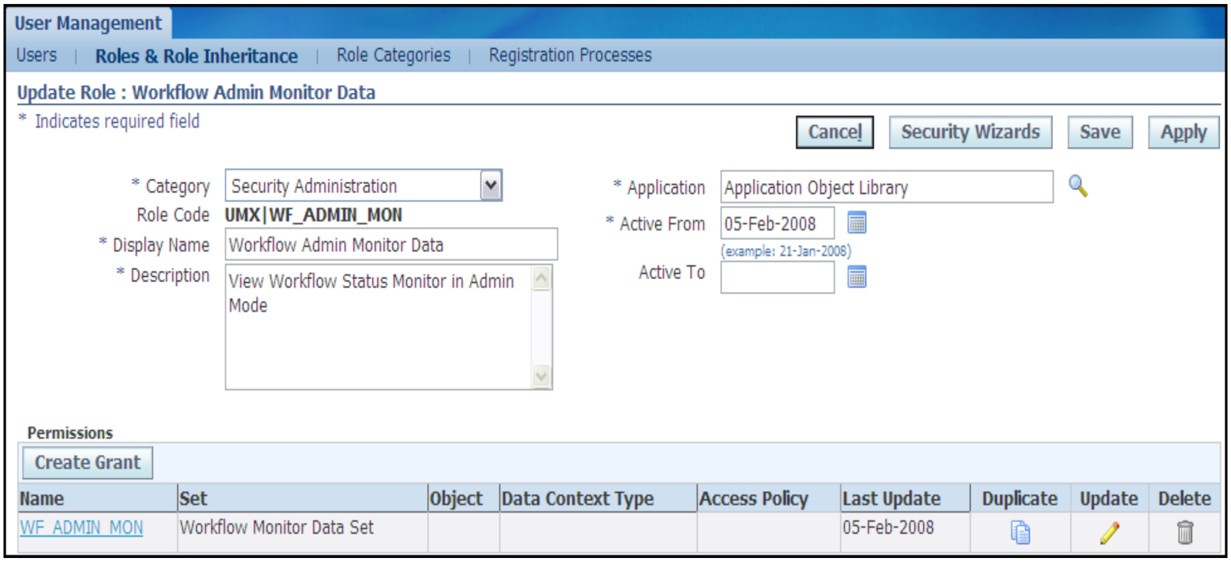
Step 1 – Enter the name of the grant and click 'Next'. Step 2 does not display, the form proceeds directly to Step 3.



Step 3 – Select one of the Permission Sets just created. In our example, we are created a role that allows users to Retry activities, so the Permission Set 'Workflow Retry Activity Set' containing the permission 'Retry Activity' is selected. Click Next.



Step 4 – Review and either click 'Back' to make corrections or 'Finish' to accept entry. The next screen states the role is created. Click OK. Repeat these steps to create all 7 roles. The following picture shows the definition for the action 'Monitor Data'.



Jr. Admin By User/Responsibility Setup – Grant Object Instance Set

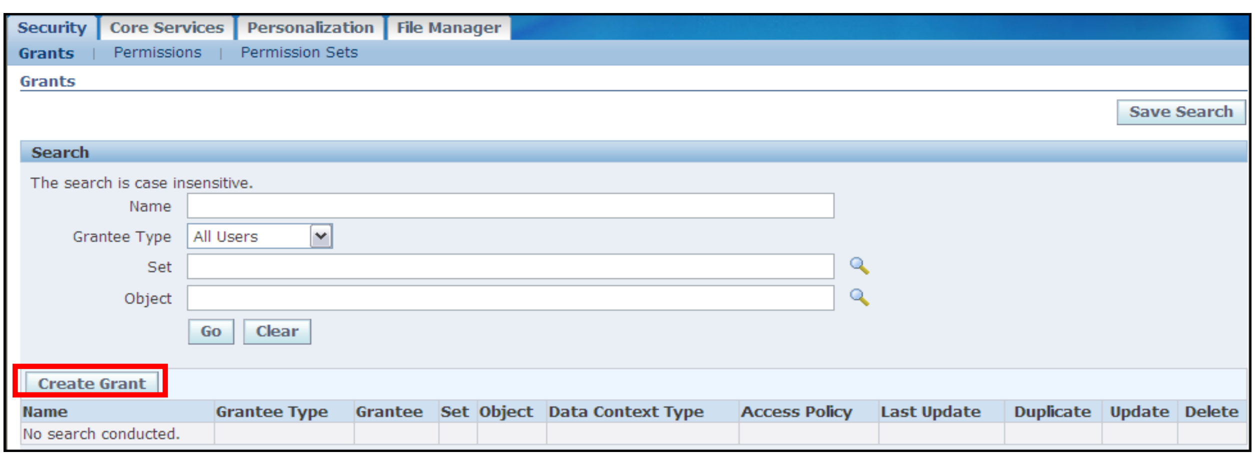
Now that all the Object Instance Sets and Roles are created, the next task is to grant the correct combination to various users and/or responsibilities.

As mentioned earlier, when granting Item Attribute Object Instance Sets, make sure that the combination of grants still allows access to the desired workflows. If a grant is made for an Object Instance Set that references the attribute CURRENT_PERSON_ID (which is only found in the workflow HRSSA) and a 2nd grant is made to the user for an Object Instance Set that references the attribute CURRENCY (which is not found in the workflow HRSSA), then this user will not be able to view any workflows as there are no workflows that contain both the item attribute CURRENCY and the item attribute CURRENT_PERSON_ID.

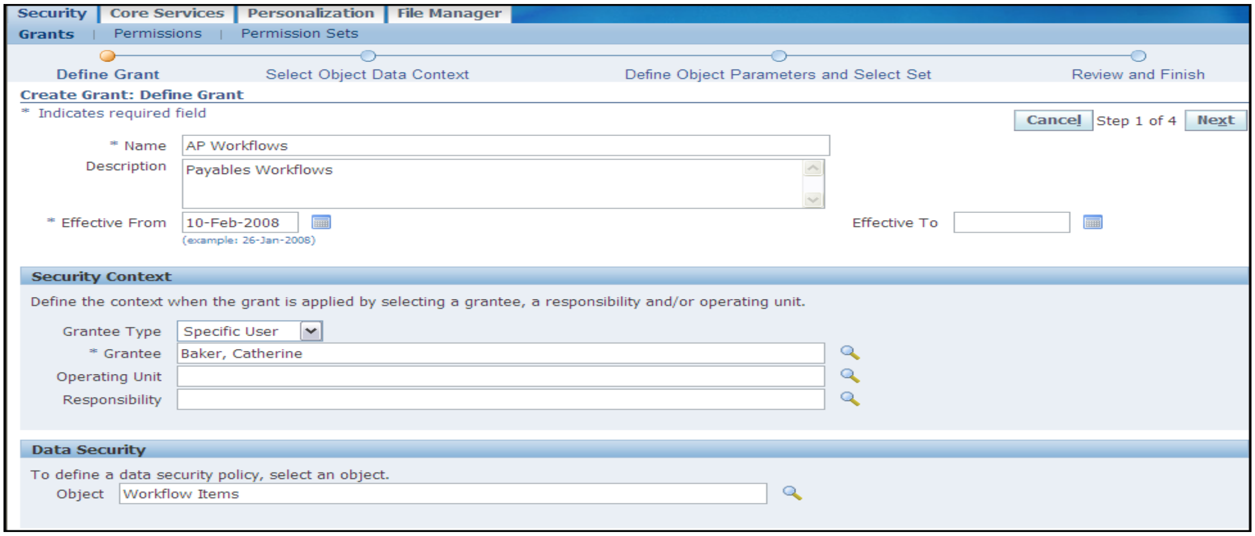
However, if grant is made for an Object Instance Set referencing the attribute CURRENCY=USD and another grant is made for an Object Instance Set referencing the attribute ORG_ID=204, then any workflow that satisfies both conditions will be listed twice. Thus the combination of grants needs to be carefully planned.

Making grants of the Object Instance Set that restricts by workflow name is performed somewhat differently than the grant for any of the Item Attribute Object Instance Sets due to the need to specify the parameter values.

Grants are made from the 'Functional Administrator' responsibility. This is a single screen responsibility, so when the form opens, click 'Create Grant'.

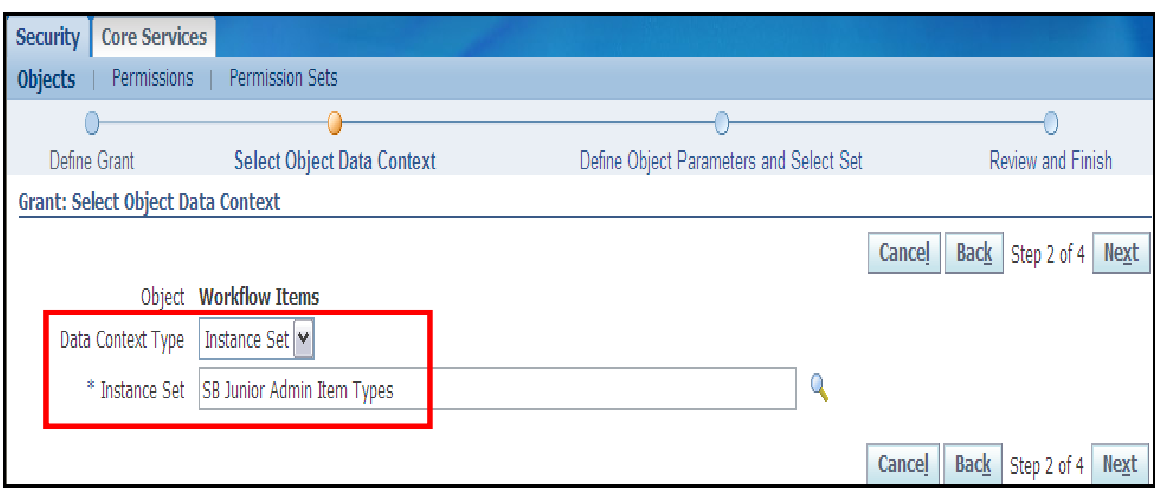


Creating grants is a four-step process. First we will show how to create the grant for the Item Attribute Object Instance Set. For Step 1, enter the following information:

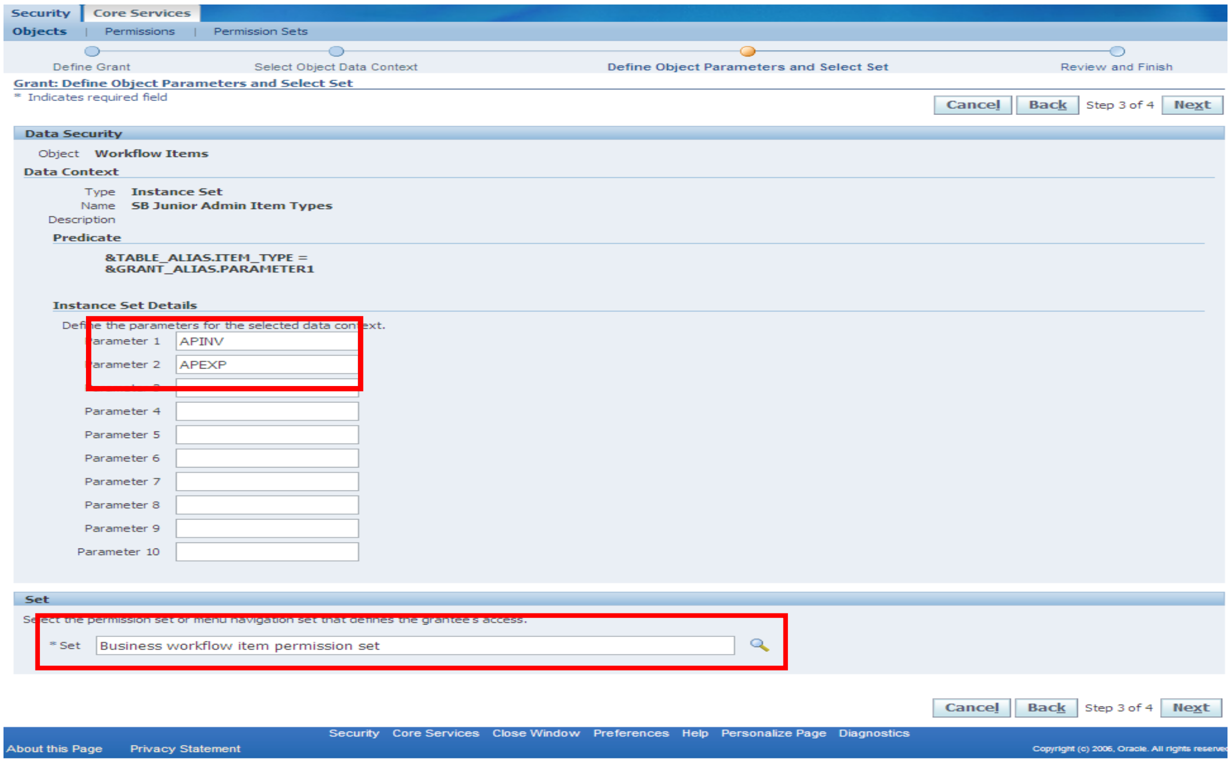


- Name – Required – enter a descriptive name
- Description – Optional – enter a description of the grant
- Effective From – Required – current date defaults in
- Security Context – Required - select Grantee Type
    - Specific User – select the user
    - Operating Unit – select the operating Unit
    - Responsibility – select the responsibility
- Data Security Object – Required – Enter 'Workflow Items' (this is an Oracle seeded value, not any object created earlier)

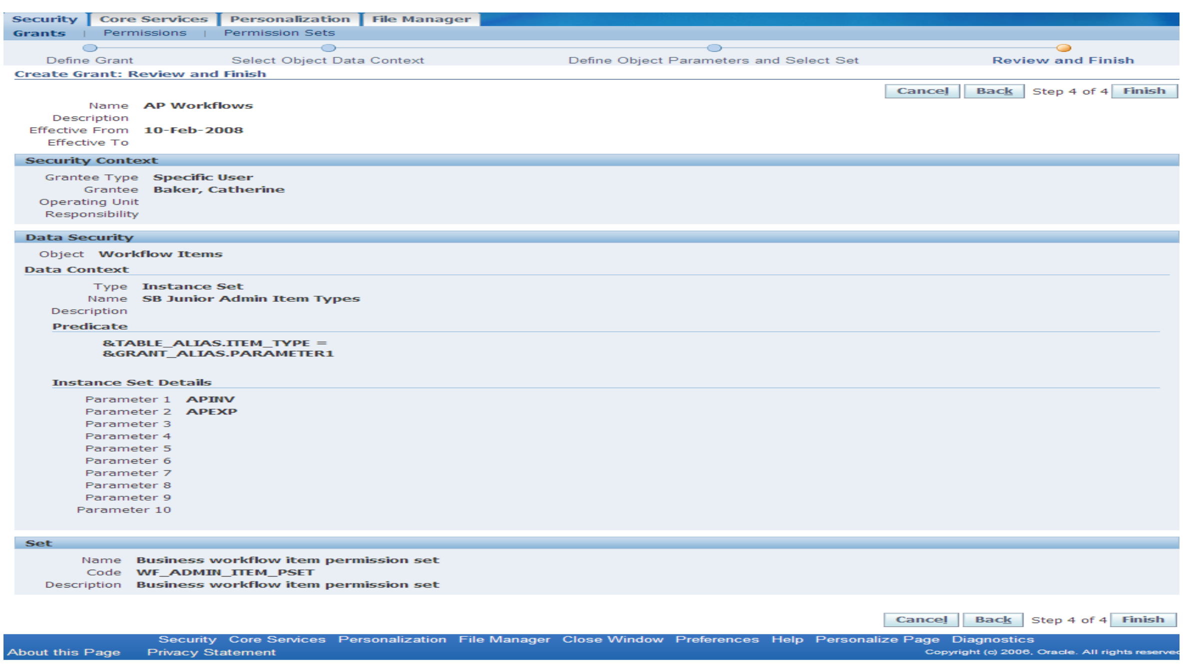
Click Next. For Step 2, set Data Context Type to 'Instance Set' and select the Instance Set created earlier. Click Next.



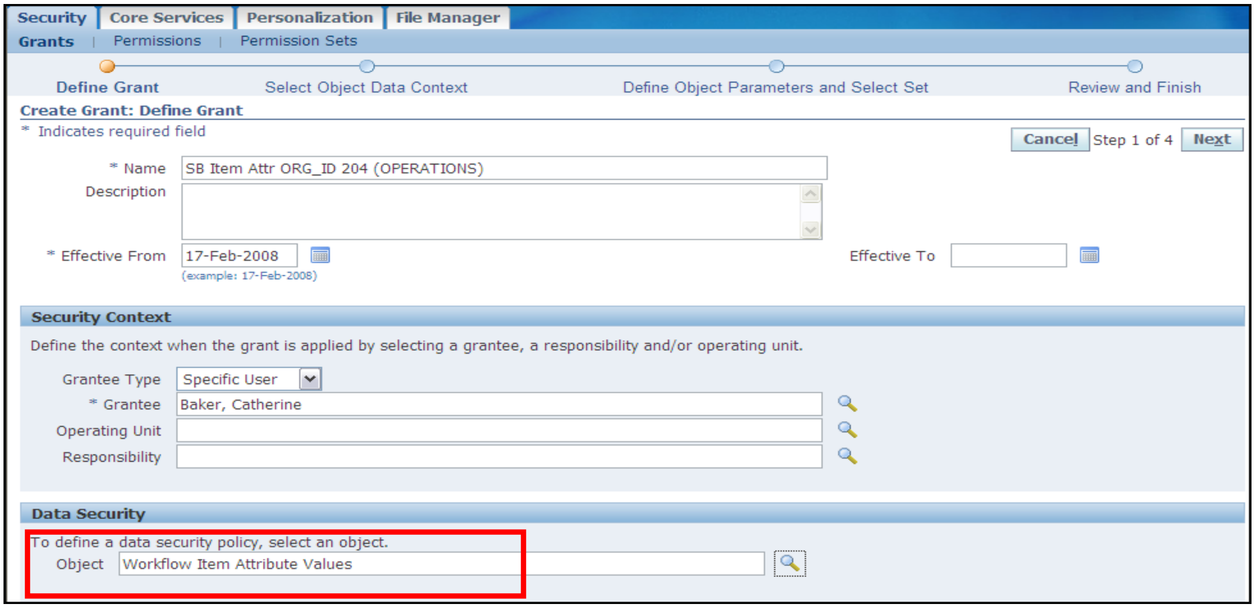
Step 3 specifies the workflows to which access will be granted. Enter up to 10 workflows. The internal name of the workflow must be used. Select the set ‘Business workflow item permission set’. Click Next.



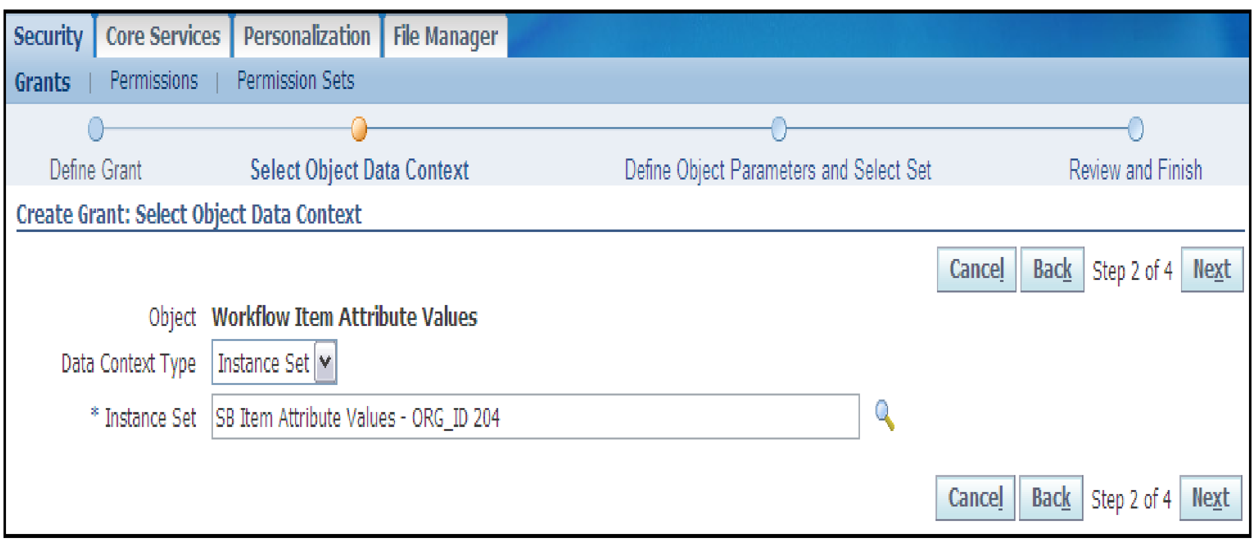
For Step 4, review the results. Click ‘Back’ to make corrections or click ‘Finish’ to accept the setup.



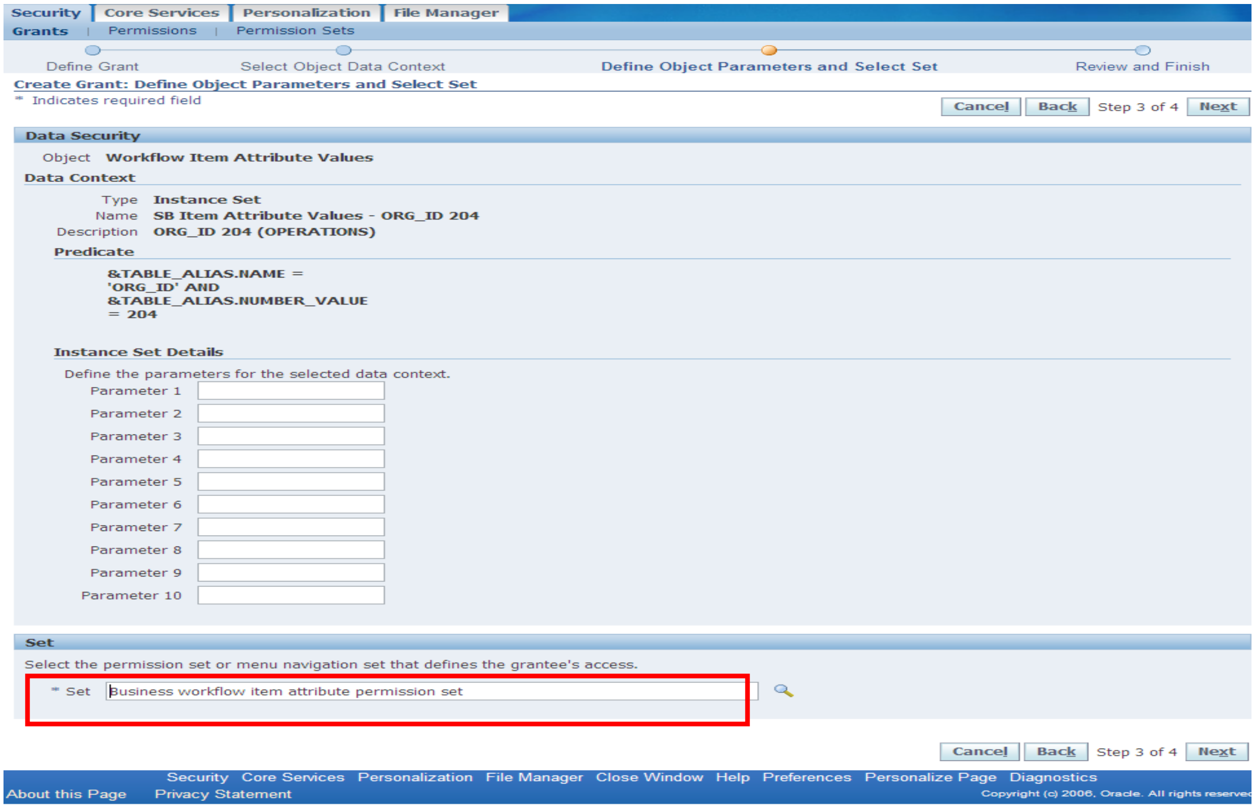
Granting an Object Instance Set to restrict access by Item Attribute Value is similar. Use the 'Functional Administrator' responsibility and click 'Create Grant' when the form opens. Enter the name of the grant and the name of the user or responsibility to whom the grant is made. The object name is now 'Workflow Item Attribute Values'. Click Next to advance to page 2.



The Data Context Set is still 'Instance Set', but this time use the name of the instance set that was created for the item attributes. Click Next to advance to the next step.



There are no parameters for an Item Attribute Object Instance Set, but the Set 'Business workflow item attribute permission set' must be specified. Click Next.



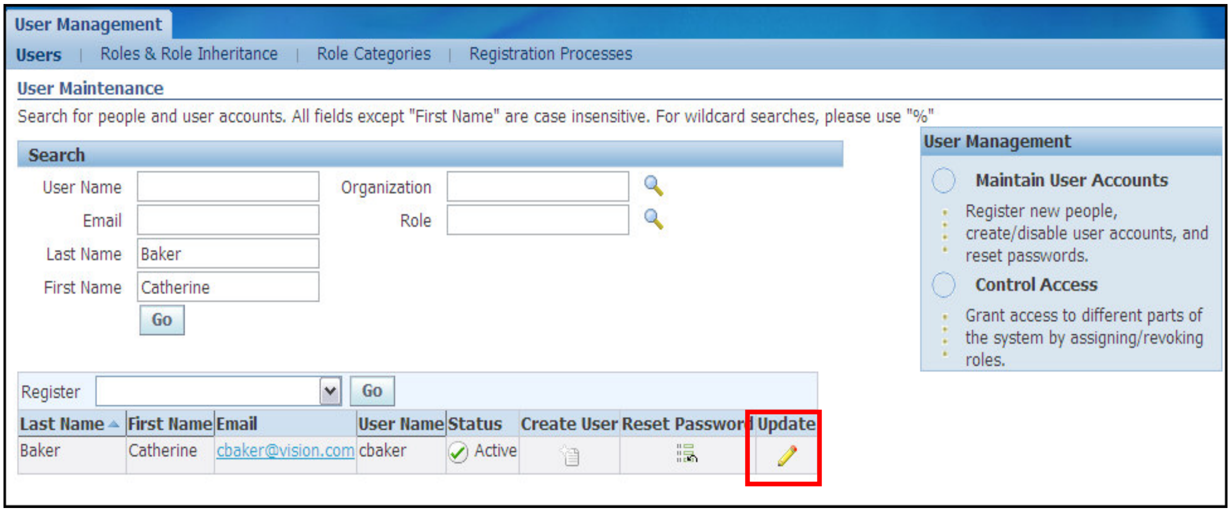
The next screen is the 'Review and Finish' screen. Click 'Back' to make any corrections or 'Finish' to accept all the values. Repeat for any additional grants.

Jr. Admin By User/Responsibility Setup – Assign Roles

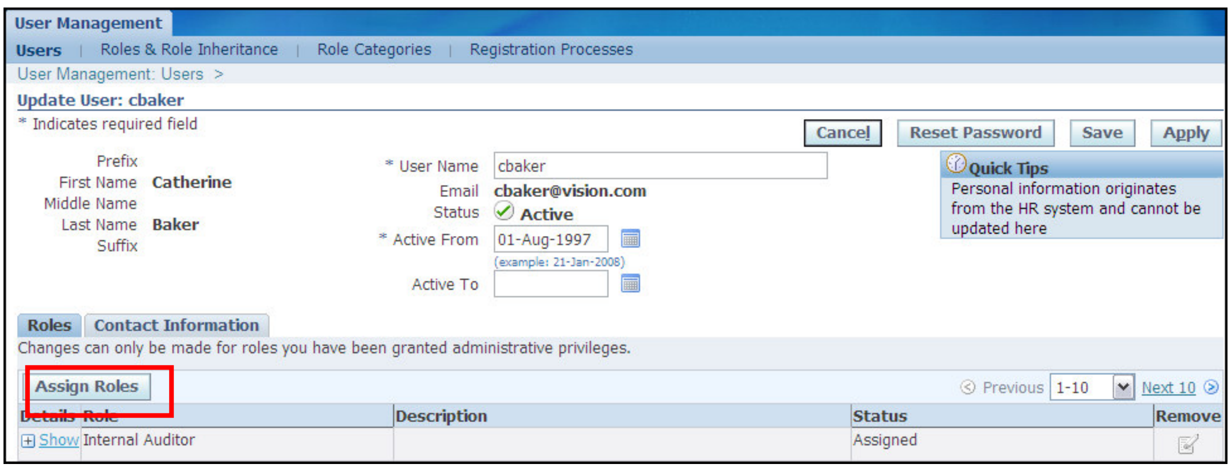
This step assigns the roles that determine which actions will be allowed in the Status Monitor screen. Unlike grants on Object Instance Sets, which can either cause duplicates or be too restrictive, grants of roles are cumulative. Remember that the role for monitoring must always be granted. Since are roles are setup so that each roles represents an action, assign the roles that match the desired action(s).

Grants of roles must be made from the 'User Management' responsibility. This responsibility only functions if the user has first been assigned the role 'Security Administrator'. Initially only the user SYSADMIN has this role, so either the following steps must be performed as the user SYSADMIN or the user SYSADMIN must grant the 'Security Administrator' role to additional users (after assigning the 'Security Administrator' role, remember to assign the 'User Management ' responsibility).

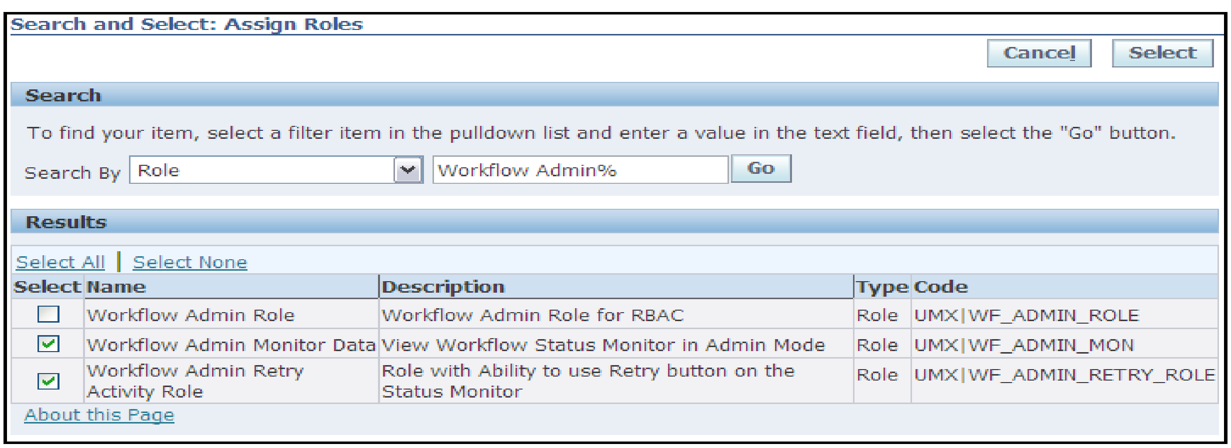
Navigate to the 'Users' screen by either selecting this menu choice, or selecting any other menu choice and clicking this tab from the resulting screen. Enter the user to whom the role will be assigned. When the user name is returned, click the pencil icon in the Update column.



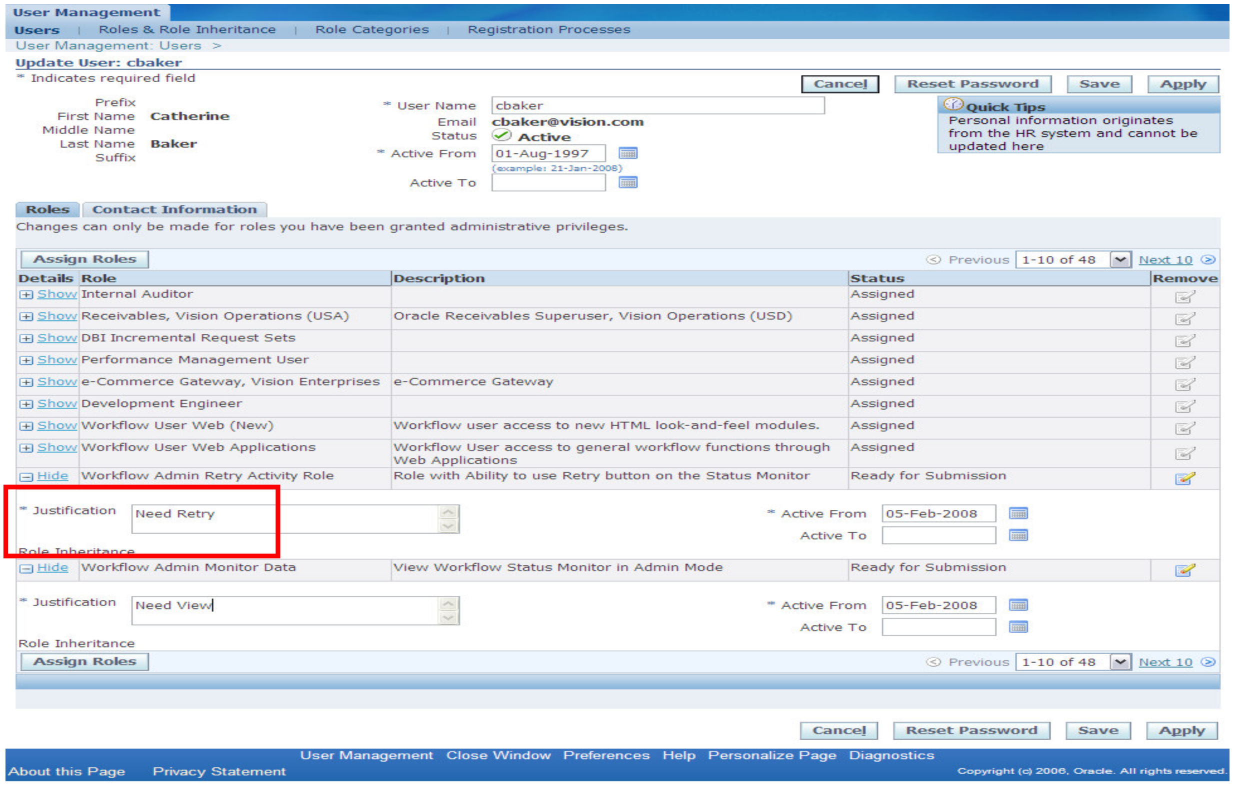
Click ‘Assign Roles’.



Since we started all our role names with ‘Workflow’, query by ‘Workflow%’. Click the box beside each desired role. Remember that the role, ‘Workflow Admin Role’, assigns all actions, so if this role is clicked, no other roles are needed. When all desired roles are clicked, click the ‘Select’ button in the upper right-hand corner.



For each role assigned, a justification must be entered. This is a comment field and thus can be anything. To save your changes but still display the same data, click 'Save'. To save your changes and return to a blank form, click 'Apply'.



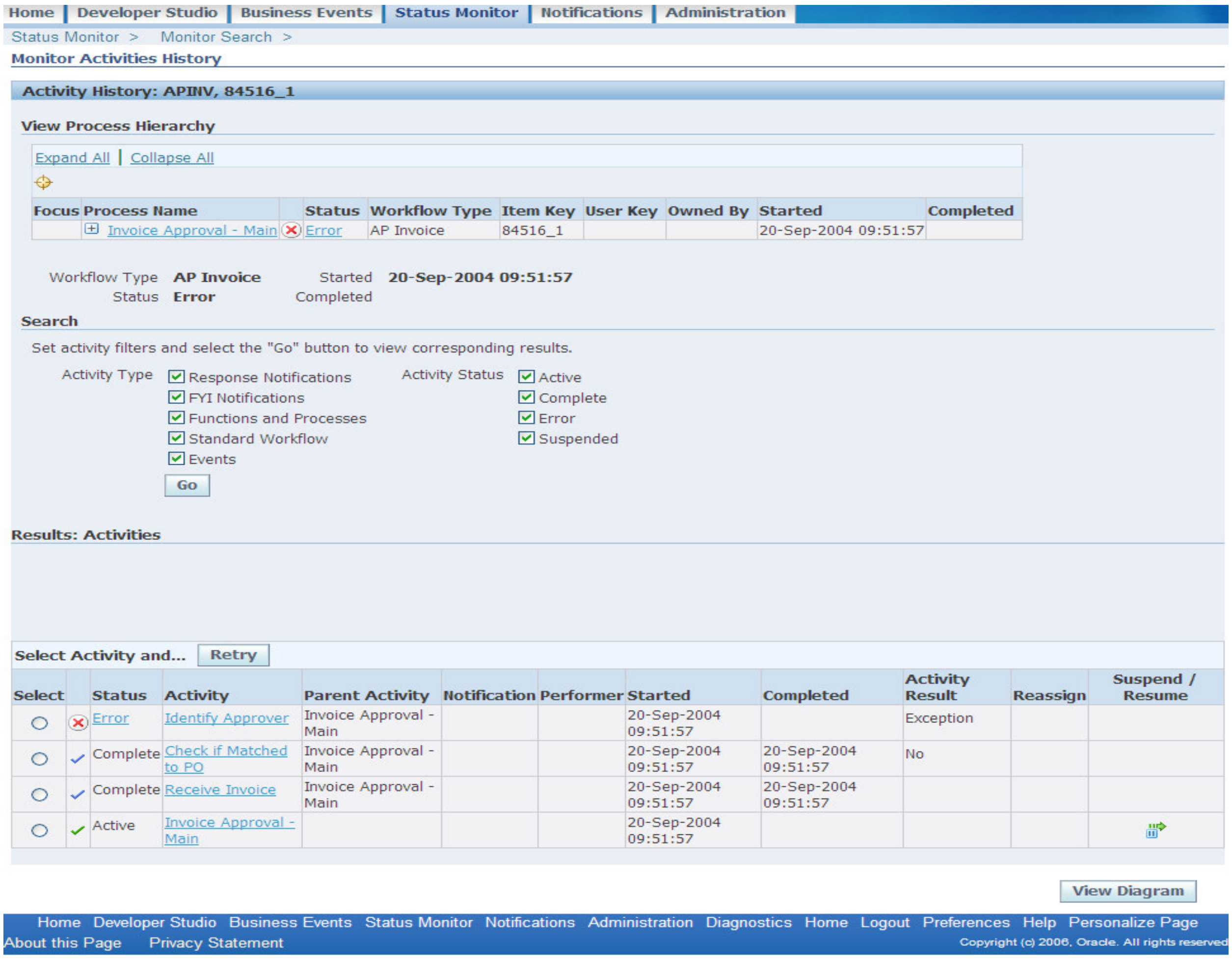
Jr. Admin By User/Responsibility Setup – Final Step

Once all the grants and roles are defined and assigned, the user who will be the Junior Administrator must be assigned a responsibility with the workflow administration screens. Do not select the responsibility assigned as the workflow administrator. For example, if the responsibility 'Workflow Administrator Web Applications' is assigned as the workflow administrator, then use the responsibility 'Workflow Administrator Web (New)' or create a responsibility with the admin menus. Note that if the grants were made to a responsibility and not to a user, then the workflow administration menus should be added to that responsibility.

The entire workflow administration responsibility can be granted. All the screens in this menu function in query mode except the Notification worklist, the status monitor and the Notification Search screen. The Notification Worklist and the Notification Search screen restrict the user to his/her own notifications. The Status Monitor restricts access based on the assigned grants and roles.

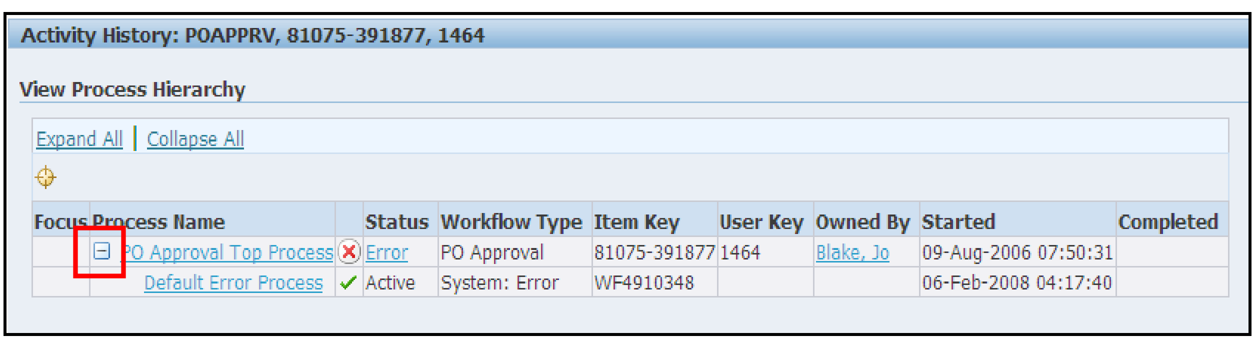
The item types that can be accessed are limited by the Object Instance Grants. If both our examples from above are assigned, the user will only be able to access APEXP workflows where the ORG_ID item attribute has a value of 204 (APINV workflows do not have an item attribute ORG_ID).

Opening the Activity Statuses screen for one of these workflows yields a screen similar to below. Note there is no 'Skip', 'Update Attributes', 'Rewind', 'Suspend Workflow' or 'Cancel Workflow' button. Only the 'Retry' button is available.



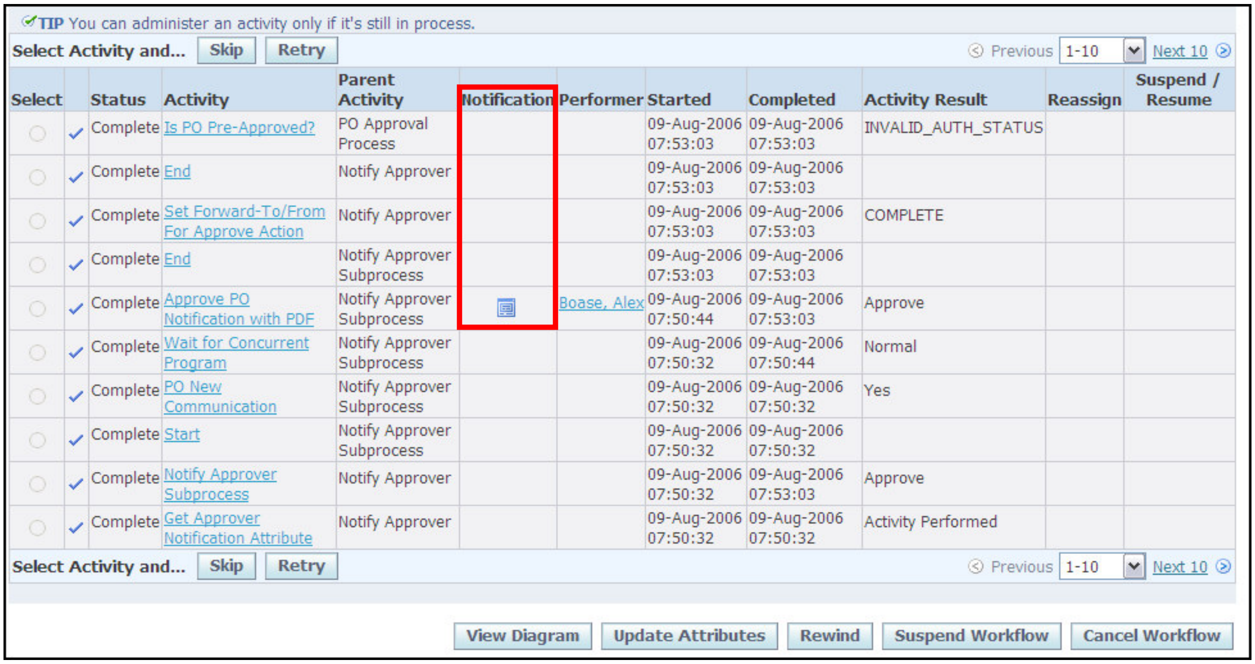
New Look for Activity History

11i.ATG_PF.H.delta.5 (RUP 5) introduced some new features for the Activity History screen. These new features are also in Release 12 regardless of the rollup. The first change is the addition of a section at the top of the screen that allows the administrator to see all child workflows and even to click into the activity history for these workflows.



Click the + box next to the Process Name to see any children workflows. Double-click on the Process Name to open the activity history for that process.

A new column, Notification, has been added to the bottom of the Activity History screen. This allows the administrator to open and view the notification (and respond) without having to click the activity link, note the notification_id and navigate to the Notification Search screen.



Select	Status	Activity	Parent Activity	Notification	Performer	Started	Completed	Activity Result	Reassign	Suspend / Resume
	Complete	Is PO Pre-Approved?	PO Approval Process			09-Aug-2006 07:53:03	09-Aug-2006 07:53:03	INVALID_AUTH_STATUS		
	Complete	End	Notify Approver			09-Aug-2006 07:53:03	09-Aug-2006 07:53:03			
	Complete	Set Forward-To/From For Approve Action	Notify Approver			09-Aug-2006 07:53:03	09-Aug-2006 07:53:03	COMPLETE		
	Complete	End	Notify Approver Subprocess			09-Aug-2006 07:53:03	09-Aug-2006 07:53:03			
	Complete	Approve PO Notification with PDF	Notify Approver Subprocess		Boase, Alex	09-Aug-2006 07:50:44	09-Aug-2006 07:53:03	Approve		
	Complete	Wait for Concurrent Program	Notify Approver Subprocess			09-Aug-2006 07:50:32	09-Aug-2006 07:50:44	Normal		
	Complete	PO New Communication	Notify Approver Subprocess			09-Aug-2006 07:50:32	09-Aug-2006 07:50:32	Yes		
	Complete	Start	Notify Approver Subprocess			09-Aug-2006 07:50:32	09-Aug-2006 07:50:32			
	Complete	Notify Approver Subprocess	Notify Approver			09-Aug-2006 07:50:32	09-Aug-2006 07:53:03	Approve		
	Complete	Get Approver Notification Attribute	Notify Approver			09-Aug-2006 07:50:32	09-Aug-2006 07:50:32	Activity Performed		

If you open the notification, you can return to the Activity History screen by clicking the 'Monitor Activities History' link at the top of the screen.

Notification Search Screen Available for End Users

Users have always had access to their notifications through the Notification Worklist. However this screen does not allow searching for specific notifications. Now the function 'Workflow Notification Search' (WF_WORKLIST_SEARCH) can be added to any menu. This screen is the same screen used by Administrators to search for notifications. However when assigned to a non-administration responsibility this screen limits users to searching only for their own notifications.

Workflow Mailer Now Required for Oracle Alert

As of 11i.ATG_PF.H.delta.4 (RUP 4), the workflow mailer must be initiated in order to send alerts or process responses from Oracle Alert. The Oracle Alert Response Processor can continue to be used to process responses for alerts sent prior to upgrading to 11i.ATG_PF.H.delta.4 (RUP 4).

Workflow Mailer Parameter Changes

Changes instituted in OWF.H and subsequent ATG_PF.H rollups have introduced issues in the notification mailer. Some of the issues include accessing links to OA Framework pages, inability to read emails sent to SYSADMIN, and the mailer inexplicably refusing to send emails. This article will cover the MetaLink Doc. IDs that address these issues.

<u>New Patches</u>

MetaLink Doc. ID 405970.1 – "Oracle ATG Newsletter – December 2007, Volume 6" contains the latest recommended notes and actions for workflow and other ATG products. This newsletter recommends that if 11*i*.ATG_PF.H RUP5 has been installed, then the one-off patches 6412999 and 6441940 should be applied. These patches have not been superseded. Additionally there is a Java bug that prohibits saving the time events should be scheduled. This bug is described in MetaLink Doc. ID 463783.1 – "Schedule Events Page Resets the Submit Time to 00 00". This note recommends the patch 6399304.

For Release 12 users, you must have applied patch 6435000 – "12.0.4 Release update Pack (RUP4)" to receive the equivalent patches.

Setting the Mailer Framework User (and Selected Other Mailer Parameters)

There must be a user account and responsibility assigned to the workflow mailer so that the mailer may access the applications. By default this user is SYSADMIN and the responsibility is "System Administrator". This user can be changed as long as:

- The user assigned is active and is either the workflow administrator or is assigned the responsibility assigned as the workflow administrator
- The responsibility assigned to the mailer must match a responsibility assigned to this user; this responsibility does not have to be the responsibility assigned as the workflow administrator, but it must contain the workflow administrator menus
- The application_id assigned to the mailer must be the same as that of the responsibility assigned to the mailer

MetaLink Doc. ID 344936.1 – "Email Body Contain: ORA-20002: 3207: User 'SYSADMIN' does not have access to notification" describes how to change this user, responsibility, and application_id.

First you need to obtain the user_id, responsibility_id, and application_id to be used. To obtain the user_id, execute the following SQL. Substitute the desired user name for <name>.

```
SELECT user_id
      ,user_name
  FROM fnd_user
 WHERE user_name = upper ('<name>');
```

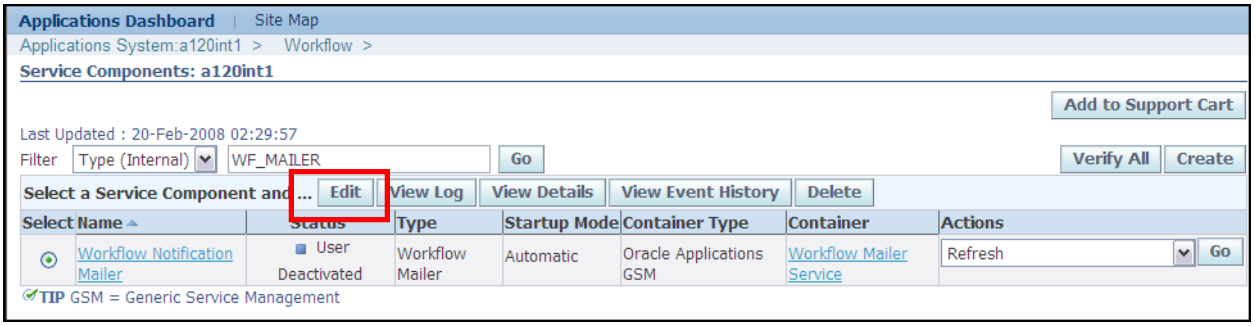
To obtain the responsibility_id and application_id, execute the following SQL. Substitute the desired responsibility name for <resp_name>.

```
SELECT responsibility_id
      ,application_id
      ,responsibility_name
  FROM fnd_responsibility_tl
 WHERE upper(responsibility_name = upper ('<resp_name>')
   AND language = 'US';
```

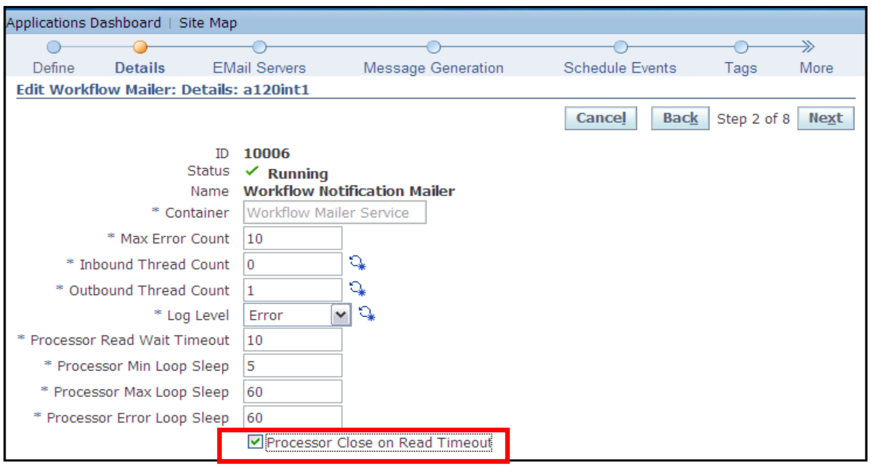
Now navigate to the Workflow Manager page of Oracle Applications Manager (OAM). From the System Administrator responsibility, the navigation path is Workflow | Oracle Applications Manager | Workflow Manager.

In the dashboard at the top of the page, click the icon to the left of 'Notification Mailers'.

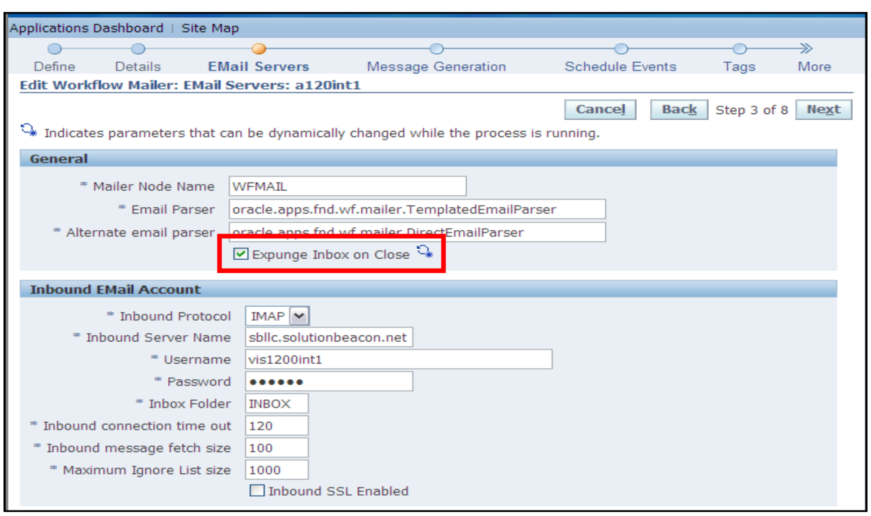
If the status of the mailer is ‘Running’, select ‘Stop’ in the Actions box and click Go. Click the Brower refresh button until the status changes to ‘User Deactivated’. Then click the Edit button.



Click the ‘Advanced’ button. Click the Next button until Step 2 of 8 appears. Per MetaLink Doc. IDs 422870.1 = “Java Mailer not Removing Processed Emails from Inbox after Folder ATG.H Rup4”, 437986.1 – “E-Mail Notifications Are Not Getting Processed, Remain Sitting In The Inbox”, 418077.1 – “Workflow Notification Mailer Stops Processing”, and 332152.1 – “OWF.H Diagnostics and Solutions”, the parameter ‘Processor Close on Read Timeout’ should be checked.

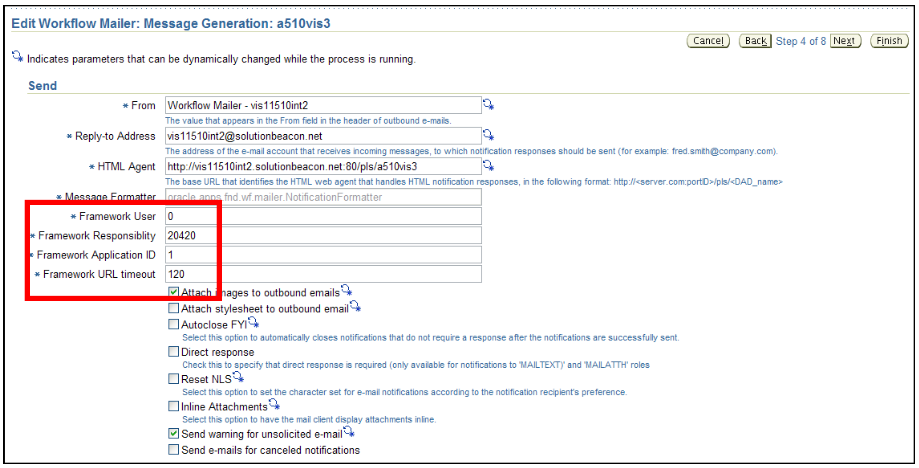


Click the Next button so that Step 3 of 8 appears. Per MetaLink Doc. ID 422870.1 = “Java Mailer not Removing Processed Emails from Inbox after Folder ATG.H Rup4”, ensure ‘Expunge Inbox on Close’ is checked.



Click the Next button so that Step 4 of 8 appears. Per MetaLink Doc. ID 414376.1 – ""You Have Insufficient Privileges For The Current Operation" On Reqapprv Notif", set 'Framework URL Timeout' to 120.

Set 'Framework User', 'Framework Responsibility', and 'Framework Application ID' to the values from the select statements above. The default values are 0 (SYSADMIN), 20420 (System Administrator), and 1 (System Administration). Remember, as long as SYSADMIN is not end-dated and the workflow administrator is set to SYSADMIN or to a responsibility and SYSADMIN is assigned this responsibility, these values may be left as is.

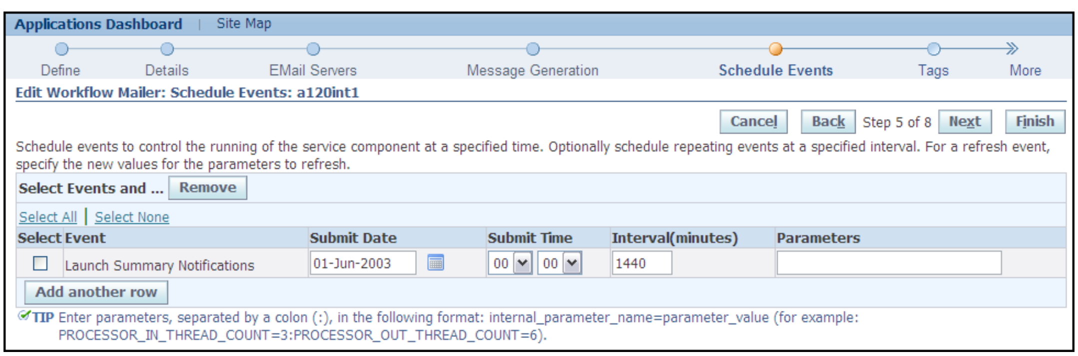


Click the Next button so that Step 5 of 8 appears. The next section describes how to schedule events so that the mailer will shutdown (briefly) and restart once per week. This step is not necessary unless your applications run 24x7. If the database is shut down at least weekly, this shutdown also stops and restarts the mailer.

Schedule Startup and Shutdown of Mailer

The next steps are from MetaLink Doc. IDs 443643.1 – "How To Automatically Restart the Workflow Mailer Processes Regularly" and 414376.1 = ""You Have Insufficient Privileges For The Current Operation" On Reqapprv Notif".

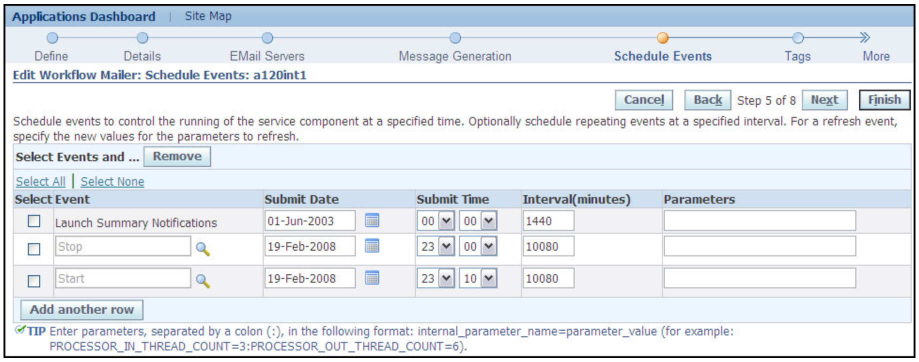
Step 5 looks like the following figure (there may be no events scheduled, this is OK).



Click 'Add another row'. For the Event, select 'Stop'. Enter the date and time you wish the mailer to stop. For example, to have the mailer stop every Friday at 11:00 PM, enter the next Friday and select the time as 23:00.

Click 'Add another row'. For the Event, select 'Start'. Enter the data and time you wish the mailer to start. Allow at least 5 minutes between the stop and start times. For example, to have the mailer re-start every Friday at 11:15 PM, enter the next Friday and select the time as 23:15.

The value entered for Interval\Resubmit is in minutes. 10080 is equivalent to 7 days.



Click the Finish button. This takes you a page that displays the current settings. Scroll down to review the Scheduled Events. If the Submit Time shows all zeros, you are experiencing the error described in MetaLink Doc. ID 463783.1 – "Schedule Events Page Resets the Submit Time to 00 00". This note recommends the patch 6399304. Apply this patch, then re-enter the time for the events. (Note: if you are running Release 12, the equivalent patch is included in RUP 4)

Scheduled Events

Event	Submit Date	Submit Time	Interval(minutes)	Parameters
Launch Summary Notifications	01-06-2003	00:00	1440	
Start	18-01-2008	00:00	10080	
Stop	18-01-2008	00:00	10080	

If patch 6399304 (Release 11*i*) or 6435000 (Release 12) has been applied, then the Scheduled Events section of screen 8 should look similar to the following screen shot. Notice that Submit Time matches the time entered in screen 5.

Scheduled Events

Event	Submit Date	Submit Time	Interval(minutes)	Parameters
Launch Summary Notifications	01-Jun-2003	00:00	1440	
Start	19-Feb-2008	23:10	10080	
Stop	19-Feb-2008	23:00	10080	

Click the Finish button. This returns you to the first Edit page. Do not click Apply. This might automatically restart the mailer. If this happens, the Submit Time is reset to current time. Instead click the 'Service Components' link at the top of the page. This will return you to the page where the mailer can be re-started.

Before restarting the mailer, perform the following query:

```
SELECT * FROM fnd_svc_comp_requests_v;
```

Fnd_svc_comp_requests_v is a view is across the table fnd_svc_comp_requests and the synonym wf_all_jobs. Wf_all_jobs is a synonym for sys.user_jobs, which is a view across dba_jobs, which is a view across SYS.JOB$.

Based on the scheduled events shot above, the query returned:

COMPONENT_ID	COMPONENT_REQUEST_ID	CREATED_BY	EVENT_DATE	EVENT_DISPLAY_NAME	EVENT_FREQUENCY
10006	10000	1	6/1/2003	Launch Summary Notifications	1440
10006	10043	0	2/19/2008 23:00	Stop	10080
10006	10044	0	2/19/2008 23:10	Start	10080

EVENT_NAME	EVENT_PARAMS	FAILURES	INTERVAL	JOB_ID
oracle.apps.fnd.wf.mailer.Mailer.notification.summary	null	0	SYSDATE + (1440/(24*60))	685
oracle.apps.fnd.cp.gsc.SvcComponent.stop	null	null	SYSDATE + (10080/(24*60))	22390
oracle.apps.fnd.cp.gsc.SvcComponent.start	null	null	SYSDATE + (10080/(24*60))	22391

LAST_DATE	NEXT_DATE	OBJECT_VERSION_NUMBER	REQUESTED_BY_USER	THIS_DATE
2/19/2008 20:44	2/20/2008 20:44	18	null	null
null	2/19/2008 23:00	1	SYSADMIN	null
null	2/19/2008 23:10	1	SYSADMIN	null

WHAT
FND_SVC_COMPONENT.EXECUTE_REQUEST (p_component_request_id => 10000);
FND_SVC_COMPONENT.EXECUTE_REQUEST (p_component_request_id => 10043);
FND_SVC_COMPONENT.EXECUTE_REQUEST (p_component_request_id => 10044);

Check the values in NEXT_DATE. If they are missing the time entered (see figure below), verify that patch 6399304 (Release 11*i*) or 6435000 (Release 12) is applied. Apply the patches, delete the events and re-enter them.

LAST_DATE	NEXT_DATE	OBJECT_VERSION_NUMBER	REQUESTED_BY_USER	THIS_DATE
	1/18/2008	2	SYSADMIN	
	1/18/2008	2	SYSADMIN	
1/16/2008 13:54	1/17/2008 13:54	30		

Return to the OAM and in the Action column, select ‘Start’ then click Go. A page displays stating ‘Action Start has been performed on Workflow Notification Mailer’. Click OK. OAM returns to the Service Components page. Click the browser refresh button until the status changes to ‘Running’.

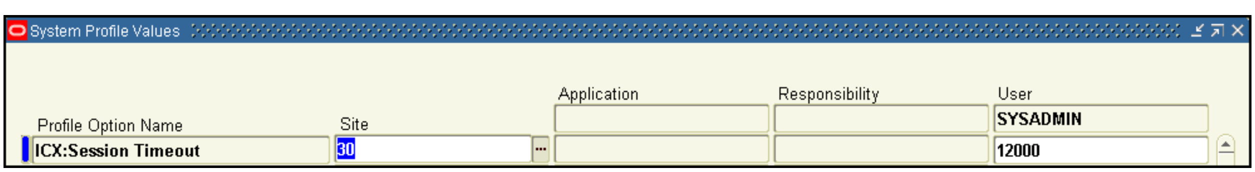
If ‘Apply’ was clicked, or the changes were made while the mailer was still running, the mailer will restart automatically and execute the new events. Unfortunately, this will also reset ‘Next Time’ for both events. So after the mailer has re-started, perform the query again on fnd_svc_comp_requests_v. If the time changed, stop the mailer, navigate to page 5, delete the events and re-enter them. This time remember not to click ‘Apply’. Restart the mailer.

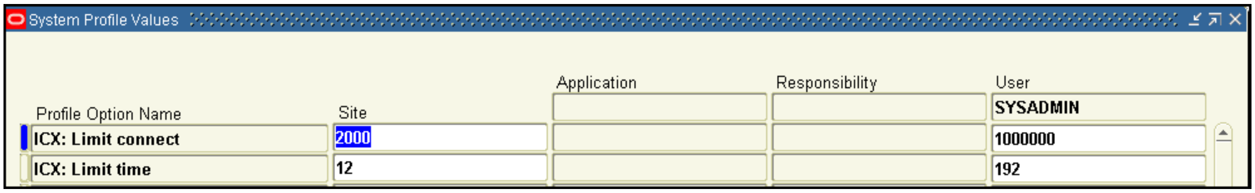
Set Profile Option Values for the User Assigned to the Mailer

Several profile options govern how long a user may stay logged into the applications. For security reasons, these profile options are set so that inactive sessions will timeout and so that regardless of the activity, users are required to periodically log in.

However, when the session expires for the user assigned to the mailer, then notification recipients cannot open links attached to framework regions. This problem is described in MetaLink Doc. ID 414376.1 = “”You Have Insufficient Privileges For The Current Operation” On Reqapprv Notif”. The recommendation is to set the following profile options at the user level for the user assigned as the mailer framework user:

- ICX:Session Timeout – 12000
- ICX: Limit connect – 1000000
- ICX: Limit time – 192





Response Value Delimiter

Another new feature introduced in 11i.ATG_PF.H.delta.5 (RUP 5) is the ability to specify the delimiter character for email responses. By default the mailer uses the single apostrophe ' as the delimiter. This has caused issues with some Blackberries and also causes comments containing a single apostrophe (such as using the word “don’t”) to be truncated. The following choices are supported:

- DEFAULT – single quote (')
- APOS – same as DEFAULT (')
- QUOTE – double quote (")
- BRACKET – [for opening and] for closing

Note that Microsoft Outlook Express does not support QUOTE. Presently the only way to set this parameter globally is via SQL. Use the following queries to find the component_id for the mailer and the parameter_id for the parameter ‘HTML_DELIMETER’

```
SELECT c.parameter_id, c.parameter_name, a.parameter_value
  FROM fnd_svc_comp_param_vals a, fnd_svc_comp_params_vl c
 WHERE c.parameter_id = a.parameter_id AND c.parameter_name =
‘HTML_DELIMITER';

SELECT   component_id, component_name
    FROM fnd_svc_components c
   WHERE component_name LIKE 'Workflow Notification Mailer'
ORDER BY component_id;
```

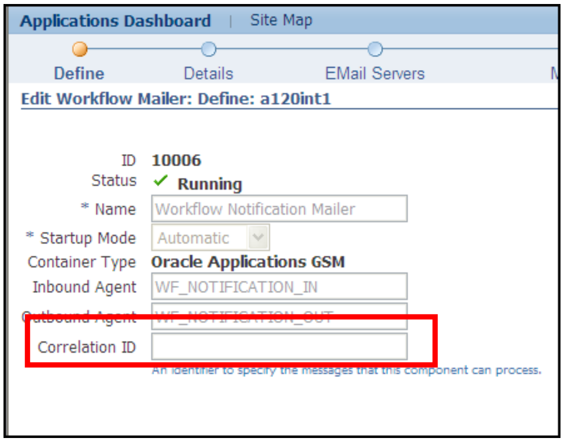
Then run afsvcpup.sql. Enter the component_id, parameter_id from the above queries and the desired value for parameter_value. The parameter value MUST match one of the four values above. The value is all uppercase.

If you only wish to override this value for specific notifications, add the message attribute #WFM_HTML_DELIMETER and set it to the desired parameter value.

Additional Mailer Features

11i.ATG_PF.H.delta.5 (RUP 5) also introduced some additional mailer features. Additional mailers can be defined and those mailers can be dedicated to specific item types or even specific messages from a specific item type. On page 1 of Advanced Setups enter the item type or item type and message name in the Correlation ID field. The format of the entry is:

<item_type_internal_name>
<item_type_internal_name>:<message_internal_name>



Another new feature is the notification to SYSADMIN when email notifications fail. In addition to the notification to SYSADMIN, the mailer will now set the recipient's mailer preference to 'DISABLED' and the MAIL_STATUS of the notification to 'FAILED'. Once the cause of the failed notification is diagnosed (usually a missing or invalid email address), the recipient's mailer preference can be reset and the notification resent through the concurrent program 'Resend Failed Workflow Notifications'.

Unfortunately, resetting an individual's mailer preference is one of the few things the workflow administrator cannot do through any of the administration screens. Individual mailer preferences are stored in the table FND_USER_PREFERENCES where MODULE_NAME = 'WF' and PREFERENCE_NAME = 'MAILTYPE' and USER_NAME = <user name>. To reset the value to the global value, use the following SQL:

```
UPDATE fnd_user_preferences fup
   SET fup.preference_value =
            (SELECT fup1.preference_value
               FROM fnd_user_preferences fup1
              WHERE fup1.user_name = '-WF_DEFAULT-'
                AND fup1.module_name = 'WF'
                AND fup1.preference_name = 'MAILTYPE')
 WHERE fup.module_name = 'WF'
   AND fup.preference_name = 'MAILTYPE'
   AND fup.user_name = '<username>';
```

Workflow Directory Services User/Role Validation

This program was delivered via the one-off patch 4719658 and bundled into 11i.ATG_PF.H.delta.5 (RUP 5). The program will repair any issues with users and their roles. MetaLink Doc. ID 418765.1 – "What parameters Should be Passed for "Workflow Directory Services User/Role Validation" Program" recommends running the program twice. The first run should set the parameter 'Add missing user/role assignments' to 'Yes' and 'Update WHO columns in WF tables' to 'No'. The second run should reverse the values for the parameters.

Other Directory Services Notes

Numerous issues have been noted with changing responsibilities assigned to users and the changes not being reflected in the user's list of responsibilities without running the above program or bouncing Apache. Oracle now states in MetaLink Doc. ID 433473.1 – "Unable to Activate a User Responsibility Assignment that Existed Before Upgrade" that this is due to an error in the subscription 'AP_WEB_PROXY_ASSIGN_PKG.proxy_assignments' for the event oracle.apps.fnd.wf.ds.userRole.updated. According to this Doc. ID, this subscription should be disabled.

MetaLink Doc. ID 406892.1 – "Missing/Corrupted User-Role Responsibilities" recommends several patches (which are included in 11*i*.ATG_PF.H.delta.5 (RUP 5)) and also recommends scheduling the following programs (in order):

Sync responsibility role data into the WF table.

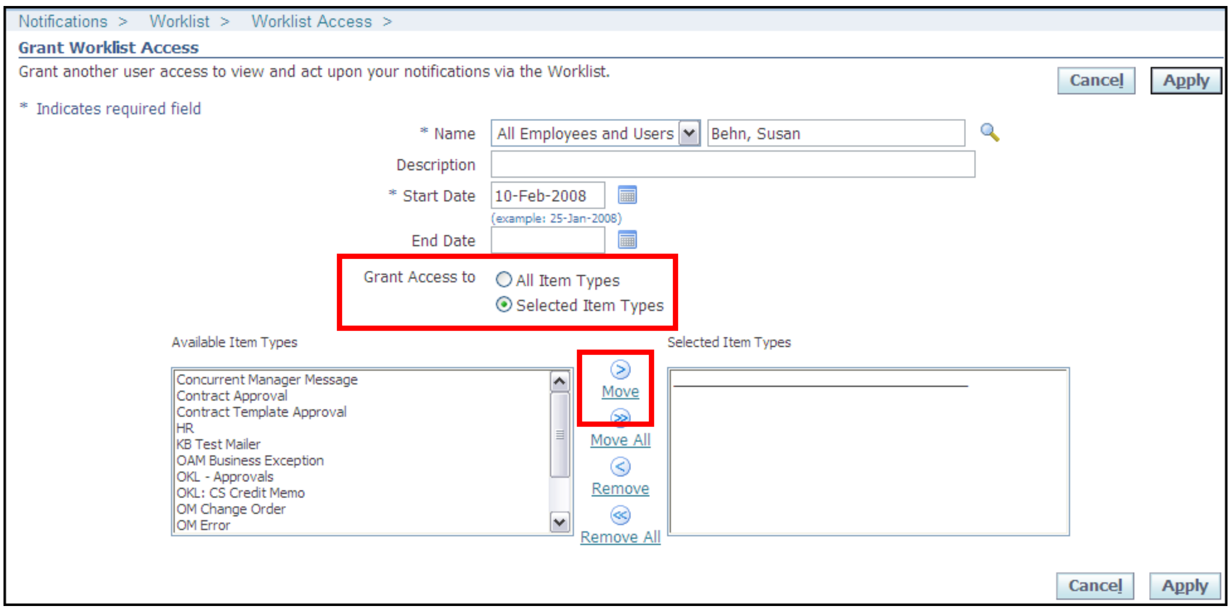
Synchronize WF LOCAL tables

Workflow Directory Services User/Role Validation

Additional Security Feature for Grant Worklist

'Grant Worklist" has always been part of Release 11i and Solution Beacon has recommended using this feature to control access to SYSADMIN's notifications and using this feature to grant one's supervisor access to notifications.

In 11*i*.ATG_PF.H.delta.5 (RUP 5), Oracle added the ability to restrict the grant by item type. To restrict by item type, click 'Selected Item Types, then highlight the desired item type(s) and click the 'Move' link. Access can be revoked by clicking the 'Remove' link.



Worklist Flexfields

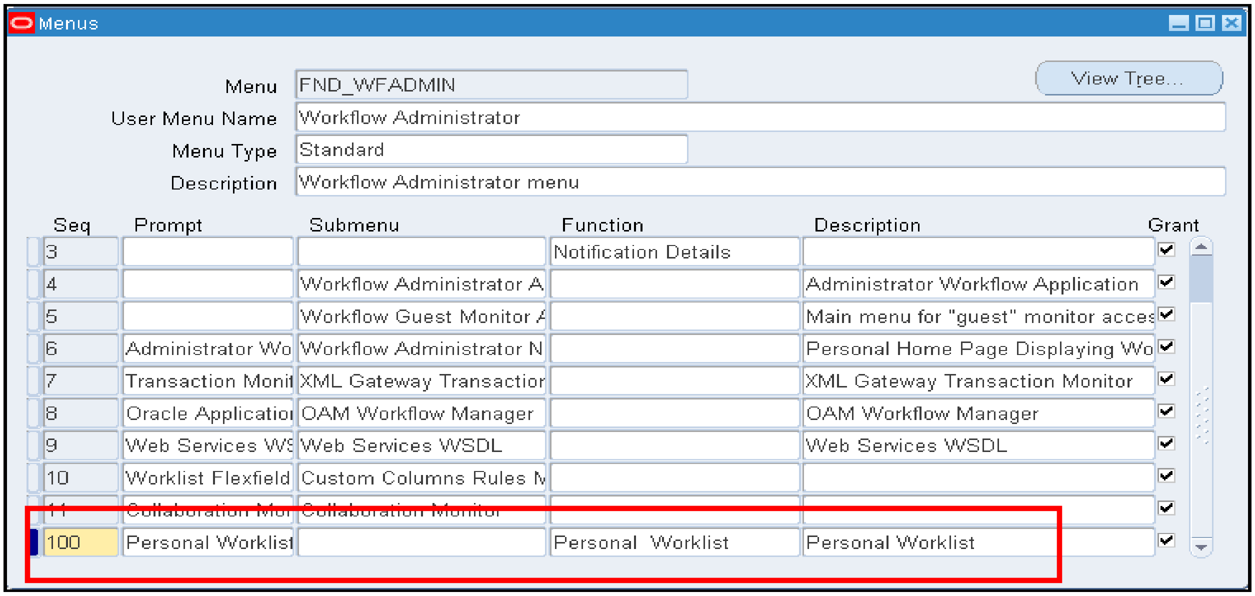
This feature was actually introduced in 11*i*.ATG_PF.H.delta.3 (RUP 3), but it has not been widely used or understood. Worklist Flexfields allow the display of message attributes that appear in the body of a message to be seen in the notification worklist without opening the notification.

Once set up, the data is stored in WF_NOTIFICATIONS and available for display from the Personal Worklist. Oracle provides 5 Date, Form, URL, or Number fields and 10 Text fields. There are the same number of Protected fields that are reserved for Oracle use.

Since message attributes are specific to a particular message, this functionality is best used when creating a worklist view for a specific workflow.

Assign Personal Worklist to a Menu

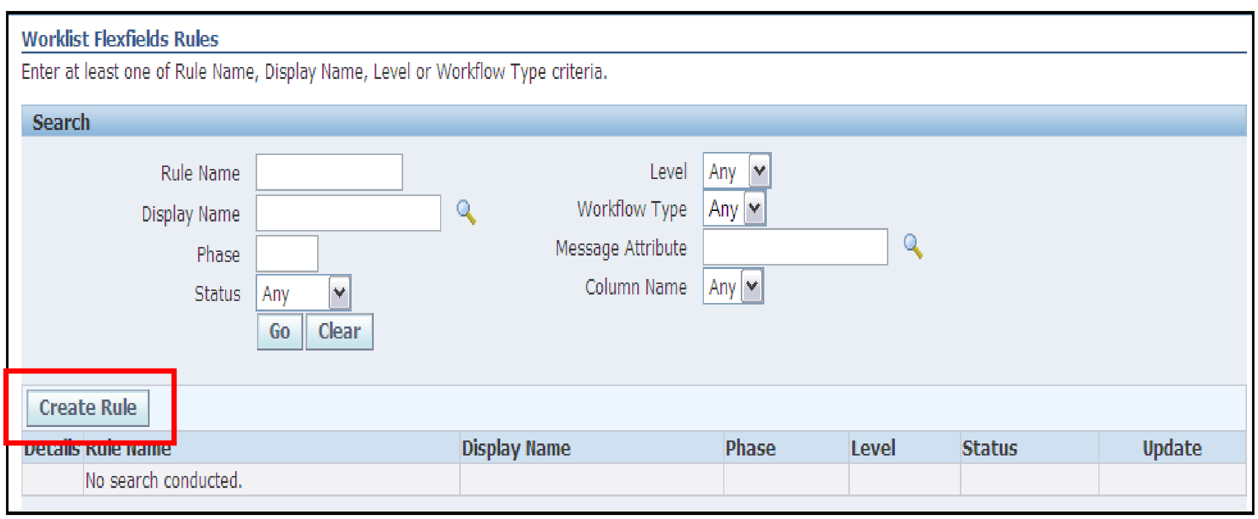
Since worklist flexfields are only available from the Personal Worklist, the first step is to assign this function to any desired menus. Oracle documentation says you must also set the profile option ‘Personalize Self_service Defn’ to ‘Yes’. This is not true.



Create Flexfield Rule(s)

The next step involves assigning the message attributes to the special WF_NOTIFICATION fields. This functionality is available from the Workflow Administration menus. The navigation is Worklist Flexfields Rules ➔ Worklist Flexfields Rules. When the Search screen opens, click ‘Create Rule’.

The rule shown in the following example will be used to add the errored item type or event, error message and error stack from the workflow WFERROR. This way when looking at the notification worklist for this workflow, the workflow administrator will be able to see which workflow errored and the complete error message and error stack. If the Export button has been enabled for the Personal Worklist screen, the information can even be exported to Excel.

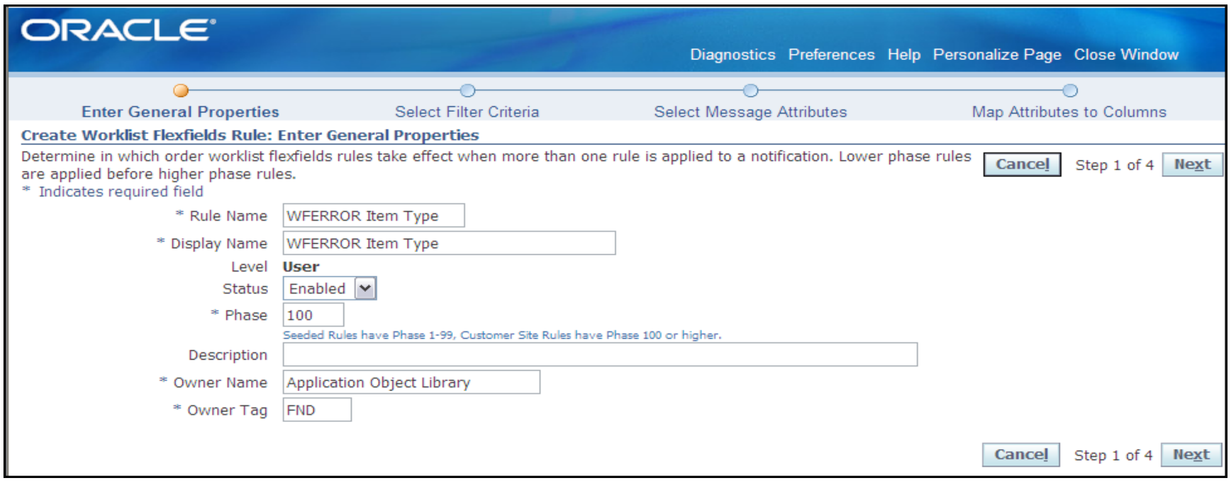


Enter the following information:

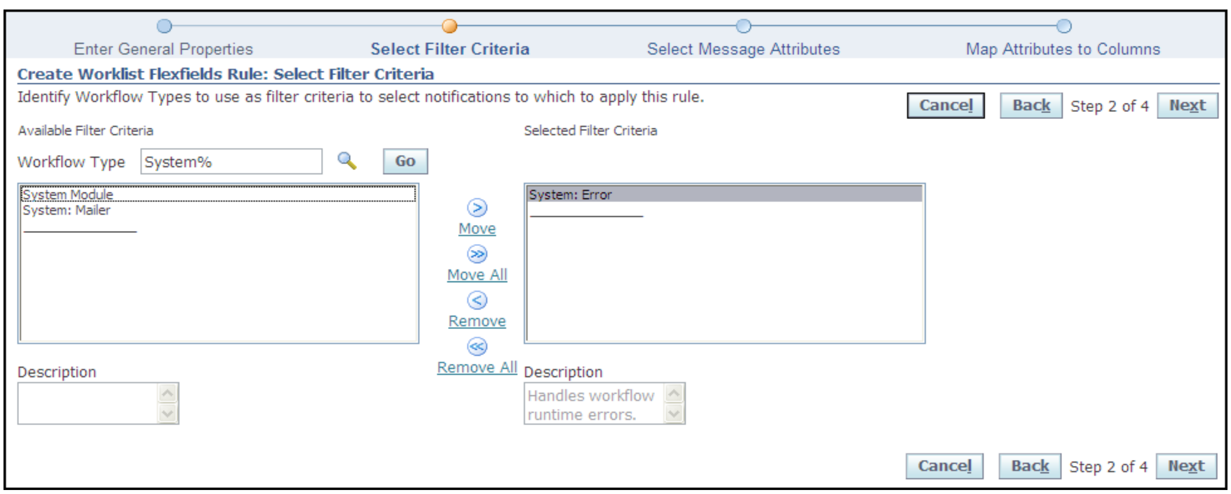
- Rule Name – Required – enter a name for the rule, no restrictions on characters or case

- Display Name – Required – enter a display name for the rule
- Status – Required with default – defaults to ‘Enabled’
- Phase – Required – must be a number 100 or higher.
- Description – Optional – description of the rule
- Owner Name – Required – the display name of an installed application, must match DISPLAY_NAME in FND_APPLICATION_TL
- Owner Tag – Required – the application short name for the application listed in ‘Owner Name’, must match APPLICATION_SHORT_NAME in FND_APPLICATION

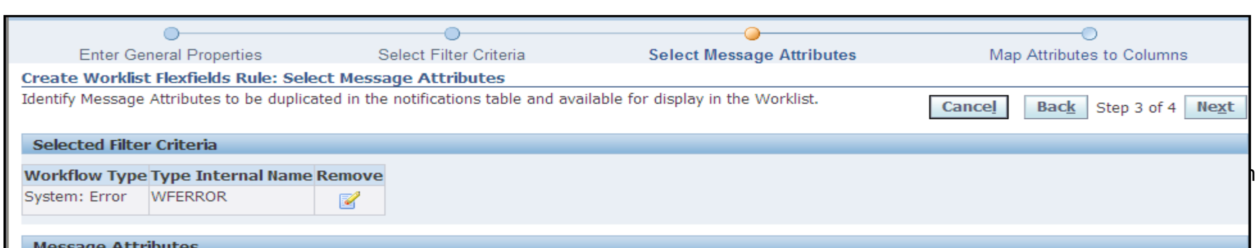
Note that Level defaults to ‘User’ and cannot be changed. After entering the data, click ‘Next’.



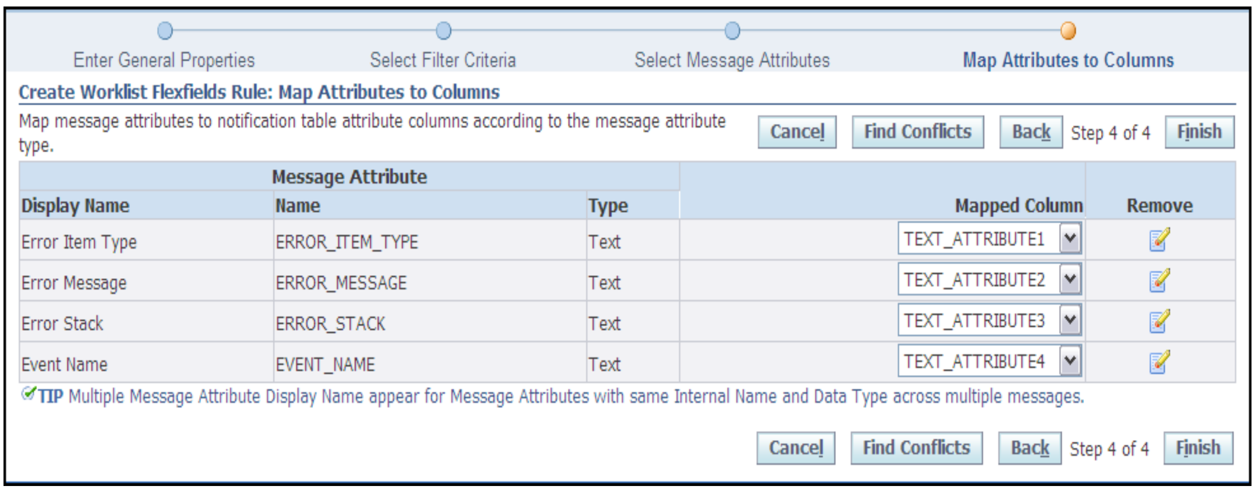
Select the workflow that owns the message attributes using the workflow’s DISPLAY_NAME. Click Next.



Select the desired Message Attributes. The LOV will be limited to messages attributes from the workflows selected in Step 2. Click Next.



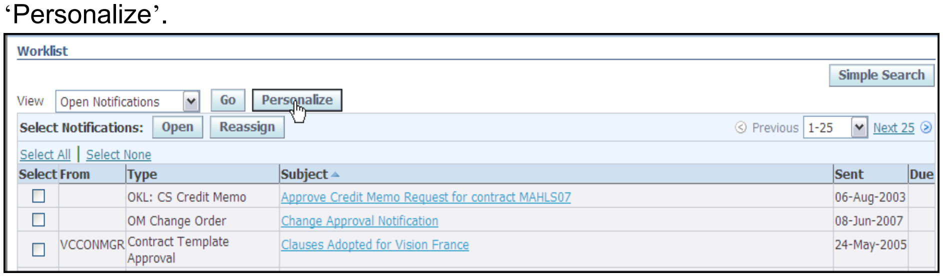
The selected attributes need to be assigned to flexfield columns. Remember that you are limited to 5 Numeric, Date, URL, or Form attributes and 10 Text attributes.



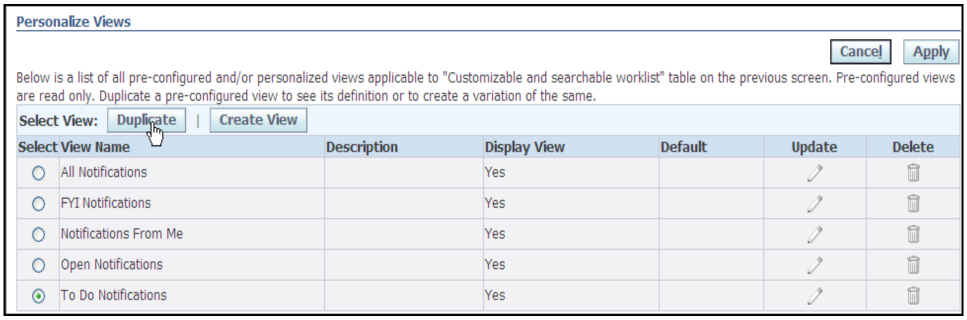
After mapping the attributes, click the ‘Find Conflicts’ button. This will identify if multiple message attributes have been assigned to the same flexfield attribute. Conflicts are OK as long as the message attributes belong to different workflows. Click Finish.

Create Worklist View

Now that ‘Personal Worklist’ is assigned the message attributes are assigned to a workflow flexfield, the view to display these attributes must be created. Open the ‘Personal Worklist’ form and click ‘Personalize’.

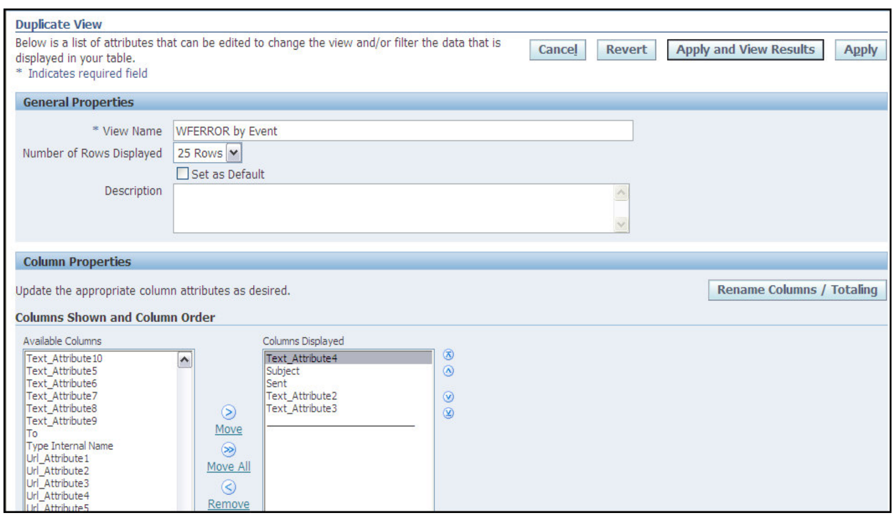


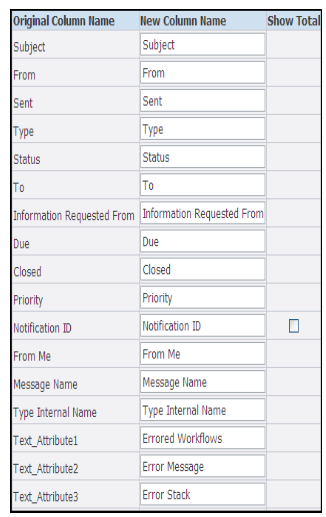
Either select an existing view and click ‘Duplicate’ or click ‘Create View’. For our example, since messages from WFERROR require a response, we will duplicate the ‘To Do Notifications’ view.



Enter a name for the View, select the number of rows to display (25 is the highest value allowed), click whether you want this view to be the view used when ‘Personal Worklist’ is opened, and (optionally) give the view a description.

Refer back to the mapping of message attributes to flexfield columns and add the appropriate flexfield columns by highlighting the fields in ‘Available Columns’ and using the ‘Move’ link or arrow to move these fields to ‘Columns Displayed’. Highlight any undesired fields in ‘Columns Displayed’ and use the ‘Remove’ link or arrow to remove these fields from the view. Use the ‘Rename Columns / Totaling’ button to rename the columns from ‘Text Attribute<n>’ to a name that describes the mapped message attribute. Use the re-order arrows to arrange the order of the selected fields.

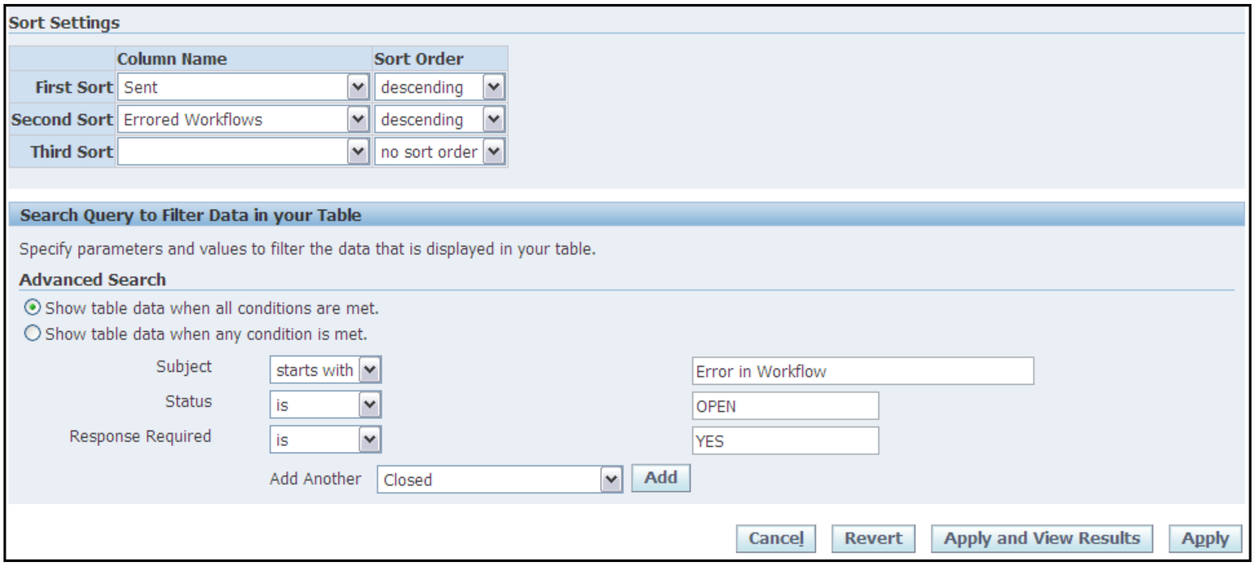


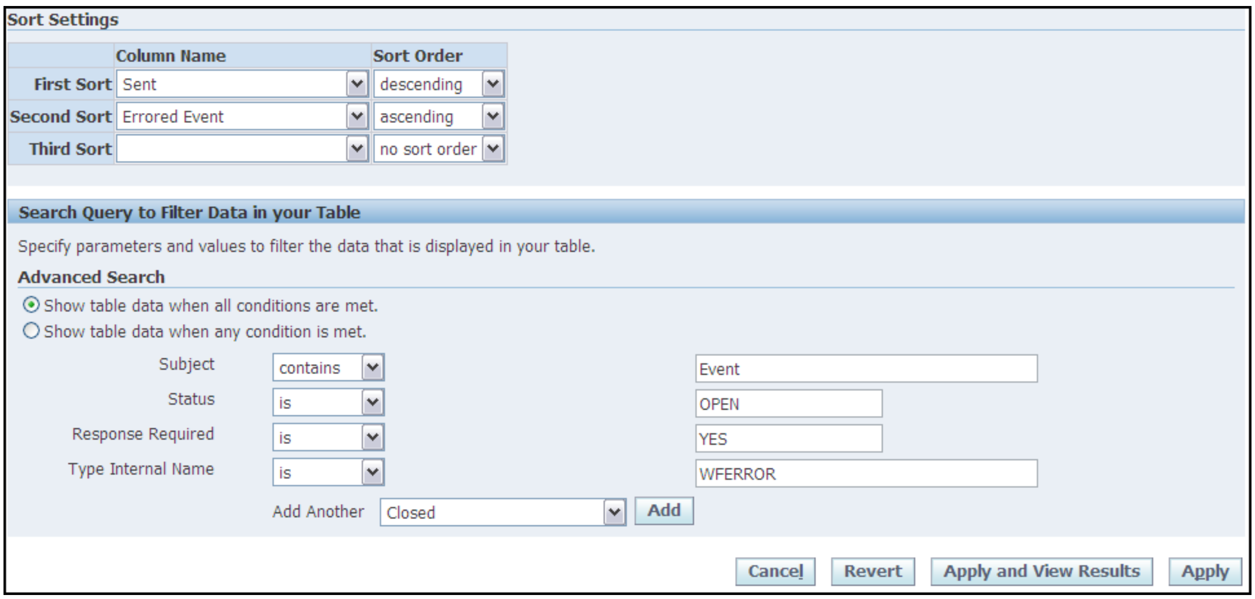


Move to the bottom of the form to set the Sort Settings and Filter Criteria. For our example, two views were created, ‘WFERROR by Item Type’ and ‘WFERROR by Event’. The first screen shows the sort settings and filter criteria for ‘by Item Type’ and the second screen shows the settings for ‘by Event’.

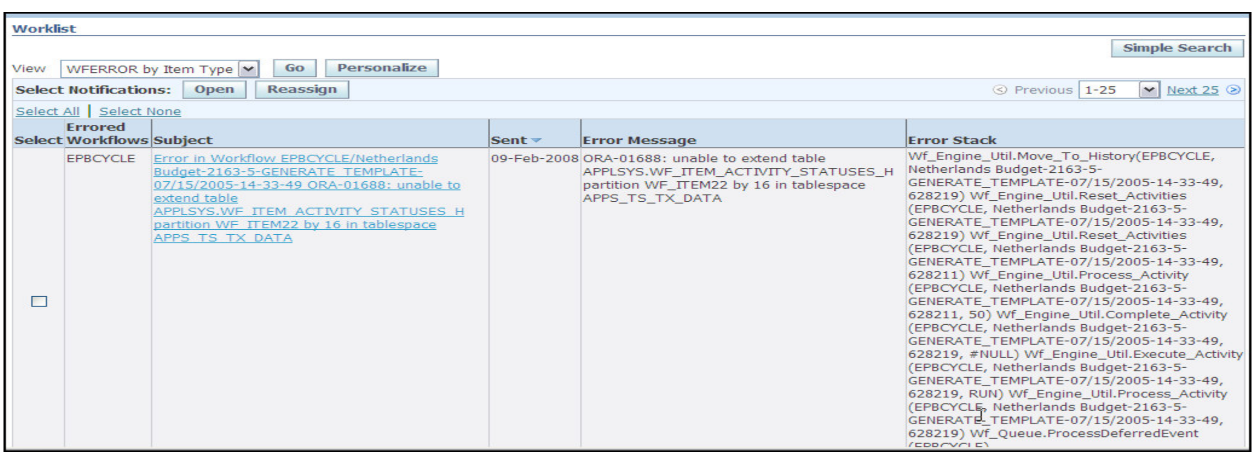
Be aware that you can later update any of these settings except the filter criteria. New criteria can be added, existing criteria can be changed, but there is no way to remove criteria except by deleting the view and recreating it.

When all the data is entered, click the ‘Apply and View Results’ button to see the resulting view of notifications.

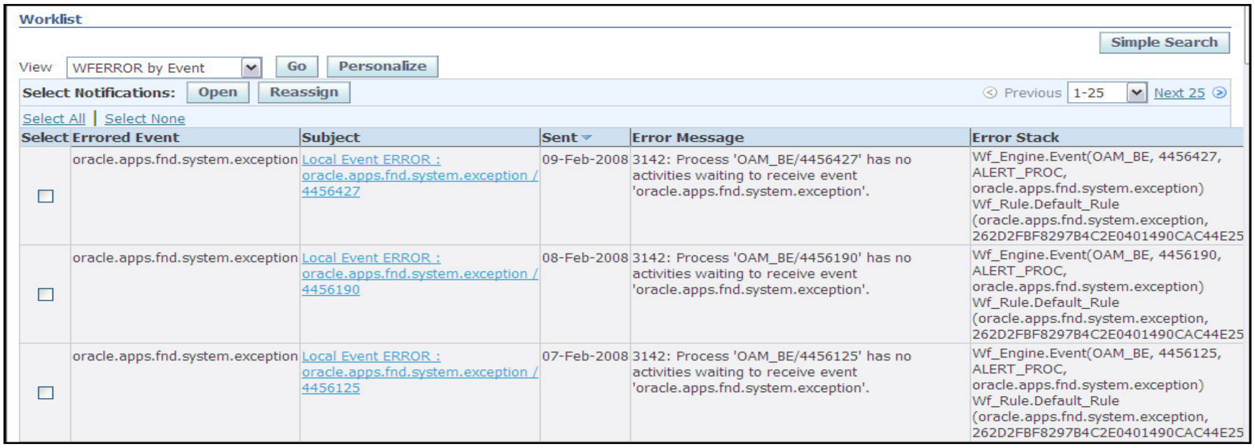




This is the view for errors from Item Types



This is the view for errors from events.



Select	Errored Event	Subject	Sent	Error Message	Error Stack
☐	oracle.apps.fnd.system.exception	Local Event ERROR : oracle.apps.fnd.system.exception / 4456427	09-Feb-2008	3142: Process 'OAM_BE/4456427' has no activities waiting to receive event 'oracle.apps.fnd.system.exception'.	Wf_Engine.Event(OAM_BE, 4456427, ALERT_PROC, oracle.apps.fnd.system.exception) Wf_Rule.Default_Rule (oracle.apps.fnd.system.exception, 262D2FBF8297B4C2E0401490CAC44E25
☐	oracle.apps.fnd.system.exception	Local Event ERROR : oracle.apps.fnd.system.exception / 4456190	08-Feb-2008	3142: Process 'OAM_BE/4456190' has no activities waiting to receive event 'oracle.apps.fnd.system.exception'.	Wf_Engine.Event(OAM_BE, 4456190, ALERT_PROC, oracle.apps.fnd.system.exception) Wf_Rule.Default_Rule (oracle.apps.fnd.system.exception, 262D2FBF8297B4C2E0401490CAC44E25
☐	oracle.apps.fnd.system.exception	Local Event ERROR : oracle.apps.fnd.system.exception / 4456125	07-Feb-2008	3142: Process 'OAM_BE/4456125' has no activities waiting to receive event 'oracle.apps.fnd.system.exception'.	Wf_Engine.Event(OAM_BE, 4456125, ALERT_PROC, oracle.apps.fnd.system.exception) Wf_Rule.Default_Rule (oracle.apps.fnd.system.exception, 262D2FBF8297B4C2E0401490CAC44E25

It should be noted that Error Message and Error Stack contain carriage returns, so when exported to Excel, these columns spill over to other lines. The following queries will display the same information with the carriage returns removed.

WFERROR – Errored Item Type

```
SELECT    Wf_Notification.GetAttrText(notification_id,
              'ERROR_ITEM_TYPE') errored_workflow
        ,Wf_notification.GetAttrText(notification_id,
              'ERROR_ACTIVITY_LABEL') errored_activity
        ,begin_date sent
        ,REPLACE (subject, CHR (10), '; ') subject
        ,REPLACE (Wf_Notification.GetAttrText(notification_id,
              'ERROR_MESSAGE'), CHR (10), '; ') error_message
        ,REPLACE (Wf_Notification.GetAttrText(notification_id,
              'ERROR_STACK'), CHR (10), '; ') error_stack
    FROM wf_notifications
   WHERE MESSAGE_TYPE = 'WFERROR'
     AND message_name = 'RESET_ERROR_MESSAGE'
     AND status = 'OPEN'
ORDER BY 1 ASC
          ,2 ASC
          ,3 DESC;
```

WFERROR – Errored Event

```
SELECT    Wf_Notification.GetAttrText(notification_id,
              'EVENT_NAME') error_event
          ,Wf_Notification.GetAttrText(notification_id,
              'EVENT_KEY') event_key
          ,begin_date sent
          ,REPLACE (Wf_Notification.GetAttrText(notification_id,
              'ERROR_MESSAGE'), CHR (10), '; ') error_message
          ,REPLACE (Wf_Notification.GetAttrText(notification_id,
              'ERROR_STACK'), CHR (10), '; ') error_stack
    FROM wf_notifications
   WHERE MESSAGE_TYPE = 'WFERROR'
     AND message_name = 'DEFAULT_EVENT_ERROR'
ORDER BY 1 ASC
          ,3 DESC;
```

Conclusion

The myriad changes covered in this paper show that Workflow continues to be enhanced both in Release 11*i* and Release 12. The 11*i*.ATG_PF.H RUPs mirror the functionality added to Release 12. However, to gain the new functionality, one must apply the current patches. This puts the onus on workflow administrators to keep current with the notes published in MetaLink, discern what needs to be applied, and to test the results.