Extended Notifications for SAP Business Workflow

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Chapter 1: Overview

Extended Notifications for SAP Business Workflow is implemented as a server notification framework. The processing is divided into 2 phases:

1. Selection of work items and creation of notifications
2. Delivery of the notifications via e-mail or SMS

Extended Notifications for SAP Business Workflow is intended to inform users about work items that need to be processed. Work items to be processed are dialog work items and deadline items. The users are notified in the form of messages. A message can be an e-mail (HTML or plain text) or SMS.

In principle it's the same usage as notification program RSWUWFML2 but Extended Notifications provides more functionality and flexibility as they are a notification framework, which is based on ABAP classes (handler). These handlers can be replaced by custom code.

Quick overview of the Notification Process

The notification process via Extended Notifications for SAP Business Workflow comprises of two phases:

- **Selection**: The relevant work items are selected and notifications are created and stored in database table SWN_NOTIF.
- **Delivery**: The notifications are selected from SWN_NOTIF and messages are created and sent to the users.

This initially requires customizing via transaction SWNCONFIG (or SWNADMIN). Afterwards program SWN_SELSEN has to be scheduled periodically. Program SWN_SELSEN processes both the selection and the delivery.

Customizing at a glance

Selection

- For the selection a filter pair has to be defined. A filter pair consists of a so called FULL filter and a DELTA filter. One of the filters is marked as main filter (Usually it's the FULL filter). The filter pair is used to identify the relevant work items and so single-step tasks can be maintained at the filter pair.
- In addition a category has to be assigned to the filter pair. A possible category could be e.g. Leave Request or Shopping Cart Approval. The notifications, which are created during the selection phase are assigned to this category. The category is important for the delivery later on.
- Each filter of the filter pair requires a selection schedule. The selection schedule contains the information when (weekdays, time and interval) the filter has to be processed.

Delivery

- For the delivery a subscription has to be defined. The subscription defines who should be notified about which work items and how the messages will look. The subscription must be assigned to a category (see above). By doing so, the relevant work items for the delivery are chosen. In addition the recipient(s), the delivery type (e-mail, sms) and the message structure are configured.
- The subscription requires a delivery schedule. The delivery schedule contains the information when (weekdays, time and interval) the subscription has to be processed. This means when the messages should be delivered.

Runtime (Report SWN_SELSEN) at a glance

The program SWN_SELSEN must be scheduled periodically. SWN_SELSEN is responsible for the whole notification process. At first it processes the selections and afterwards the delivery.

Selection

- The program reads the available selection schedules and analyses which of them are due.
- The following procedure is done for each due selection schedule:
    - The assigned filter is retrieved.
    - On the basis of its assigned tasks, the relevant work items are selected. This means the work items, which were created or changed since last processing of the filter pair are selected.
    - The agents of these work items are determined. One notification per work item and agent is created and stored in database table SWN_NOTIF.
    - In addition obsolete notifications are marked as logically deleted in SWN_NOTIF. A notification becomes obsolete, when the work item is not available anymore in the inbox of its recipient. E.g. Due to work item execution or forwarding to another user.

Delivery

- The program reads the available delivery schedules and analyses which of them are due.
- The following procedure is done for each due delivery schedule:
    - The assigned subscription is retrieved.
    - Based on its assigned category and recipient the relevant notifications from SWN_NOTIF are selected.
    - The message content is created by using a BSP application (Business Server Page). The settings of the subscription are taken into account for that.
    - The messages are sent to the recipients. The message is marked a 'Delivered' in SWN_NOTIF.

Chapter2: Customizing in Detail

The customizing can be done either via SWNCONFIG or SWNADMIN.

It is based on several database tables. Transaction SWNCONFIG is a view cluster which contains the maintenance views for most of these customizing tables. Due to this, SWNCONFIG is rather complex but offers all possible customizing options.

Due to the complexity of the customizing tables and of SWNCONFIG, a simplified customizing transaction was provided. The transaction SWNADMIN was created, which is a Business Server Page application (BSP). SWNADMIN does not provide all the possible customizing options, but it hides the complexity by generating customizing entries.

HINT: When first trying to configure Extended Notifications please try via transaction SWNADMIN (See page 16) and then check the corresponding customizing in SWNCONFIG.

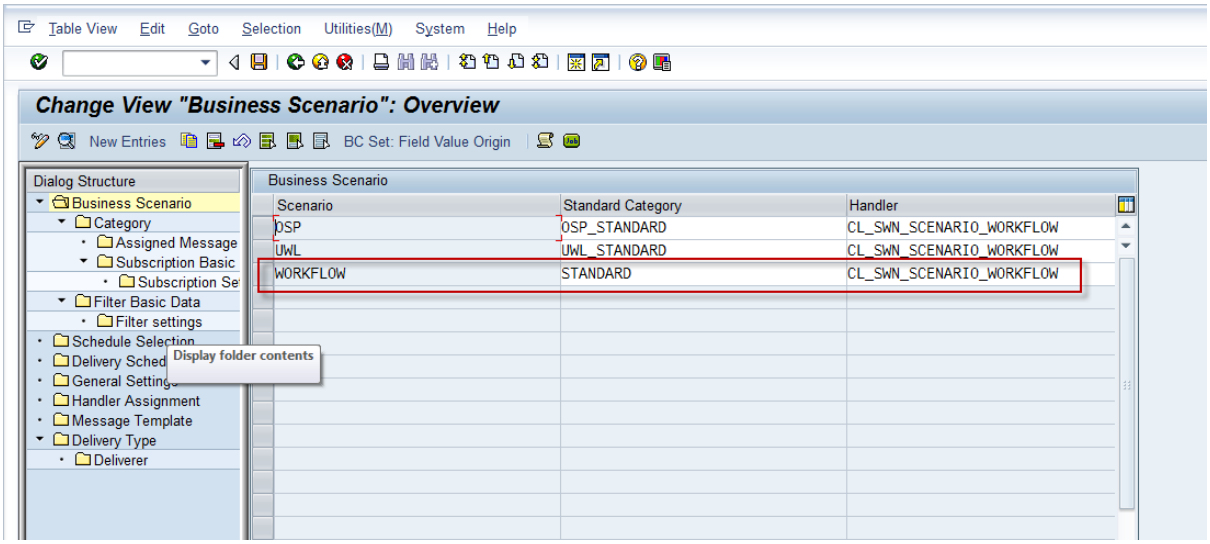
IMPORTANT: SWNADMIN: No transport link/connection
SWNADMIN has one important disadvantage: It does not support the transportation of the customizing so it is only suitable for local configuration in a system. But if the customizing should be transported into other systems, the transport request would have to be created manually via SWNCONFIG.

Required Customizing

The following sections show the required customizing via transaction SWNCONFIG.

1. Scenario

Select scenario WORKFLOW (Business Workflow). The scenario WORKFLOW is intended for the Extended Notifications for Business Workflow. This means for notifying the users about work items via e-mail or SMS.



Important. Scenario UWL and OSP

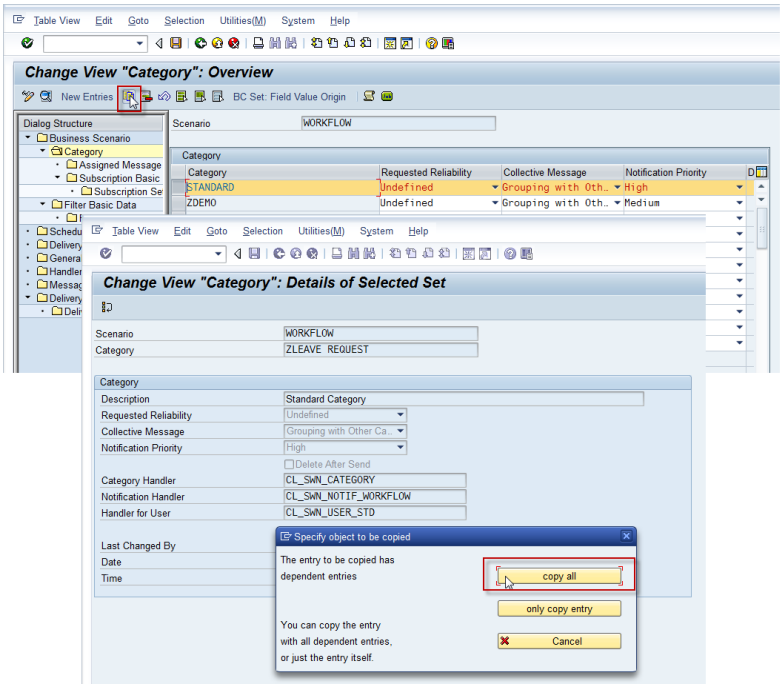
The scenario UWL is reserved for the delta pull mechanism of the UWL. OSP is reserved for the delta mechanism of DUET and Alloy. Due to this these scenarios must not be used for the Extended Notifications for Business Workflow. This may lead to inconsistencies within the UWL, DUET or Alloy.

2. Category

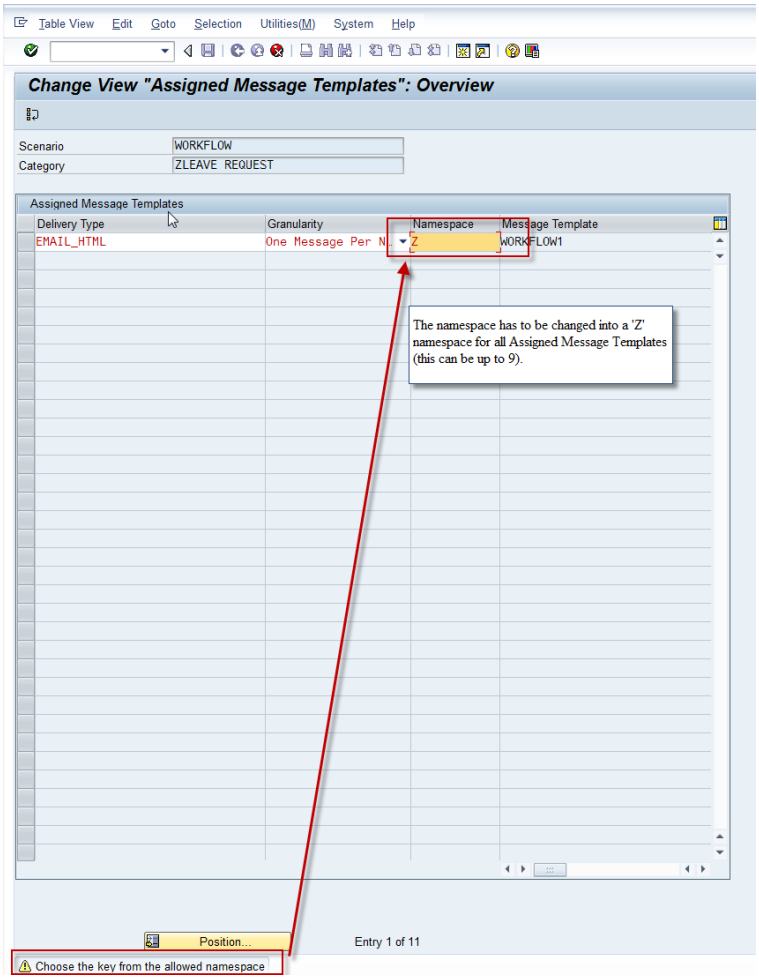
Create a new category. The easiest way is to copy category STANDARD, which is delivered by SAP. In this case you can also copy also the assigned message templates. Otherwise they have to be created and assigned manually.

The category is used during the selection and delivery phases. During the selection phase, the work items are selected and notifications are created and stored in SWN_NOTIF. The notifications are assigned to the category of the filter which is processed. The notifications are grouped via the category and the subscription is also assigned to the category. The category tells which group of notifications should be delivered.

Create Category



Also copy Message Templates



3. Filter Pair

The filter pair defines which work items have to be selected. It consists of a so called FULL filter and a DELTA filter.

When a filter is processed the relevant work items are selected. The processing of the FULL filter is different than the processing of the DELTA filter.

FULL filter

- Selects all open work items (based on filter criteria). The database selection is done via SWWWIHEAD and is independent from any time stamp.
- The agents of these work items, including substitutes, are determined.
- A notification for each work item and agent is created.
- New notifications are inserted.
- Existing notifications which have become obsolete are logically deleted (e.g. work item is not open anymore, work item does not exist anymore, work item was forwarded to another user, etc.)

DELTA filter

- Selects all work items, which were created or changed since last run of the filter pair. The data selection is done via SWWWIHEAD and SWWLOGHIST. The selection includes open and completed work items.
- The agents of the open work items, including substitutes are determined.
- A notification for each work item and agent is created.
- New notifications are inserted.
- Existing notifications which became obsolete are logically deleted.
- Existing notifications are modified in case of special work item changes. But this case is only relevant for the UWL and DUET!

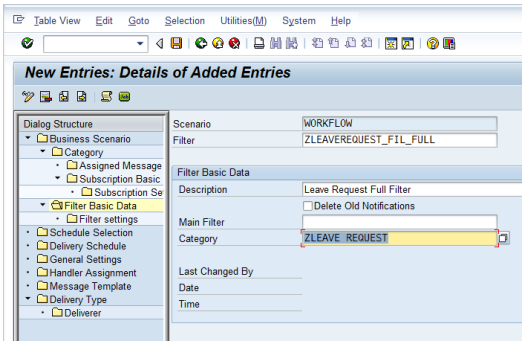
Steps

1. Create a FULL filter and a DELTA filter.

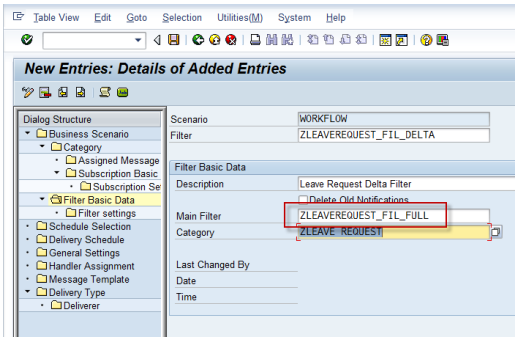
2. Assign both filters to the newly created category (-> in this example it is ZLEAVE REQUEST). This means that the notifications are assigned to this category during selection phase.

3. Connect them, so that they can interact as a pair. To do so go to the DELTA filter and assign the FULL filter as main filter. (-> in the screenshot below the filter ZLEAVEREQUEST_FIL_FULL is entered into field 'Main Filter')

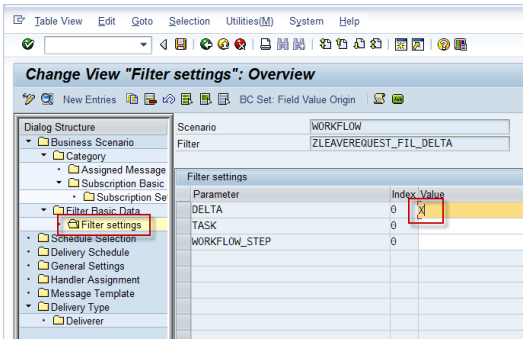
Full Filter



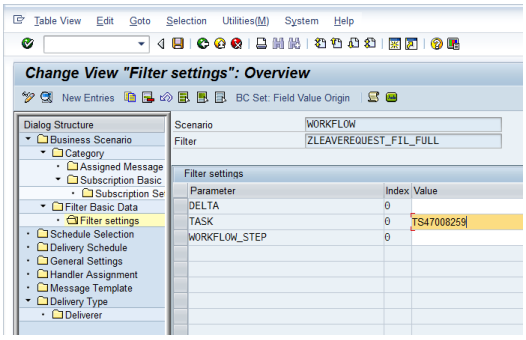
Delta Filter

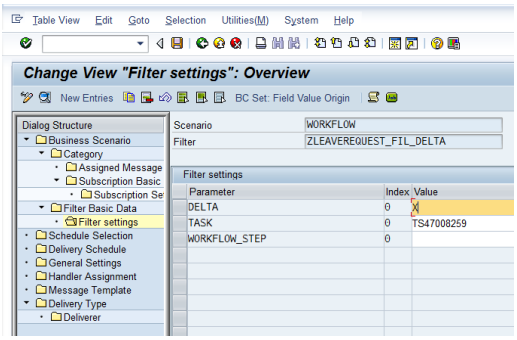


4. The delta filter has to be marked so that it works as DELTA filter. This is done in the filter settings. Set value DELTA = 'X'.



5. Maintain the relevant single-step tasks at both filters. The values must be the same for both filters. If no single-step task is entered, the work item selection is done without considering the task as filter criteria. (Info: The filter criteria WORKFLOW_STEP was introduced for DUET and is usually not used for the Extended Notifications -> e-mail).





Important!

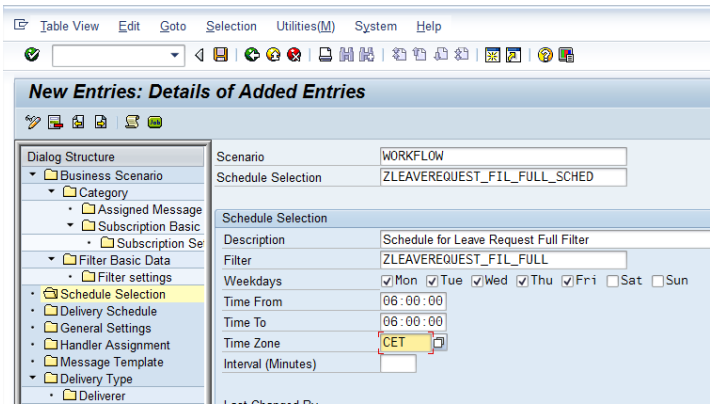
The category of the FULL filter must be the same as of the DELTA filter. The categories of the filter must not differ. If no category is assigned to the filters, then the notifications are assigned to the standard category of the scenario. But it is recommended to maintain the category in the filter itself.

4. Selection Schedules

Create a selection schedule for each filter. The selection schedule defines when (weekdays, time frame and interval) the filter should be processed. (SWN_SELSEN must be scheduled in addition).

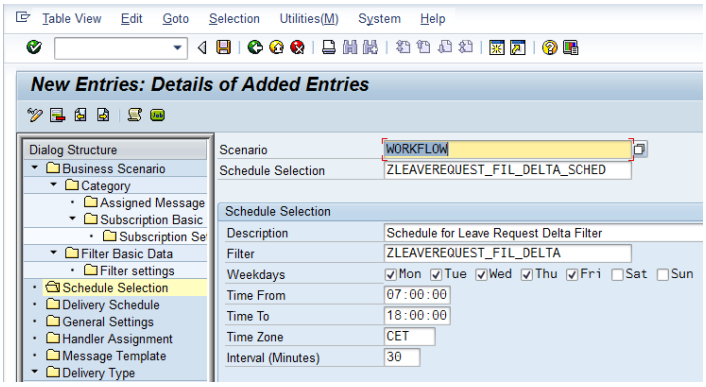
Selection schedule for FULL filter:

- Create a new schedule and choose the FULL filter.
- Mark the weekdays.
- The FULL filter should be processed once a day. Therefore enter the desired time into the field 'Time from' as well into 'Time to' and maintain the Time Zone. Do not enter a value into the field 'Interval'.



Selection schedule for DELTA filter:

- Create a new schedule and choose the DELTA filter.
- Mark the weekdays.
- The DELTA filter should be processed more frequently. Maintain the start time ('Time from'), end time ('Time to') and the Time Zone. Enter the interval in minutes.



IMPORTANT: Both filters are required

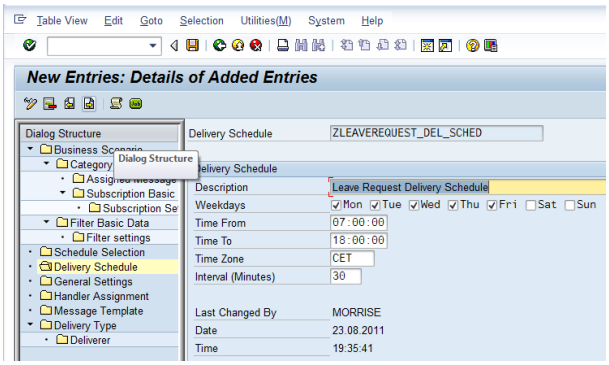
The DELTA filter selects work items, which were changed (SWWLOGHIST) or created (SWWWIHEAD) since last run. Actions and changes on a work item are stored in SWWLOGHIST. But changes in the Organizational Management, which affect the agent assignment or changes related to the substitution rules are not available in SWWLOGHIST. This means that the DELTA filter recognizes such changes only for work items, which were changed since last run. But the FULL filter recognizes these changes for all open work items, as it selects the work items without using a time stamp. Due to this the FULL filter must be scheduled at least once a day.

5. Delivery Schedule

Create a delivery schedule. The delivery schedule tells when the e-mails should be sent out. The delivery schedule is later on assigned to the subscription.

A delivery schedule can be assigned to more than one subscription.

Delivery Schedule



6. Subscription

The subscription is required for the delivery phase. E-mails are only delivered if a subscription is available.

It contains the following information:

- Which notifications should be delivered -> Category.
- When they should be delivered -> Delivery schedule.
- How the e-mail/SMS should look like.

Steps

1. Choose the newly created category. (The notifications created during selection phase were assigned to the category. By using the same category in the subscription the notifications, which should be sent out, are chosen.)

2. Create a new subscription.

3. Assign the delivery schedule.

4. Choose the delivery type e.g.

    E_MAIL_HTML -> HTML mail

    E_MAIL_PLAIN -> plain text mail

    SMS

5. Choose the granularity (N -> One e-mail contains a list of work items; 1 -> For each work item one e-mail is sent; C -> Only a general information "you have new work items" is sent out, which does not contain work item-specific data)

6. Define the recipients (fields Recipient address, Recipient type and Handler):

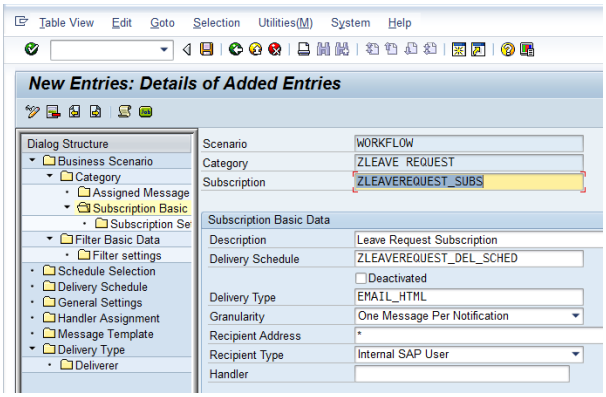
There are several possibilities:

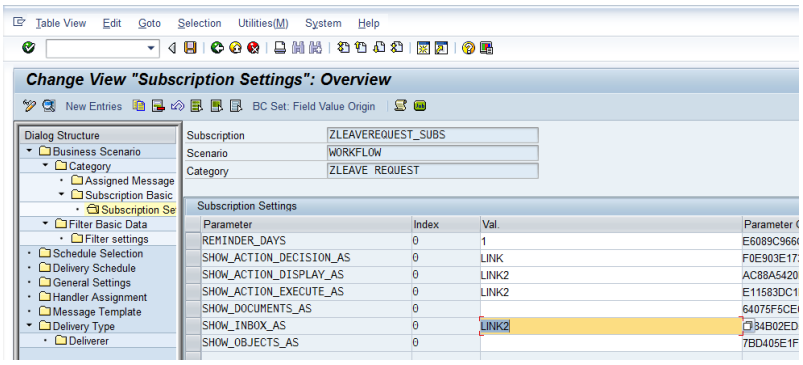
a) The e-mails should be send to all work item agents -> recipient address = * and recipient type = RML

b) The e-mails should be send to one particular user -> recipient address = <user ID> and recipient type = RML

c) The e-mails should be send out to a list of work item agents, but NOT TO ALL -> recipient address = * and recipient type = CUS and handler = ABAP class. For further information see note 847042 (Handler for filtering notifications in the subscription).

7. Maintain the subscription settings





Setting	Values	Description
REMINDER_DAYS	Number of days	SWN_SELSEN sends out another e-mail after x days, if the work item has not been completed/cancelled yet (A due delivery schedule is required nevertheless)
SHOW_ACTION_DECISION_AS	LINK	If the work item is based on a user decision, the decision alternatives are inserted into the e-mail as links, which references BSP application SWN_WIEXECUTE. The work item can be executed directly via these links
	SPACE	The decision alternatives are not generated into the e-mail.
SHOW_ACTION_DISPLAY_AS	LINK1	A link ("Display Work Item") is generated into the e-mail. The transaction SWNWIEX is called via ICF service "WEBGUI"
	LINK2	A link ("Display Work Item") is generated into the e-mail. This link references ICF service "shortcut", which creates and executes a SAP Shortcut on the fly. This SAP shortcut calls transaction SWNWIEX via SAPGUI for Windows.
	ATTACH1	A SAP Shortcut is attached to the e-mail. This SAP shortcut calls transaction SWNWIEX via SAPGUI for Windows. This option only makes sense for granularity "1" (For each work item one e-mail is sent). If granularity "N" is used in the subscription, then SWN_SELSEN ignores the granularity and sends out one e-mail per work item automatically

		(see CL_SWN_DELIVERY_MAN->CREATE_SINGLE_MESSAGE)
SHOW_ACTION_EXECUTE_AS	LINK1	A link ("Execute Work Item") is generated into the e-mail. The transaction SWNWIEX is called via ICF service "WEBGUI"
	LINK2	A link ("Execute Work Item") is generated into the e-mail. This link references ICF service "shortcut", which creates and executes a SAP Shortcut on the fly. This SAP shortcut calls transaction SWNWIEX via SAPGUI for Windows.
	ATTACH1	A SAP Shortcut is attached to the e-mail. This SAP shortcut calls transaction SWNWIEX via SAPGUI for Windows. This option only makes sense for granularity "1" (For each work item one e-mail is sent). If granularity "N" is used in the subscription, then SWN_SELSEN ignores the granularity and sends out one e-mail per work item automatically (see CL_SWN_DELIVERY_MAN->CREATE_SINGLE_MESSAGE)
SHOW_INBOX_AS	LINK1	A link ("Workflow Inbox") is generated into the e-mail. The transaction SO01 is called via ICF service "WEBGUI"
	LINK2	A link ("Workflow Inbox") is generated into the e-mail. This link references ICF service "shortcut", which creates and executes a SAP Shortcut on the fly. This SAP shortcut calls transaction SO01 via SAP Gui for Windows.
	ATTACH1	A SAP Shortcut is attached to the e-mail. This SAP shortcut calls transaction SO01 via SAPGUI for Windows.

Advanced Customizing

1. General Settings

The parameters, which were delivered in the initial development, are documented in the SAP Help Portal

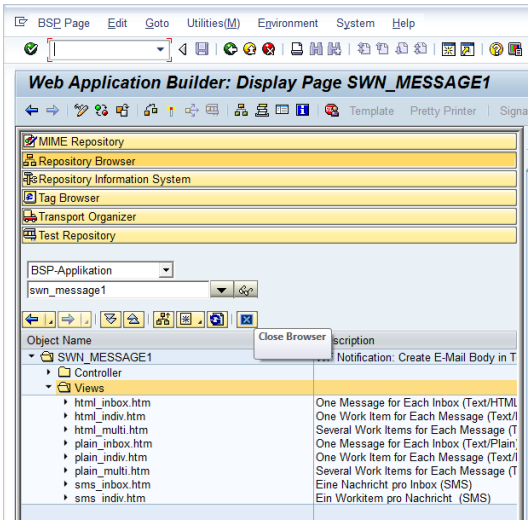
The parameters below were delivered via SAP Notes later on:

Parameter	Note Number	Description
MESSAGE_EXPIRY_DAYS	938541	Expiry days of the SAP Office documents (e-mails)
OPT_DELTA_SELECTION	1526484	Performance improvement for processing the DELTA filters
WI_TASK_LANGUAGE	1230808	Handling of the languages of work item task description
OPT_DELTA_UWL	1459177	Performance improvement for UWL, DUET and Alloy. Not relevant for the Extended Notifications

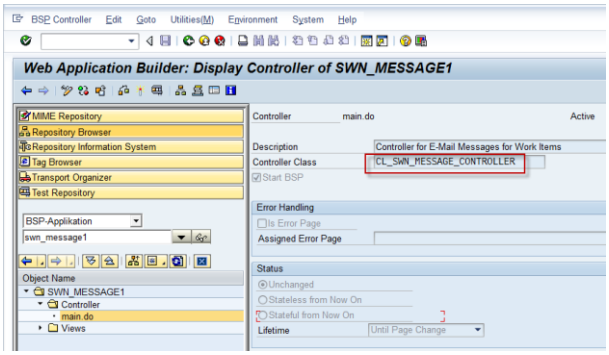
2. Own BSP Application -> Message template

The e-mail content is generated by using BSP application SWN_MESSAGE1 and customized in SWN_CONFIG in the area "Message Template". If your e-mail should have another look and feel or should contain additional information it is possible to create your own BSP application to generate the e-mail content.

In this case copy the BSP application SWN_MESSAGE1 and adapt the different views. The name of the controller and the views must not be changed. There is one view for each delivery type and granularity.



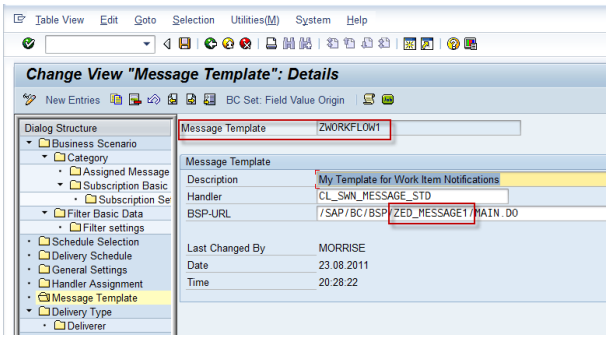
If required the controller class can be exchanged to have more influence on the e-mail content generation.

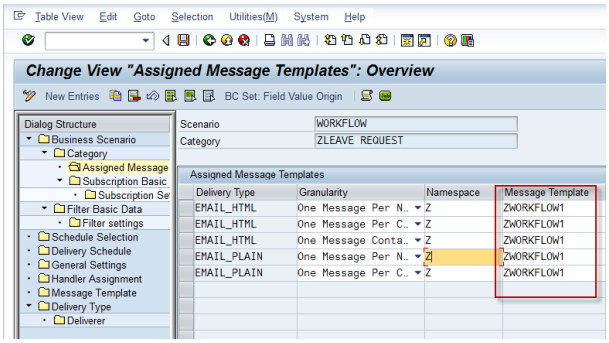


The BSP application must be maintained in SWNCONFIG:

1. Create a new message template

2. Assign this message template to your category





3. Own Handler Classes

The notification framework is based on handler classes (ABAP classes). The classes are referenced in SWNCONFIG.

At the category e.g. there is the category handler (CL_SWN_CATEGORY), notification handler (CL_SWN_NOTIF_WORKFLOW) and the handler for user (CL_SWN_USER_STD). It is possible to create your own handler classes by inheriting from the standard classes. Afterwards they have to be maintained in SWNCONFIG (in this case at the category).

During runtime these classes are used instead of the standard classes. This allows the implementation of additional requirements.

4. Alternative Visualization for the Work Item Execution (Transaction SWFVISU)

The e-mail can contain a link to start the work item execution (parameter SHOW_ACTION_EXECUTE_AS). The transaction SWNWIEX is called to trigger the execution. The BOR method or the method of the ABAP class of the underlying task is called. In this case the execution is usually based on Dynpros.

More and more SAP applications deliver other applications (e.g. WebDynpro ABAP) for their business objects. If such an application should be called instead of SWNWIEX a customization in SWFVISU is required.

SWFVISU is intended for the work item execution via the UWL. The Extended Notifications also support the customizing of SWFVISU but in a very limited way.

See documentation in SAP Help Portal

The Extended Notifications generates URLs for the following visualization types:

- Business Server Pages
- BSP Blueprint
- Web Dynpro ABAP

- Web Dynpro Java (see class CL_SWN_URL_GENERATOR)

URL Generation: The extended notifications do not evaluate expressions of the UWL, with the exception of ${item.externalId}. This is expression is replaced by the workitem ID. In addition the WorkitemID is added to the URL by using parameter name WI_ID.

Transaction SWNADMIN

SWNADMIN is a transaction, which call the Business Server Page application SWN_CONFIG. It offers a simplified customizing UI. It generates most of the customizing entries.

- Disadvantages of SWNADMIN: It does not support the transportation of the customizing. So it's suitable for local configuration in a system. If the customizing should be transported into other systems the transport request would have to be created manually via SWNCONFIG.
- It supports only the scenario WORKFLOW.
- Not all available customizing options are available in SWNADMIN (e.g. handler classes cannot be maintained, only specific general settings can be maintained, ...)

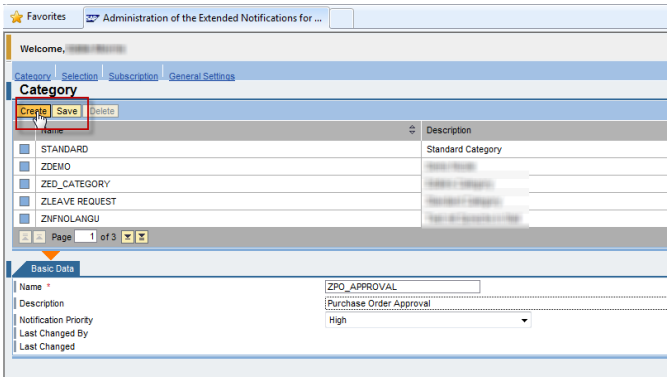
Customizing via SWNADMIN

The terminology used in SWNADMIN differs from the terminology used in SWNCONFIG. The reason is that many customizing entries (e.g. filter, assigned message templates, ...) are generated in the background. The following sections describe the steps in SWNADMIN and describes which entries are generated in the background.

1. Category

Configuration in SWNADMIN

- Create a category. Enter the name.
- Choose the message priority and Save.



Generation in background

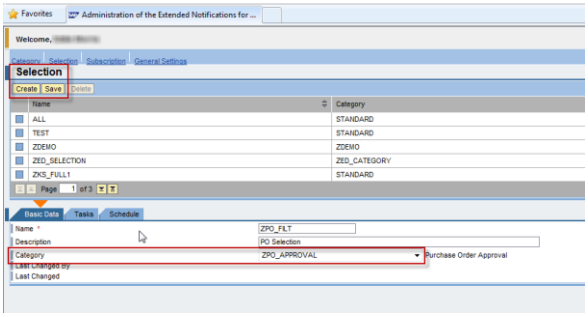
- The new category is created and assigned to scenario WORKFLOW. -> The default category of scenario WORKFLOW is copied.
- The message templates are assigned to the new category. -> The message templates, which are assigned to the default category of scenario WORKFLOW are used.

2. Selection

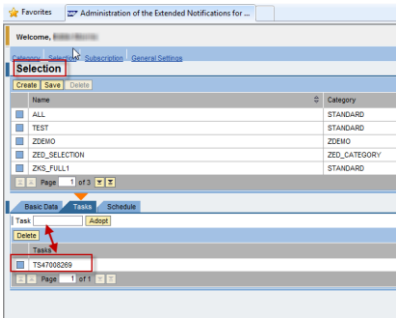
Configuration in SWNADMIN

- Create a selection. Enter the name e.g. ZPO_FILT.
- Assign the newly created category.
- Enter the tasks that should be considered.
- Enter the schedule data. The data of area 'Select All Work Items of Selected Tasks' is used for the FULL filter. The data of area 'Select only new and changed work items of the selected tasks' is used for the DELTA filter.

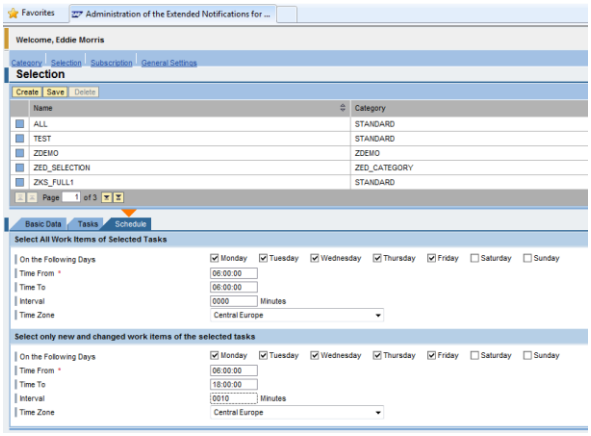
Assign Category



Enter Task



Enter schedule data



Generation in background

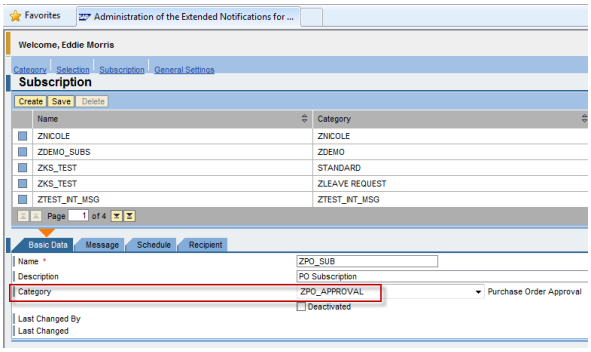
- A filter pair is generated. This means a FULL filter is generated with ID <name>_FULL, e.g. ZPO_FILT_FULL. A DELTA filter is generated with ID <name>_DELTA, e.g. ZPO_FILT_DELTA. Both filter are connected via the field 'Main filter'.
- The category is assigned to both filters.
- Within the filter settings the DELTA setting is set for the DELTA filter.
- The tasks are assigned to both filters.
- For each filter a selection schedule is generated. The IDs are <name>_FULL (e.g. ZPO_FILT_FULL), <name>_DELTA (e.g. ZPO_FILT_DELTA). The filter is assigned to its schedule.

3. Subscription

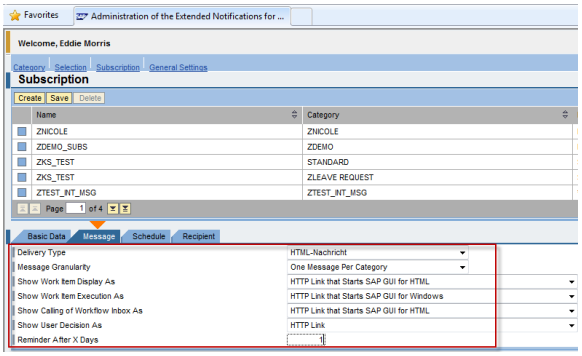
Configuration in SWNADMIN

- Create a subscription and enter the name.
- Assign the newly created category.
- Tab Message: Define how the message should look.
- Tab Schedule: Create a new schedule or choose an existing schedule.
- Tab Recipient: Define the recipients of the messages. (It's not possible to enter a handler in SWNADMIN.)

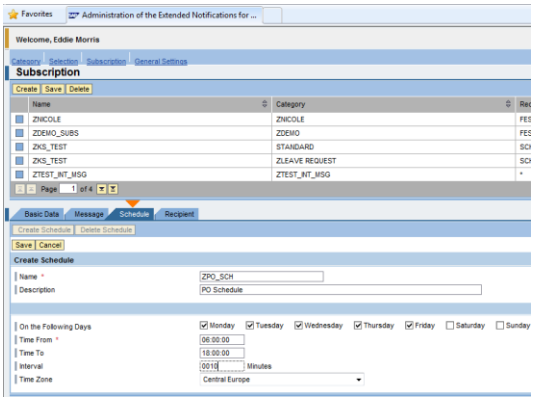
Assign Category



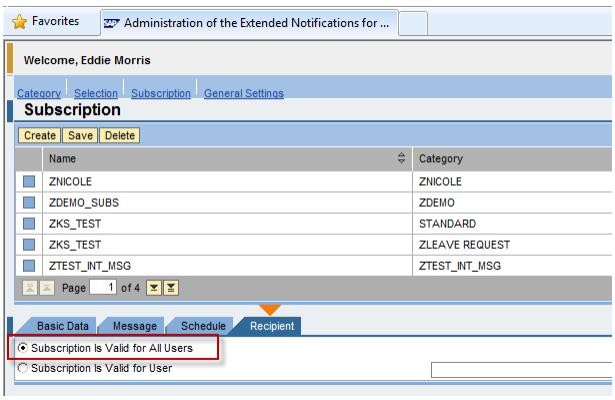
Define Message



Create Schedule



Define Recipients



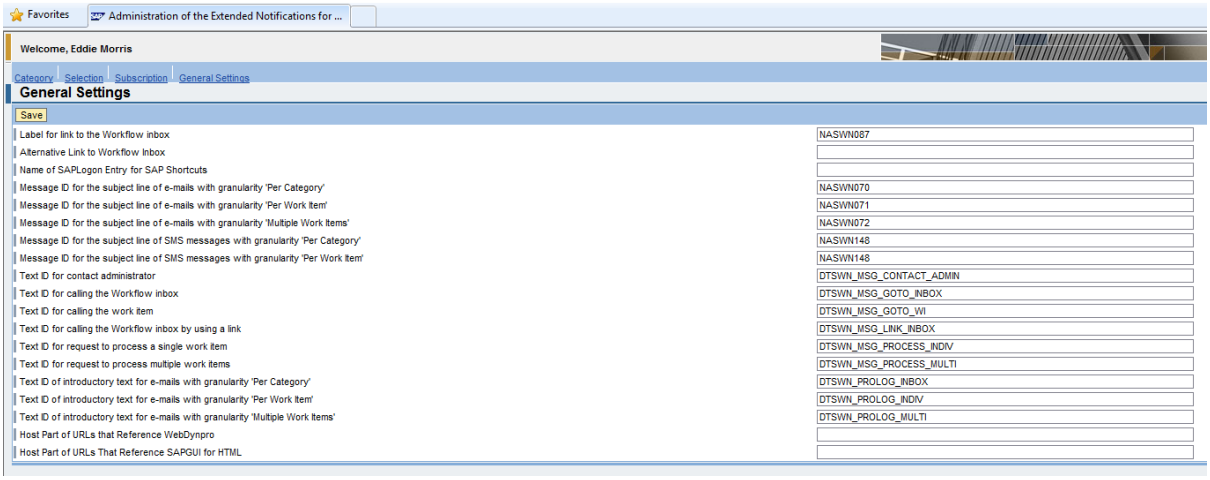
Generation in background

- If a new schedule was created, a delivery schedule is created.
- A subscription is generated.
- The category and the schedule are assigned to the subscription.
- The recipient is set with recipient type RML.
- The subscription settings are set.

4. General Settings

Configuration in SWNADMIN

- Maintain the general settings. Be aware that not all settings are available in SWNADMIN.



Generation in background

- The general settings are set.

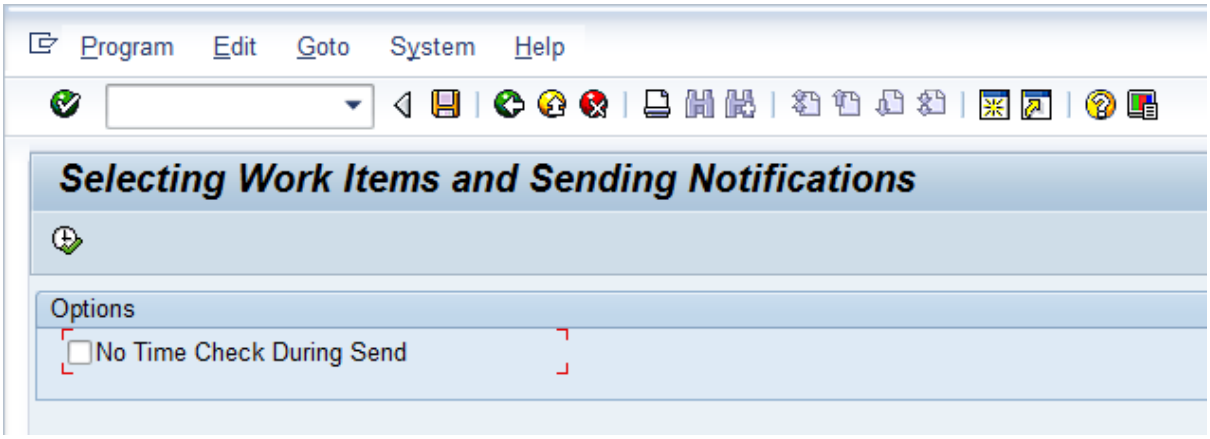
Chapter 3: Additional Runtime Details

1. SWN_SELSEN

Program SWN_SELSEN must be scheduled as a batch job to send out e-mails via the Extended Notifications. The frequency should be adjusted to the selection and delivery schedules created via the customizing. Usually SWN_SELSEN is scheduled more frequently to ensure that the selection and delivery schedules can be served.

The notification process via SWN_SELSEN consists of two phases: selection and delivery. For each phase a schedule must be created via the customizing - selection schedule and delivery schedule. The actual processing is done only if the corresponding schedule is due.

If checkbox 'No Time Check During Send' is marked, the program does not check whether the delivery schedules are due. This means all existing delivery schedules are processed and the e-mails are sent out.



2. Technical Aspects

BSP Application SWN_MESSAGE1 - Generation of E-Mail Content

The BSP application SWN_MESSAGE1 is called during delivery phase for each e-mail/SMS to create the content. It consists of the following components:

Controller	Class	Description
main.do	CL_SWN_MESSAGE_CONTROLLER	The controller class retrieves the message object via cl_swn_transfer. Depending on the notification granularity and delivery type it calls the appropriate view to generate the e-mail content

View	Delivery Type + Granularity	Description
html_inbox.htm	EMAIL_HTML + One message per category (C)	HTML e-mail, which contains just general information like 'You have new work items'
html_indiv.htm	EMAIL_HTML + One message per notification (1)	HTML e-mail, which contains information about one work item
html_multi.htm	EMAIL_HTML + One message contains multiple notifications (N)	HTML e-mail, which contains information about a list of work items
plain_inbox.htm	EMAIL_PLAIN + One message per category (C)	Text e-mail, which contains just general information like 'You have new work items'
plain_indiv.htm	EMAIL_PLAIN + One message per notification (1)	Text e-mail, which contains information about one work item
plain_multi.htm	EMAIL_PLAIN + One message contains multiple notifications (N)	Text e-mail, which contains information about a list of work items
sms_inbox.htm	SMS + One message per category (C)	SMS, which contains just general information like 'You have new work items'
sms_indiv.htm	SMS + One message per notification (1)	SMS, which contains information about one work item

IMPORTANT: SICF Service

Be aware that a BSP application requires an SICF service. The service is created automatically when creating the BSP application. You can find the service assigned to BSP application SWN_MESSAGE1 via transaction SICF -> path: /default_host/sap/bc/bsp/sap/swn_message1.

In transaction SICF you can search for the service via the service name (-> SWN_MESSAGE1). The service must be active so that the BSP application can be called. Otherwise e-mails cannot be created and sent out.

ATTENTION: SWN_MESSAGE1 is replaceable

The BSP application is configured in SWNCONFIG at the message templates. You can work with your own BSP application, e.g. if you want to change the layout of the e-mails. If you want to create your own BSP application it is important that you copy SWN_MESSAGE1 because the names of the view should not be changed. The reason is that the view names are hardcoded in the controller class CL_SWN_MESSAGE_CONTROLLER. You can re-use this controller class within your BSP application. It's not required to copy the controller class. But if CL_SWN_MESSAGE_CONTROLLER is not sufficient for your customer requirements you can copy the controller class in addition. In this case you have more influence on the e-mail content generation. If you use your own BSP application the assigned SICF service must be active.

3. RSWNNOTIFDEL

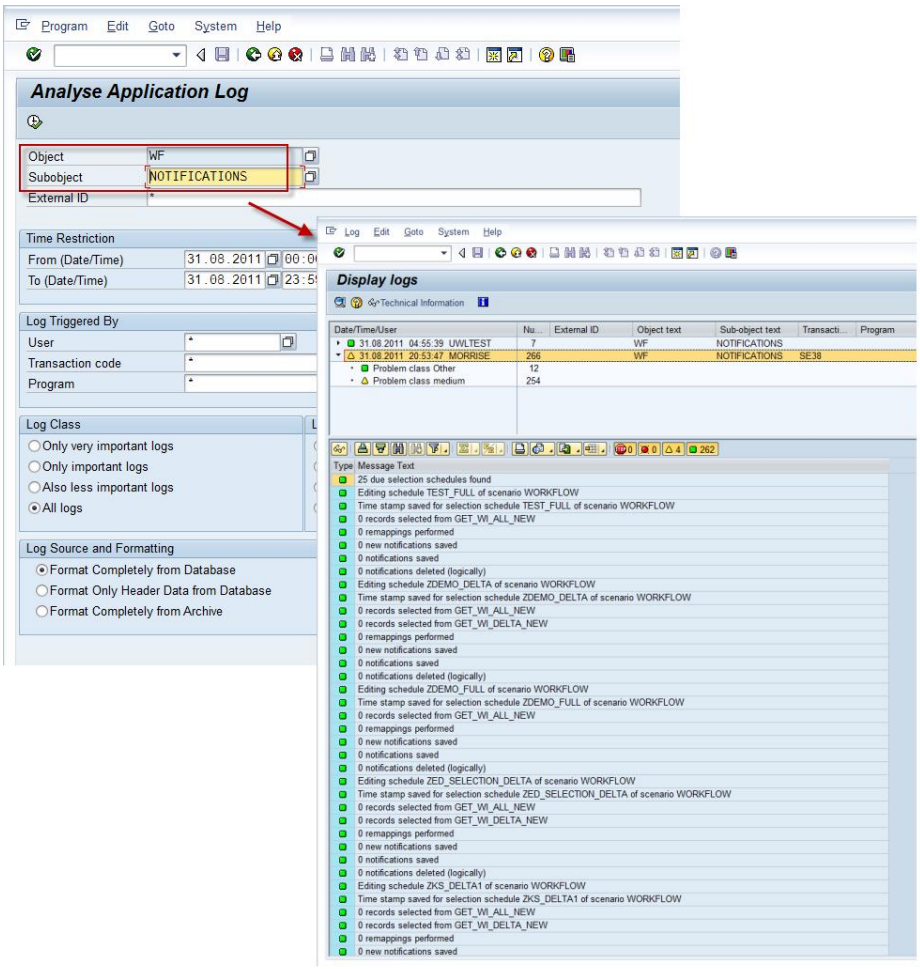
When a work item disappears from the user's inbox (e.g. work item is completed, cancelled, forwarded to another user, etc.) SWN_SELSEN recognizes that. The corresponding notification is set to status 'Logically Deleted' (L) in SWN_NOTIF. The physical deletion is done by program RSWNNOTIFDEL. This program has to be scheduled periodically, e.g. once a day. For further details please review the online help.

4. General Information – Substitiution, Duet & Alloy and the Application Log

(a) Limitations with Substitution: Personal substitution is supported. This means these substitutes are also notified about work items via the Extended Notifications. But position-related substitutions are NOT supported.

(b) RSWNUWLSEL, RSWNSEL: The programs RSWNUWLSEL and RSWNSEL are inherited from SWN_SELSEN. RSWNUWLSEL is exclusively intended for the UWL for the Delta Pull Mechanism. RSWNSEL is used by the Information Worker Solutions (Duet, Alloy) to retrieve work items.
IMPORTANT: SWN_SELSEN sets an enqueue at the beginning to ensure that only once instance of the program can be processed. The same is done by RSWNUWLSEL and RSWNSEL. Each of the three programs work with the same enqueue. This means SWN_SELSEN, RSWNUWLSEL and RSWNSEL cannot run at the same time.

(c) Application Log: Transaction SLG1 is available and displays the runtime log information for Extended Notification **as well as RSWUWFML2**.



(d) Important Transaction Codes

Transaction	Description
SWNCONFIG	Customizing of the Extended Notifications
SWNADMIN	Customizing of the Extended Notifications via BSP application
SLG1	Display the application log (Object=WF, Subobject=Notifications). Be aware that RSWUWFML2 uses the application log with same object and subobject.
SICF	Check the services for the BSP applications and the service shortcut.
SOST	SAP Office sends requests. Display the e-mails in the SAP system which were sent out.

(e) Sources of Information: Please review the Online Help