Oracle SOA Suite 11g R1 PS5

SOA Suite for healthcare integration Series

Domain Value Map (DVM) – On-the-fly Code Mapping

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Introduction

In this article the routing and transformation solution developed in the article entitled "SOA Suite for healthcare integration Series – Routing and Transformation using XSL Solution, will be extended to add an on-the-fly code mapping. This does not have anything to do with HL7 or HL7 processing, or indeed SOA Suite for healthcare integration infrastructure, but since the task is a pretty common one in the HL7 messaging world, it will be discussed and illustrated.

This article assumes that the reader has the SOA Suite for healthcare integration environment with all necessary components installed and ready to use. The Bill of Materials for such an environment and a discussion on where the components can be obtained is provided in the earlier article, "SOA Suite for healthcare integration Series - Overview of the Development Environment", to be found at

http://blogs.czapski.id.au/2012/08/soa-suite-for-healthcare-integration-series-overviewof-the-development-environment.

This article assumes that the reader completed the solution discussed in the earlier article, "SOA Suite for healthcare integration Series – Routing and Transformation using XSL Solution", to be found at

http://blogs.czapski.id.au/2012/12/soa-suite-for-healthcare-integration-series-routing-and-transformation-using-xsl-solution.

Solution Overview

Domain Value Map, the infrastructure functionality found, amongst others, in the Oracle XSL transformation technology implementation, allows one to define a "mapping table" consisting of a set of an original values and a substitution values, and a default (when an original value is not found), and to configure a XSL transformation to perform the substitution as transformation proceeds. In this case the "mapping table" is stored as a XML file, which can be transiently modified at runtime using a web-based UI. Other mechanisms, which use database tables, also exists, but will not be discussed here.

The solution components are depicted in Figure 1 Solution Components.



Figure 1 Solution Components

The diagram uses the convention which clearly separates the external systems, the SOA Suite for healthcare integration-specific components and generic SOA Suite components using the "swim-line" analogy.

Since the entire solution, with the exception of the on-the-fly mapping, already exists, we will only modify the "TransformerMediator" component.

As before, the solution will receive a HL7 v2 message, acknowledge it with an immediate acknowledgement and pass it onto the SOA Composite. The immediate acknowledgement will be sent as soon as the message is received and persisted, before it is processed in any way. The acknowledgement received from the HL7 listener will be discarded.

As the "TransformerMediator", which implements and XSL transformation, mapps the segments, fields, conponents and subcomponents of the incoming ADT A01 or A03 message to construct the outgoing ADT A08 message, it will translate / map the gender code, carried in the PID-8 field, inot its equivalent long version, for example "M" into "MALE".

We need to create the Domain Value Map (DVM) and add the DVM Lookup function in the appropriate place in the XSLT to accomplish the taks.

Define Domain Value Map (DVM)

In this section we will define the Domain Value Map, the mapping table containing original and substitute codes.

- □ Start JDeveloper Studio
- □ Make sure the "RouterApp" Application is open open it is it is not

□ Right-click the name of the project, "RouterPrj" and choose "New..."

٩	Oracle JDeveloper 11g Release 1 - Route	erApp.jws : RouterPrj.jpr	
Ei	e <u>E</u> dit <u>V</u> iew <u>Application</u> Refactor	<u>S</u> earch <u>N</u> avigate <u>B</u> uild <u>R</u> un Versi <u>o</u> ning <u>T</u> ools <u>W</u> indow <u>H</u> e	elp
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□ Choose "SOA Tier" \rightarrow "Transformations" \rightarrow "Domain Value Map(DVM)"

New Gallery		×
All Technologies Current Project Tech This list is filtered according to the curren	nologies t project's <u>selected technologies</u> ,	
⊆ategories:	Items:	Show All Descriptions
General General Connections Deployment Descriptors Deployment Profiles 	Cross Reference(XREF) Cross Reference(XREF) Domain Value Map(DVM) A domain value map (DVM) is a domain systems. To enable this option, you mus Application Navigator.	a mapping of domain values among different st select a project or a file within a project in the
SOA TierService Components Transformations	XSL Map XSL Map From XSL Stylesheet	

Name the new DVM "gender_map.dvm", replace "domain1" with "Gender Code", "value1" with "M", "domain2" with "GenderName", "domain2" with "Male" and click "OK"

🖕 Create Domain Value Map(DVM) File	×
A domain value map (DVM) is a mapping of domain values among different domain systems.	
File Name: gender_map.dvm Directory Name:	
C:\JDeveloper\mywork\RouterApp\RouterPrj	Browse
Description:	
Panaia Nanai CanderCada	
Domain Name: [GenderName] Domain Value: Male	
Help ОК	Cancel

□ Pull down the "Plus" button and choose "Add Domain Values"

📲 composite.xml 🗴 🛅 gender_map.	.dvm 🗶	Resource Palette ×
🛗 Domain Value Map(DVM)		📬 🕶 🦓 🕶 Name
		My Catalogs
Name:		V IDE Connections
		🖃 🕀 🔂 🛃 🕀 🔄
Description:		
Map Table:		+ <u>/ ×</u>
GenderCode	GenderName	Add Domain Values
м	Male	Add Domain 45

□ Enter "F" for "GenderCode" and and "Female" for "GenderName"

🛗 Dom	nain Value Map(DVM)	I	
<u>N</u> ame:	gender_map		
<u>D</u> escriptic	on:		
Map Tab	ble:		🕂 🥖 🗙
GenderC	ode	GenderName	
м		Male	
F		Female	

□ Click "Save All" and close the domain value map

📤 Oracle JDeveloper 11g Release 1 - Route	rApp.jws : RouterPrj.jpr : C:\JDeveloper\mywork\RouterApp\RouterPrj\gender_n	1ap.dvr
<u>File Edit View Application Refactor</u>	<u>S</u> earch <u>N</u> avigate <u>B</u> uild <u>R</u> un Versi <u>o</u> ning <u>T</u> ools <u>W</u> indow <u>H</u> elp	
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RouterApp	🖽 Domain Value Map(DVM)	
RouterPrj SOA Content	Name: gender_map	
in testsuites	Description:	
ssd		
Business Rules	Map Table:	
composite.xml	GenderCode GenderName	
gender_map.dvm	M	
	F Female	

We are done. The domain value map is ready. Let's modify the "TransformerMediator" to perform the actual mapping.

Add DVM to TransformerMediator

In this section we will modify the "TransformerMediator"'s XSLT-based mapping file to perrofmr code mapping using the domain value map we which created earlier.

- □ Open the "composite.xml", if not already open
- Double-click the "TransformerMediator" component to open the "mplan" editor
- □ Click the "Mapper File" button

Resequence Off				
Static Routing				
< <filter expression="">></filter>	9 🕉	HCI_HA08_SystemA_Out::send	🌼 Sequential 🕶	
	Validate Semantic		8	
	Transform Using	body : xsl/ADT_To_ADT_A08.xsl	R	
	Assign Values	hc.messageId := oraext:generate-guid()	Select an existing r	napper file or create a new one.

□ Click the "Edit Mapping..." button

≜ R	equest Transformation Map	×	
Tran	sformation from request message B2BMsg to message B2BMsg.		
Tra	nsformation to part: body Use Existing Mapper File: xsl/ADT_To_ADT_A08.xsl Greate New Mapper File:	Edit Mapping.]
	Help	OK Cancel	

□ Expand PID node trees on both sides by one level, expand PID-8 node trees on both sides, repeat for each of the mapping lines between PID-8 field and its attributes: click the line to select it and press the "Del" key to delete the mapping

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Select "Advanced" from the "Component Palette", expand the "DVM Functions" and drag the "lookupValue": function onto the center swim line in the empty space alongside the PID-8 node



Drag from the left-had side PID-8 node to the tiny square at the right of the function box to connect the node to the function, providing node value as the argument

elecomposite.xml 🗴 😽 TransformerMediator.mp	lan × MADT_To_ADT_A08.xsl ×	
Source: HCI_In.wsdl		XSLT File: HCI_HA08_SystemA_Out.wsdl
A III MARIAN		for-each 🚧 🕀 🔨
		ns1:PID.7 🚷 🕀
🖨 🖓 ns1:PID.8		ns1:PID.8 🔕 🖷
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Type		Type XYZ
^{IXI} S LongName		
×si:nil	5	
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- 0.4		IOF-Eacit @3 11

□ Drag from the tiny square at the right og the function to the PID-8 node oin the right hand node tree to assign the function result to the PID-8 node

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Double-click the center of the function to start the configuration wizard

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																		XSLT File: HCI_HA08_SystemA_Out.ws	;d
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							÷		-	1		1					Er	Error: Function with Too Few Parameters	
ll-			-												-		Dr	Drag and Drop tree nodes to function or double-click to edit	
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11.			-																

□ Click on the "looking glass" button alongside the "dvmLocation" box, click the "Browse..." button, locate and select the "gender_map.dvm" then click "OK" and "OK" to complete DVM file selection

📤 Edit Function - 🛛	ookup¥alue				×
Define function para (Note: Parameters c	meters below: an also be set th	rough drag and drop from t	ree nodes)		
dvmLocation	/nsl:ADT/ns	l:PID/nsl:PID.8			Add
sourceColumnName	S. Ent	er I IDI		ic i l	
sourceValue					
targetColumnName				Browse	re <u>D</u> own
defaultValue			OK	Cancel	
Examples: \$var1, \$(Press Ctrl + Space f	🍝 SOA Resou	rce Browser			
	🎇 File System	m			-
Function Description					
Look up the targ source value and	Location:	🖆 RouterPrj		- 🖻 🖄 🎽	
If no value is fo	🗀 classes	🗀 SCA-INF	🗀 xsd	🖹 gender_ma	o.dvm
Usage: dvm:look	🗀 deploy	🗀 testsuites	🗀 xsl	1	
				f -	
Help	File <u>N</u> ame:	gender_map.dvm		Contract (1998)	
ns1:PID.23	File <u>T</u> ype:	Domain Value Map Files (*	.dvm)		-
ns1:PID.24					
ns1:PID.25	Help				Cancel
ns1:PID.26	nop		-		Cancer

□ Click the "magnifying glass" icon alongside the "sourceColumnName" box, choose "GenderCode" and click "OK" to complete setting the value

¢	Edit Function - l	ookup¥alue	×
	Define function para (Note: Parameters c	meters below: an also be set through drag and drop from tree nodes)	
	dvmLocation	"gender_map.dvm"	±
	sourceColumnName		ive
	sourceValue	Select Domain	<u>up</u>)own
	targetColumnName	Select a Domain:	
	defaultValue	GenderCode	
	Examples: \$var1, \$p Press Ctrl + Space fo	or Inv	

□ Click the data entry box alongside the "sourceValue" label, press control+spacebar to obtain the value list, choose "ns1:ADT" and press enter to expand one level, and continute doing so until you have "/ns1:ADT/ns1:PID/ns1:PID.8" selected - make sure PID.8 is NOT followed by a "/"

ć	Edit Function - lookup¥alue							
	Define function para (Note: Parameters c	meters below: an also be set through drag and drop from tree nodes)						
	dvmLocation	"gender_map.dvm"	Q	Add				
	sourceColumnName	"GenderCode"	9	Remove				
	sourceValue	/nsl:ADT/nsl:PID/nsl:PID.8						
	targetColumnName	ns1:PID.8 Element	9					
	defaultValue							
	Examples: \$var1, \$pfx:param1, 'abc', "abc" Press Ctrl + Space for Invoking XPath Building Assistant.							

□ Click the "magnifying glass" button alongside the "targetColumnName" label, choose "GenderName" and click "OK" to complete selection

Ś	è Edit Function - lookup¥alue							
	Define function para (Note: Parameters c	meters below: an also be set through drag and drop from tree nodes)						
	dvmLocation	"gender_map.dvm"		<u>A</u> dd				
	sourceColumnName	"GenderCode"		<u>R</u> emove				
	sourceValue	/nsl:ADT/nsl:PID/nsl:PID.8		Move Up				
	targetColumnName	Q		110VE <u>D</u> 0WII				
	defaultValue							
	Examples: \$var1, \$p	🙀 🎃 Select Domain 🛛 🗶						
	Press Ctrl + Space fo	^{pr} <u>S</u> elect a Domain:						
	Function Description: Look up the targ	GenderCode GenderName	n	has the				

□ Enter "'UNKNOWN'" into the text box alongside the "defaultValue" label and click "OK" to complete function configuration – this is the value which will be populated in the target node when the GenderCode is not found in the DVM

ć	Edit Function - Io	ookup¥alue			×		
	Define function para (Note: Parameters c	meters below: an also be set through drag and drop from tree nodes)					
	dvmLocation	"gender_map.dvm"	٩	Add			
	sourceColumnName	ourceColumnName "GenderCode"					
	sourceValue	sourceValue /nsl:ADT/nsl:PID/nsl:PID.8					
	targetColumnName	"GenderName"	9	MOVE DOWN	- 1		
(defaultValue	י אאאטיין					
	Examples: \$var1, \$p Press Ctrl + Space fo	tx:param1, 'abc', ''abc'' or Invoking XPath Building Assistant.					
	Function Description:						
	Example 1. uvin.	оокаруана, слауннясовныў-совелачні, отасле зузлені, оз ,	SF	ъr зумени, 💡	~		
	"United States")	la stary Webs study down abore waters and the down II. Now star Constants II. III.C.	10.4	D. Constant			
	Example 2: dvm:lookupvalue("C:\dvms\country-code.dvm", "Oracle System", "OS", "SAP System",						
	"United States", "Application", "Financial")						
	I nis function takes a minimum of 5 and a maximum of 25 parameters.						
	Help OK Cancel						

□ "Save All" and deploy the project

Start the "Receiving" "External Systems"

We will use the CMDHL7Listener command line client to receive HL7 ADT messages look at the output in the output directory specified on the listener's command line – for me c:\hl7\received. The CMDHL7Listener will display trace of message exchange in the console window. The SOA Suite for healthcare integration will record message tracking information which we will look at a later stage.

Please note that in this solution the CMDHL7Listener returns an ACK as soon as it gets the message.

- □ Check that your configured output directory is empty
- To start the listener for the "BcastB_SystemA_Out" sender endpoint, in a command / terminal window execute the following command

```
java -jar c:\tools\CMDHL7\CMDHL7Listener_v0.7.jar -c ID_ -p 22200 -s
c:\hl7\received
```

□ Inspect the CMDHL7Listener console output making sure the listener started and is listening on the appropriate port

```
08/12/2012 10:45:36 AM au.id.czapski.hl7.CMDHL7Listener main
INFO: Port: 22200
08/12/2012 10:45:36 AM au.id.czapski.hl7.CMDHL7Listener main
INFO: Store in: c:\hl7\received
08/12/2012 10:45:36 AM ca.uhn.log.HapiLogImpl info
INFO: au.id.czapski.hl7.SimpleACKApplication registered to handle *^*
messages
08/12/2012 10:45:36 AM ca.uhn.log.HapiLogImpl info
INFO: SimpleServer running on port 22200
```

□ To start the listener for the "HA08_SystemA_Out" sender endpoint, in a command / terminal window execute the following command

```
java -jar c:\tools\CMDHL7\CMDHL7Listener_v0.7.jar -c ID_ -p 22100 -s
c:\hl7\received
```

Send ADT messages

As before, we will use the CMDHL7Sender command line client to read files containing a single HL7 ADT message and submit them to the ADT Receiver endpoint. We will then look at the console output produced by the CMDHL7Listener which we started earlier, then look at the output in our configured output directory – for me c:\hl7\received, and finally review message tracking information in the Healthcare Integration Console.

Please note that in this solution the receiver endpoint returns immediate ACK as soon as it gets the message. There may be a delay, most noticeable the first time one executes the processing flow after application server restart, between the receipt of the ACK and the time the message is written to a file in the file system.

- □ Check that your configured output directory is empty
- □ Locate the input file containing a single HL7 message for me this will be C:\hl7\adt\sources\ADT_A01_output_1.hl7

The content of my file, where each segment starting with the 3 character segment ID in bold text is a single line up to the next 3 character segment ID, looks like this:

 $\hfill\square$ In a command / terminal window execute the following command

```
java -jar c:\tools\CMDHL7\CMDHL7Sender_v0.7.jar -a SystemA -b HosA -c ID_
-n 1 -d \r\r\n -p 22222 -h localhost -t 30000 -f
c:\hl7\adt\sources\ADT A01 output 1.hl7
```

□ Locate the output files in the received directory and inspect them to confirm that a) A01 or A03 and A08 have been written and b) that A01/A03 has the same content as the input file and the A08 has the same content as the input file except for the tree changes we made in the "TransformerMediator" component. Take particular note of the Gender value – which will be "Male"

The content of the A08 output file looks like this:

The content of the file named

```
"38313332333630313831353734383532_ADT_A08_1356512791863.hl7" is the same as the message which was sent except for the fields and components which we explicitly modified.
```

□ Submit the ADT A03 file, ADT_A03_output_1.hl7, and inspect the output.

Our solution works to the extent of receiving HL7 v2.3.1 messages, and acknowledging them, transforming ADT messages to A08 for one stream of processing and writing them to files in the file system.

The Domain Value Map, which we implemented in this article, sees the gender codes, "M" and "F", translated into gender names, "Male" and "Female".

If you feel particularly keen, modify the input file to use a gender code other than "M" or "F", submit it and look for "UNKNOWN" in the gender field

Modify runtime version of the DVM

In this section we will explore the mechanism for modifying the DVM at runtime

- □ Start the COS Composer <u>http://localhost:7001/soa/composer</u>
- □ Log in with your credentials mine are weblogic/welcome1
- □ Pulls down the "Open" menu and choose "Open DVM"

🏉 SOA Compose	er la							
ORACLE' SOA Composer								
🔁 Open 😓	🛛 🖊 Edit 🔰 🗔 Commit 🖆 Revert 🗢 🛛 🗸 Validate 🌐 Info							
🔋 💷 Open Rules	:dit.							
🔛 Open DVM	N							
👌 Open Task	12							
ny Edits	•							

□ Select the DVM and click "Open"

Select a DVM to open						
Show All Search composite		•				
Composite	Partition	DVM File				
RouterPrj_rev1.0	default	gender_map.dvm				

□ Click "Edit" button

ORACLE' SOA Composer

Dopen ⊽ 2000 gender_map.d	Edit 🛛 🔝 Commit	🕍 Revert	🗢 📔 🗸 Validate	1 Info
Name gende Description View v	r_map			
GenderCode	GenderName			
M	Male			
F	Female			

□ Select the DVM entry and click "Edit"

声 Open 🗢 🛛 🔚 Save 🔰 📚 Commit 🖆 Revert 🗢 🗍 🖌 Validate 🚹 Info
🖽 gender_map.dvm
Name gender_map Description
View - + ×
GenderCode Image: Code of the second secon
F Female

 $\hfill\square$ Change the vale from "Male" to "MALE" and click "OK"

Edit Domain Va	lues	
GenderCode	М	
GenderName	MALE	
		OK Cancel

□ Repeat the process changing "Female" to "FEMALE" and click the "Save" button to save the changes

🗁 Open 😓 📄 Sav	e 🔄 🕏 Commit 🖆 Revert 🤝 🛛 🗸 Validate 🚯 Info
🖽 gender_map.dvn	
Name gender_n Description	nap
View 🗸 🛟 💋	×
GenderCode	GenderName
M	MALE
F	FEMALE

□ Click "Commit" button to commit the changes to the runtime, confirm commit and exit from the SOA Composer

ORACLE' SOA Composer	
➢ Open ☑ ☑ Commit ☑	
🖽 gender_map.dvm	
Name gender_ Description	map
GenderCode	A GenderName
M	MALE
F	FEMALE

□ Submit a message and observe new outcome

INFO: Received message:
MSH ^~^&}SystemA HosA PI MDM 20080910112956 ADT^A08 2d343630303439363431343132383634 P 2.3.1 AL NE
EVN¦ AD8¦ 20080910112956¦
PID:1;;#000010^^^HosA^HR^HosA;;#Essel^Abigail;;19460101123045;MALE;;;7 South 3rd Circle^^Downham Market^England - Norfolk^30828^UK;;;;;;;4200809080152
PV1 1 I I I FUL^Fulde^Gordian^^^^^^MAIN EMR W2008090804529^^^^UISIT
01/01/2013 11:44:57 AM au.id.czapski.hl7.SimpleACKApplication processMessage
INFO: FileName: c:\h17\received\2d343630303439363431343132383634_ADT_A08_1357001097377.h17
01/01/2013 11:44:57 AM au.id.czapski.hl7.SimpleACKApplication processMessage
INFO: Sending ACK:
MSH;^~\&}PI;MDM;SystemA;HosA;20130101114457.0362;;ACK;1152334;P;2.3.1
MSA AA 2d343630303439363431343132383634

Note that the changes will be lost when the application is re-deployed. To make the changes permanent one must edit the DVM in JDeveloper (or using a text editor in the file system) so that re-deployment of the application propagates the changes made to runtime through the SOA Composer

Summary

In this article the router developed in the previous article in the series was modified to perform an on-the-fly code mapping. The design-time and runtime mapping modificaoitn were also explored.