Development Workbench - Notifications Oracle FLEXCUBE Universal Banking Release 14.6.2.0.0 Part No. F72916-01 [November] [2022]



# Contents

	201100		
1	Pref	ace	3
	1.1	Audience	3
2	Intro	oduction	3
	How to	o use this Guide	3
3	Noti	fication – Getting started	4
	3.1	What is Notification	4
	3.2	Notification Trigger	4
4	Noti	fication Development	4
	4.1	Pre-request for Notification development and testing	4
	4.2	Notification specification	5
	4.3	Notification XML development	5
	4.4	Notification Process	5
	4.5	Development process in Development Workbench	5
	4.6	Notification Trigger	6
	4.7	Notifications	12
5	Dep	loy Notification	18
	5.1	Notification - Workbench related deployment	18
	5.2	Notification Trigger deployment	18
6	Test	Notification	18
	6.1	Notification flow	19
	6.2	Scheduler based notification	19
	6.3	MDB based notification flow	20
	6.4	Triggering notification and testing	21

# 1 Preface

This document describes the steps to develop the notification XML and notification trigger using Oracle FLEXCUBE Development Workbench for Universal Banking.

### 1.1 Audience

The Development Workbench Notification Development book is intended for the FLEXCUBE Application Developers who perform the following tasks:

Develop new Notification

10 Use this manual, you need conceptua	and working knowledge of the below:
Proficiency	Resources
FLEXCUBE UBS Development	FCUBS-FD01-01-01-Development
overview	Overview Guide
Interface Getting started	FCUBS-FD04-01-01-Interface Getting started

To Use this manual, you need conceptual and working knowledge of the below:

Interface Getting started	FCUBS-FD04-01-01-Interface Getting started
FLEXCUBE Development Workbench for Universal Banking Reference	User manuals
Web service development to have query web service in place	FCUBS-FD02-03-01-RAD Web Service Development

# 2 Introduction

# How to use this Guide

The information in this guide includes:

- <u>Chapter 3, "Introduction"</u>
- Chapter 4, "Notification Getting started"
- <u>Chapter 5, "Notification Development"</u>
- <u>Chapter 6, "Deploy Notification"</u>
- <u>Chapter 7, "Test Notification"</u>

# 3 Notification – Getting started

### 3.1 What is Notification

Notification framework in FLEXCUBE UBS is used to communicate the business event happened in FLEXCUBE UBS to external systems. Depending upon the event, the XML message is pushed to external system's asynchronous Queues for their consumption.

## 3.2 Notification Trigger

Notification Triggers is developed to recognize the event and then invoke the notification process. This trigger is developed using Development Workbench.

# 4 Notification Development

### 4.1 Pre-request for Notification development and testing

Following are pre-request for notification development:

- Target FLEXCUBE Environment with Notification framework installed
- Development Workbench link mapped to the FLEXCUBE environment
- Required Query Web services developed and tested

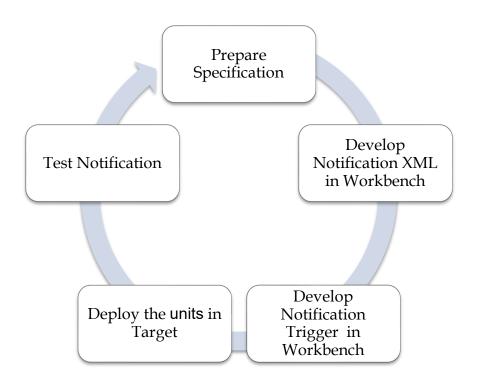


Fig 5.1.1: Development of Notifications

## 4.2 Notification specification

Identify the notification requirement as below

- What is the Notification function ID name for RAD XML (Third character should be N)?
- What is the Notification code?
- What is the Base table in FLEXCUBE UBS that triggers the notification?
  - What operation at base table triggers (insert/update/delete)?
  - What is the where clause for filter?
- What is the query Web service to be used?
  - What is the operation?
  - What are the tags required?

#### Example;

- Notification function ID name STNCUMOD
- Notification code NOTIF\_CA\_CUSTACC\_MOD
- Base table STTM\_CUST\_ACCOUNT
  - Operation DELETE
  - $\circ$  Filter Account class type in (S, U)
- Web service to be used *FCUBSAccService* 
  - Operation *QueryCustAcc*
  - Request node Cust-Account-IO

### 4.3 Notification XML development

Notification RAD XML development creates the following files:

- RAD XML
- SPC
- SQL
- Static Data

### 4.4 Notification Process

There will be one trigger for the base table of notification and in case of multiple notifications sharing the same base table, there will be no new triggers created. Instead the same trigger created on the base table will be reused. This approach reduces the number of triggers being used for notifications.

# 4.5 Development process in Development Workbench

The notification development process in Workbench is split into two steps:

- 1. Notification Triggers
- 2. Notification Filter Procedure

The first step is to create notification triggers for base tables. The trigger generated from Workbench will be inserting key details into a static notification log table. The following details will be captured:

- Trigger code: A unique value to for a notification trigger.
- Base Table: The base table on which, the trigger is built.
- When Clause: A simple when clause for the notification trigger.

The second step is to capture details of notifications and generate the notification filter procedure. The following details are captured:

- Notification code: A unique value to identify a notification.
- Description: Meaningful description of the notification.
- Gateway Service:

### 4.6 Notification Trigger

After successful login to Development Workbench click on Notification Trigger option in the tree as shown below:

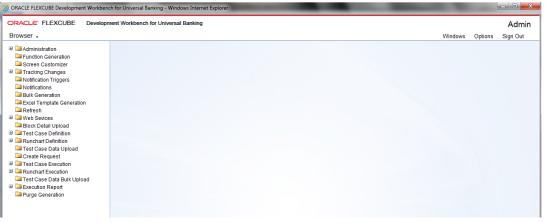


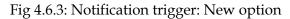
Fig 4.6.1: Notification trigger

Notification Trigger		- ×
		🧧 🛛   🖬 📴 🍃   🖗 🥥 🔿
Trigger Code *	Base Table *	1
Description Firing Time	Before  PK Types *	
Each Record	Yes v Data Types	
Selected Columns	Notification Codes	
Trigger When Clause		
Trigger Logic( Set \$NC	OTIFY To Y/N)	
	А	
	*	

Fig 4.6.2: Notification trigger options

Notification Trigger we have two options - Add a new Trigger or Modify Existing one. **New:** 

Notification Trigger	_ ×
	🗎 🛛   🖬 🌃 🏠   77 🍿 🔿
Trigger Code * TRG_CUSTADDR	Base Table * MSTM_CUST_ADDRESS
Description Trigger for Customer Address Maintenand	PK Cols * CUSTOMER_NO~LOCATION-MEDIA
Firing Time After *	PK Types * VARCHAR2-VARCHAR2-VARCHAR2
Each Record Yes 🔻	Data Types
Selected Columns Trigger When Clause (new.auth_stat='A')	Notification Codes
migger witer Glause (non-addr_stat=A)	
Trigger Logic( Set \$NOTIFY To Y/N )	
IF NVL(:old.once_auth, 'N') <> 'Y' THEN I_Operation := 'INSERT';	·
ELSE	
I_Operation := 'UPDATE'; END IF;	
	-
I	



**Trigger Code:** A unique value to for a notification trigger. Follow the naming conversion it should start with **TRG\_XXXX**. This is mandatory field. This attribute signifies the trigger code created as part of trigger creation step in OTD. Each notification will be linked to a trigger code.

**Description** : Information field. Meaningful description of Trigger is to be given.

**Firing Time** : Specify when trigger needs to fired. We can create only BEFORE and AFTER triggers for tables. (INSTEAD OF triggers are only available for views; typically they are used to implement view updates.) (After/Before).

**Each Record:** specify for each row required or not. If FOR EACH ROW option is specified, the trigger is row-level; otherwise, the trigger is statement-level. **(Yes/No)** 

**Base Table:** The base table on which, the trigger is built. This is mandatory field. Select a valid table from available LOV next to the field.

**Pk Cols:** Enter Primary key fields of table in tilde (~) separated format. This is mandatory field.

**Pk Types:** Enter Primary key type of the corresponding primary key field. This is mandatory field.

#### Selected Columns and Data Types: Defunct

**Trigger When Clause:** A simple when clause for the notification trigger. A trigger restriction can be specified in the WHEN clause, enclosed by parentheses. The trigger restriction is a SQL condition that must be satisfied in order for Oracle to fire the trigger. This condition cannot contain sub queries. Without the WHEN clause, the trigger is fired for each row.

**Notification Codes:** If the trigger is associated with a specific notification code, then the particular notification code has to be provided in the field. If the trigger is shared across many Notifications, field can be left empty

Front-End Files	System Packages	Hook Packages		Meta Data		Othurs	*
RadKML    Screen Xml    System JS	Hain Package Spec Main Package Body Notification Trogers Upload Package Spec Upload Package Body	Kernel Package Spec Kernel Package Body Citualer Package Body Cutsher Package Body Cutsher Package Body	Menu Details Datasource Details LOV Details Block Details Screen Details Arnendable Details Call form Details Summary Details	Label De Block PK Function Galeway Notificati Function Purge De	Columns Call Forms Details on Details Parameters	Xsd3 Xsd3 With Annolations Careen Hinh Uptoad Table Trigger Uptoad Tables Definition Archive Table Definition	Ŧ
SLNo		File Name		File Typ	¢	Status	•
1 G\	WTR#_TRG_CUSTADOR lrg		т	RG			
2 G)	WTM_NOTIFICATION_TRIGGERSTRG_C	NISTADOR INC	I	NC			
3 TF	RG_CUSTADOR_RAD xml		F	RADIXML			
		×					
	Error Description	Error Code ARD-SAVE-007					
							v

Fig 4.6.4: Notification trigger: Generation

On successful save Notification Trigger will generate two files (gwtr#\_<trg-code>.trg and GWTM\_NOTIFICATION\_TRIGGERS\_\_<trg-code>.INC) user needs to compile them in FLEXCUBE schema.

Modify:

ication Trigger		-
		🗎 🗶 🖬 📅 🦕 🖓 🇐
Trigger Code *	Base Table *	
Description 📃	PK Cols *	
Firing Time Before -	PK Types *	
Each Record Yes *	Data Types	
Selected Columns	Notification Codes	
Trigger When Clause		
Trigger Logic( Set \$NOTIFY To Y/N )	*	
	-	
	*	

Fig 4.6.5: Notification trigger: Modification

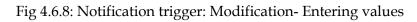
tification Trigger									×
							<u>(</u>		
		_				_			
			igger Code			<			
Trigger Code *		×5							
Description			Trigger Code						
Firing Time									
Each Record	Yes 💌								
Selected Columns					Search Reset				
Trigger When Clause					<< < 10f5 > >>				
Trigger Logic( Sel 4H	ODEY TO YOU			Trigger Code					
			CUST_AC_BRN_TFR	rigger ooue					
			LOAN_BRN_TRFR						
			TD_AC_BRN_TFR						
			TRG_APP_DETAIL						
			TRG_BLKDELMSTR						
			TRG_BRTMMSTR						
			TRG_CATDET						
			TRG_CFRAMSTR						
			TRG_CHBK						
			TRG_CLAC						
			TRG_CLTMPRD						
			TRG_CONT						
			TRG_CSTBCTRT						
			TRG_CSTMPRD						
			TRG_CUST						
					Y				

Fig 4.6.6: Notification trigger: Modification-Selecting Trigger name

Notification Trigger			_ >
		×	I I 🖬 🍗   🖓 🎯 ৰ
			Execute Query
	_		
Trigger Code *	TRG_CUSTADDR Al Base Table *		
Description	PK Cols *		
Firing Time	Before v PK Types *		
Each Record	Yes   Data Types		
Selected Columns	Notification Codes		
Trigger When Clause			
Trigger Logic( Set \$NO	TIFY To Y/N )		
	*		
	~		

Fig 4.6.7: Notification trigger: Modification- Entering values

Notification Trigger								_ ×
				×	I I7	2	17	ⓐ ⇒
				-	<u> </u>	j 🖬 :	V	19 V
Trigger Code *	TRG_CUSTADDR		MSTM_CUST_ADDRESS					
Description	Trigger for Customer Address Maintenanc		CUSTOMER_NO~LOCATION~MEDIA					
Firing Time	After 👻	PK Types *	VARCHAR2~VARCHAR2~VARCHAR2					
Each Record	Yes 👻	Data Types						
Selected Columns		Notification Codes						
Trigger When Clause	(new.auth_stat='A')							
Trigger Logic( Set \$NO								
IF NVL(: I Ope	old.once_auth, 'N') <> 'Y' THEN ration := 'INSERT';		<u> </u>					
ELSE								
LOpe END IF;	ration := 'UPDATE';							
210 11,								
			-					
								I



ation Trigger							
							1 + 17
erote Rad Files							
Front-End Files	System Packages	Hook Paokages		Meta Data		Others	^
] RadXML Screen Xml System JS	Main Package Spec Main Package Body Notification Triggers Upload Package Spec Upload Package Body	Kernel Package Spac Kernel Package Body Cluster Package Spac Cluster Package Body Custom Package Spac Custom Package Body	Menu Dejalis Datasource Delalis UOV Details Bilock Delalis Screen Details Amendable Details Call form Delalis Summary Details	Galew:	PK Columns on Call Forms ay Defails ation Defails on Parameters	XadS Xad With Annolalions Screen Himl Upload Table Trager Upload Tables Definition Archive Table Definition	
SLNo		File Name		File T	ype	Status	*
GWTR#_	TRG_CUSTADOR Irg			TRG		Generaled -	
GWTM_I	NOTIFICATION_TRIGGERSTRG_C	USTADOR INC		INC		Generaled *	
TRGCL	JSTADDR_RAD.xml			RADXML		Generaled +	
nformation	Description	Error Code	<				
Request succes	sfully Processed	RD-SAVE-007					

Fig 4.6.9: Notification trigger: Modification-Successful Generation

# 4.7 Notifications

Notifications Screen will be used to create new notification or modify existing notification; here we capture notification information for notification codes. We save notification details into xml.

							K   7	g
	Notification Function		Action None -	Save XML	Path			
Notification Code			м	odule				
Description	ı		Module Descr	ption				
Notification Xsc	d		Base	Fable *				
Firing Time	-		PK	Cols *				
Filter Type	₹		PK	'ypes *				
Gateway Service				Full Screen Reply				
Gateway Operation	1			HO Only				
Gateway IO Request	t							
Type XSD Name	FY To Y/N & Refer Current Record a							
				*				
Web Service Ta	ags				+ -			
Order	Xsd Field	Table Field	Data Type	Maximum Length	~			

Fig 4.7.1: Notification Screen

**Action:** We can choose either new or Load action. New to create a new notification and Load is used to modify the existing one.

**Save Xml Path:** Specify the path to save notification xml. This would be considered only if the Save Mode is Client and Work Directory is specified as \$CURRENT\_DIRECTORY

Notification Function: Specify the notification function-id name.

#### Conventions:

*Maximum 8 chars.* 3<sup>*rd*</sup> *letter must be 'N'. Example: FTNCONON* 

**Notification Code:** Enter the notification code to which we need to capture values. This is Mandatory field.

#### Recommended Convention for Notification Codes:

NOTIF\_<Module Code>\_<Description> Example: NOTIF\_LD\_CONTRACT This is the notification indicating that a LD contract has been created/modified

**Description:** Information field. Meaningful description of the Notification has to be provided in the field

Module: This attribute signifies the module on which the notification is based.

**Module Description:** Information field. Module Description which would be defaulted from Module LOV

**Notification XSD**: Notification XSD name will have to be provided in the corresponding Field. Naming convention to be followed while naming Notification XSD is as follows

[Module Name] – [Notification Description] – Notif.xsd Example: FT-Contract-Notif.xsd

Notification XSD has to be provided only if no Gateway Web Service Query Operation is configured to the Notification

Base Table: Select the base table on which trigger needs to be applied.

**Firing Time**: Indicates the Operation on the base Table for which Notifications has to be sent. Options available are Insert, Update or Both

Filter Type: This attribute can take the following values.

- 1. Where clause
- 2. Plsql block

Pk Cols: Enter Primary key columns of the Base Table.

Pk Types: Enter Primary key field Data Types.

Provide details of Gateway Service, Operation, Type XSD Name and Full Screen Reply if a Query Web Service has to be mapped to the Notification

**Gateway Operation:** The gateway operation name to execute query for the mentioned Service.

Gateway Service: The gateway service to be used to get the full screen response.

Gateway IO Request: The gateway IO request node to be used in querying operation.

**Type XSD Name:** This field has to be entered if Notification is mapped to a Service and Request. Name of the Master Type XSD for the service and operation has to be provided here. This can be found in include portion of the Request Msg XSD of particular Service-Operation

Example: LC-Contract-Types.xsd

**Full screen Reply:** This attribute decides whether full screen or primary key notification response to be sent. This is applicable only if gateway Service details are provided

HO only: This attribute is used to send notification only from head office.

**Filter Logic:** The filter logic which decides whether the notification needs to be sent or not. This can be a simple where-clause on base table or a complex pl/sql block.

**Web service Tags:** The columns selected from base table as part of web service tags, will be used to send the full screen notification response. These tags defines the elements of Notification Xml when no Query service is mapped to it:

Front-End Files	System Packages	Hook Packages		Meta Data	Others	
RadXML Screen Xml System JS	<ul> <li>✓ Main Package Spec</li> <li>✓ Main Package Body</li> <li>Notification Triggers</li> <li>Upload Package Spec</li> <li>Upload Package Body</li> </ul>	Kernel Package Spec     Kernel Package Body     Cluster Package Body     Cluster Package Body     Custom Package Spec     Custom Package Body	Menu Details Datasource Details LOV Details Block Details Green Details Amendable Details Call form Details Summary Details	Label Details Block PK Columns Function Call Forms Gateway Details Votification Details Function Parameters Purge Details	Xsds Screen Html Creen Html Upload Table Trigger Upload Table Definition Archive Table Definition	
SLNo	F	ile Name	File Type		Status	
SLNo		ile Name	File Type		Status	

Fig 4.7.2: Notification Screen generation

Front-El	nd Files System	Packages	ages Hook Packages		Meta Dala		Others	
2 RadXML 3 Screen Xmi 3 System JS	(m) Main Package Body		Kemel Package Spec     Menu Details     Kemel Package Body     Datasource De     Cluster Package Spec     LoV Details     Custer Package Spec     Soreen Details     Custom Package Spec     Custom Package Body     Loc Details     Custom Package Body     Custom Package     Custom Package Body     Custom Package Bo		Function Call Forms Galeway Defails Notification Defails		Xsds     Xsds     Xsdwth Annotations     Screen Hintl     Upload Table Trigger     Upload Tables Definition     Archive Table Definition	
SLNo			File Name		File Type		Status	~
	fipks_ftnconon_main.spc			s	PC		Generated +	
	flpks_ftnconon_kernel.spc			5	PC		Generated *	
	fipks_ftnconon_main.sqi	Information				×	Generated 👻	
	flpks_ftnconon_kernei.sqi						Generated 💌	
	GWTM_NOTIFICATIONS_MAS		Error Description	1	Error Code	1	Generated *	
	GWTM_NOTIFICATION_TAG_		Request successfully Processed	F	RD-SAVE-007		Generated *	
	FTINCONION_RAD.aml				Ok		Generate Cenerate	Exit

Fig 4.7.3: Notification Screen Generation Successful

#### Modifying an Existing Notification RADXML

The process of modifying an existing Notification RADXML is illustrated in the images below

Nolification Function	Action Load 👻	Load Screen Xml B	ROWSE
lification Code *	Nodule		
Description	Choose File to Upload		Ŋ .
	· · · · · · · · · · · · · · · · · · ·	✓ 4→ Search RADXML	
	Organize 👻 New folder	III 🕶 🗍 😧	
Upload File Browse	Downloads ^ Name	Date modified Type	
	SCFTDUP_RAD	xml 12/23/2012 9:48 AM XML F	
	Desktop		
	RECORD		
	B panraju		
	System (C:)		
	Data (Dr)		
	FTDDSHBD_RAD.     FTDMSHBD_RAD.     FTDMSKCH_RAD		
	FIEXCUBE_Kerr FTDMT101_RAD	xml 12/23/2012 9:48 AM XML F 👻	
		· · · · · · · · · · · · · · · · · · ·	
	File name:	▼ All Files (*.*) ▼	
		Open Cancel	
			ע
Order Xsd Field Tal		Iximum Length	

Fig 4.7.4: Notification Screen Loading

														×	1
			Notification Function FT	INCONON		Actio	n Load 👻			Save Xml Pa	th FTNCONO	I_RAD.xml	BROWSI		
ſ	Notificat	ation Code *	NOTIF_FT_CONTRACT					Module	FT			]			
		Description	This is the notification in				Mod	lule Description	Funds Transfer		2				
		ication Xsd							CSTB_CONTR	ACT 🗾					
	Fir	Firing Time	Insert 👻					PK Cols <sup>3</sup>	CONTRACT_R	EF_NO					
	F	Filter Type	Plsql Block 🛛 🔻					PK Types *	VARCHAR2						
	Gatewa	vay Service	FCUBSFTService	<b>*</b>					Full Screen	Reply					
G	Gateway C	Operation	QueryContract	×=					HO Only						
Gat	ateway IO	O Request	Contract-Details-IO												
		KSD Name													
ilter L			T_RECORD.module_code	Record as \$CURRENT		otify := 'N';	END IF; RETU	IRN TRUE;	•						
ilter L						OTIFY := 'N';	END IF; RETU	IRN TRUE;							
v	IF \$ Web Se	SCURRENT	T_RECORD.module_code	e = 'FT' THEN SNOTIF'	(:= Υ; ELSE \$N	OTIFY := 'N';			*		+				
V	IF \$ Web Se Orde	ervice Tag	IS Xsd Field	e = 'FT' THEN SNOTIF'	(:= Υ; ELSE \$N Table Field		D	ata Type	Maxim	num Length	+ -				
V	IF \$ Web Se Orde	ervice Tag	15 Xsd Field OURCEREFNO	e = FT THEN SNOTF	Table Field F_NO	22	U D VARCHAR	<b>ata Type</b> 2	Maxim		+				
V	Web Se Orde 1 2	iervice Tag	IS Xsd Field	e = 'FT' THEN SNOTIF'	Table Field F_NO		D	<b>ata Type</b> 2	Maxim						

Fig 4.7.5: Notification Screen Loaded

Descript Notification X Firing Tit Filter Ty							<b>[</b> ]	×	V
Descript Notification X Firing Tit Filter Ty	ode * NOTIF_FT_CONTRAC								
Descript Notification X Firing Tit Filter Ty	tion This is the notification	-	Actio	n Load 👻	Save Xml Path FT	NCONON_RAD.xml	BROWSE		
Notification X Firing Tit Filter Ty				Module	FT	<b>*</b> E			
Firing Ti Filter Ty	Ksd	indicating that a FT 🖓		Module Description	Funds Transfer	$\sim$			
Filter Ty				Base Table	* CSTB_CONTRACT				
	me Insert 👻			PK Cols	* CONTRACT_REF_NO				
	ype Pisqi Block 👻			PK Types	* VARCHAR2				
Gateway Serv	/ice FCUBSFTService	<b>*</b> E			Full Screen Reply				
Gateway Operat		×E			HO Only				
Gateway IO Requ	est Contract-Details-IO								
Type XSD Na		Record as \$CURRENT_RECORD )							
	-				v				
Web Service	<b>.</b>				+ -	·			
Order	Xsd Field SOURCEREFNO	Table Field EXTERNAL_REF_NO	×E	Data Type VARCHAR2	Maximum Length 64	<b>^</b>			
m 1		EXTERNAL_NEL_NO	×-	VARCHAR2	7				
	CONTREFNO	CONTRACT_REF_NO							
1 2 3		CONTRACT_REF_NO BOOK_DATE		DATE	64				

Fig 4.7.6: Notification Screen Loaded and Modified

# 5 Deploy Notification

### 5.1 Notification - Workbench related deployment

Compile the following files in Target FLEXCUBE UBS Database schema

- Notification Main Package generated from ODT
- Hook Packages
- GWTM\_NOTIFICATION\_TAG\_MAP\_\_\_<Notification Function ID>\_.INC
- GWTM\_NOTIFICATIONS\_MASTER\_\_\_<Notification Function ID>\_.INC

### 5.2 Notification Trigger deployment

Compile the following files in Target FLEXCUBE UBS Database schema

- GWTM\_NOTIFICATION\_TRIGGERS\_TRIG\_CONTRACT.INC
- GWTR#\_TRIG\_CONTRACT.TRG

# 6 Test Notification

This section explains the run time notification flow and testing steps.

### 6.1 Notification flow

The notification process occurs as two parts:

- 1. Oracle JOBs created using FCJ Scheduler framework that sends data required for notification to an internal JMS queue.
- 2. Gateway MBD that lists on internal JMS queue, that picks the notification XMLs and prepare full web service response and send to external system queues.

### 6.2 Scheduler based notification

The Notification Process in FLEXCUBE can be done using the jobs scheduler as follows:

The trigger generated from Workbench will be inserting key details into a static notification log (STTB\_NOTIFICATION)

Once Job is triggered, a request is sent to EJB layer from job execution class and the notification log table will be polled for unprocessed records.

Each unprocessed record is locked.

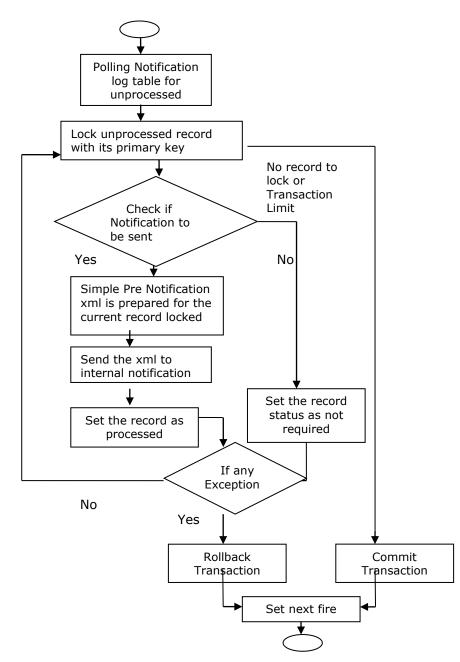
The record is verified against the notification maintenance and checked whether notification is to be sent or not.

If notification is to be sent, pre notification message xml is built and it is sent to internal NOTIFY\_QUEUE(JMS queue) configured in Gateway layer.

The job is then rescheduled to fire next time based on the previous execution.

Refer Gateway Installation documents on how to setup the Queues.

Flow Chart for Notification Flow in Scheduler

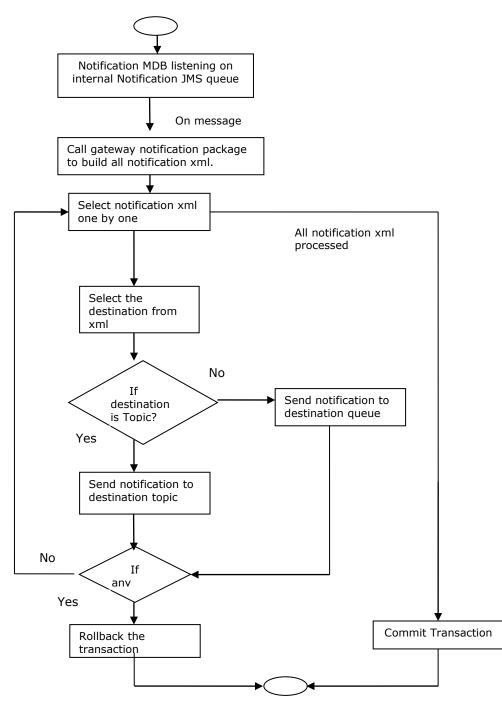


### 6.3 MDB based notification flow

Notification processes in MDB are as follows:

- 1. Notification MDB listens on the internal NOTIFY\_QUEUE(JMS queue)
- 2. On any message received, the MDB identifies which schema to connect using the JNDI name being present as part of the message xml.
- 3. Gateway notification processing package is called from MDB to build notifications.
- 4. In MDB, the notifications built is processed and sent to the destination specified in corresponding notification.
- 5. In case of exception the transaction is rolled back.
- 6. If all notifications are successfully processed, transaction is committed.

#### Flow Chart for Notification Flow in MDB



## 6.4 Triggering notification and testing

Follow the below steps to test notification:

- Simulate a case where base table under goes data change.
- Check record populated at STTB\_NOTIFICATION table
- Check Notification message
   GWTBS\_NOTIFICATIONS\_LOG.NOTIFICATION\_MESSAGE



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