talend | Connecting the Data-Driven Enterprise

Lab Guide

TDM Optional Modules

Version 6.1

Talend Inc.
800 Bridge Parkway, Suite 200
Redwood City, CA 94065
United States
+1 (650) 539 3200

Welcome to Talend Training

Congratulations on choosing a Talend training module. Take a minute to review the following points to help you get the most from your experience.

Technical Difficulty

Instructor-Led

If you are following an instructor-led training (ILT) module, there will be periods for questions at regular intervals. However, if you need an answer in order to proceed with a particular lab, or if you encounter a situation with the software that prevents you from proceeding, don't hesitate to ask the instructor for assistance so it can be resolved quickly.

Self-Paced

If you are following a self-paced, on-demand training (ODT) module, and you need an answer in order to proceed with a particular lab, or you encounter a situation with the software that prevents you from proceeding with the training module, a Talend Support Engineer can provide assistance. Double-click the **Live Expert** icon on your desktop and follow the instructions to be placed in a queue. After a few minutes, a Support Engineer will contact you to determine your issue and help you on your way. Please be considerate of other students and only use this assistance if you are having difficulty with the training experience, not for general questions.

Exploring

Remember that you are interacting with an actual copy of the Talend software, not a simulation. Because of this, you may be tempted to perform tasks beyond the scope of the training module. Be aware that doing so can quickly derail your learning experience, leaving your project in a state that is not readily usable within the tutorial, or consuming your limited lab time before you have a chance to finish. For the best experience, stick to the tutorial steps! If you want to explore, feel free to do so with any time remaining after you've finished the tutorial (but note that you cannot receive assistance from Tech Support during such exploration).

Additional Resources

After completing this module, you may want to refer to the following additional resources to further clarify your understanding and refine and build upon the skills you have acquired:

- Talend product documentation (help.talend.com)
- Talend Forum (talendforge.org/)
- Documentation for the underlying technologies that Talend uses (such as Apache) and third-party applications that complement Talend products (such as MySQL Workbench)

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LESSON 1

Working with SWIFT Structures

This chapter discusses the following.

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Overview

Lesson Overview

The objective of this lab is to create a SWIFT Structure and test it using an existing SWIFT file.

The example is based on the MT521 SWIFT part of the ISITC (Industry Standardisation for Institutional Trade Communication), an industry group that is developing a standard automated method for communicating trade instructions and reconciliation messages between Investment managers and Custodian banks. This eliminates the need for the Investment Management community to develop multiple proprietary linkages with the Custodian banks.

Objectives

After completing this lesson, you will be able to:

- Create a SWIFT MT 521 Structure manually by defining message blocks and fields that match an available data file

Next Step

First, let's create the SWIFT Structure itself before creating each of its fields.

Creating the SWIFT Structure

Overview

The input file contains information stored within message blocks delimited by `{ }`.

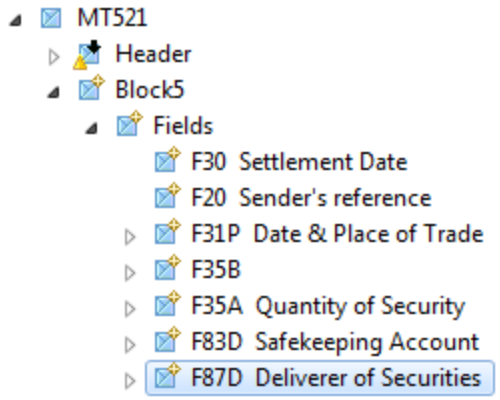
Each block can have fields starting with `:nn:` (where `nn` is some number). For example, block 5 below is the only one containing fields called `30`, `20`, `31P`...

If a line does not start with `:nn:`, then it's a continuation of the previous field. For example, the two lines under `:35B:` that start with `JGB` are a continuation of the `:35B:` field.

MT-521_sample.txt

```
{1:F01GCNXNYPWAXXX          }{2:I521GCNTOKSLAXXX}{4:SWNL2014709 11:39}{5:
:30:140717
:20:SE6439500032
:31P:140717TOKYO, JAPAN
:35B:ISIN JP1103101A95
JGB NO.310(10YRS)
JGB NO.310(10YRS)
:35A:FMT100000000,
:83D:/336965
SK-336965    -ACCT-TITLE
:87D:   0000580
BROKER-   0000580-NAME
-}
```

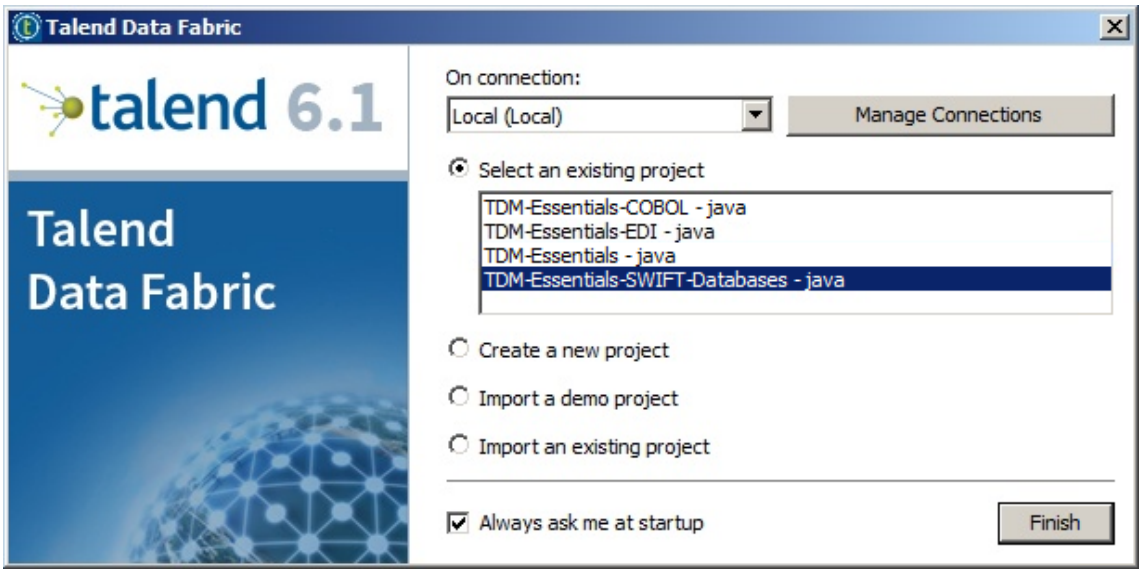
The objective is to represent the input file in the following Structure, where *Header* is already prepared for you.



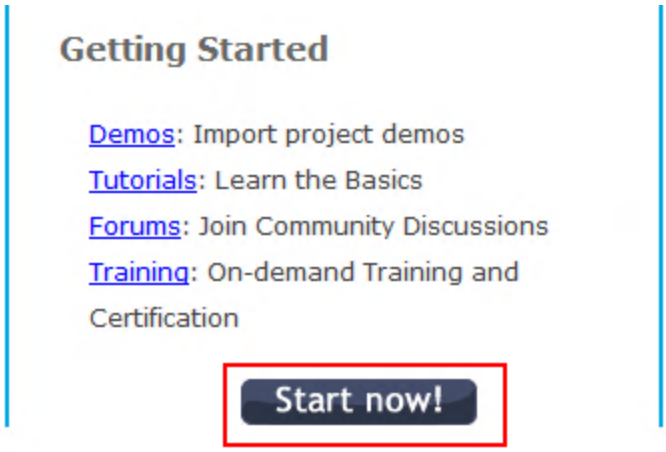
Starting Talend Studio

1. Click the **Talend Studio** link on the desktop.

2. Select the existing **TDM-Essentials-SWIFT-Dabases** project and click **Finish**.

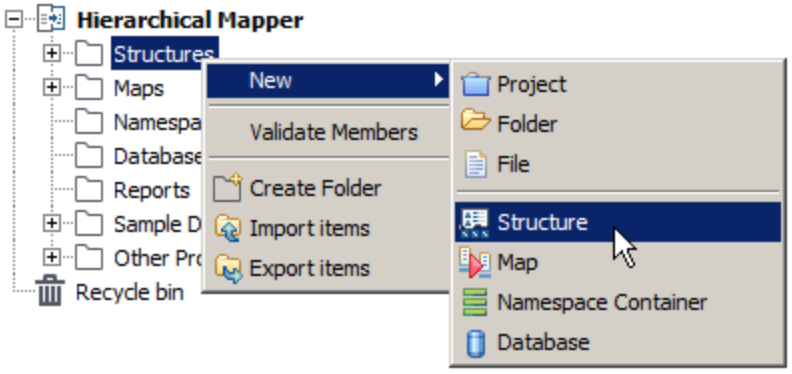


3. Click the **Start Now** button if the Welcome screen shows up. Otherwise, go to the next step.

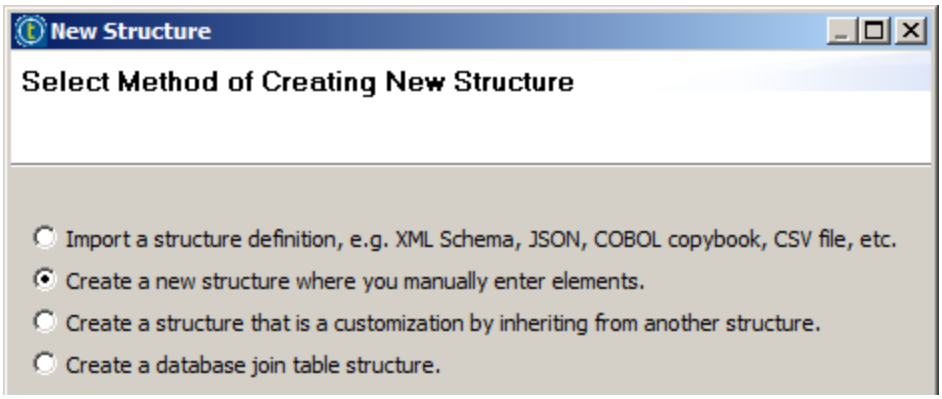


Creating the SWIFT Structure

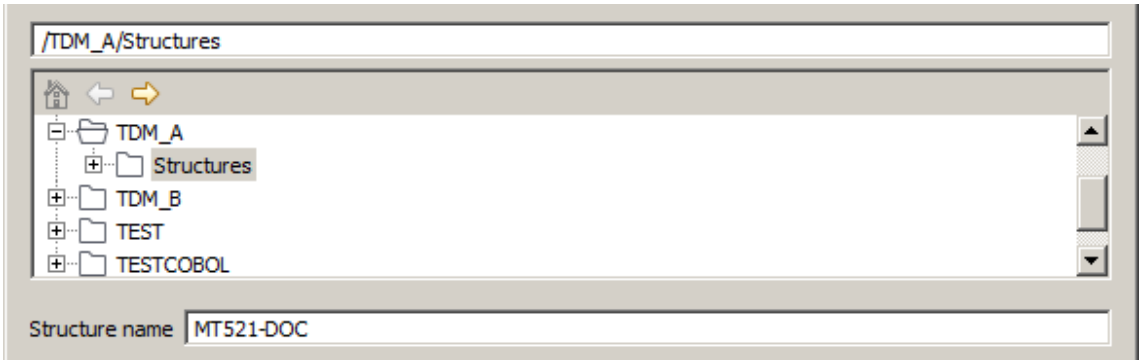
1. Right-click **Hierachical Mapper > Structures** and select **New > Structure**.



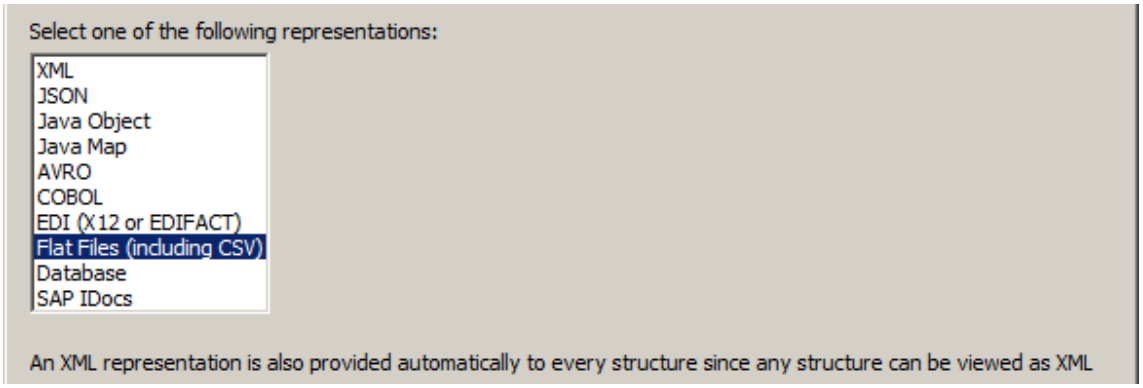
2. Select **Create a new structure where you manually enter elements** and click **Next >**:



3. Name the new Structure **MT521-DOC**, keep the default location and click **Next**:

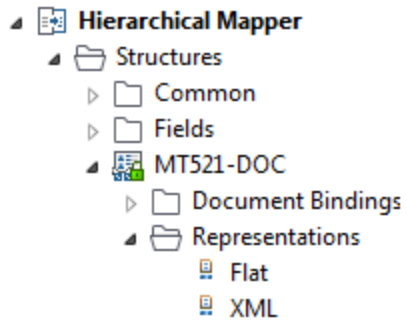


4. Select **Flat Files (including CSV)** for the representation and click **Finish**:

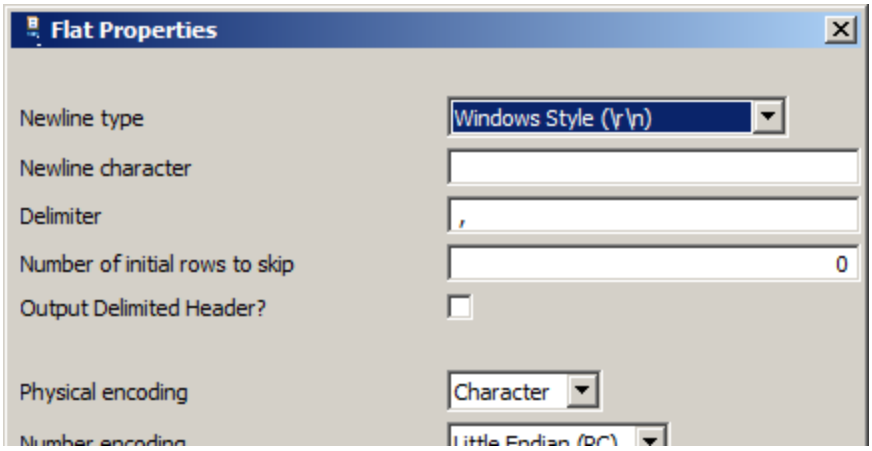


Edit Properties

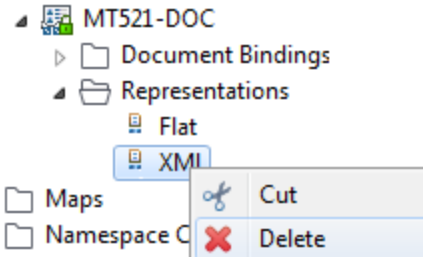
1. To edit the properties of the representation, double-click **Hierarchical Mapper > Structures > MT521-DOC > Representations > Flat**.



2. Check that **Newline type** is set to **Windows Style (\r\n)**. If not, select it and click **OK**.

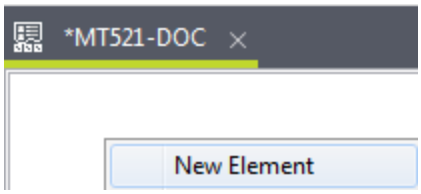


3. Finally, delete the **XML** Representation by right-clicking it and selecting **Delete**, as it will not be used.

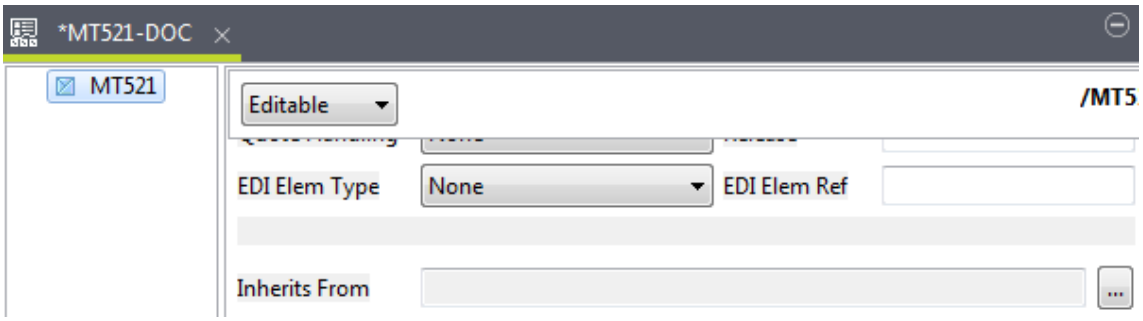


Create New Element

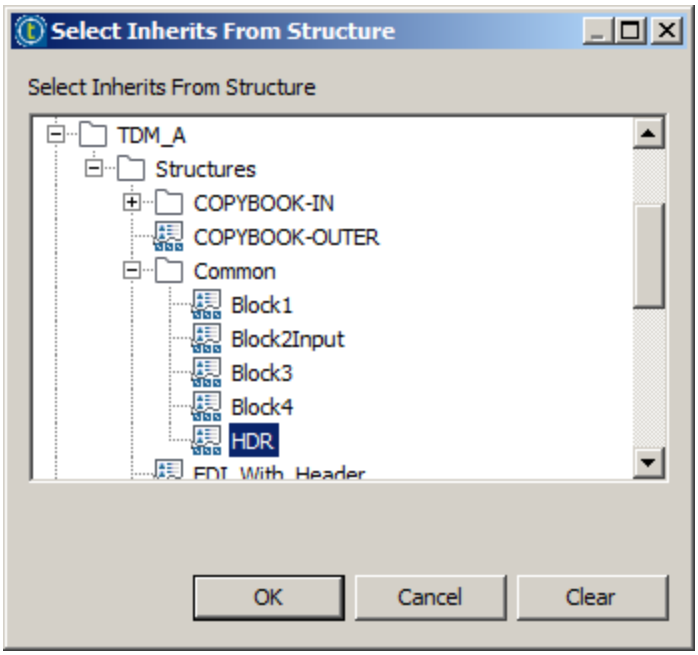
1. In the new structure **MT521-DOC**, right-click the empty area and select **New Element**.



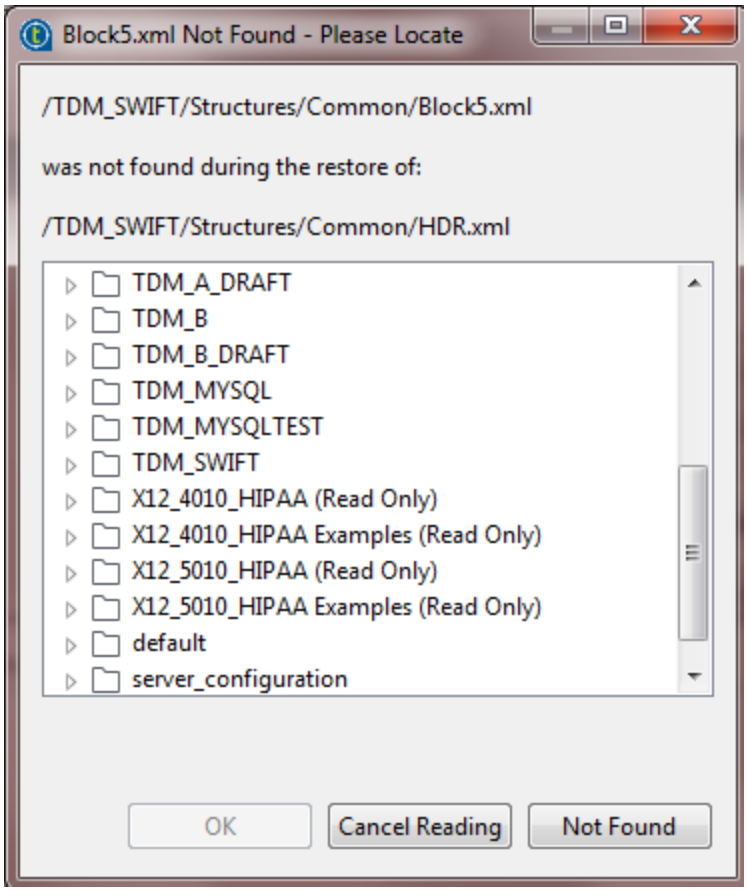
2. Enter *MT521* for the name of the new element . Then scroll down to the **Inherits From** field and click the **...** button next to it.



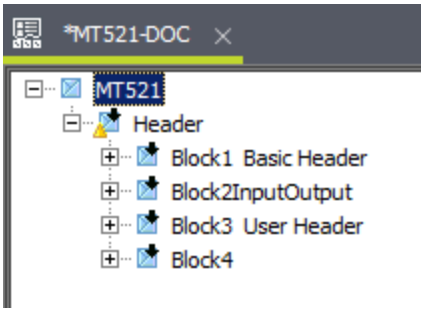
3. Select the **Structures > Common > HDR** Structure and click **OK**.



4. A message will indicate that *Block5* could not be found. Click the **Not found** button to proceed.

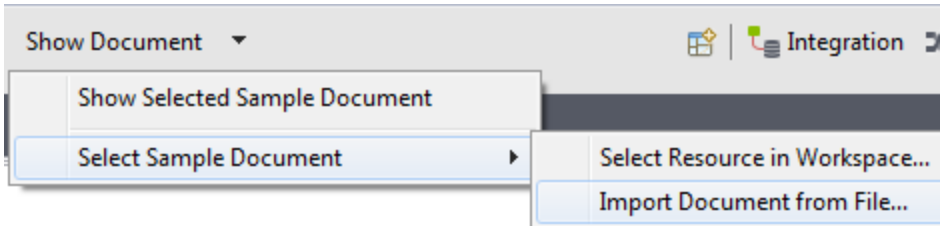


5. Expand the structure and check that it looks like the following:

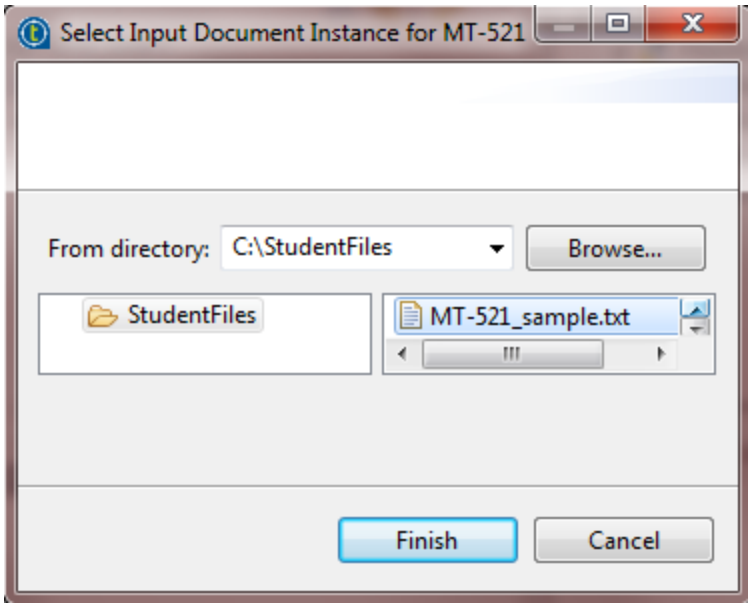


Show Document

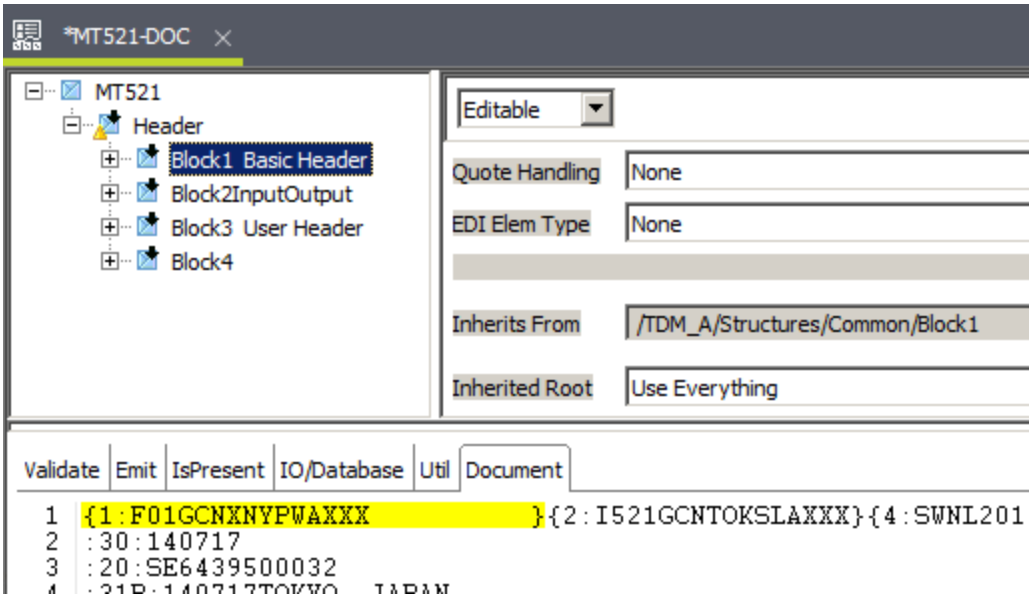
1. Expand the **Show Document** menu and select **Select Sample Document > Import Document from File**.



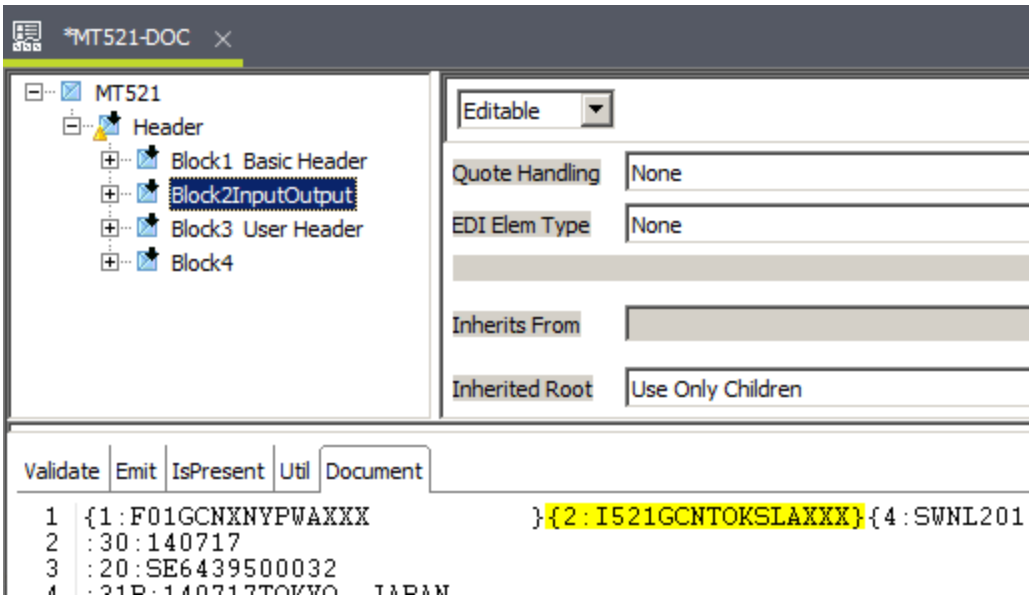
2. Select *MT-521_sample.txt* from *C:\StudentFiles* and click **Finish**.



3. Select *Block1 Basic Header* in the Structure and check the following data is highlighted.

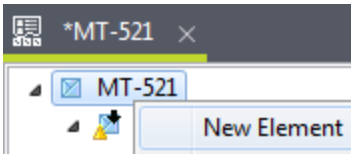


4. Select *Block2InputOutput* in the Structure and check the following data is highlighted.

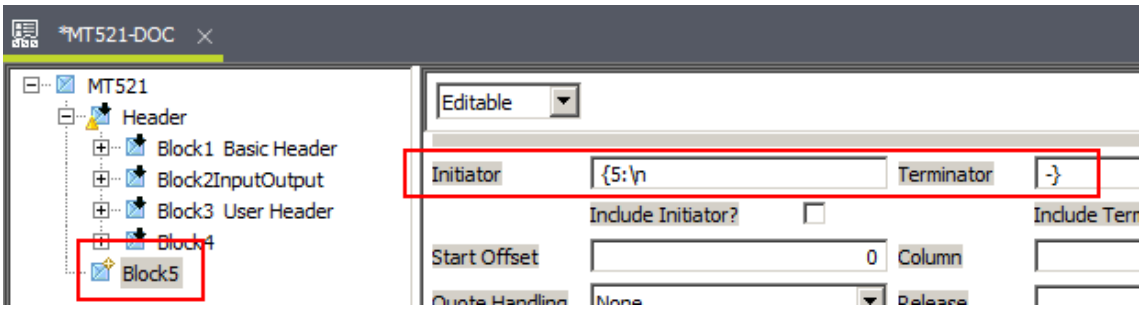


Create New Elements

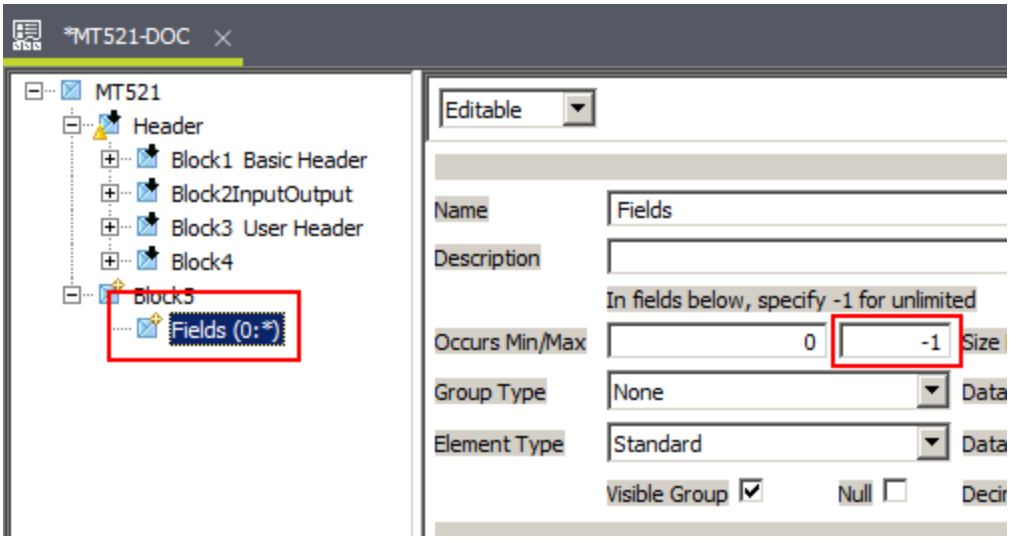
1. Right-click element **MT521** and click **New Element**.



2. Enter *Block5* for the name, *{5:\n* in the **Initiator** field and *-}* in the **Terminator** field.



3. Finally, add a new *Fields* element under *Block5*. Enter *0* and *-1* in **Occurs Min/Max** to make it a looping element.



Next Step

With the new Structure created, let's add fields 30 and 20 under the *Fields* node.

Creating the F30 and F20 Fields

Overview

You will now create and prepare all the Sub Structures that will be inherited from in the MT521 Structure. They will be created in the **Hierarchical Mapper > Structures > Fields** folder. This helps in organizing your work.

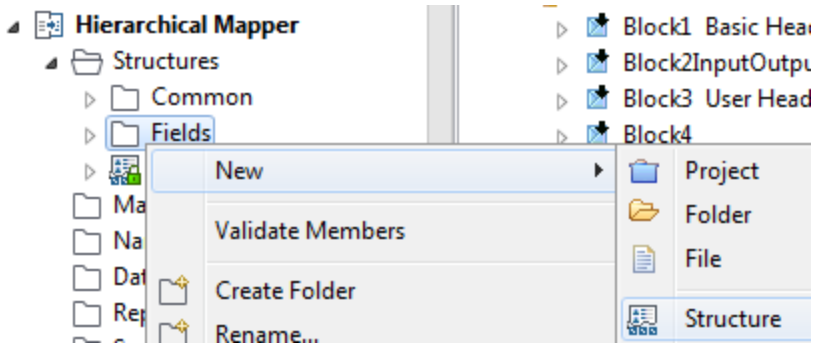
In this exercise, you will add one or two fields at a time to the *MT521-DOC* Structure and test it to make sure it is highlighting correctly. Due to the way the data mapper processes the data, you will need to create the next field before you can test the current one. For example, you will need to create both the *30D* field and the *20D* field before you can test the *30D* field.

Each of the fields will be set up as a separate Structure and then **inherited** into the *MT521-DOC* Structure. Note that a field can have one to many elements under it. It can also loop. All of the fields start with **:nn:**. Finally, if a field has multiple elements, you will need to create them under the main Structure (examples will be shown).

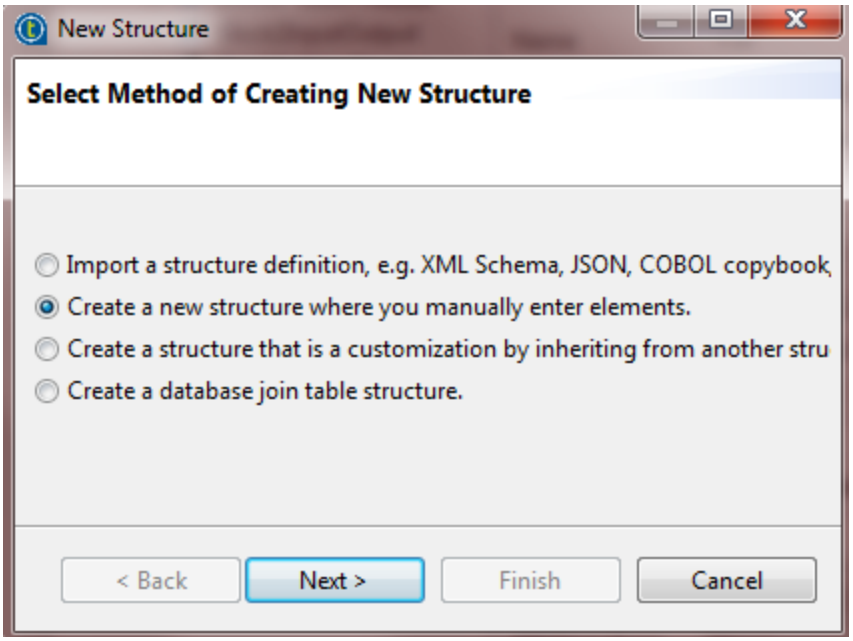
Field	Element	Type	Loop
F30	Settlement Date	String 6	0
F20	Sender's Reference	String 1-35	0

Creating the F30 Structure

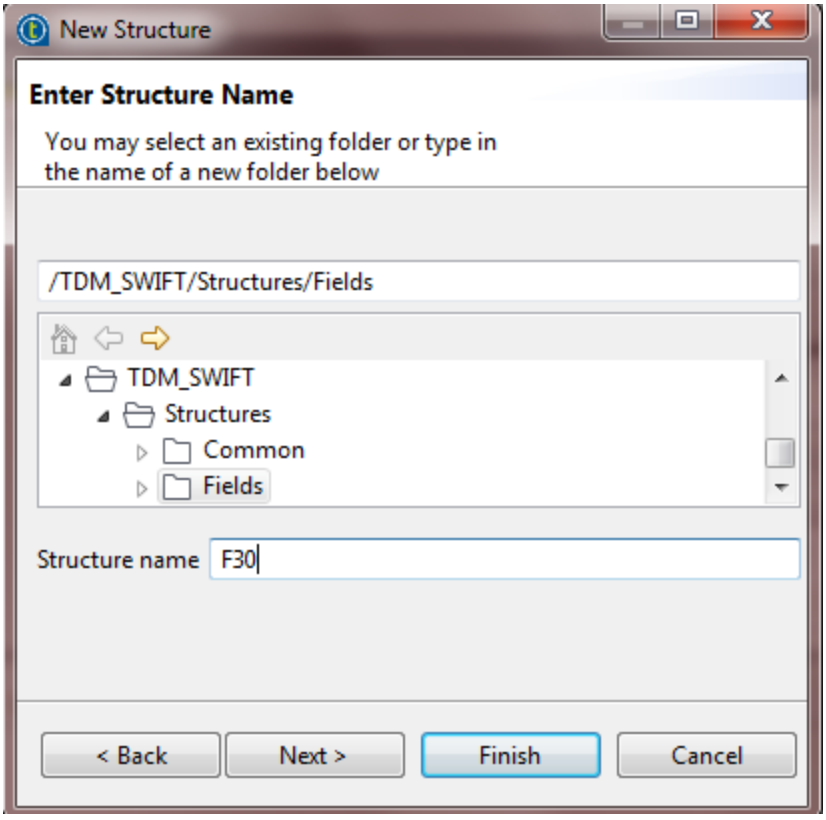
1. Right-click **Hierarchical Mapper > Structures > Fields** and select **New > Structure**.



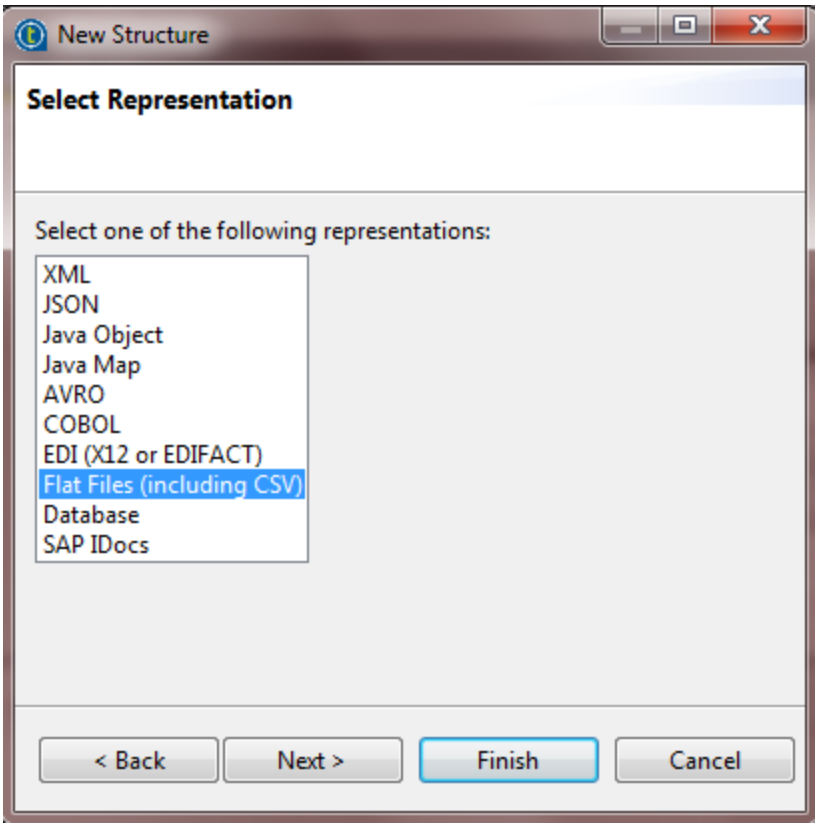
2. Select **Create a new structure where you manually enter elements** and click **Next >**.



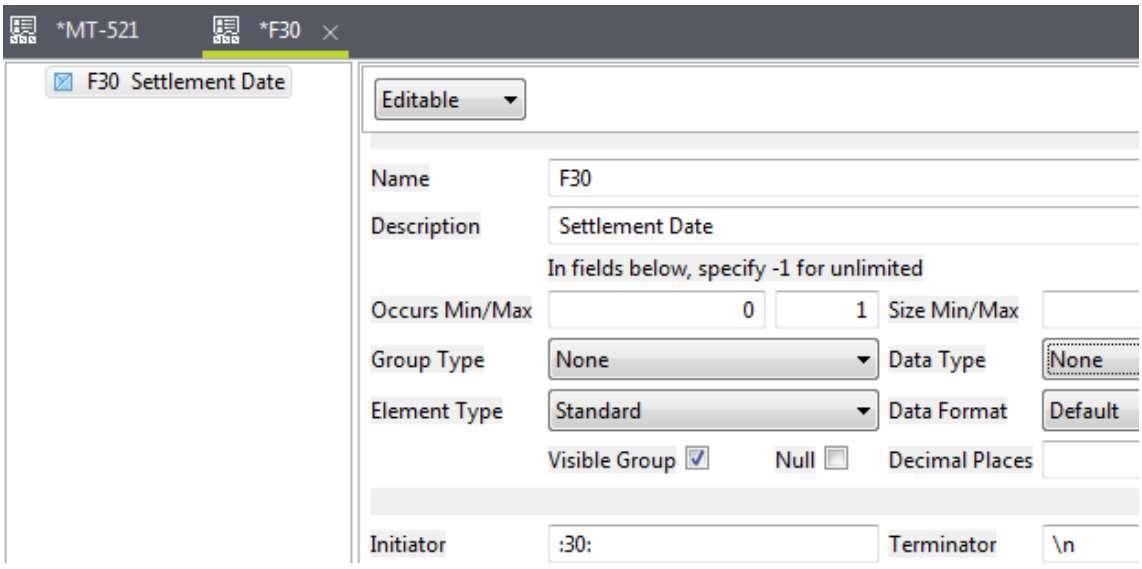
3. Name the new Structure **F30** and click **Next >**:



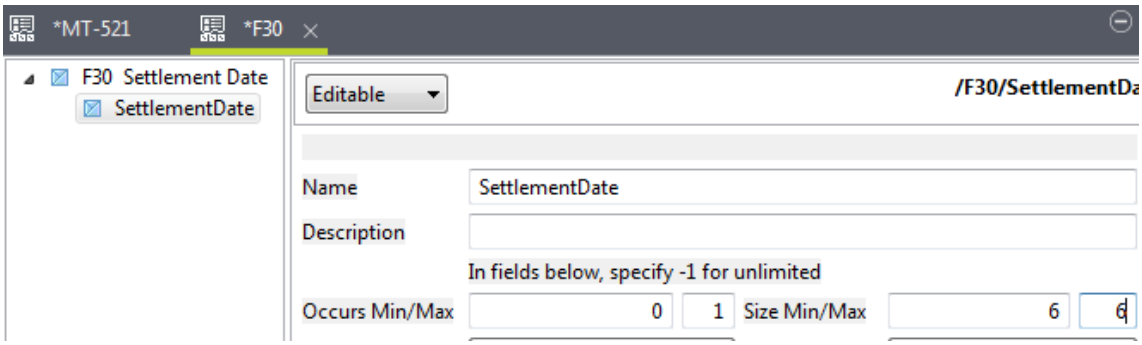
4. Select **Flat Files (including CSV)** for the representation and click **Finish**.



5. In the new Structure, right-click the empty area and select **New Element**. Enter *F30* for the **Name** and *Settlement Date* for the **Description** , then enter *:30:* in the field **Initiator** and *\n* in the field **Terminator**. **Data Type** should also be set to **None**.

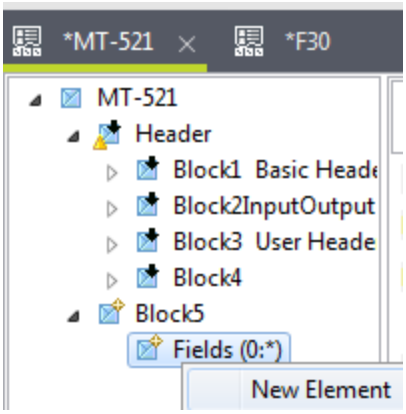


6. Right-click **F30 Settlement Date** and select **New Element**. Name it *SettlementDate* and enter *6* for **Size Min/Max** in both fields. Finally, set **Data Type** to *String*.

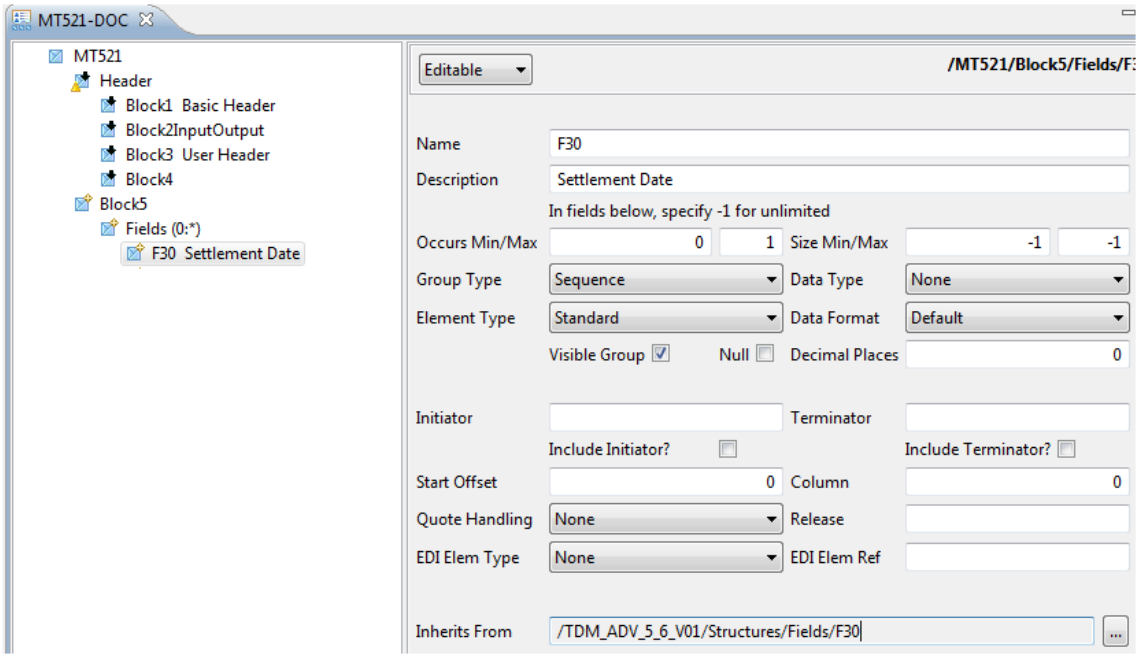


Creating a New F30 Element in MT521-DOC

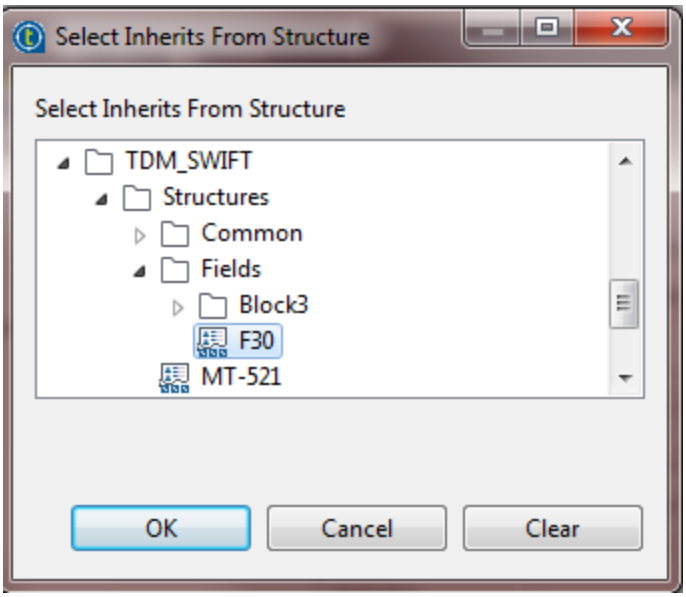
1. Switch back to the *MT521-DOC* Structure. Right-click the *Fields* element then select **New Element**.



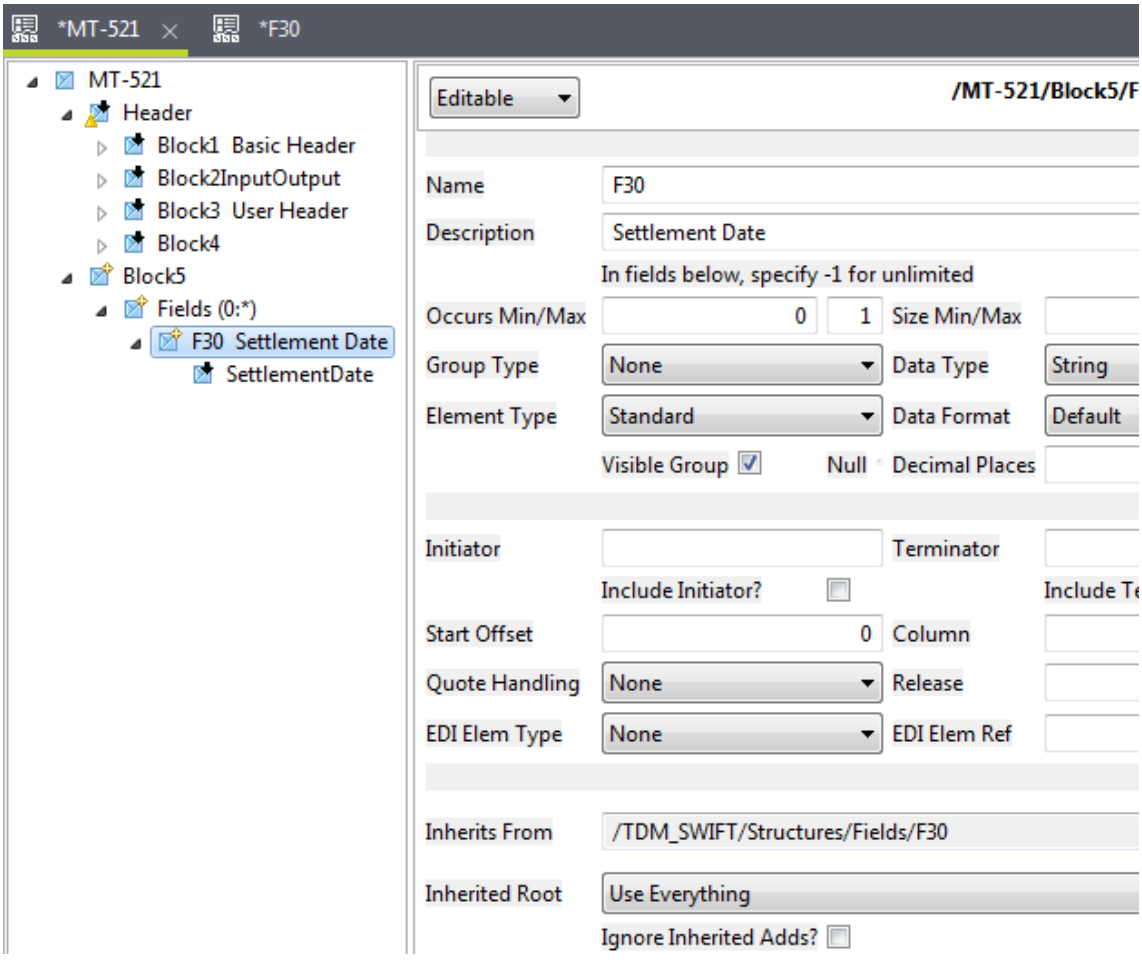
2. Enter *F30* for the **Name** and *Settlement Date* for the **Description**. Finally, click the **...** button next to the **Inherits From** field:



3. Select the **Structures > Fields > F30** Structure and click **OK**.



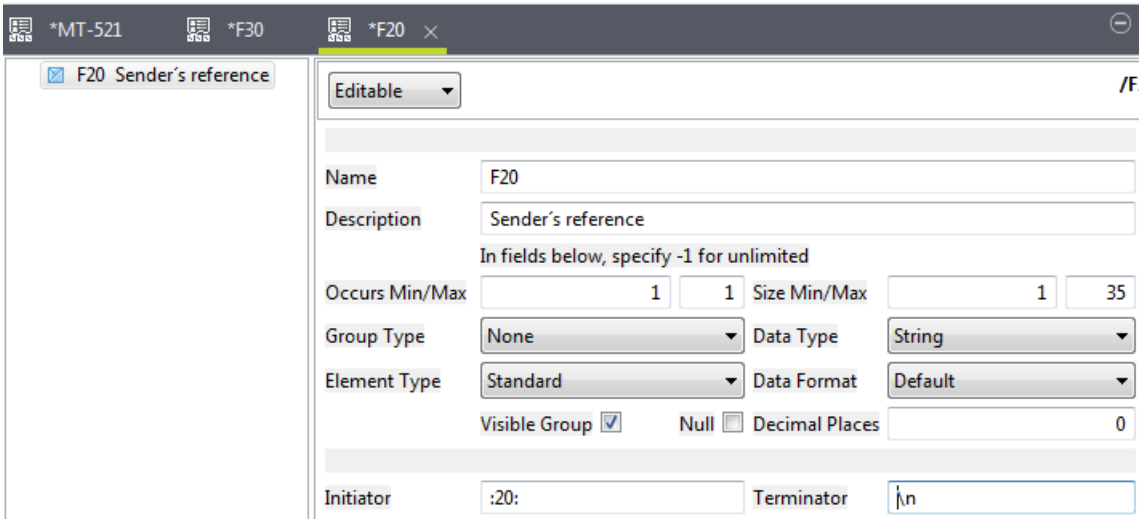
4. Finally, set **Inherited Root** to *Use Everything* for the *F30 Settlement Date* element and check the final screen looks like:



Creating the F20 Structure

1. Right-click **Hierarchical Mapper > Structures > Fields** and select **New > Structure**.
2. Select **Create a new structure where you manually enter elements** and click **Next >**.
3. Name the new Structure *F20* and click **Finish**.
4. Right-click the empty area and select **New Element** to create a new element with the following properties:

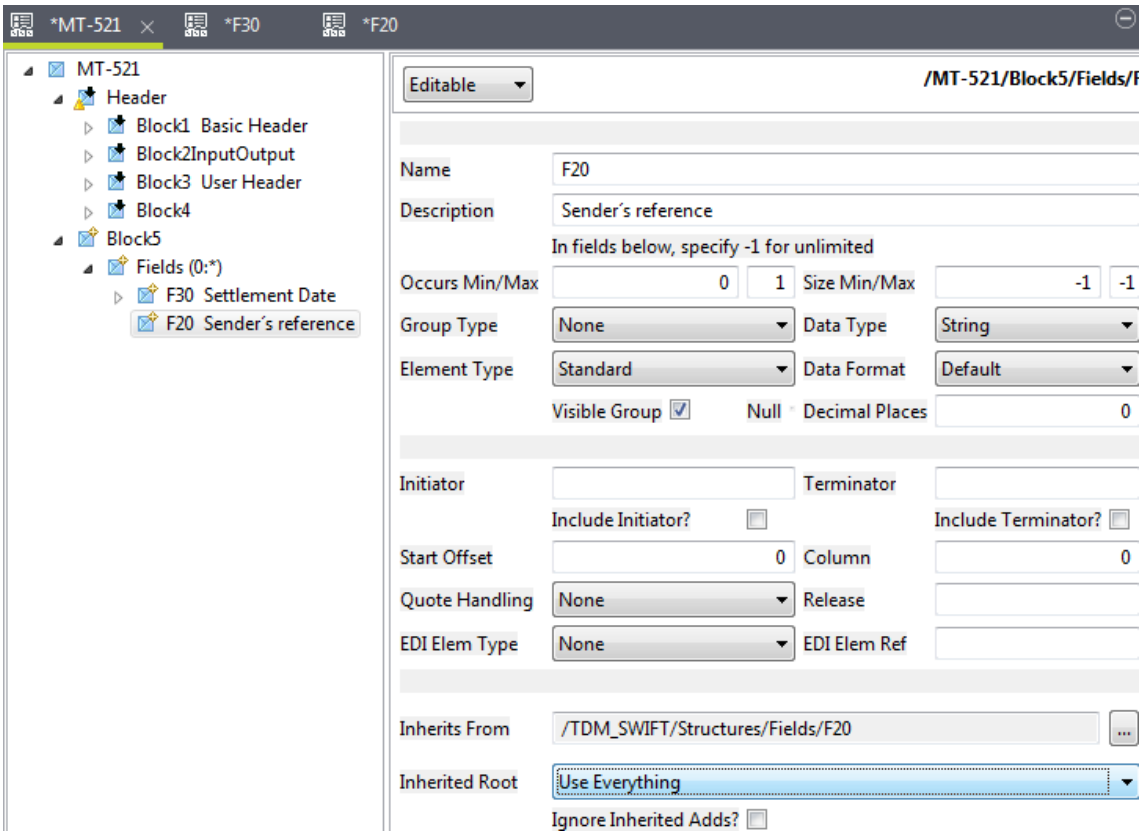
Property	Value
Name	F20
Description	Sender's Reference
Occurs Min/Max	1 / 1
Size Min/Max	1 / 35
Data Type	String
Initiator	:20:
Terminator	\n



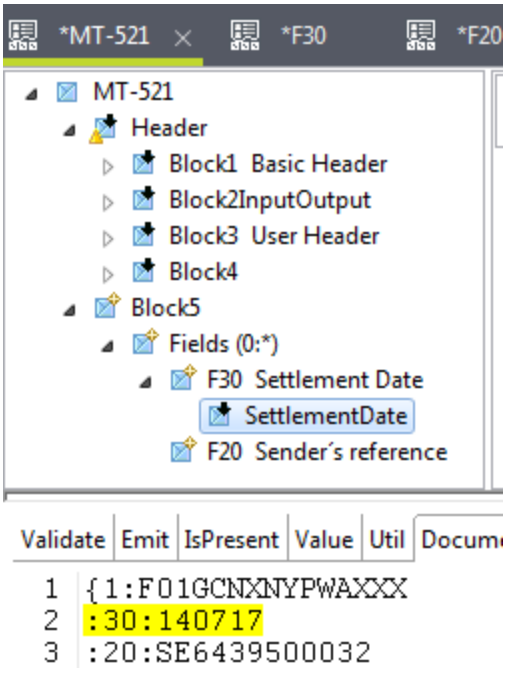
Creating a New F20 Element in MT521-DOC

1. Switch back to the *MT521-DOC* Structure.
2. Right-click **Fields** and select **New Element** to create a new element with the following properties.

Property	Value
Name	F20
Description	Sender's Reference
Inherits From	Structures/Fields/F20
Inherited Root	Use Everything



3. Finally, select the *SettlementDate* element to verify that the data is highlighted correctly. Remember you had to specify both F30 and F20 to be able to test just F30 (the first one in the list).



Next Step

Let's add the next two fields, F31P and F35B.

Creating the F31P and F35B Fields

This section adds two new fields to the list:

Field	Element	Type	Loop
F31P	Trade Date	String 6	0
	Settlement Location	String 1-29	0
F35B	Sender's Reference	String 1-35	0
	Security Info	String 1-35	0-2

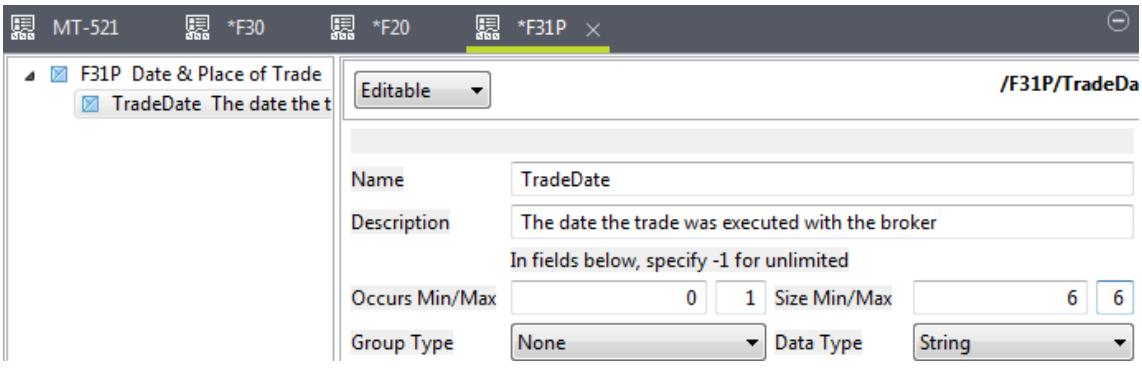
Creating the F31P Structure

1. Right-click **Hierarchical Mapper > Structures > Fields** and select **New > Structure**.
2. Select **Create a new structure where you manually enter elements** and click **Next >**.
3. Name the new Structure *F31P* and click **Finish**.
4. Right-click the empty area and select **New Element** to create a new element with the following properties:

Property	Value
Name	F31P
Description	Date & Place of Trade
Data Type	None
Initiator	:31P:
Terminator	\n

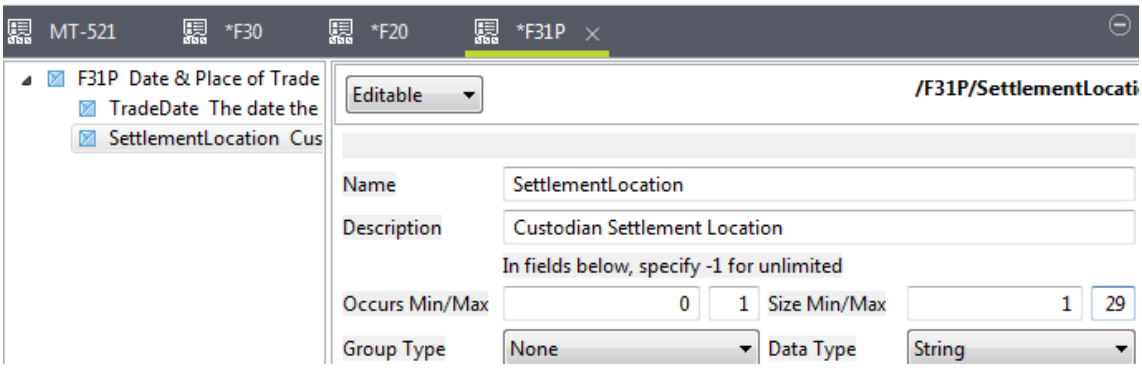
5. Right-click *F31P Date & Place of Trade* and select **New Element** to create a new child with the following properties:

Property	Value
Name	TradeDate
Description	The date the trade was executed with the broker
Size Min/Max	6/6
Data Type	String



6. Right-click *F31P Date & Place of Trade* again and select **New Element** to create another child with the following properties:

Property	Value
Name	SettlementLocation
Description	Custodian Settlement Location
Size Min/Max	1/29
Data Type	String



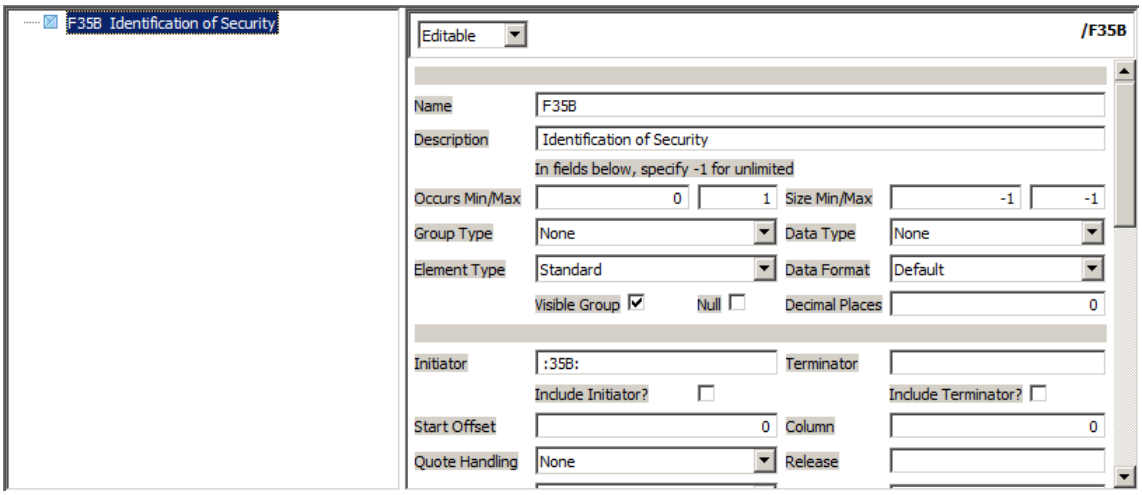
7. Save your changes.

Creating the F35B Structure

1. Right-click **Hierarchical Mapper > Structures > Fields** and select **New > Structure**.
2. Select **Create a new structure where you manually enter elements** and click **Next >**.
3. Name the new Structure *F35B* and click **Finish**.
4. Right-click the empty area and select **New Element** to create a new element with the following properties:

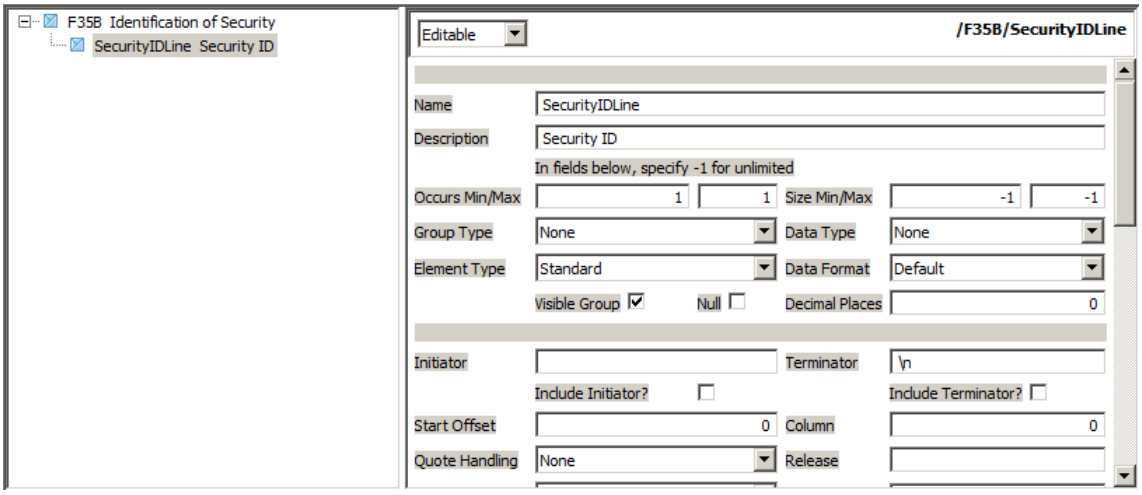
Property	Value
Name	F35B
Description	Identification of Security
Data Type	None
Initiator	:35B:

Note that, since this is a multiple line field, the terminator is not set to \n here. It will be set that way on the next sub element.



5. Right-click *F35B Identification of Security* and select **New Element** to create a new child with the following properties.

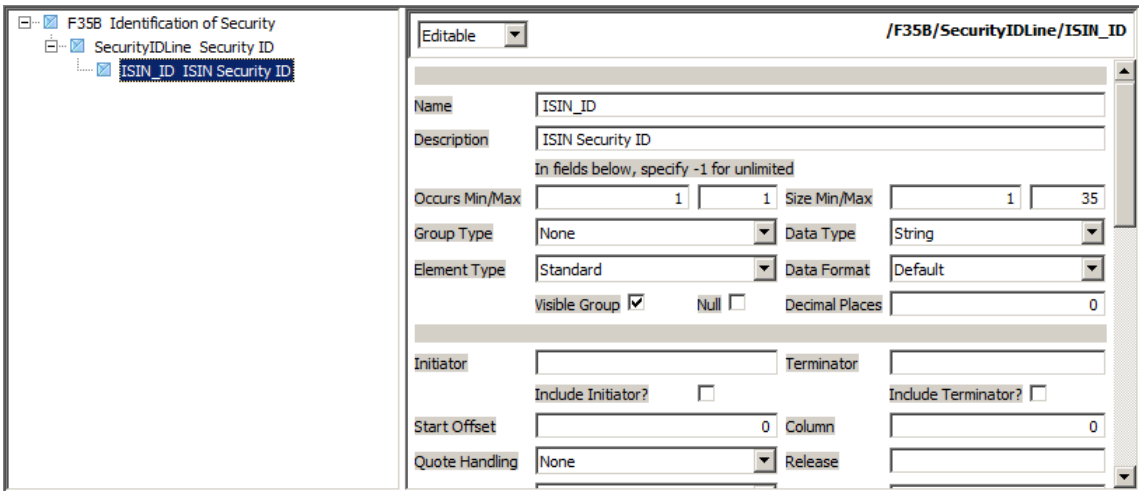
Property	Value
Name	SecurityIDLine
Description	Security ID
Occurs Min/Max	1/1
Data Type	None
Terminator	\n



6. Right-click *SecurityIDLine Security ID* and select **New Element** to create a new child with the following properties.

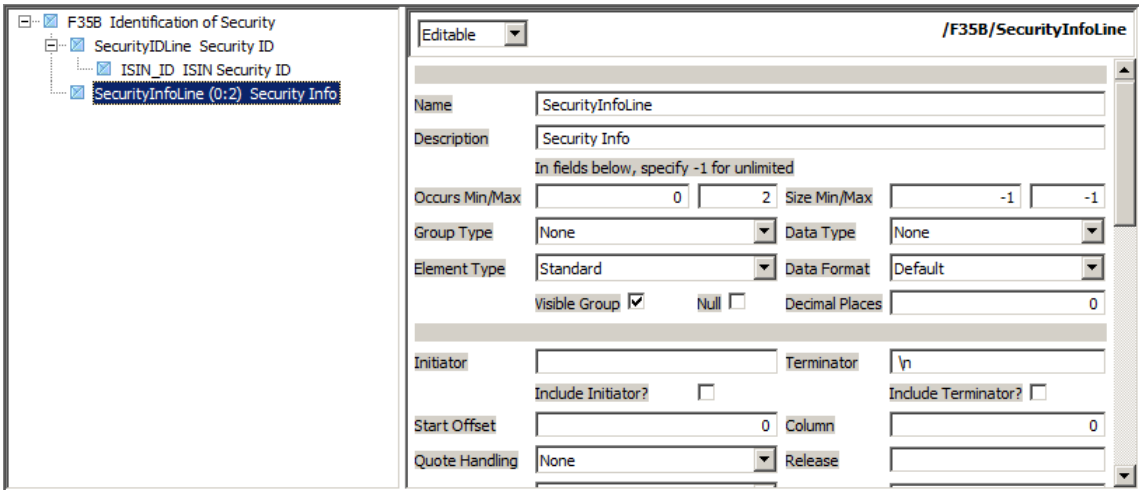
Property	Value
Name	ISIN_ID
Description	ISIN Security ID

Property	Value
Occurs Min/Max	1/1
Size Min/Max	1/35
Data Type	String



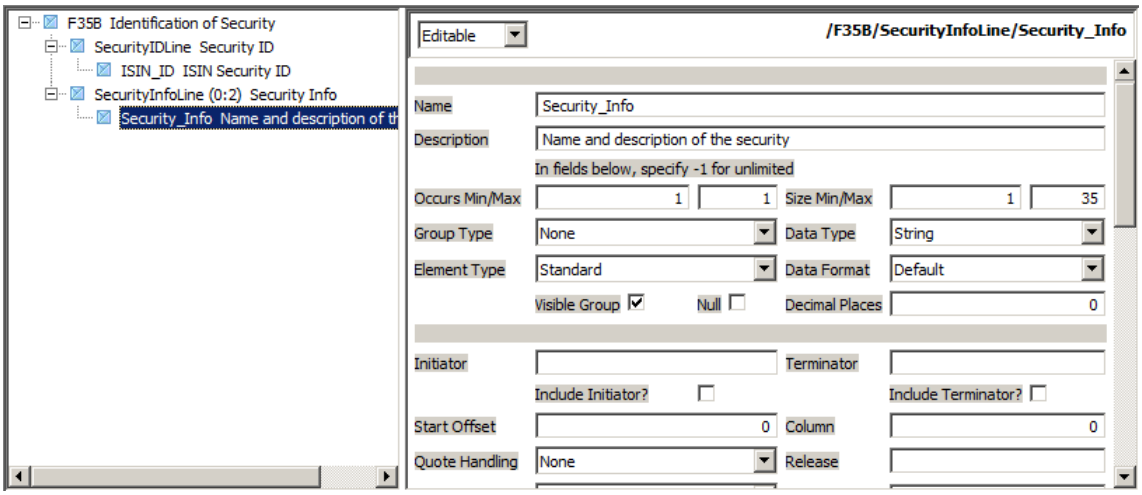
7. Right-click *F35B Identification of Security* and select **New Element** to create a new child with the following properties.

Property	Value
Name	SecurityInfoLine
Description	Security Info
Occurs Min/Max	0/2
Data Type	None
Terminator	\n



8. Right-click *SecurityInfoLine Security Info* and select **New Element** to create a new child with the following properties.

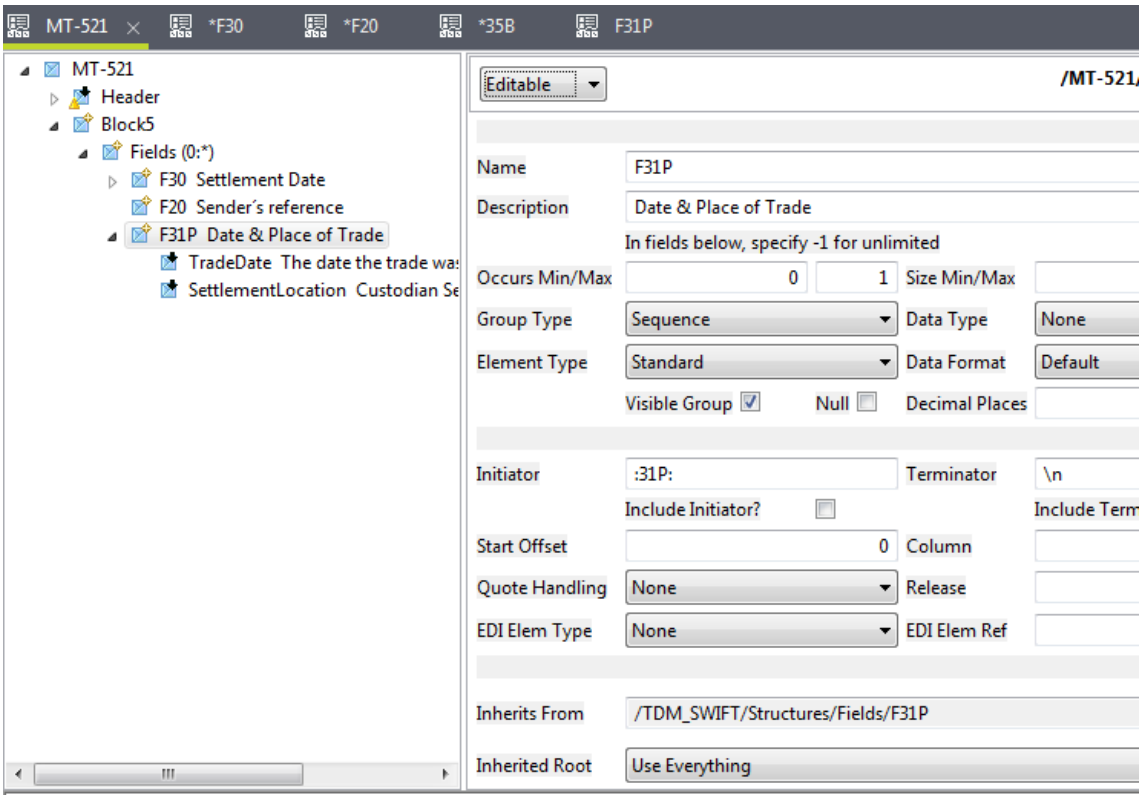
Property	Value
Name	Security_Info
Description	Name and description of the security
Occurs Min/Max	1/1
Size Min/Max	1/35
Data Type	String



Creating New F31P and F35B Elements in MT521-DOC

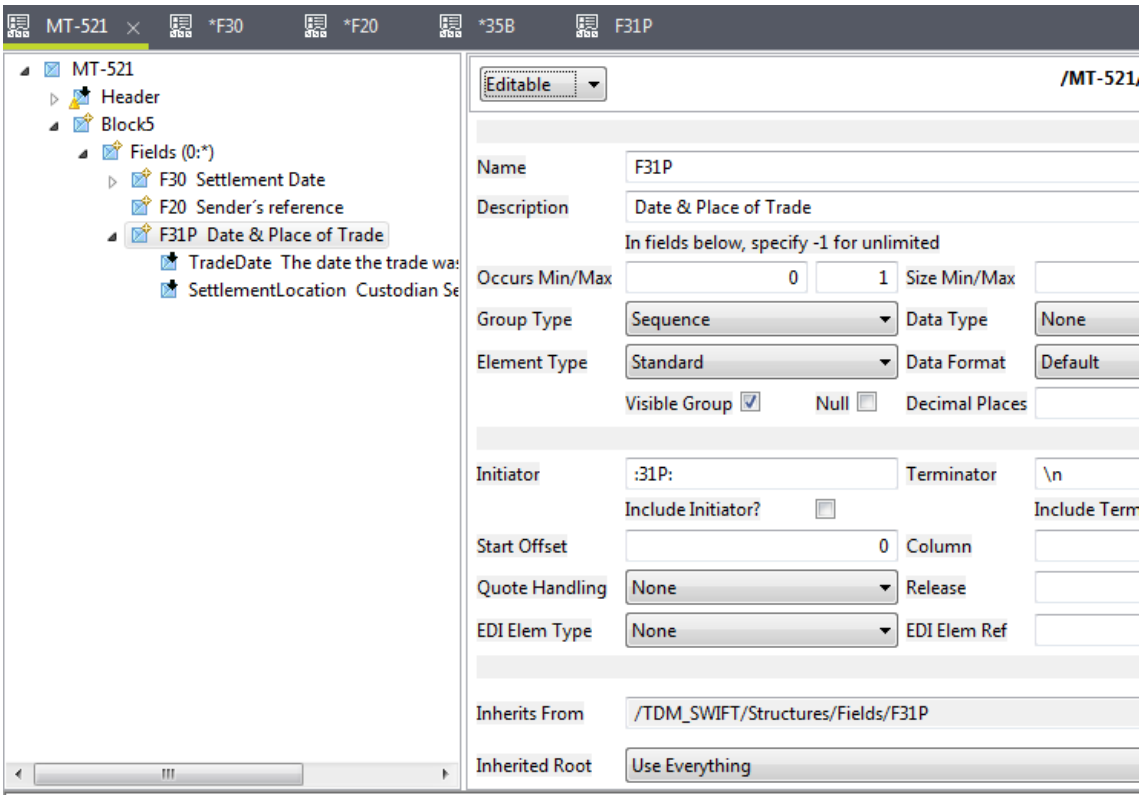
1. Switch back to the *MT521-DOC* Structure.
2. Right-click **Fields** and select **New Element** to create a new element with the following properties.

Property	Value
Name	F31P
Description	Date & Place of Trade
Inherits From	Structures/Fields/F31P
Inherited Root	Use Everything

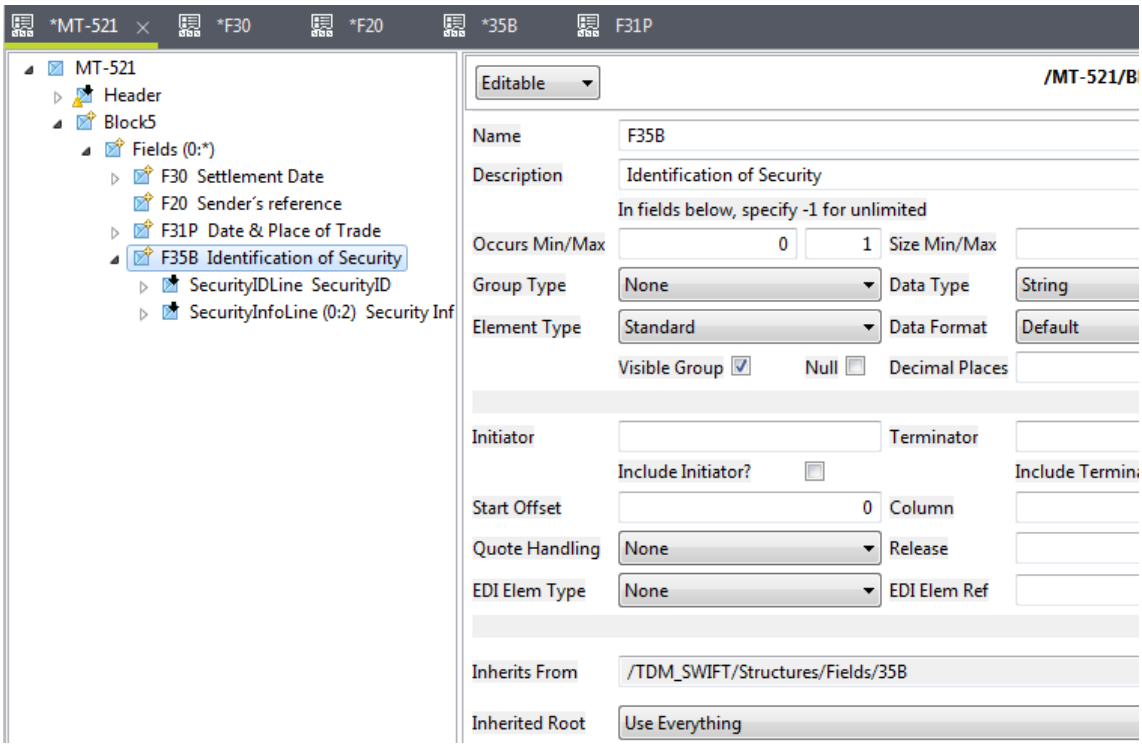


3. Right-click **Fields** and select **New Element** again to create another new element with the following properties.

Property	Value
Name	F35B
Description	Identification of Security
Inherits From	Structures/Fields/F35B
Inherited Root	Use Everything



4. Check the final result looks like the following.



Next Step

Let's add two more fields, F35A and F83D.

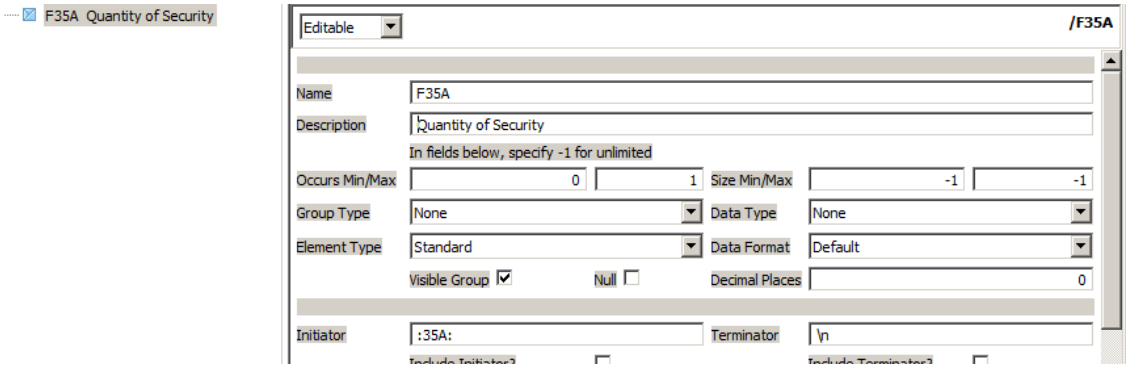
Creating the F35A and F83D Fields

Field	Element	Type	Loop
F35A	Prefix	String 1-3	0
	Quantity	String 1-15	0
F83D	Account Number	String 1-34	0
	Account Name	String 1-35	0

Creating the F35A Structure

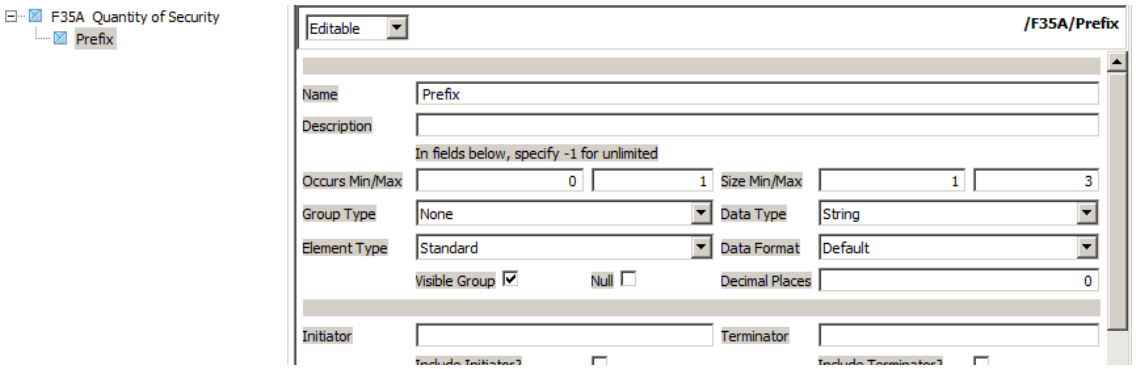
1. Right-click **Hierarchical Mapper > Structures > Fields** and select **New > Structure**.
2. Select **Create a new structure where you manually enter elements** and click **Next >**.
3. Name the new Structure *F35A* and click **Finish**.
4. Right-click the empty area and select **New Element** to create a new element with the following properties:

Property	Value
Name	F35A
Description	Quantity of Security
Data Type	None
Initiator	:35A:
Terminator	\n



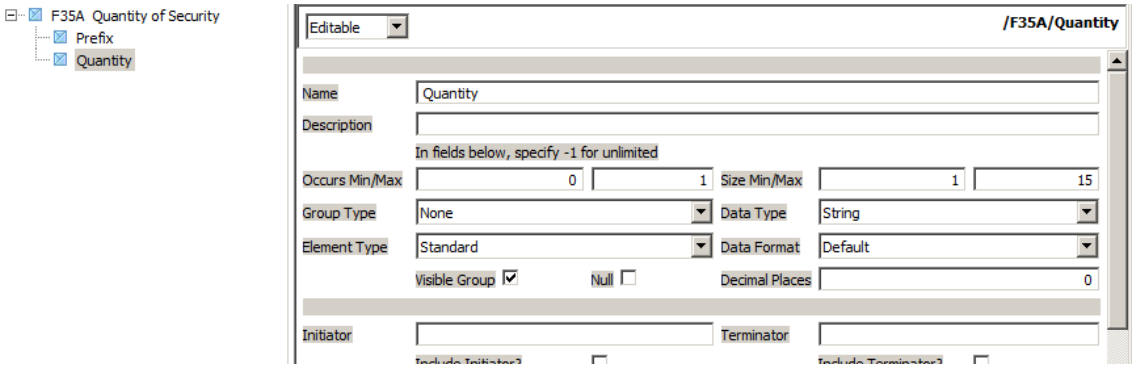
5. Right-click *F35A Quantity of Security* and select **New Element** to create a new child with the following properties:

Property	Value
Name	Prefix
Size Min/Max	1/3
Data Type	String



6. Right-click *F35A Quantity of Security* again and select **New Element** to create another child with the following properties:

Property	Value
Name	Quantity
Size Min/Max	1/15
Data Type	String

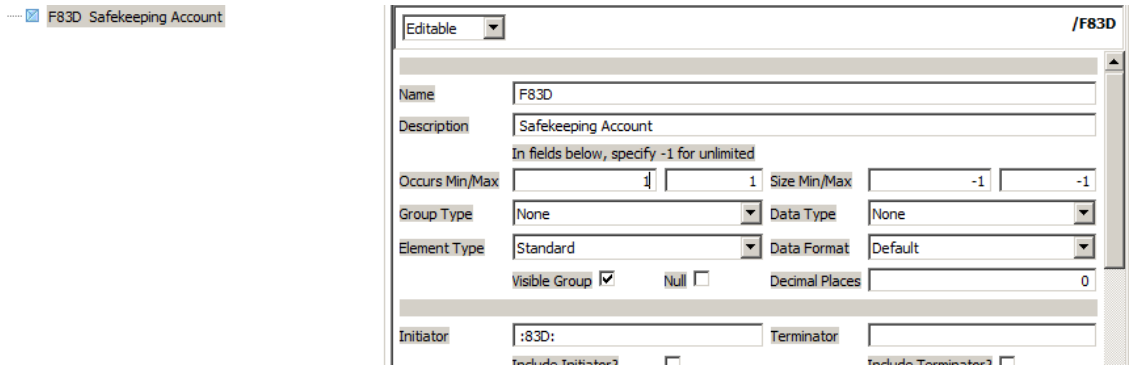


7. Save the changes to the Structure.

Creating the F83D Structure

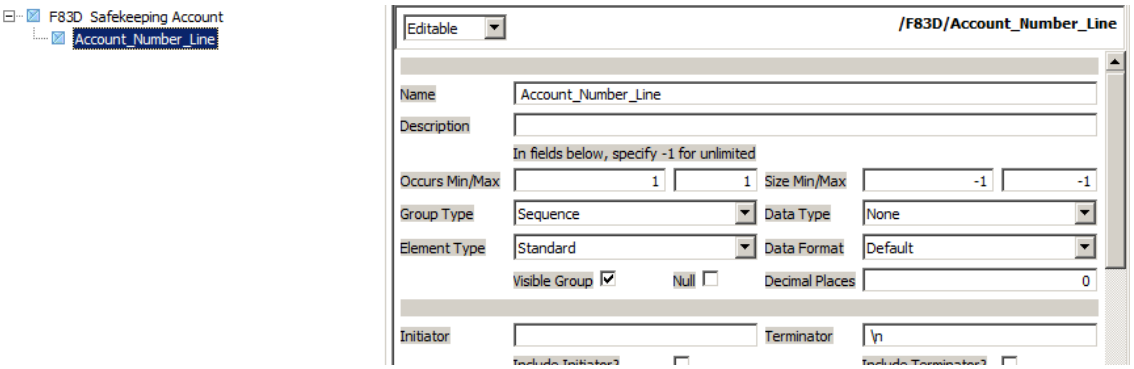
1. Right-click **Hierarchical Mapper > Structures > Fields** and select **New > Structure**.
2. Select **Create a new structure where you manually enter elements** and click **Next >**.
3. Name the new Structure *F83D* and click **Finish**.
4. Right-click the empty area and select **New Element** to create a new element with the following properties:

Property	Value
Name	F83D
Description	Safekeeping Account
Occurs Min/Max	1/1
Data Type	None
Initiator	:83D:



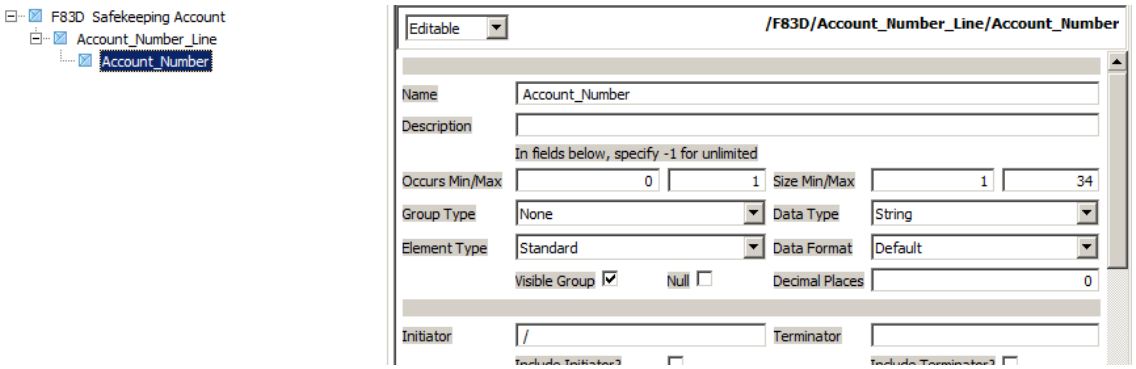
5. Right-click *F83D Safekeeping Account* and select **New Element** to create a new child with the following properties:

Property	Value
Name	Account_Number_Line
Occurs Min/Max	1/1
Data Type	None
Terminator	\n



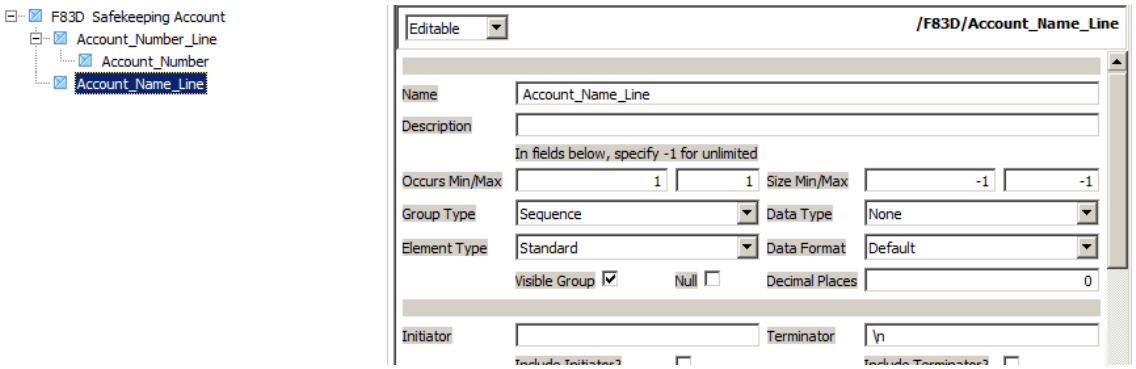
6. Right-click *Account_Number_Line* and select **New Element** to create a new child with the following properties:

Property	Value
Name	Account_Number
Size Min/Max	1/34
Data Type	String
Initiator	/



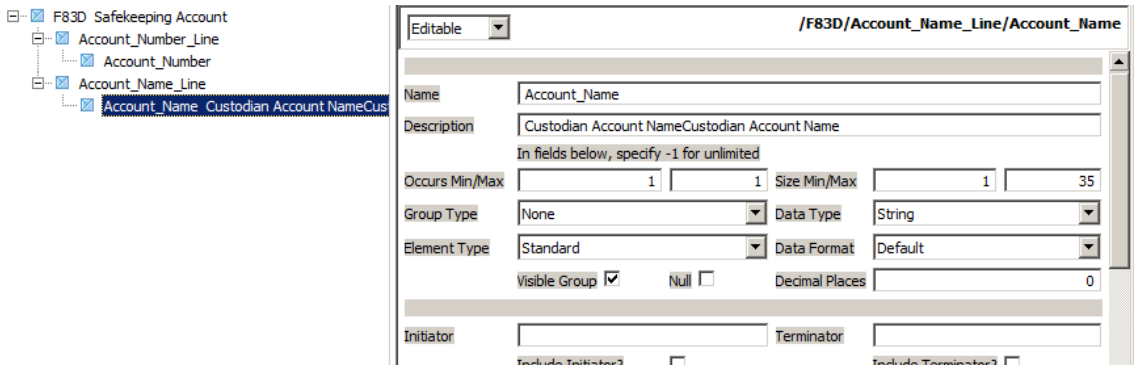
7. Right-click *F83D Safekeeping Account* and select **New Element** to create a new child with the following properties:

Property	Value
Name	Account_Name_Line
Occurs Min/Max	1/1
Data Type	None
Terminator	\n



8. Right-click *Account_Name_Line* and select **New Element** to create a new child with the following properties:

Property	Value
Name	Account_Name
Description	Custodian Account Name
Occurs Min/Max	1/1
Size Min/Max	1/35
Data Type	String

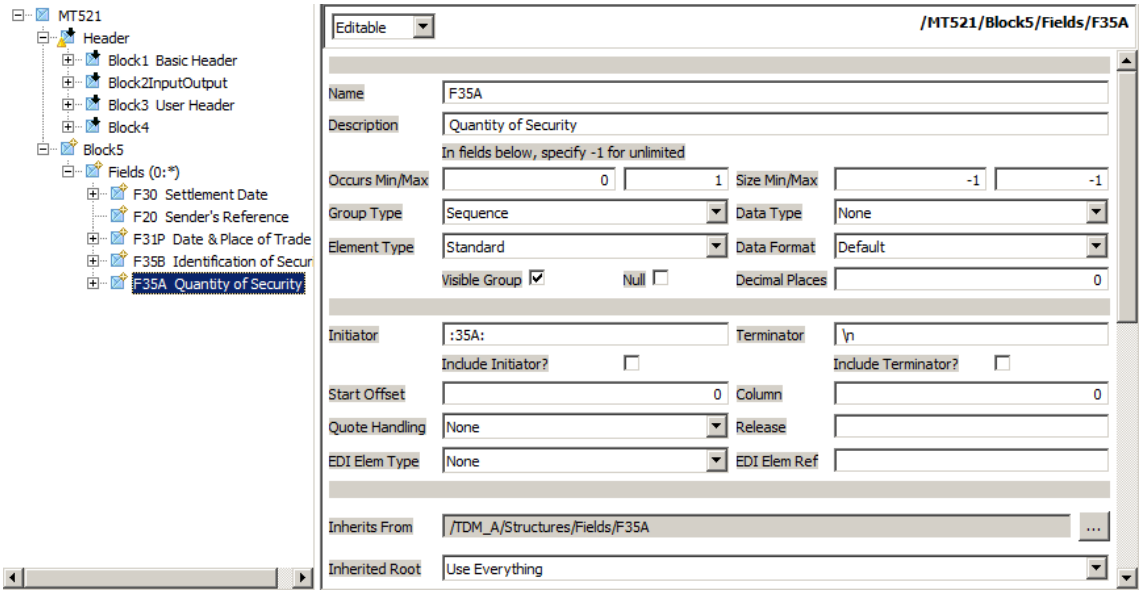


9. Save the changes to the Structure.

Creating New F35A and F83D Elements in MT521-DOC

1. Switch back to the *MT521-DOC* Structure.
2. Right-click **Fields** and select **New Element** to create a new element with the following properties.

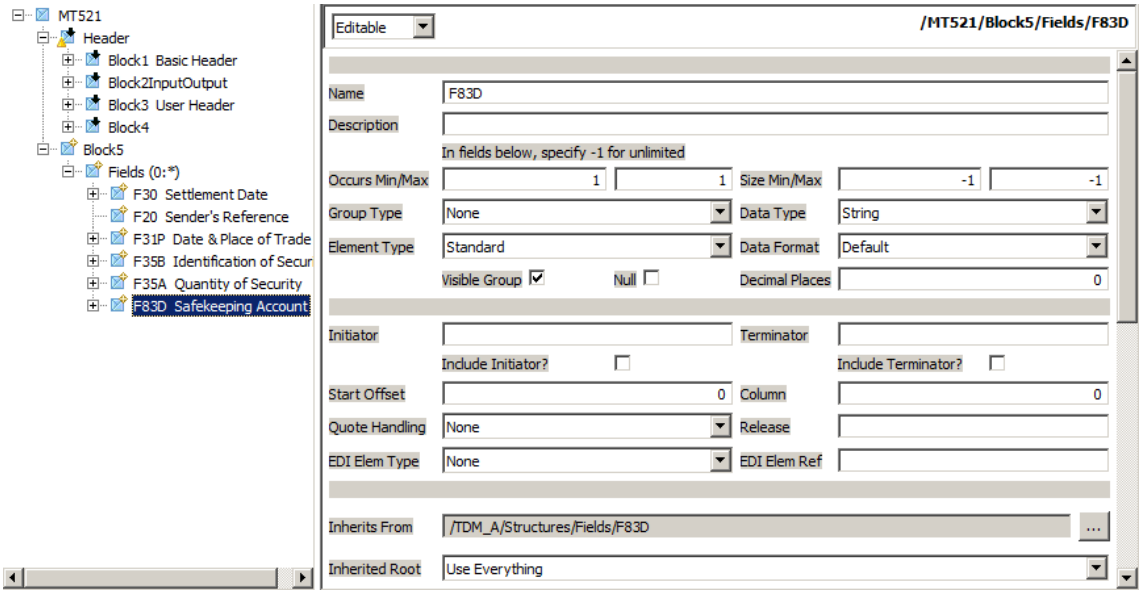
Property	Value
Name	F35A
Description	Quantity of Security
Inherits From	Structures/Fields/F35A
Inherited Root	Use Everything



3. Right-click **Fields** and select **New Element** again to create another new element with the following properties.

Property	Value
Name	F83D

Property	Value
Description	Safekeeping Account
Occurs Min/Max	1/1
Inherits From	Structures/Fields/F35B
Inherited Root	Use Everything



4. Save the changes to the Structure.

Next Step

Let's add the final F87D field.

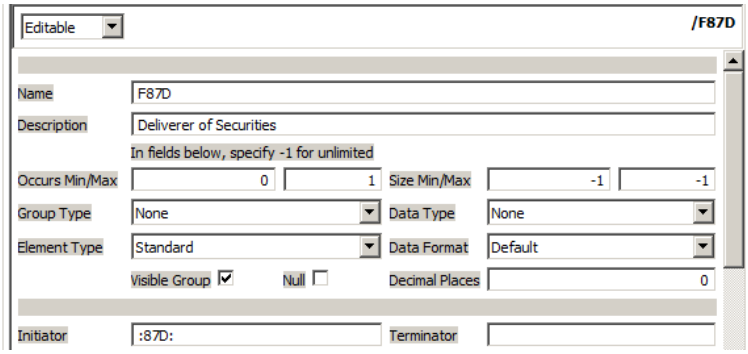
Creating the F87D Fields

Field	Element	Type	Loop
F87D	Code	String 1-34	0
	Broker Settlement Agent Name	String 1-35	0

Creating the F87D Structure

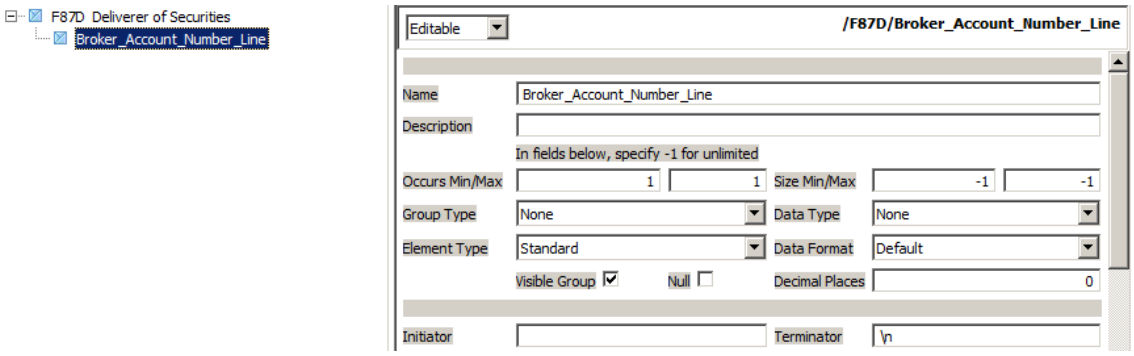
1. Right-click **Hierarchical Mapper > Structures > Fields** and select **New > Structure**.
2. Select **Create a new structure where you manually enter elements** and click **Next >**.
3. Name the new Structure *F87D* and click **Finish**.
4. Right-click the empty area and select **New Element** to create a new element with the following properties:

Property	Value
Name	F87D
Description	Deliverer of Securities
Data Type	None
Initiator	:87D:



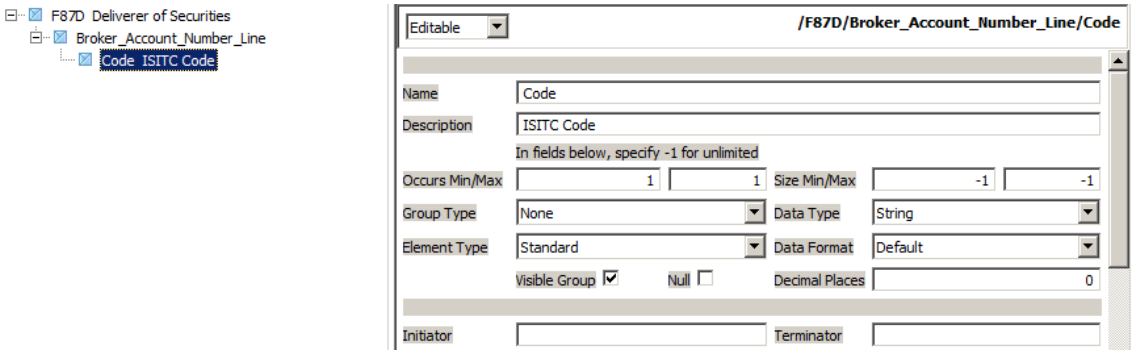
5. Right-click *F87D Deliverer of Securities* and select **New Element** to create a new child with the following properties:

Property	Value
Name	Broker_Account_Number_Line
Occurs Min/Max	1/1
Data Type	None
Terminator	\n



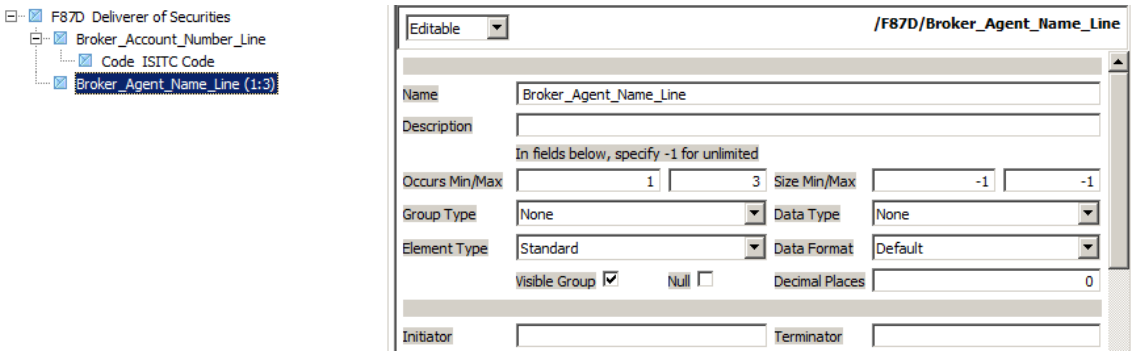
6. Right-click *Broker_Account_Number_Line* and select **New Element** to create a new child with the following properties:

Property	Value
Name	Code
Description	ISITC Code
Occurs Min/Max	1/1
Data Type	String



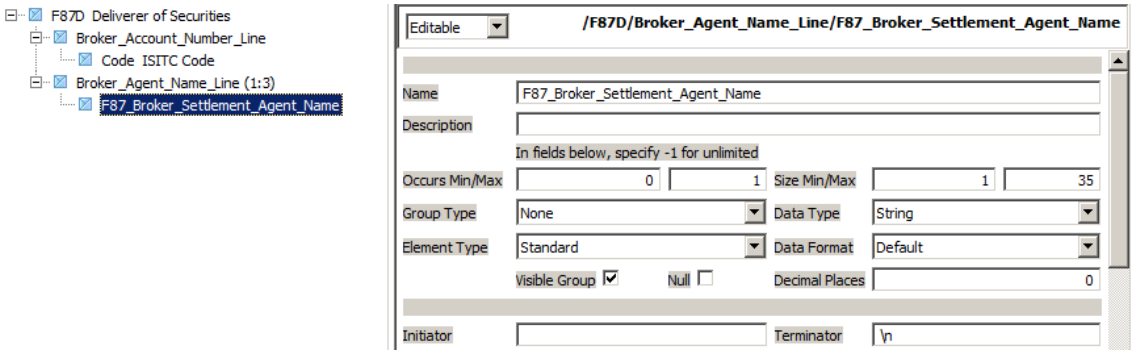
7. Right-click *F87D Deliverer of Securities* and select **New Element** to create a new child with the following properties:

Property	Value
Name	Broker_Agent_Name_Line
Occurs Min/Max	1/3
Data Type	None



8. Right-click *Broker_Agent_Name_Line* and select **New Element** to create a new child with the following properties:

Property	Value
Name	F87_Broker_Settlement_Agent_Name
Size Min/Max	1/35
Data Type	String
Terminator	\n

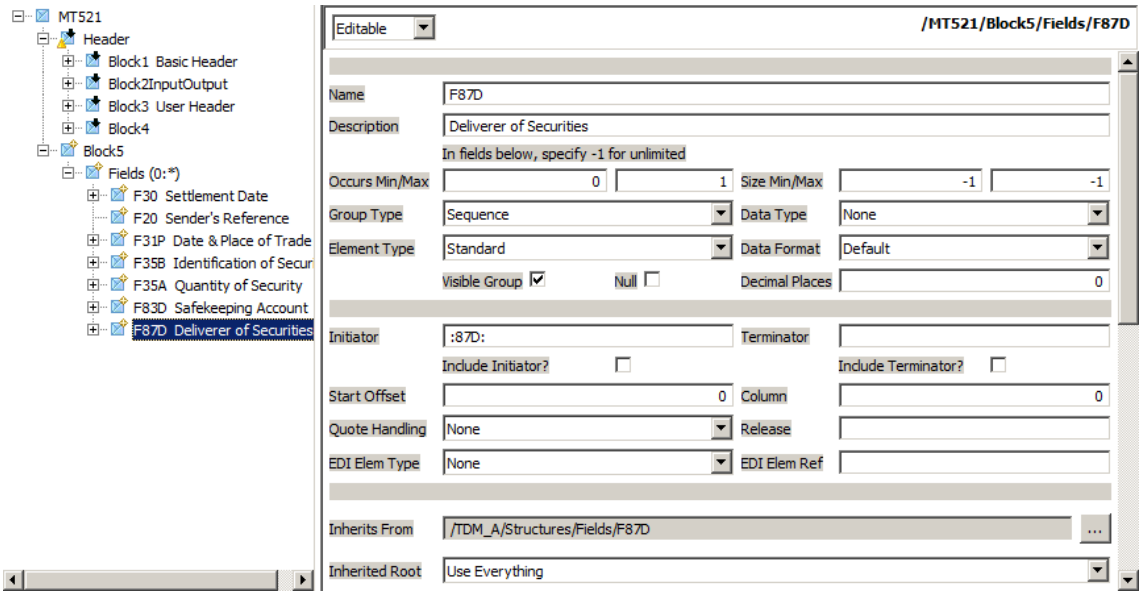


9. Save the changes to the Structure.

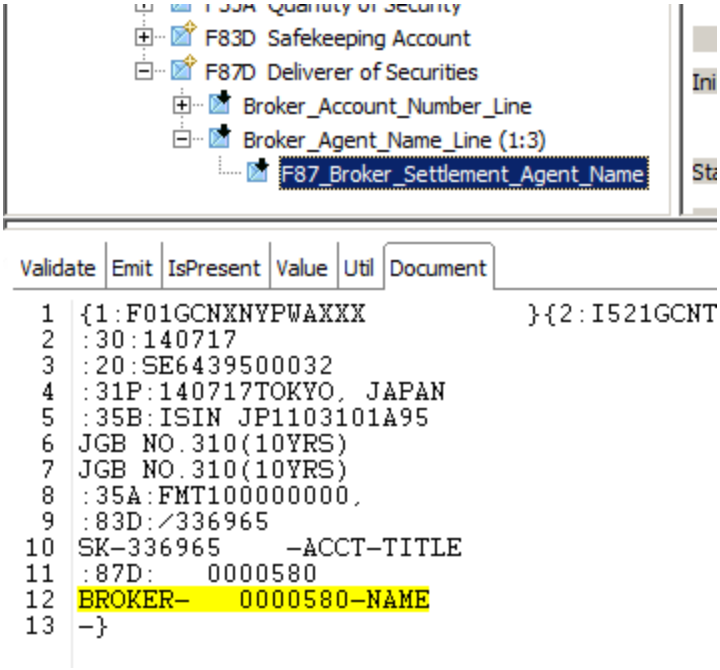
Creating a New F87D Element in MT521-DOC

1. Switch back to the *MT521-DOC* Structure.
2. Right-click **Fields** and select **New Element** to create a new element with the following properties.

Property	Value
Name	F87D
Description	Deliverer of Securities
Initiator	:87D:
Inherits From	Structures/Fields/F87D
Inherited Root	Use Everything



3. Save the changes to the Structure.
4. Select **F87_Broker_Settlement_Agent_Name** in the Structure and check that the data is highlighted correctly.



Next Step

This lesson is almost over. Head to the Wrap-Up section for a summary of the concepts reviewed in this lesson.

Wrap-Up

In this lesson, you learned how to:

- Create a SWIFT MT 521 Structure manually by defining message blocks and fields that match an available data file

Next Step

Congratulations, you successfully completed this lesson. Click the **Check your status with this unit** button below in order to save your progress. Then click **Completed. Let's continue >** on the next screen to jump to the next lesson.

LESSON 2

Mapping SWIFT Files to MySQL

This chapter discusses the following.

Overview 48
Setting Up the MySQL Connection 49
Creating the DI Job 53
Performing the Mapping 64
Running the Job 73
Wrap-Up 77

Overview

Lesson Overview

The objective of this lab is to create a Job that reads from a SWIFT file and writes to a MySQL database.

Objectives

After completing this lesson, you will be able to:

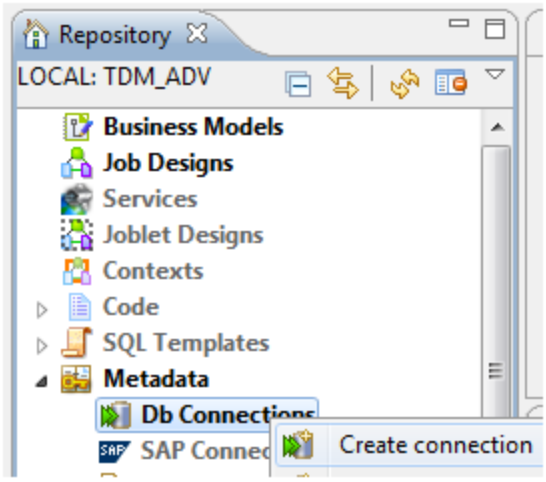
- Set up a MySQL connection
- Use a tHMap Component to read from a SWIFT file and write to a MySQL database

Next Step

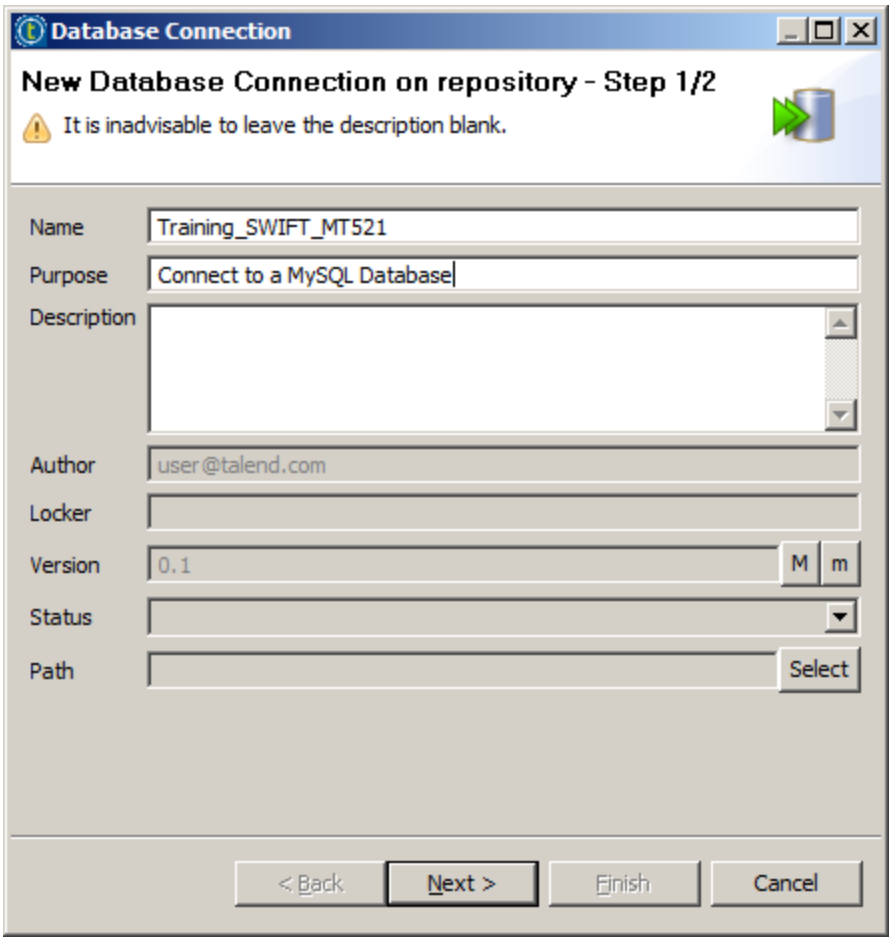
First, let's set up the MySQL connection.

Setting Up the MySQL Connection

1. In the **Integration** perspective, right-click **Metadata > Db Connections** and select **Create connection**.



2. Provide details as illustrated then click **Next >**.

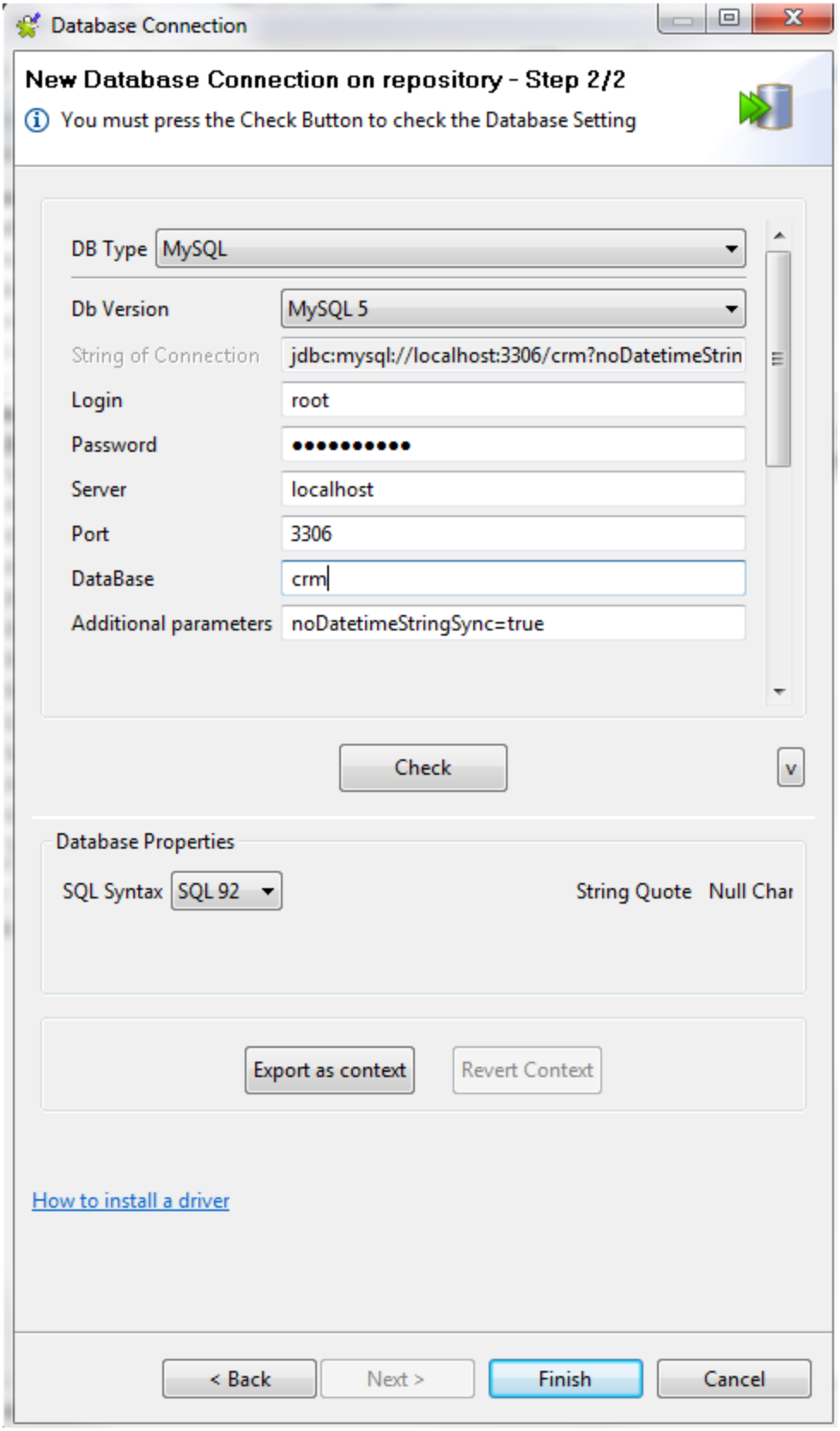


3. Select **MySQL** for the **DB Type**.

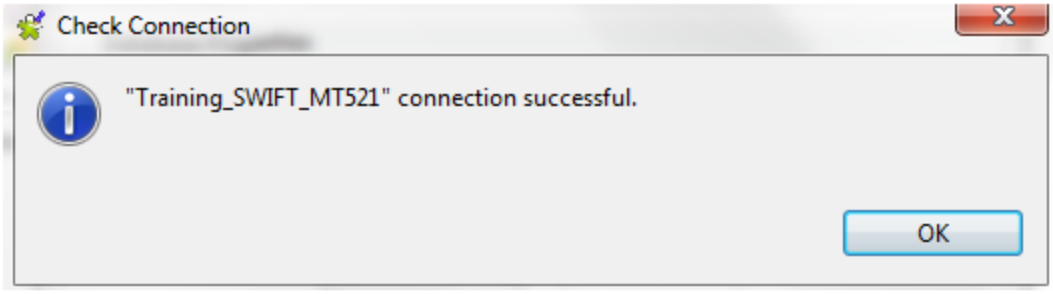
   Use **root** for both the **Login** and the **Password**.

Enter **localhost** for the **Server** and **crm** for the **DataBase**.

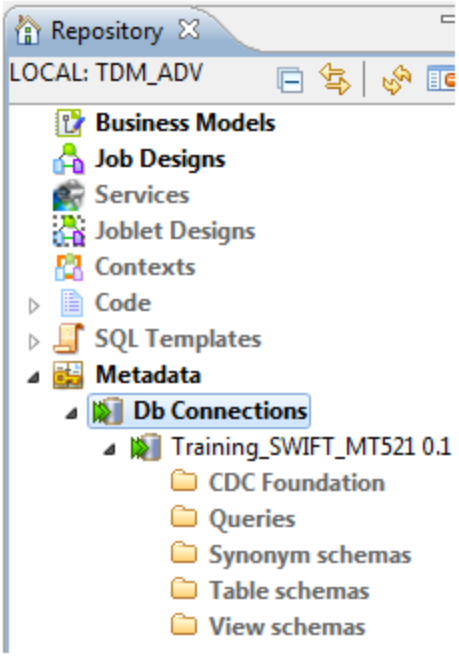
Finally, click the **Check** button to verify the connection.


Database Connection
New Database Connection on repository - Step 2/2
You must press the Check Button to check the Database Setting
DB Type
MySQL
Db Version
MySQL 5
String of Connection
jdbc:mysql://localhost:3306/crm?noDatetimeStrin
Login
root
Password
Server
localhost
Port
3306
DataBase
crm
Additional parameters
noDatetimeStringSync=true
Check
Database Properties
SQL Syntax
SQL 92
String Quote
Null Char
Export as context
Revert Context
How to install a driver
< Back
Next >
Finish
Cancel

4. Click **OK** in the dialog indicating success and click **Finish** to close the wizard.



5. Check that the MySQL connection appears under **DB Connections**.

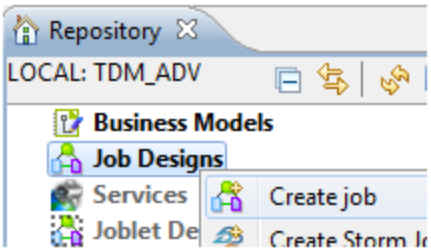


Next Step

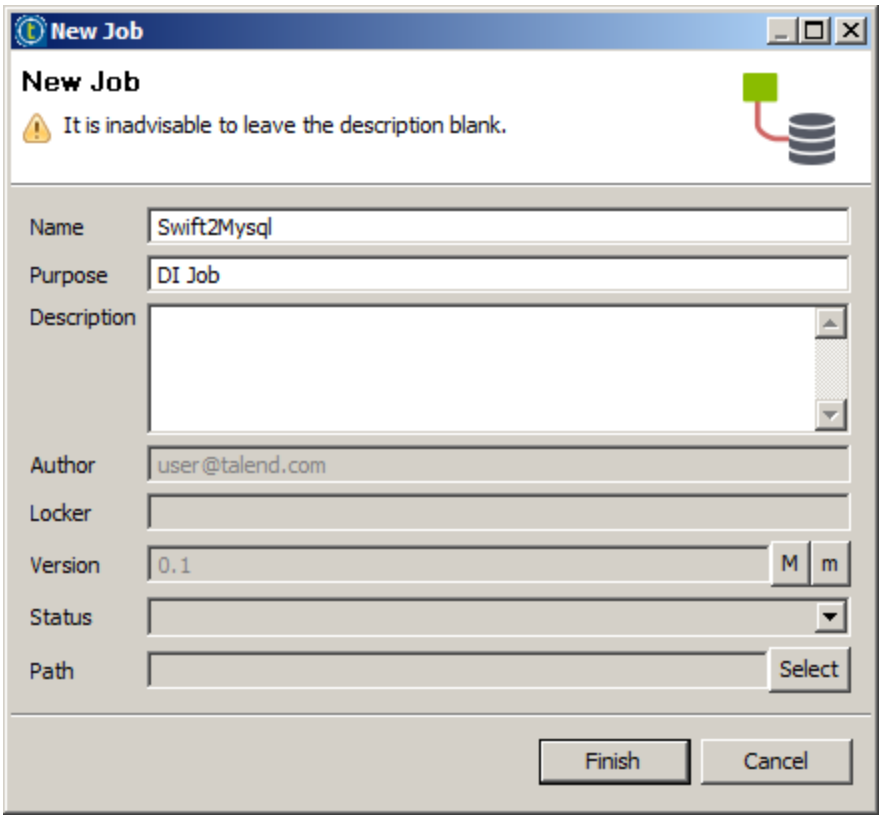
With the MySQL connection set up, let's create a new DI Job.

Creating the DI Job

1. In the **Integration**perspective, right-click **Job Designs** and select **Create Standard Job**.

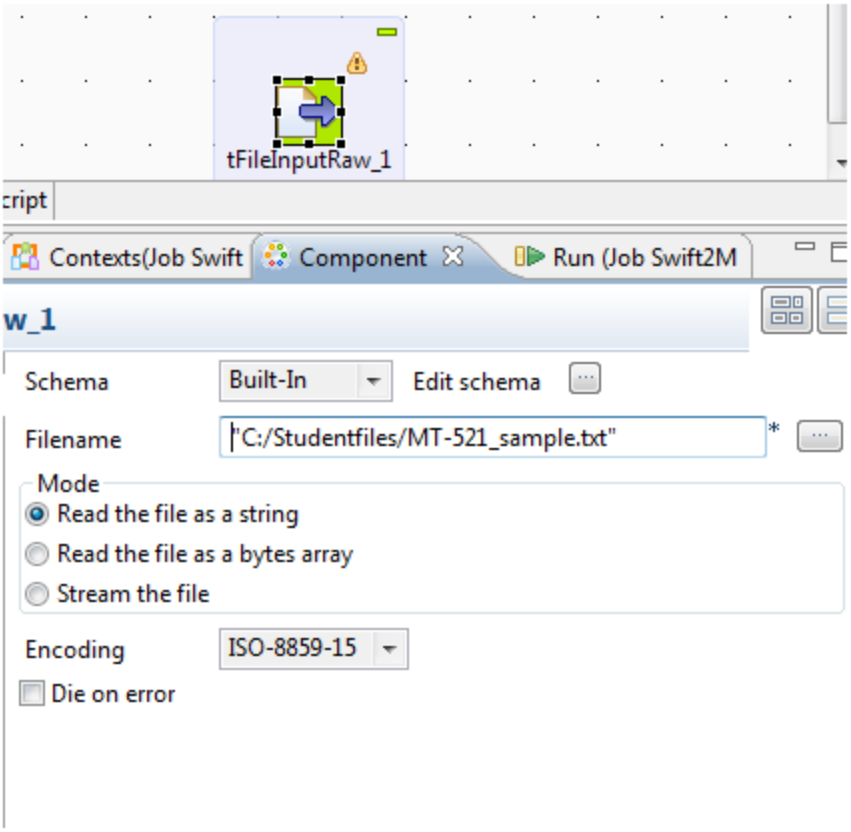


2. Provide details as illustrated below then click **Finish** to create the Job and open the Design area.

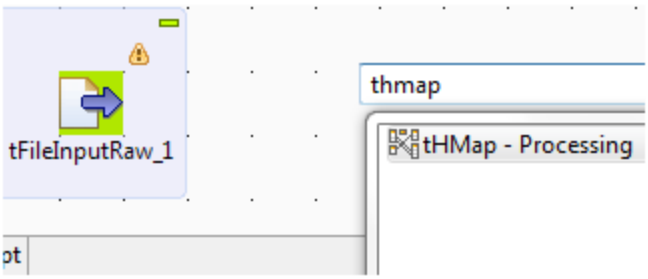


3. Drop a **tFileInputRaw** Component to the Design area and double-click it to display its **Component** View.

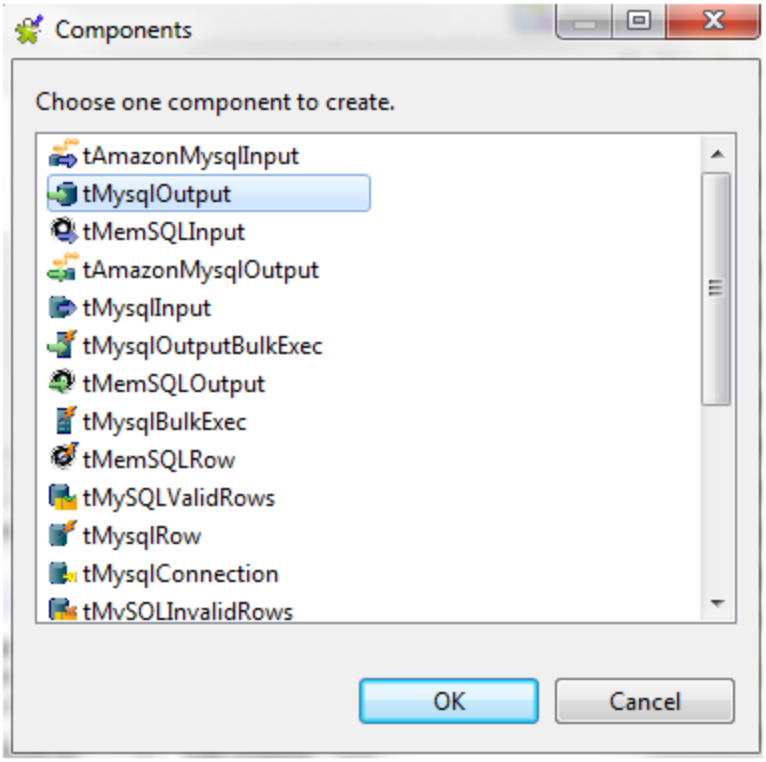
   Click the **...** button next to the **Filename** field and select *C:/StudentFiles/MT-521_sample.txt*.



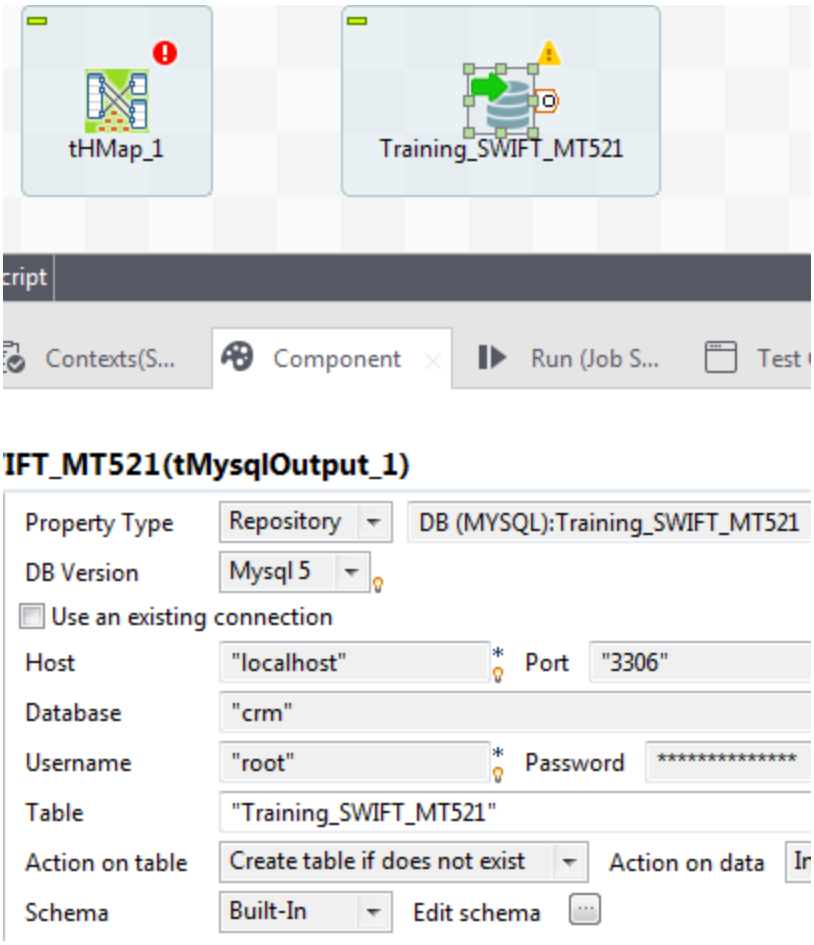
4. Add a **tHMap** Component to the Job.



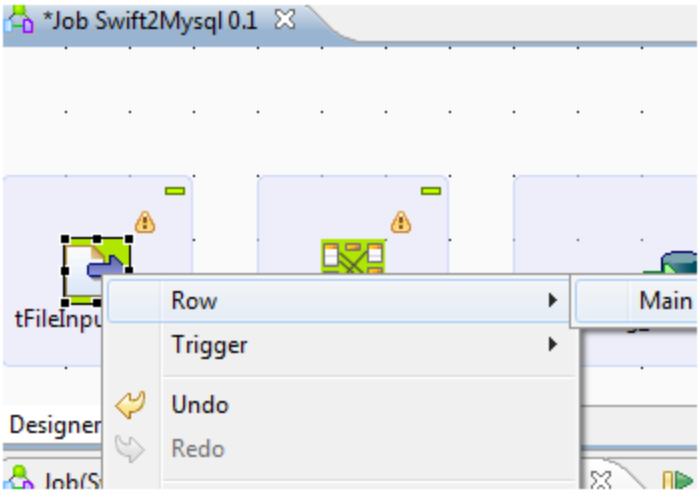
5. Drag & drop **Metadata > Db Connections > Training_SWIFT_521** to the right side of **tHMap**, select a **tMysqlOutput** Component then click **OK**.



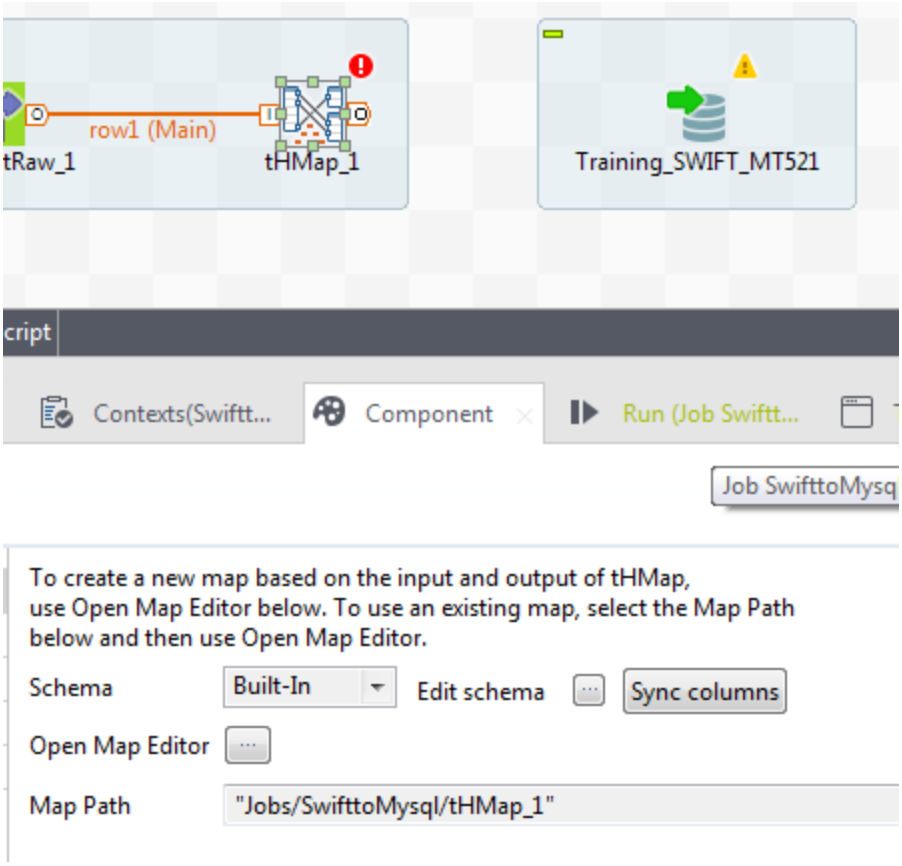
6. In the **Component** view, enter *"Training_SWIFT_MT521"* for the **Table** field and set **Action on table** to **Create table if it does not exist**.



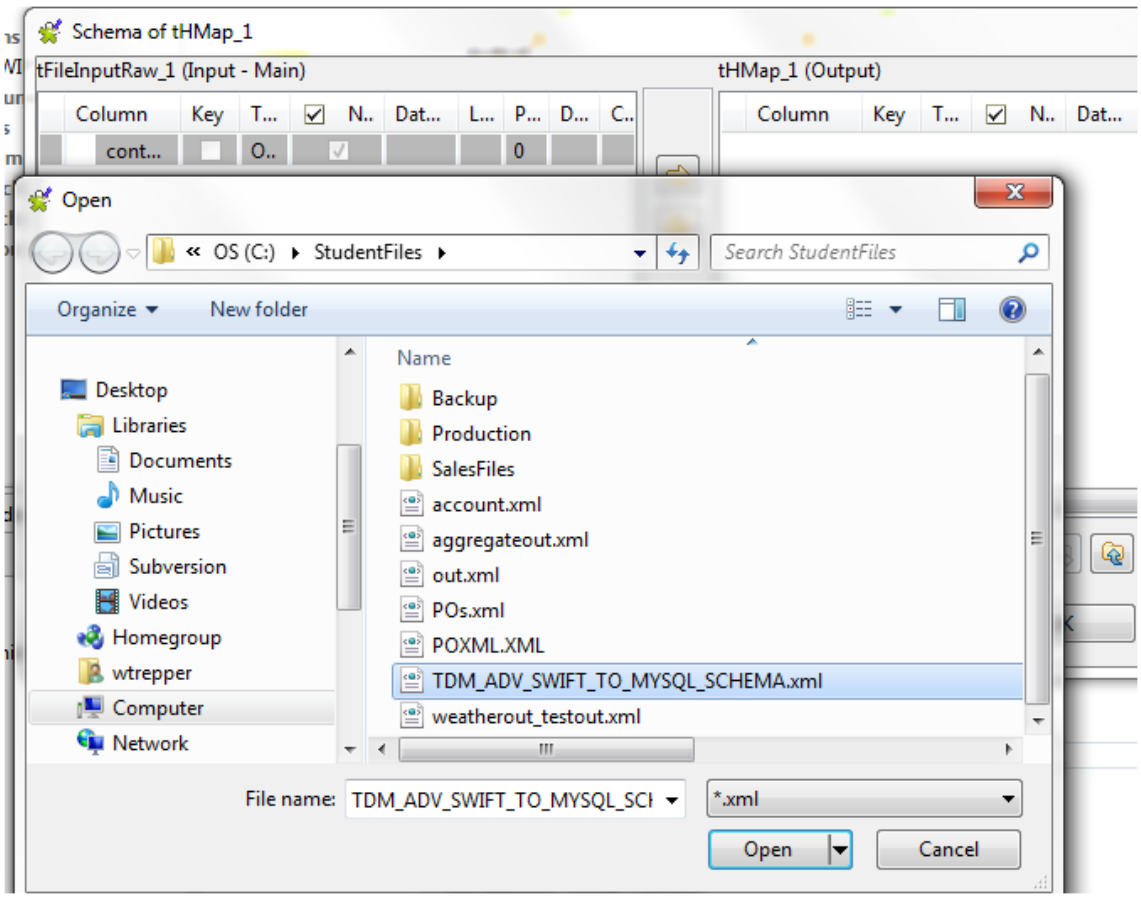
7. Right-click **tFileInputRaw**, select **Row > Main** and connect it to **tHMap**.



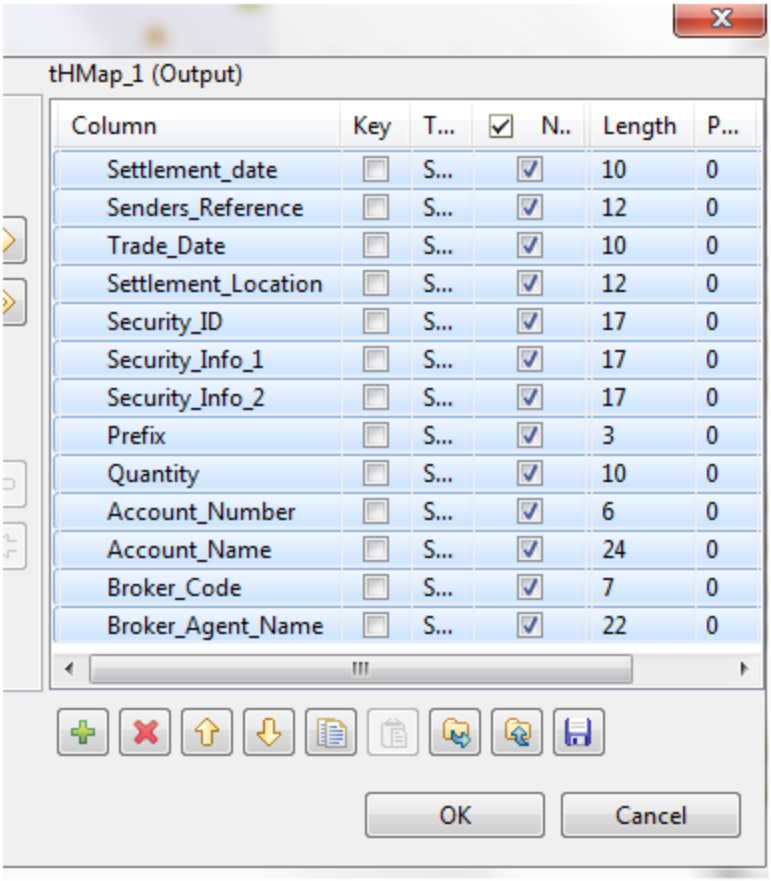
8. Select the **tHMap** Component and click the **...** button next to **Edit schema**.



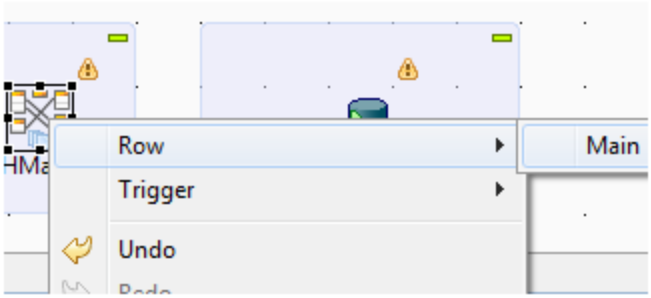
9. The output schema used to write in the MySQL database can be imported from an existing XML file. To do so, click the  button below the output table, select *C:/StudentFiles/TDM_ADV_SWIFT_TO_MYSQL_SCHEMA.xml* and click **Open**:



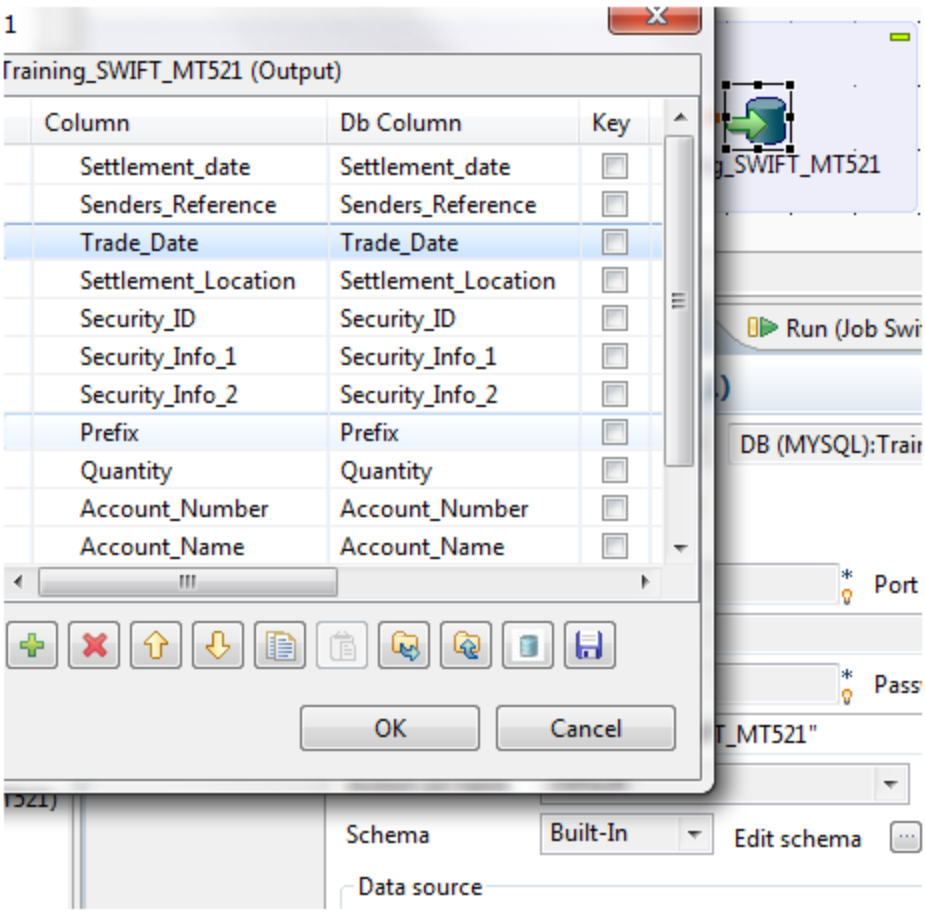
10. Check that the schema is actually copied to the **Output** then click **OK**.



11. Right-click **tHMap**, select **Row > Main** and connect it to **Training_SWIFT_MT521**.

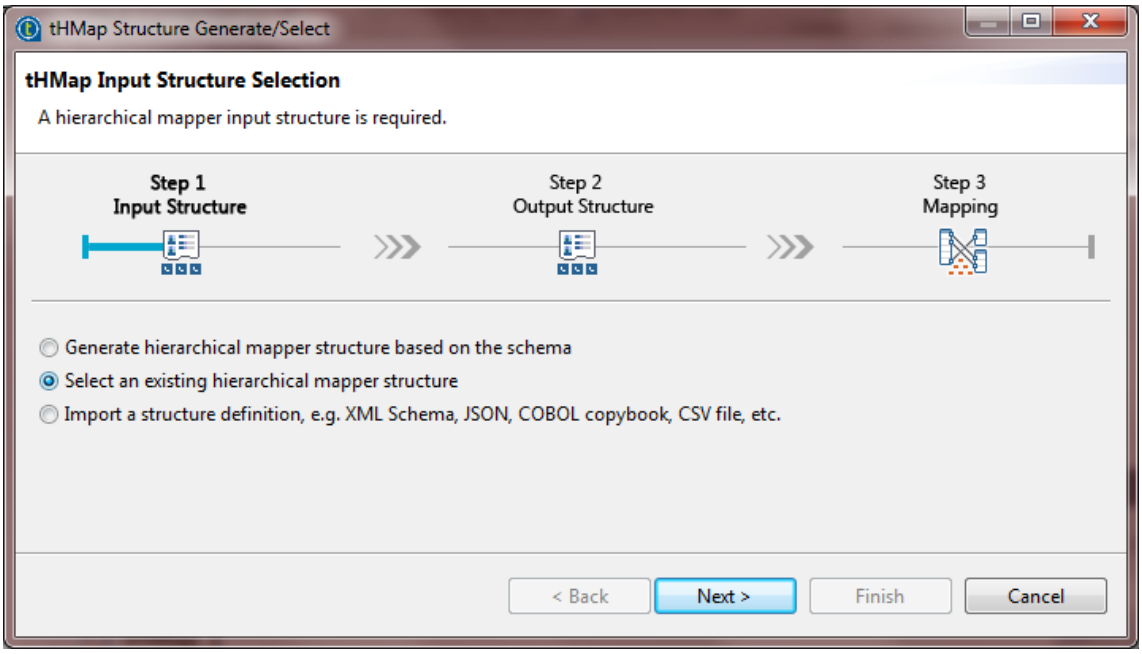


12. Select the **Training_SWIFT_MT521** Component then click the **...** button next to **Edit schema**. Check that the schema was copied from the **tHMap** Component, then click **OK**.

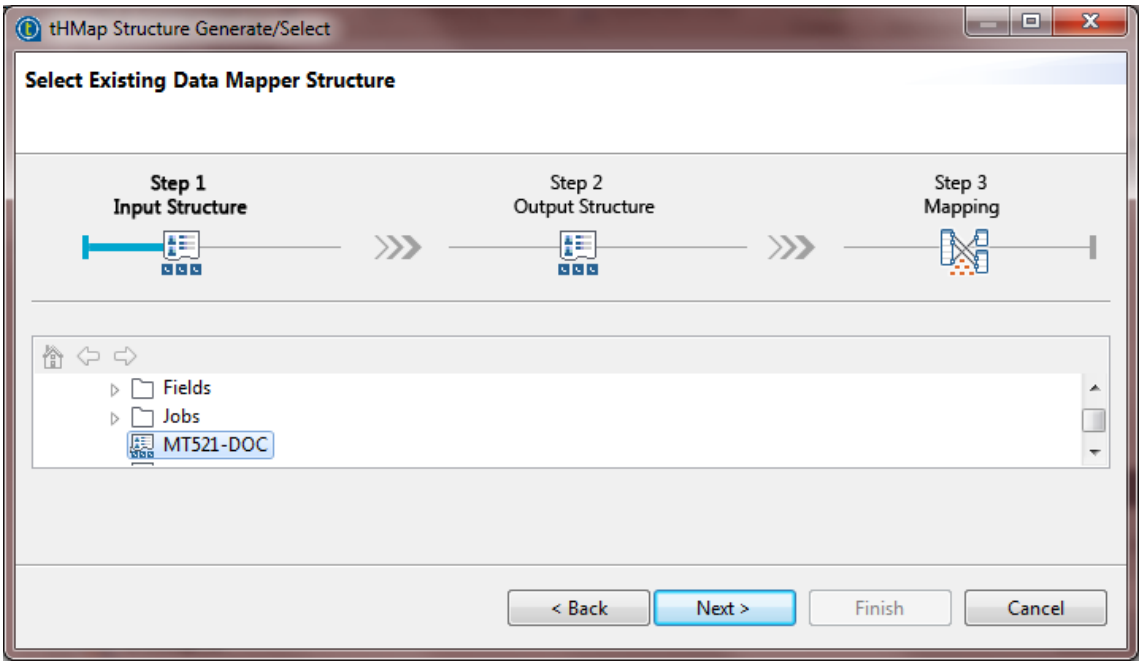


Creating the Mapping

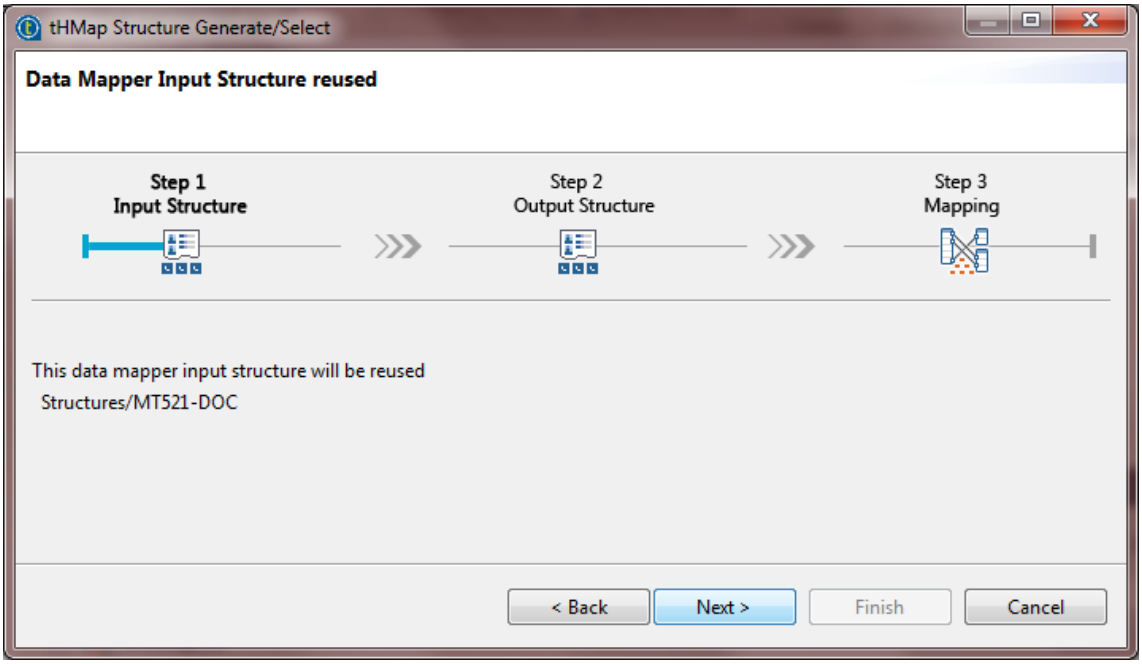
1. Double-click **tHMap** to start the mapping wizard. Pick the **Select an existing hierarchical mapper structure** option and click **Next >**.



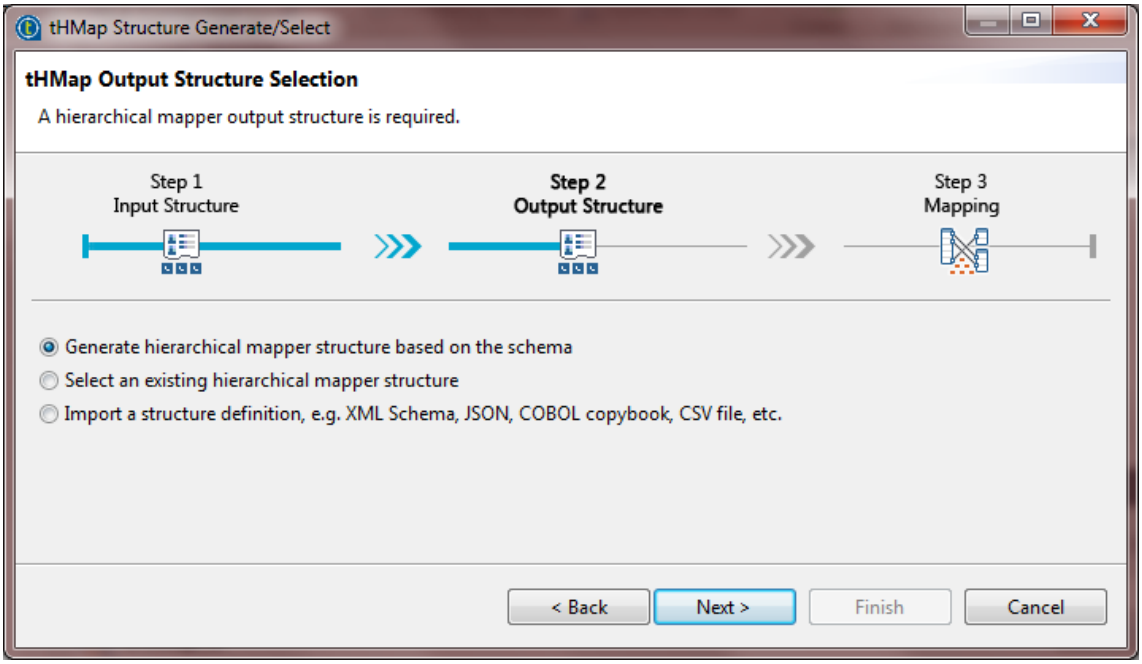
2. Select the **Structures > MT521-DOC** Structure then click **Next >**.



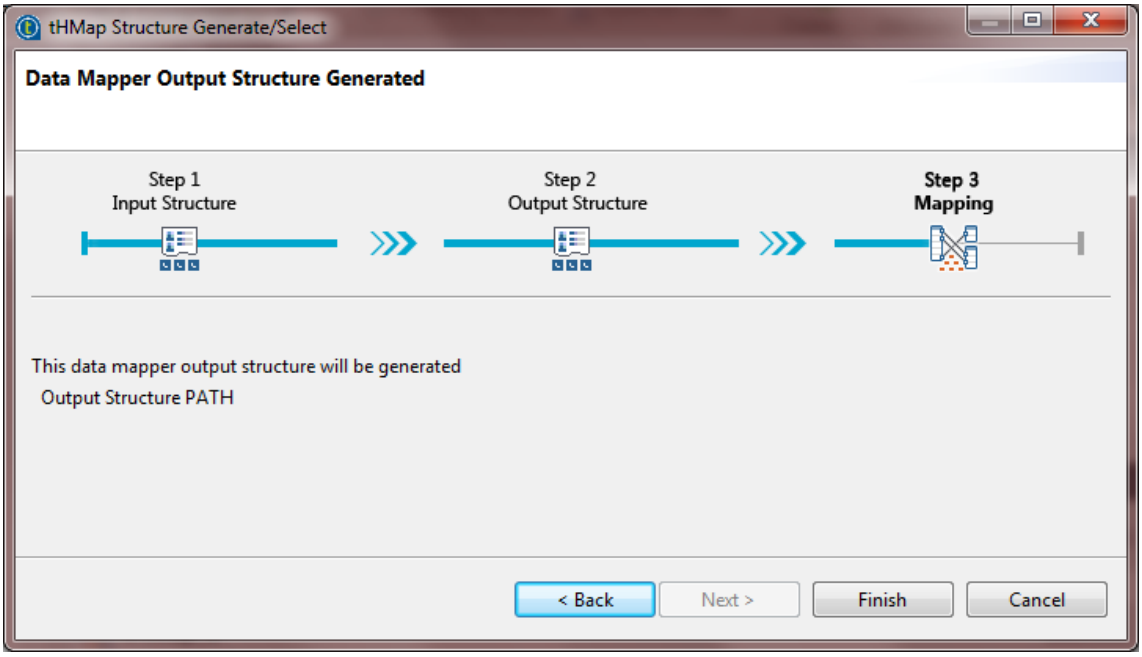
3. Click **Next >** in the confirmation screen.



4. Pick the **Generate hierarchical mapper structure based on the schema** option in Step 2 and click **Next >**.



5. Click **Finish** in the confirmation screen to open the Map Editor.

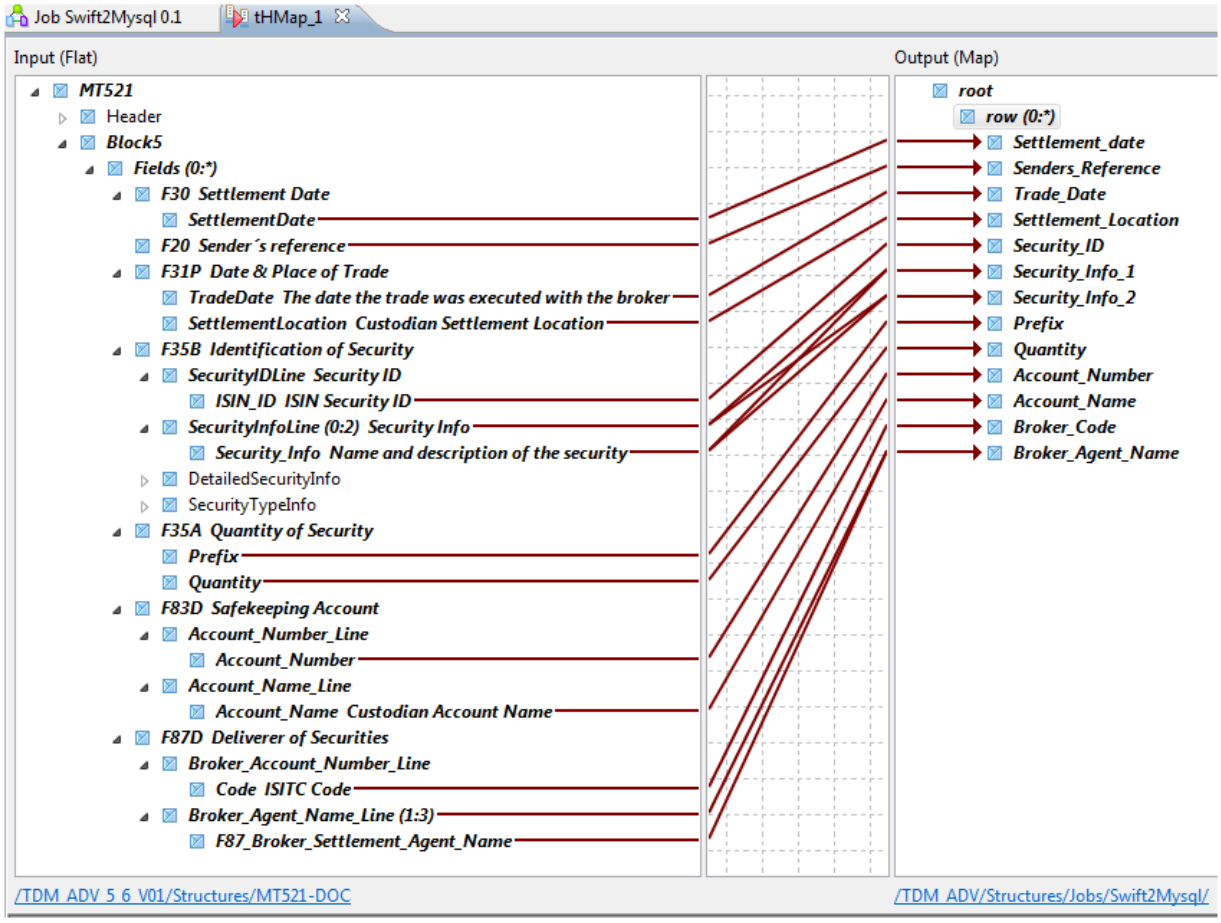


Next Step

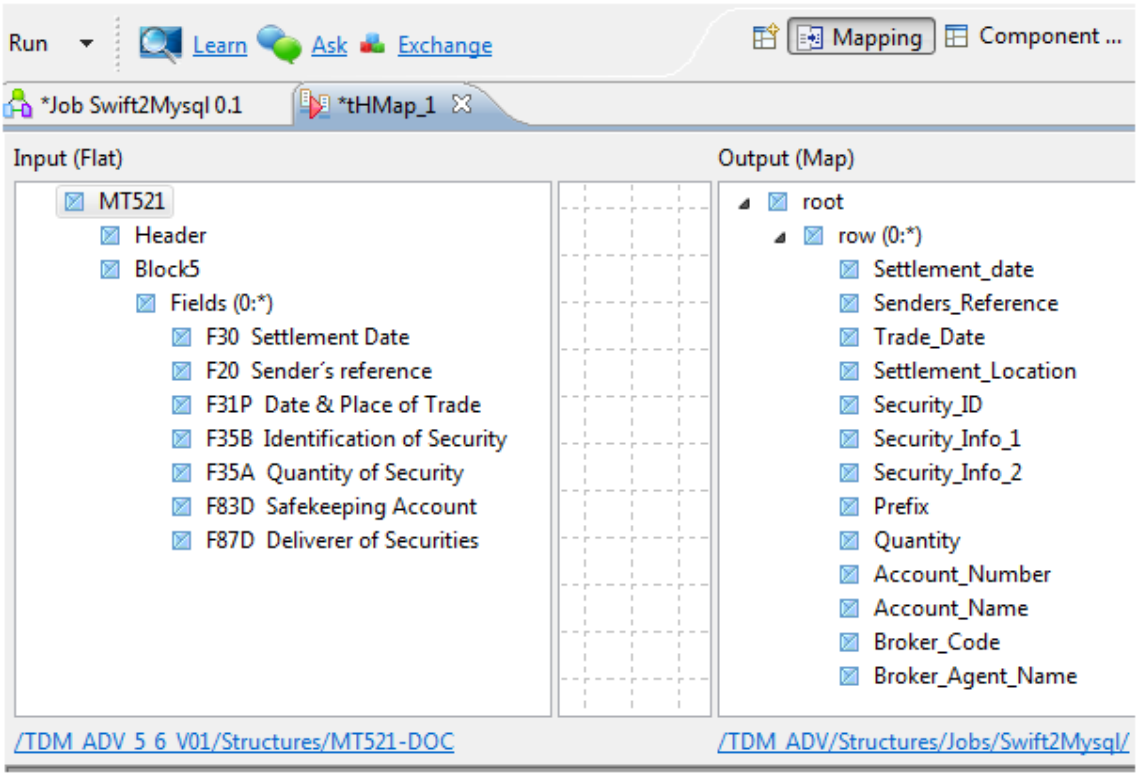
Now that the input and output Structures are defined, let's perform the actual mapping.

Performing the Mapping

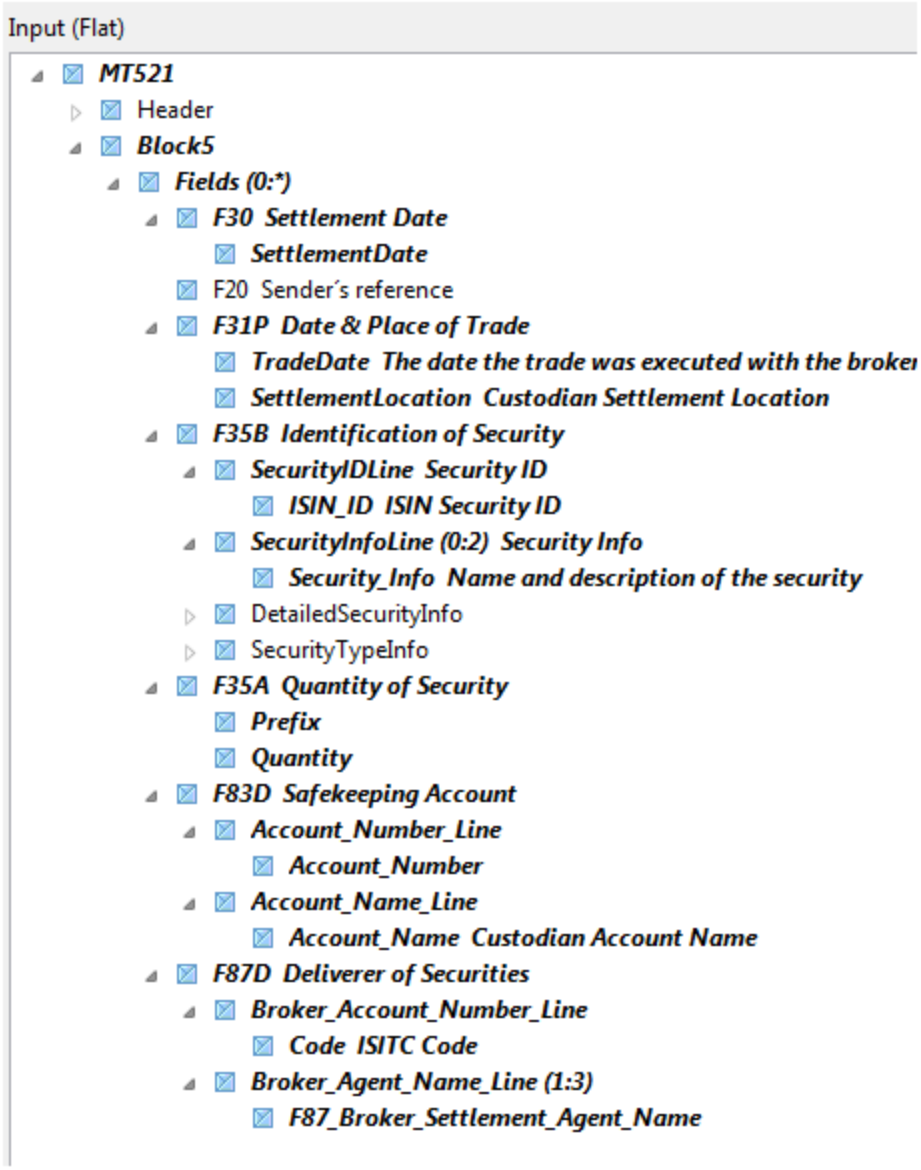
The elements will be mapped like this:



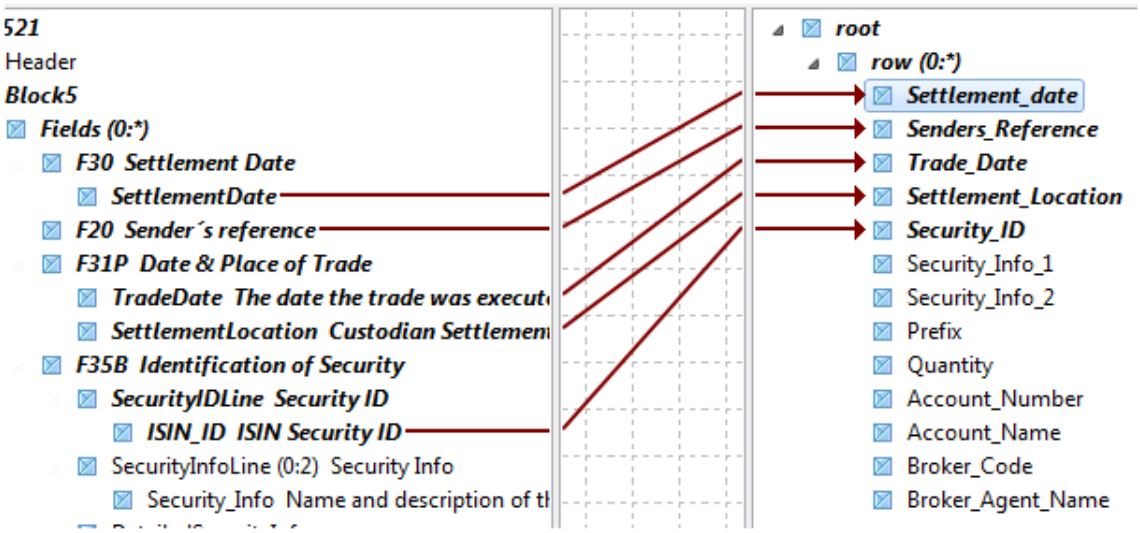
1. Switch to the **Mapping** perspective if it is not the current one already.



2. Expand **Block5** in the Input area.



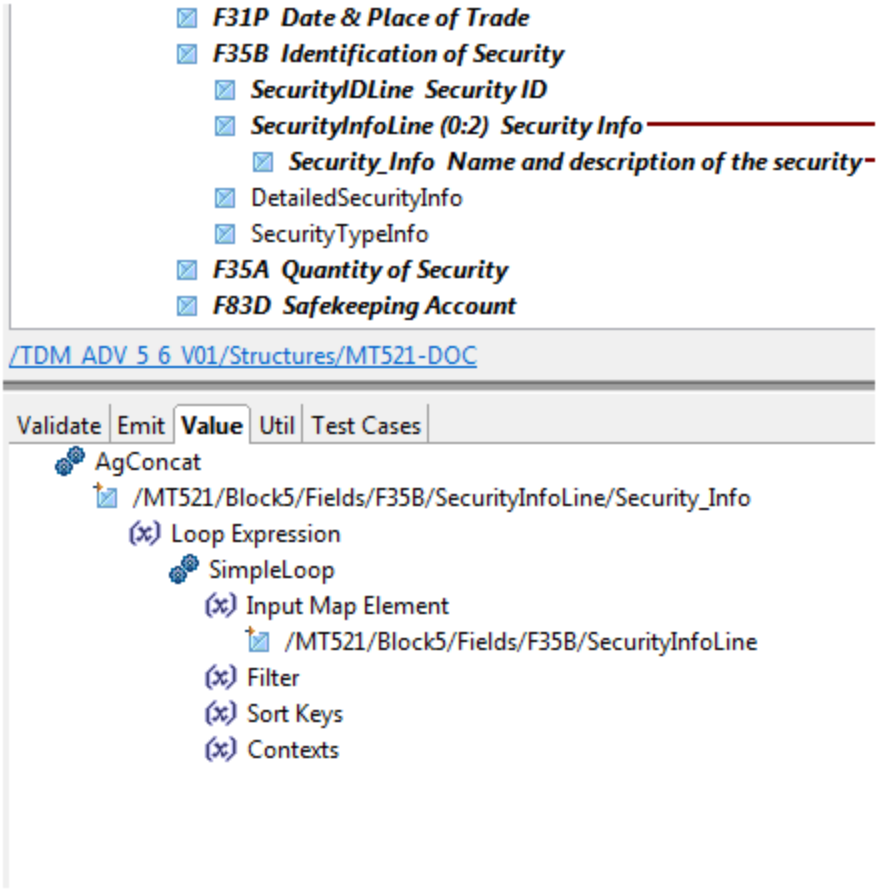
3. First, map **SettlementDate**, **Senders_Reference**, **Trade_Date**, **Settlement_Location** and **Security_ID** as illustrated below.



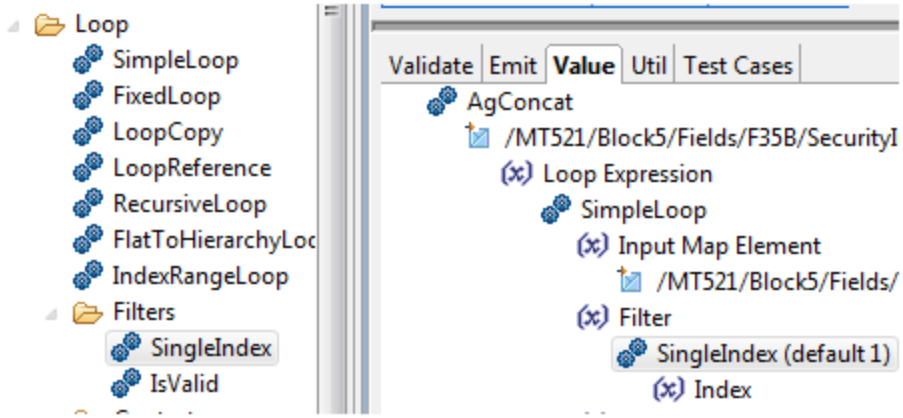
4. Select **Security_Info_1** in the **Output** area and display its **Value** tab.

   Drag & drop a **Functions > Aggregate > AgConcat** Function to the **Value** Tab.

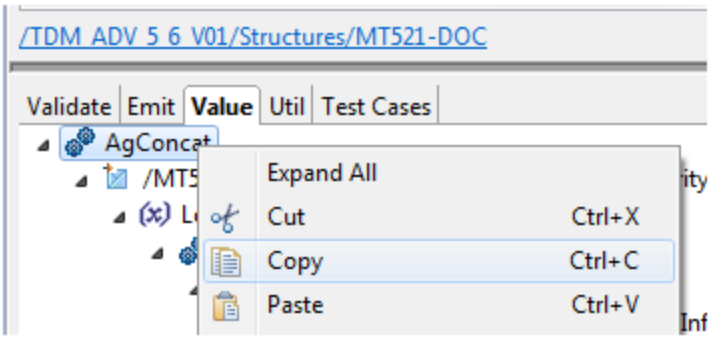
   Finally, drag & drop **Security_Info Name and description of the security** from the **Input** area to **AgConcat**.



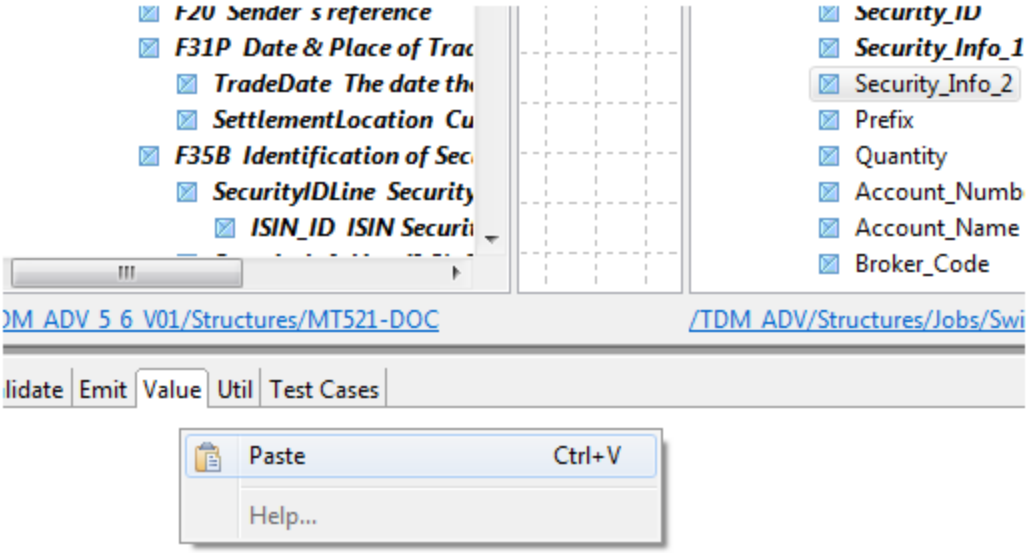
5. Drag & drop a **Functions > Loop > Filters > SingleIndex** Function to the empty **Filter** branch.



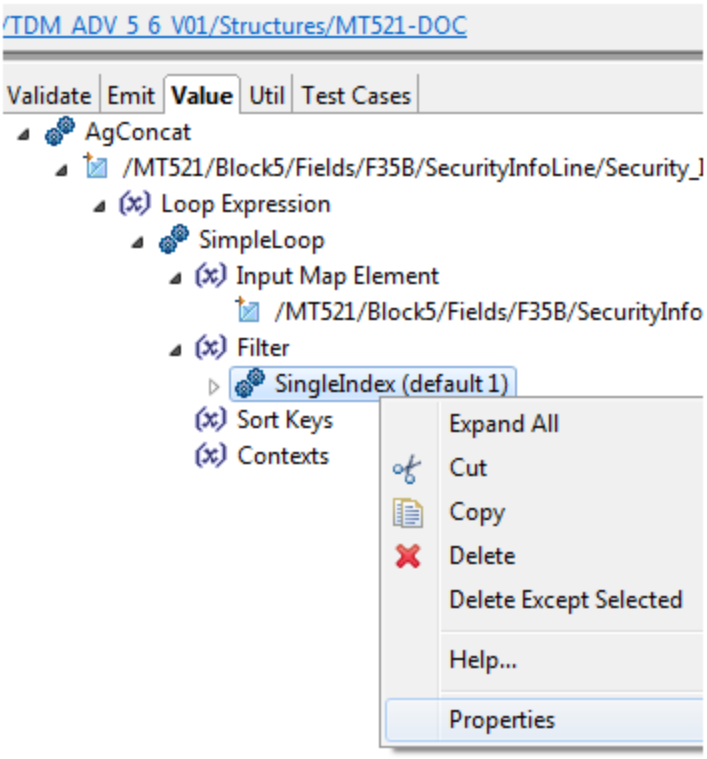
6. Right-click **AgConcat** and select **Copy**.



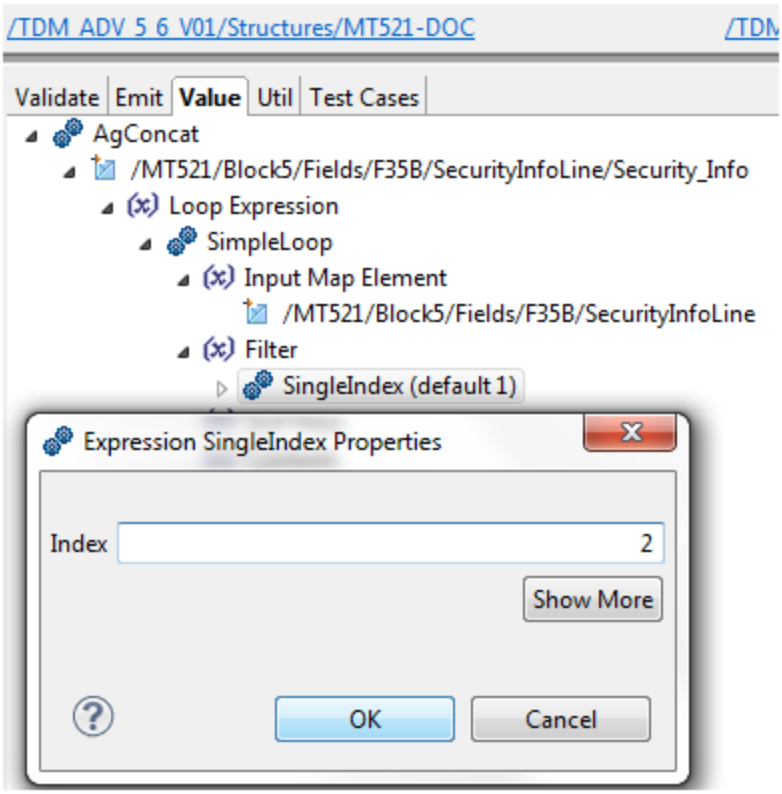
7. Select **Security_Info_2** in the **Output** area, right-click inside its **Value** tab and select **Paste** to insert a copy of the *AgConcat* Function.



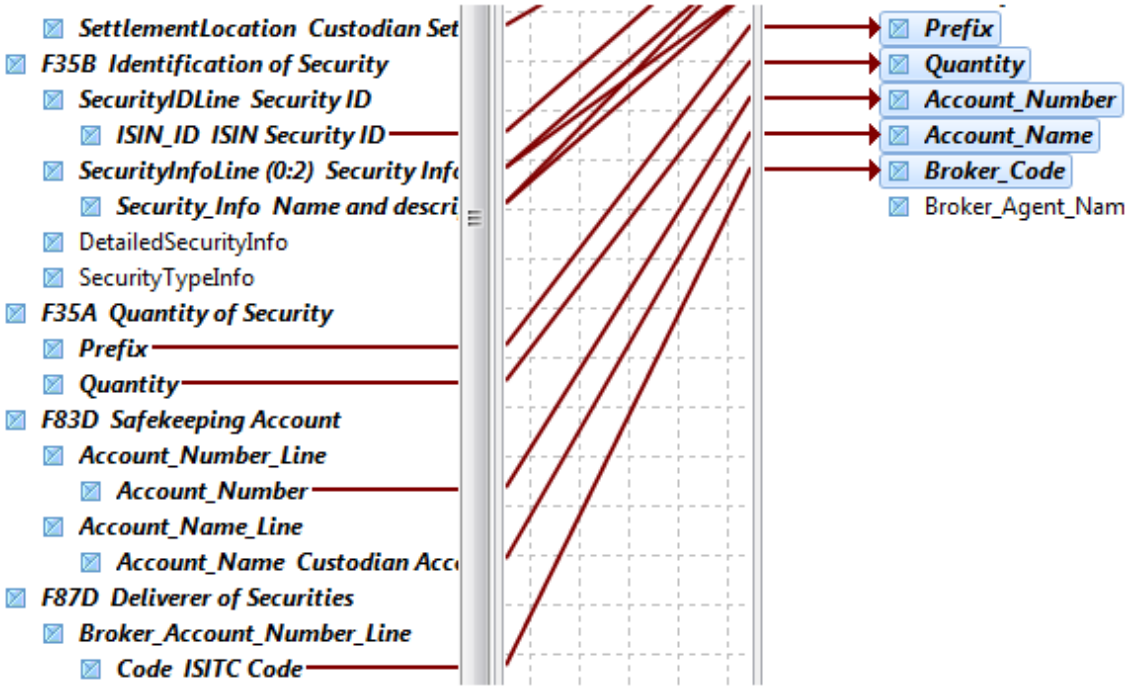
8. Expand the hierarchy and double-click **SingleIndex (default 1)** to display its properties.



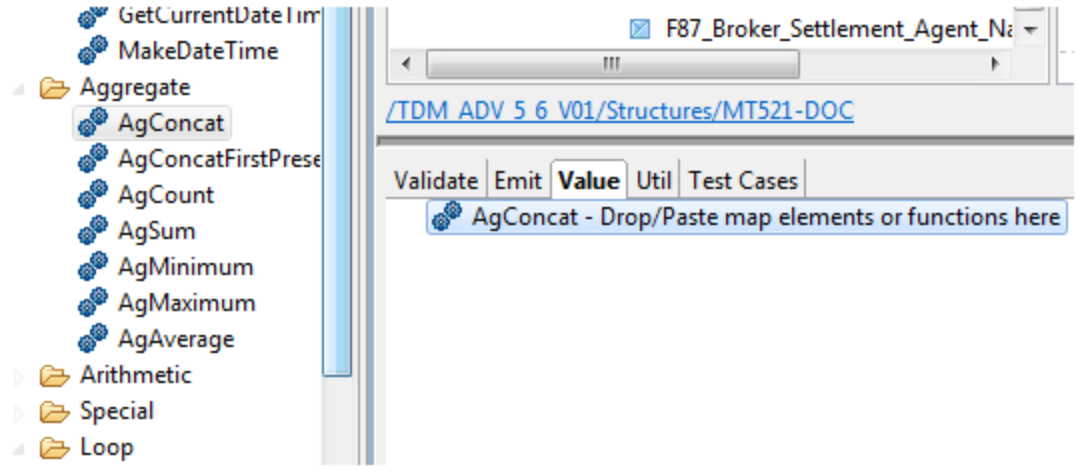
9. Set **Index** to *2* and click **OK**.



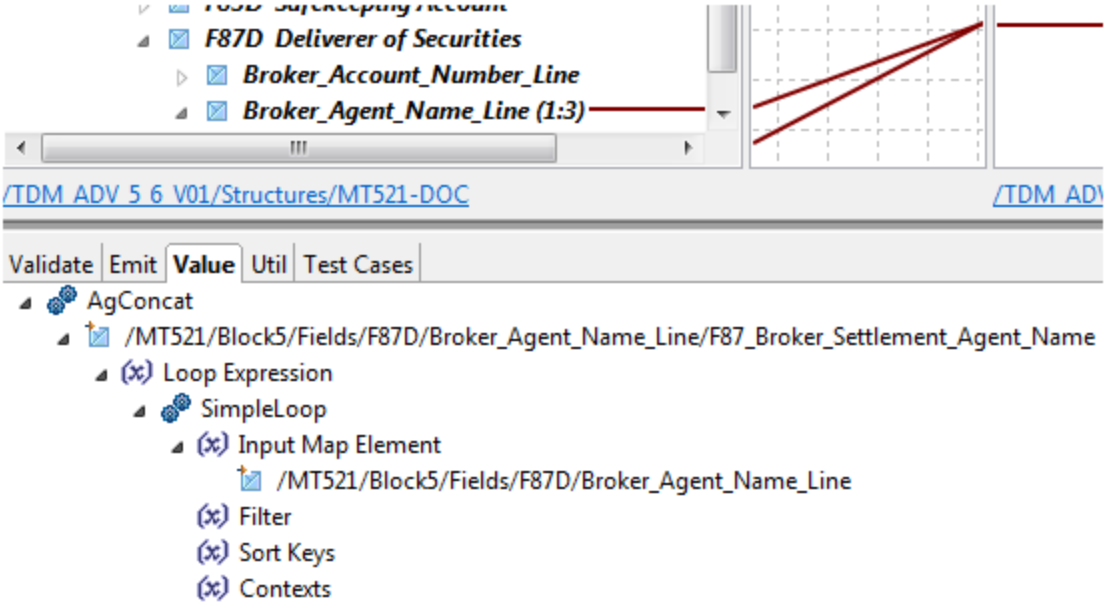
10. Map **Prefix**, **Quantity**, **Account_Number**, **Account_Name** and **Broker_Code** as illustrated below.



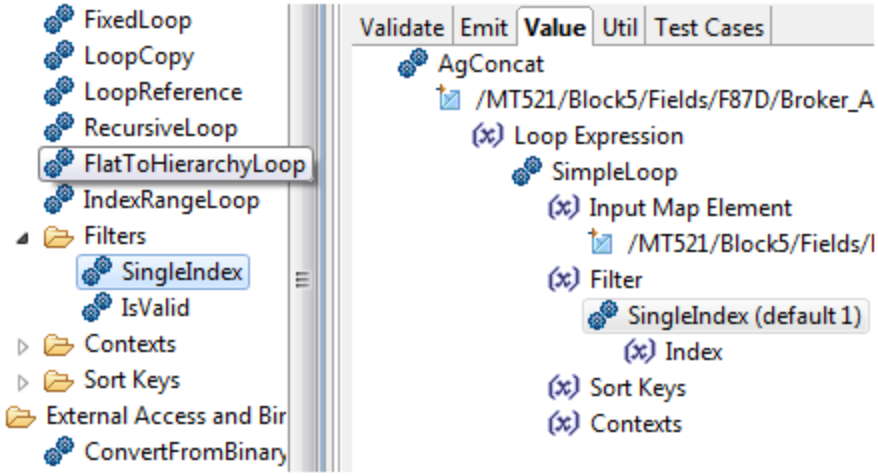
11. Finally, select **Broker_Agent_Name** in the **Output** area, display its **Value** tab and drag another **Functions > Aggregate > AgConcat** Function to it.



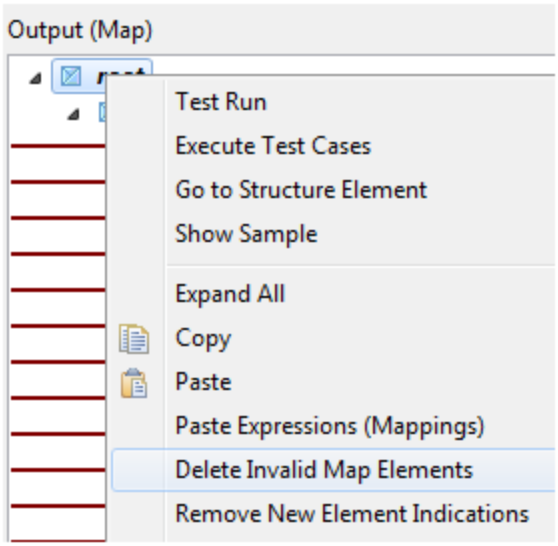
12. Drag & drop **F87_Broker_settlement_Agent_Name** from the **Input** area to the **AgConcat** function.



13. Drag & drop a **Functions > Loop > Filter > SingleIndex** Function to the **Filter** branch.



14. Finally, right-click **root** in the **Output** area and select **Delete Invalid Map Elements**.

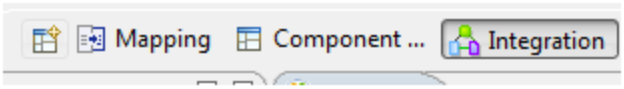


Next Step

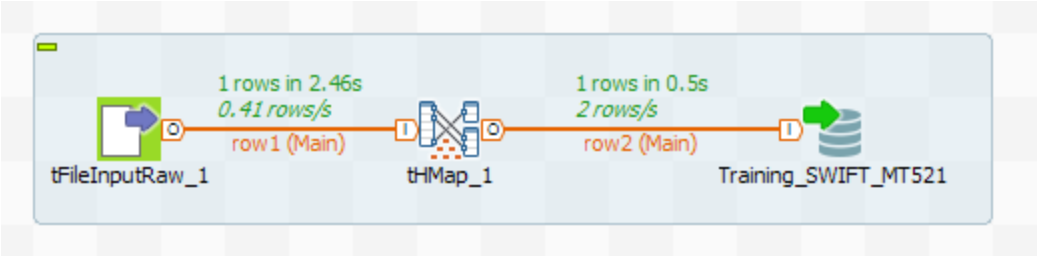
With the mapping performed, let's run the DI Job and check the results.

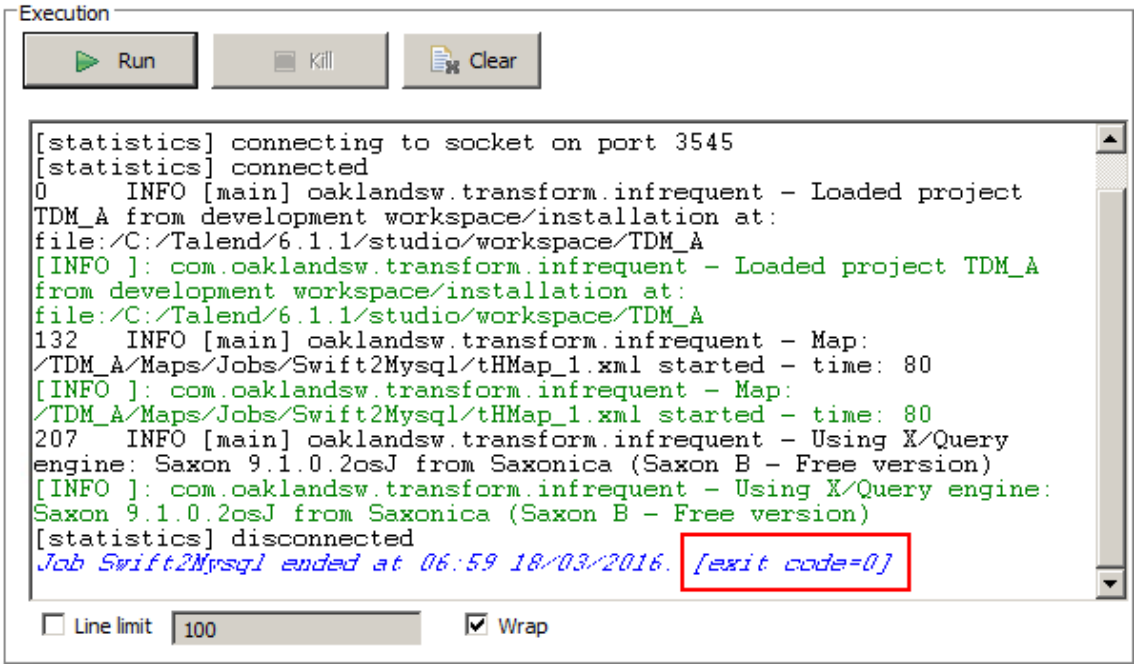
Running the Job

1. Switch back to the **Integration** perspective and the **Swift2Mysql** Job.



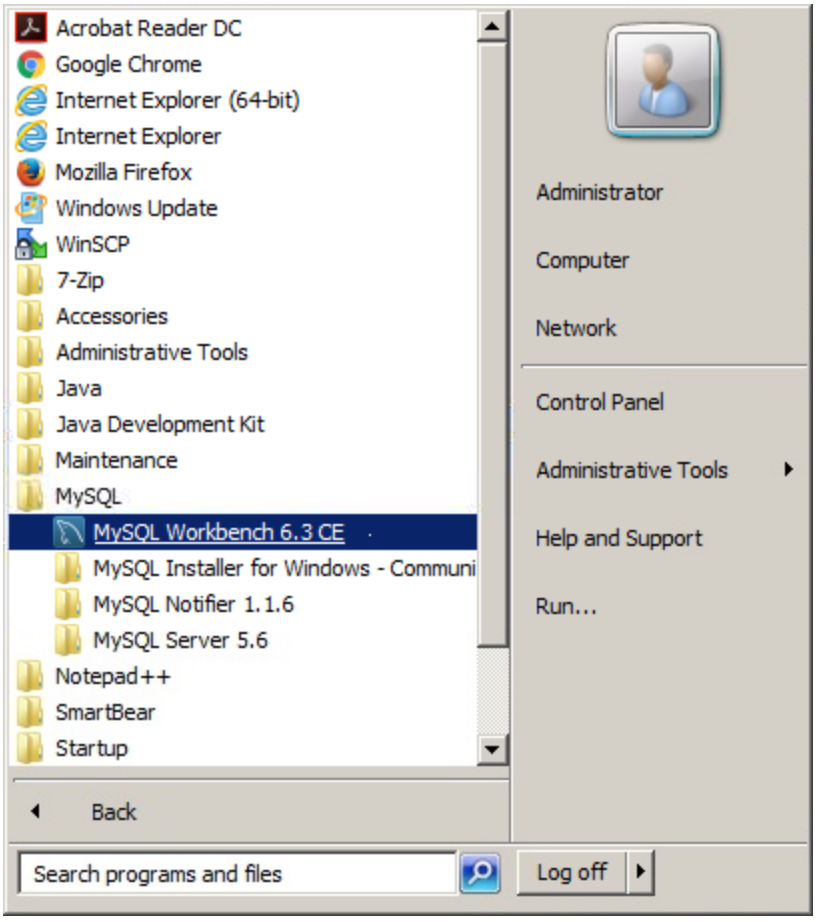
2. Run the job and check that it exits with a 0 code, indicating success.



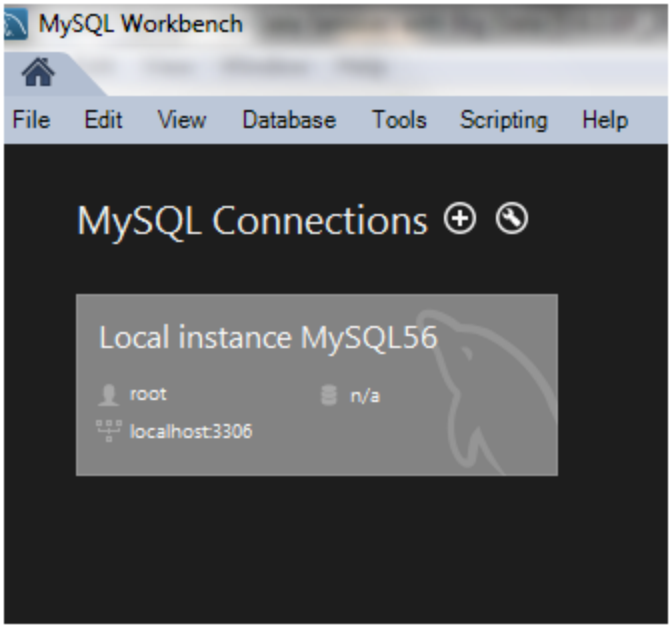


Checking the Results

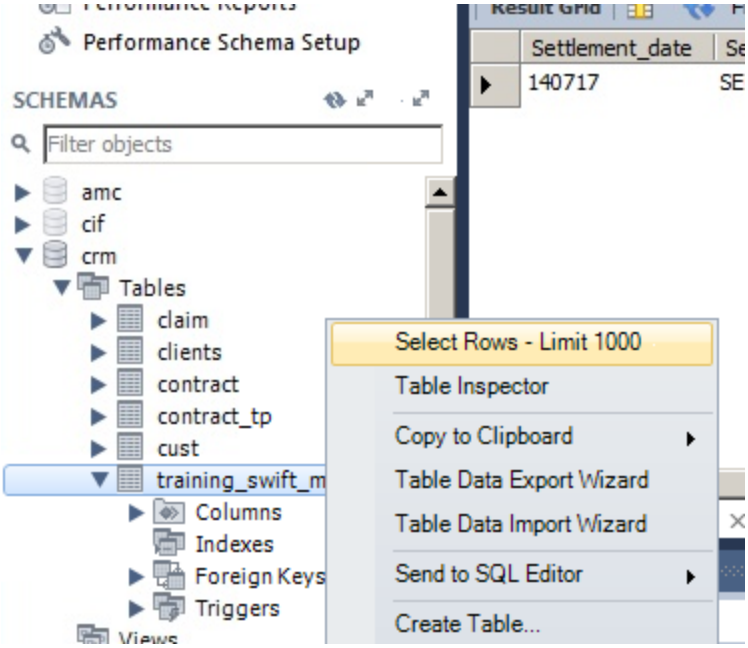
1. Run **All Programs > MySQL > MySQL Workbench 6.x CE** from the Start Menu.



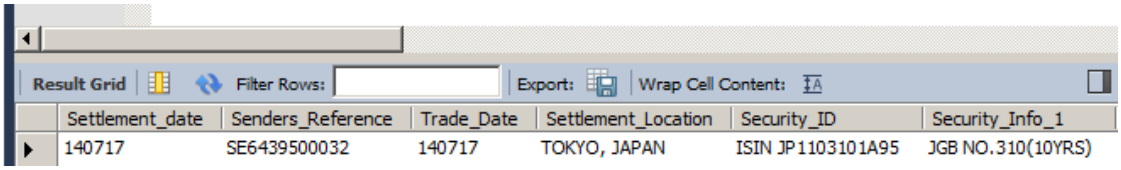
2. Double-click the *localhost* connection to open it.



3. Expand the **crm** branch on the left, right-click **crm > Tables > training_swift_mt521** and select **Select Rows - Limit 1000** to display the first thousand rows.



4. There is only one record in the sample file, so one row should be added to the table every time the Job runs. Running the Job multiple times will only duplicate the first row.



Next Step

This lesson is almost over. Head to the Wrap-Up section for a summary of the concepts reviewed in this lesson.

Wrap-Up

In this lesson, you learned how to:

- Set up a MySQL connection
- Use a tHMap Component to read from a SWIFT file and write to a MySQL database

Next Step

Congratulations, you successfully completed this lesson. Click the **Check your status with this unit** button below in order to save your progress. Then click **Completed. Let's continue >** on the next screen to jump to the next lesson.

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LESSON 3

Mapping Multiple Record Types

This chapter discusses the following.

Overview 80
Creating the Input Structure 82
Creating the Output Structure 94
Mapping the Elements 102
Creating the DI Job 115
Wrap-Up 121

Overview

Lesson Overview

This exercise will guide you through the creation of a Map that converts a multiple record type flat file to another multiple record type flat file.

Here are the specifications you have been provided about the data conversion to be performed. The document contains all the configuration details, which elements to move, which elements to discard, which elements to compute...

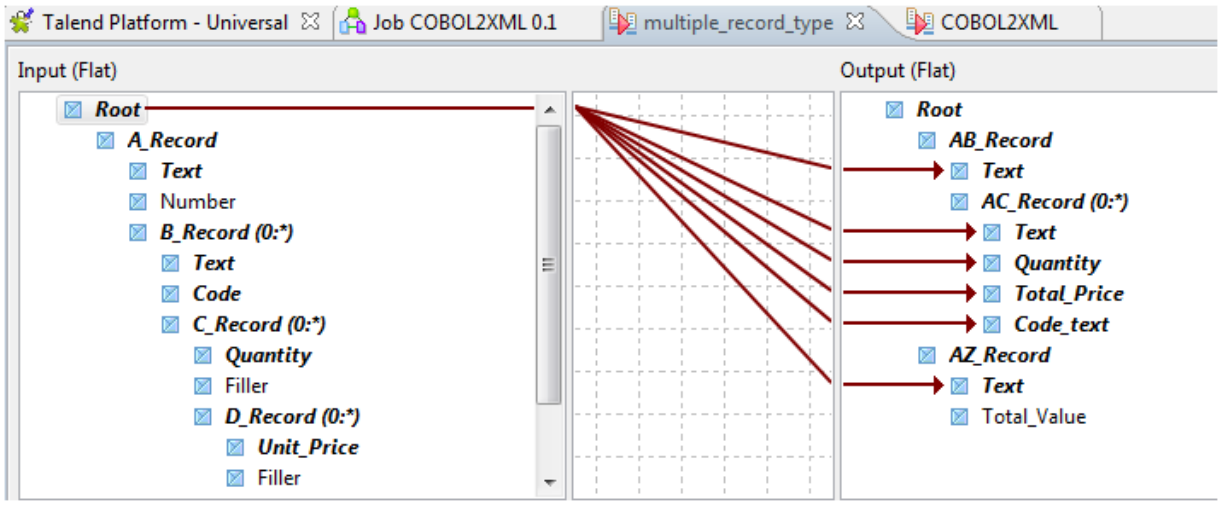
Conversion Talend POC

Input file				Conversion	Output file		
Header record					**Header record**		
Label	Length	fix value			Label	Length	fix value
Type	1	"A"		Convert fix value "A" to "AB"	Type	1	"AB"
Text	10			Move without change	Text	10	
Number	5			Don't move			
Detail record	(exists 2 times)				**Detail record**	(exists 2 times)	
Label	Length	fix value			Label	Length	fix value
Type	1	"B"		Convert fix value "B" to "AC"	Type	1	"AC"
Text	15			Move without change	Text	15	
Code	2			Move from Quantity in sublevel "C"	Quantity	5	
				calculate Quantity in "C" x Unit price in "D"	Total price	5	
Sublevel first record				Lookup text corresponding to "Code" in param file	Code text	20	
Label	Length	fix value					
Type	1	"C"					
Quantity	5			Move without change to quantity in AC			
Sublevel second record							
Label	Length	fix value					
Type	1	"D"					
Unit price	7			Don't move			
Footer record					**Footer record**		
Label	Length	fix value			Label	Length	fix value
Type	1	"Z"		Convert fix value "Z" to "AZ"	Type	1	"AZ"
Text	10			Move without change	Text	10	
				Sum of "Total price" fields in output records "AC"	Total value	7	

Param file contents

Code	Text
01	Text 01
02	Text 02
03	Text 03
04	Text 04

The final Map will look like the following, and will be called from a DI Job.



Objectives

After completing this lesson, you will be able to:

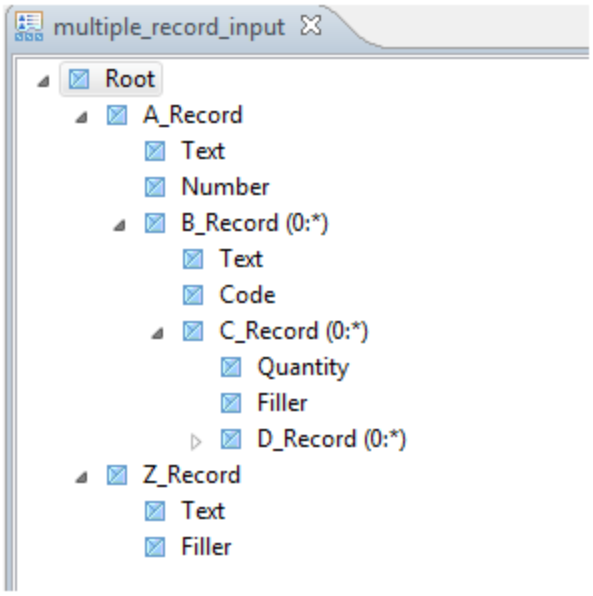
- Convert a multiple record type Structure to another multiple record type Structure
- Apply this transformation to flat files using a DI Job and a tHMap Component

Next Step

First, let's create the input Structure manually by adding and configuring elements.

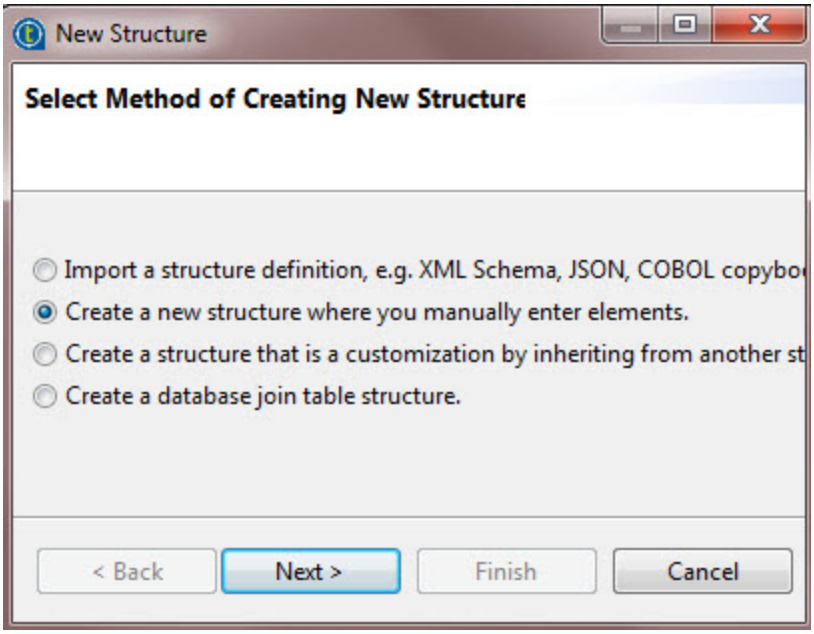
Creating the Input Structure

The objective of this section is to create the following input Structure.

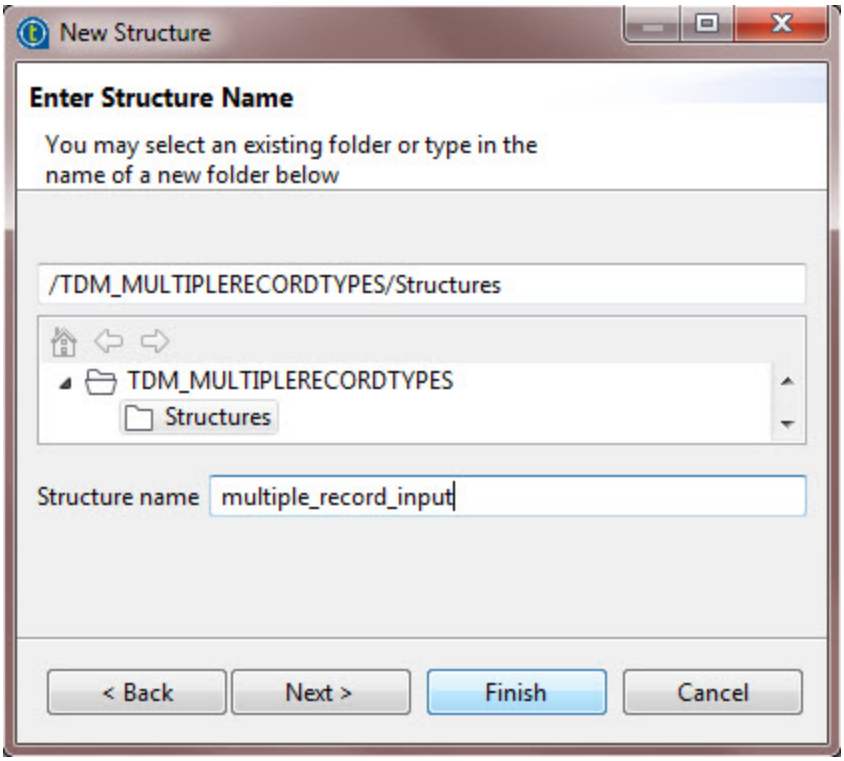


1. In the **Mapping** perspective, right-click **Hierarchical Mapper > Structures** and select **New > Structure**.

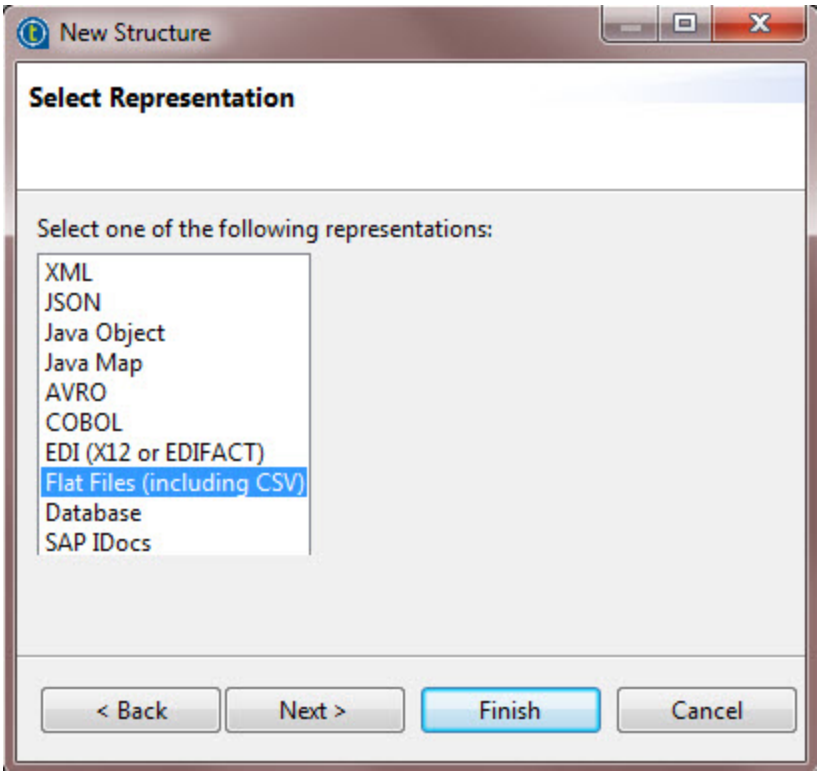
   Pick the **Create a new structure where you manually enter elements.** option and click **Next >**:



2. Name the new Structure *multiple_record_input* and click **Next >**.



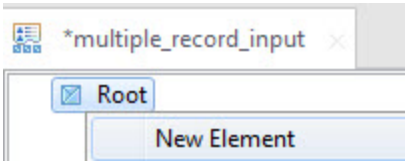
3. Finally, select **Flat Files (including CSV)** for the representation and click **Finish**:



Creating the A_Record Element

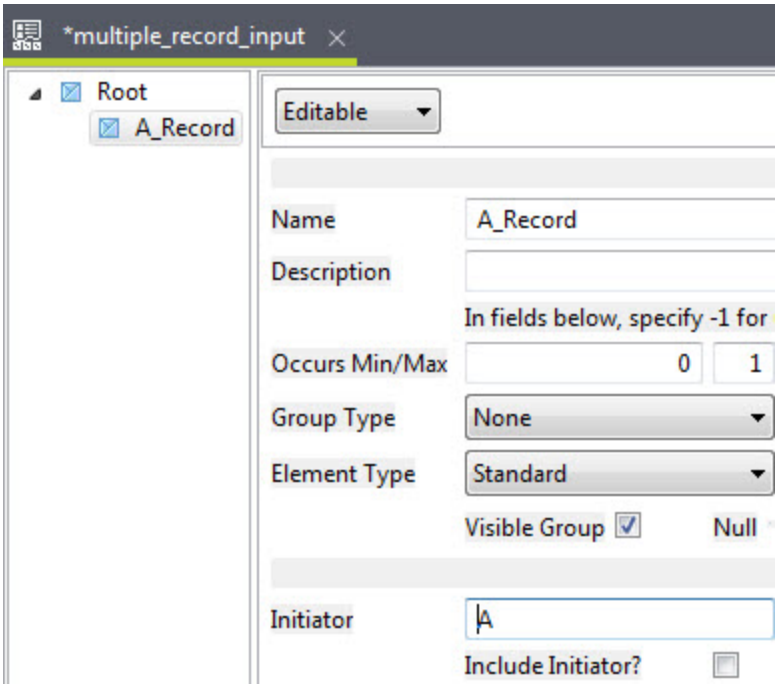
1. In the new Structure, right-click the empty area and select **New Element**.

   Name it *Root*, then right-click it and select **New Element** again.



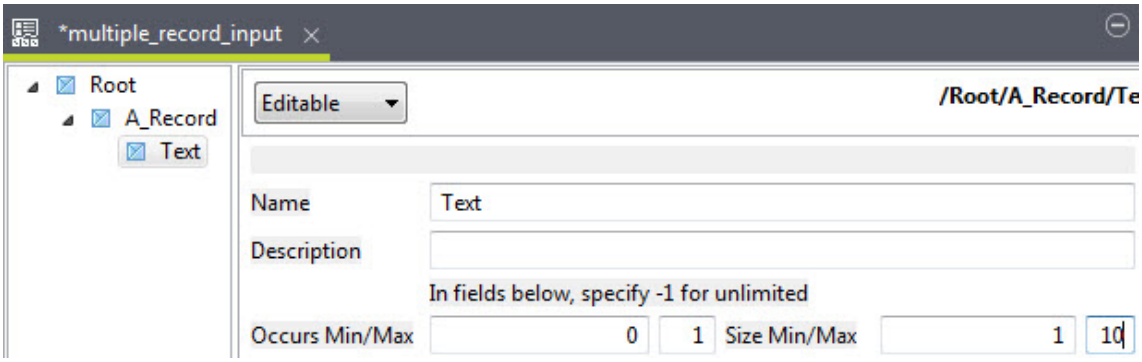
2. Name the new element **A_Record** and set the **Initiator**field to *A*.

   Make sure the **Include Initiator** box is not checked.



3. Right-click **A_Record** and select **New Element** to create a new child element.

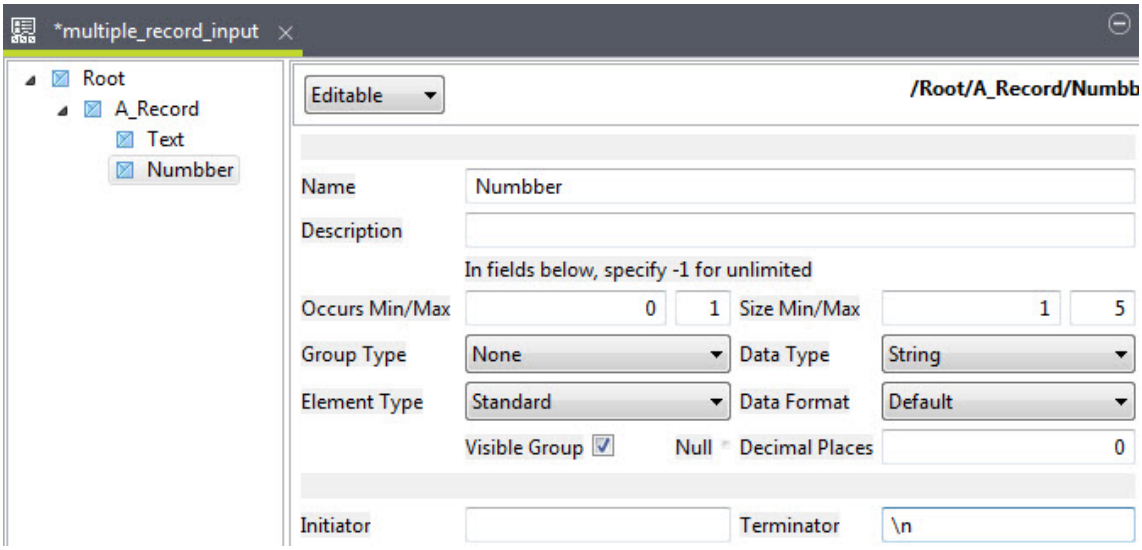
   Name it *Text* and set the **Size Min/Max** fields to *1* (Min) and *10* (Max).



4. Right-click **A_Record** again and select **New Element** to create another child element.

   Name it *Number* and set the **Size Min/Max** fields to *1* (Min) and *5* **(Max)**.

Finally, enter *\n* in the **Terminator** field.

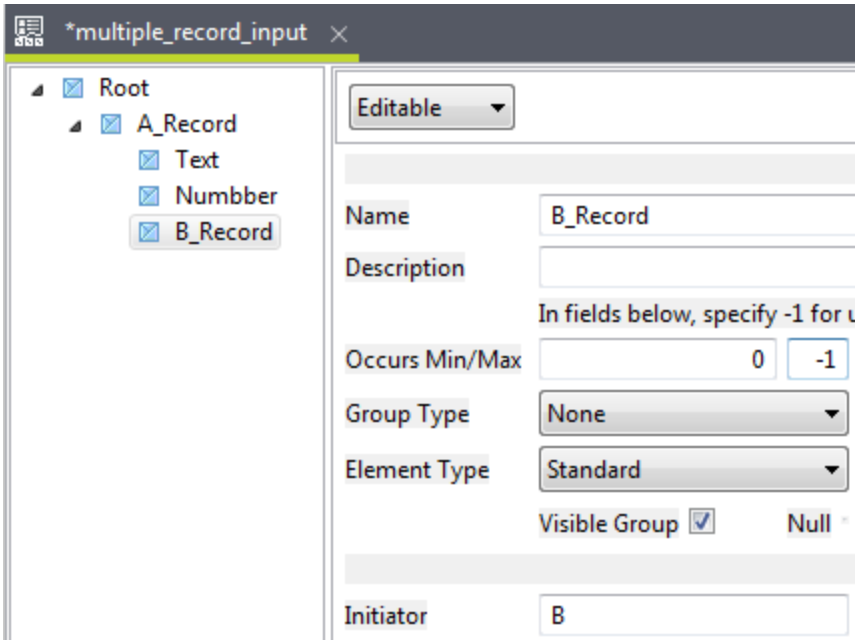


Creating the B_Record Element

1. Right-click **A_Record** and select **New Element**.

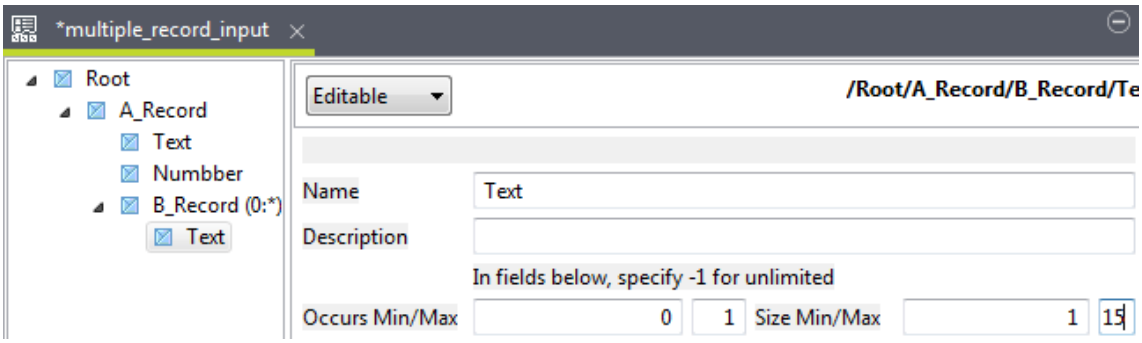
   Name it *B_Record* and set the **Initiator** field to *B*.

   Finally, set the **Occurs Min/Max** fields to *0* (Min) and *-1* (Max) make it a looping element.



2. Right-click **B_Record** and select **New Element** to create a child element.

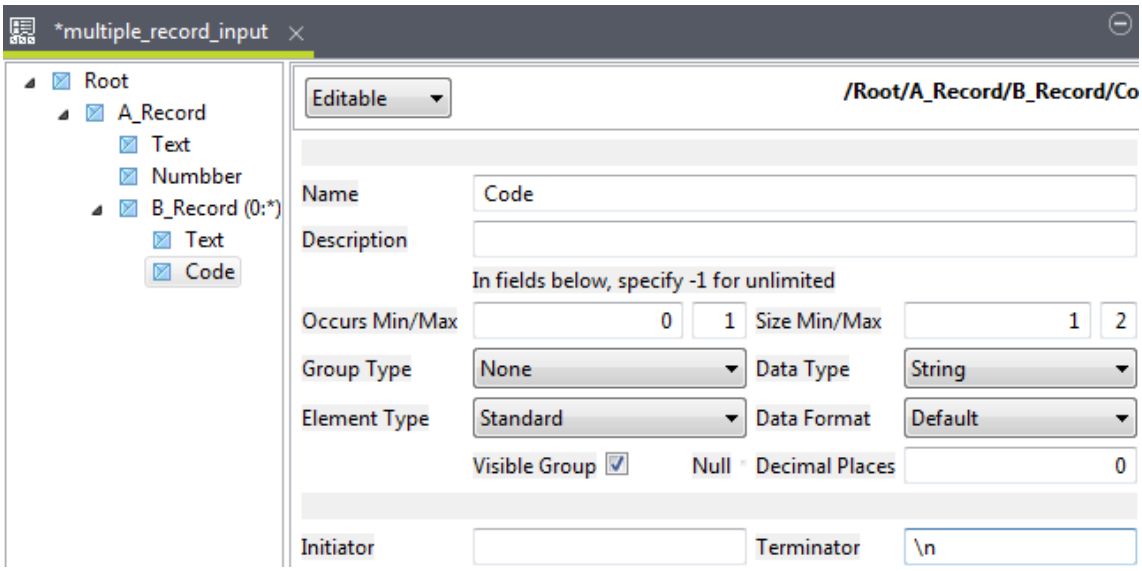
   Name it *Text* and set the **Size Min/Max** fields to *1* (Min) and *15* (Max).



3. Right-click **B_Record** again and select **New Element** to create another child element.

   Name it *Code* and set **Size Min/Max** fields to *1* (Min) and *2* (Max).

   Finally, set **Data Type** to *Integer (32)* and set **Terminator** to *\n*.

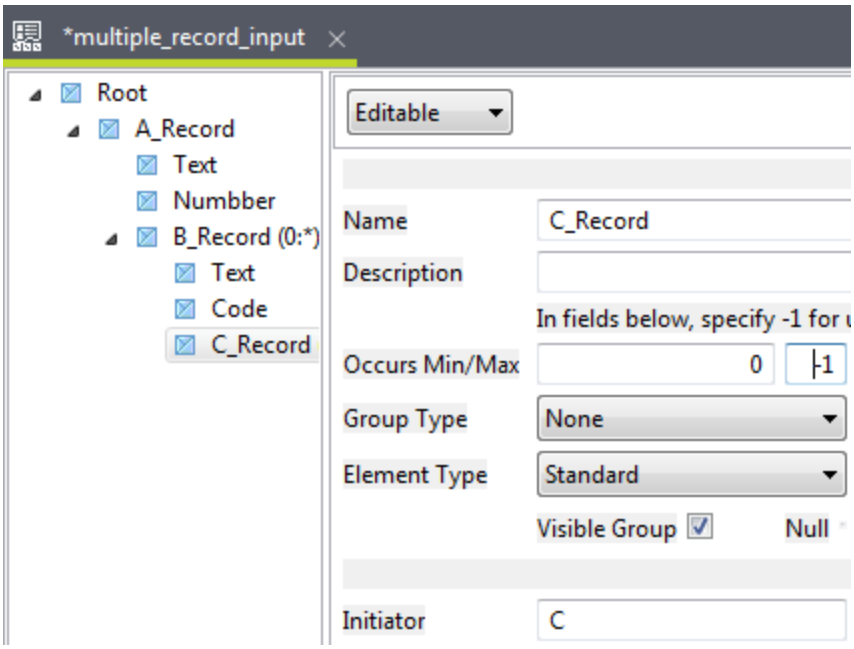


Creating the C_Record Element

1. Right-click **B_Record** and select **New Element**.

   Name it *C_Record* and set the **Initiator** field to *C*.

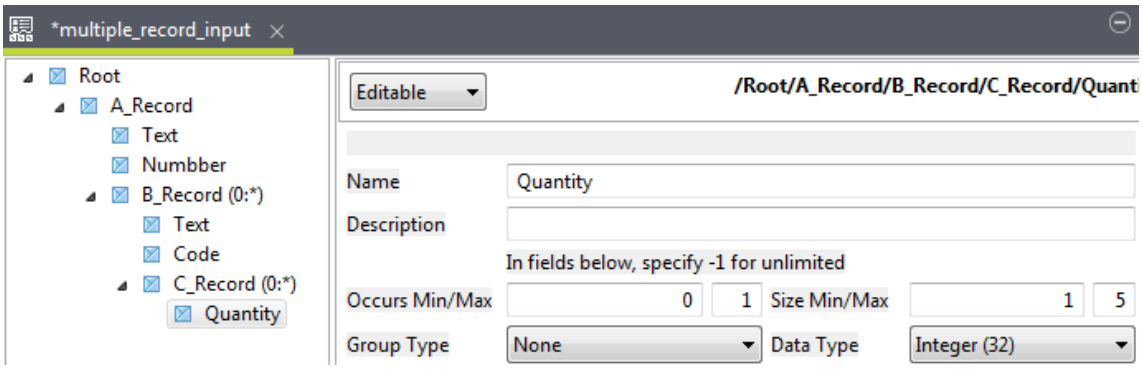
   Finally, set the **Occurs Min/Max** fields to *0* (Min) and *-1* (Max) to make it a looping element.



2. Right-click **C_Record** and select **New Element**.

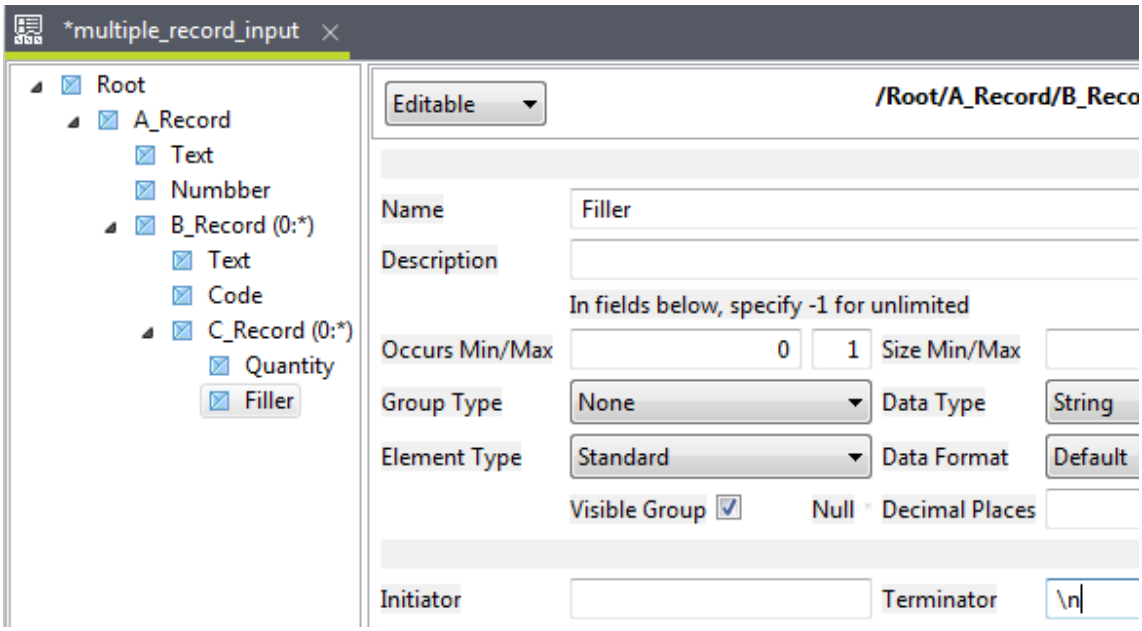
   Name it *Quantity* and set the **Size Min/Max** fields to *1* (Min) and *5* (Max).

   Finally, set **Data Type** to *Integer (32)*.



3. Right-click **C_Record** and select **New Element**.

   Name it *Filler* and set the **Terminator** field to *\n*.

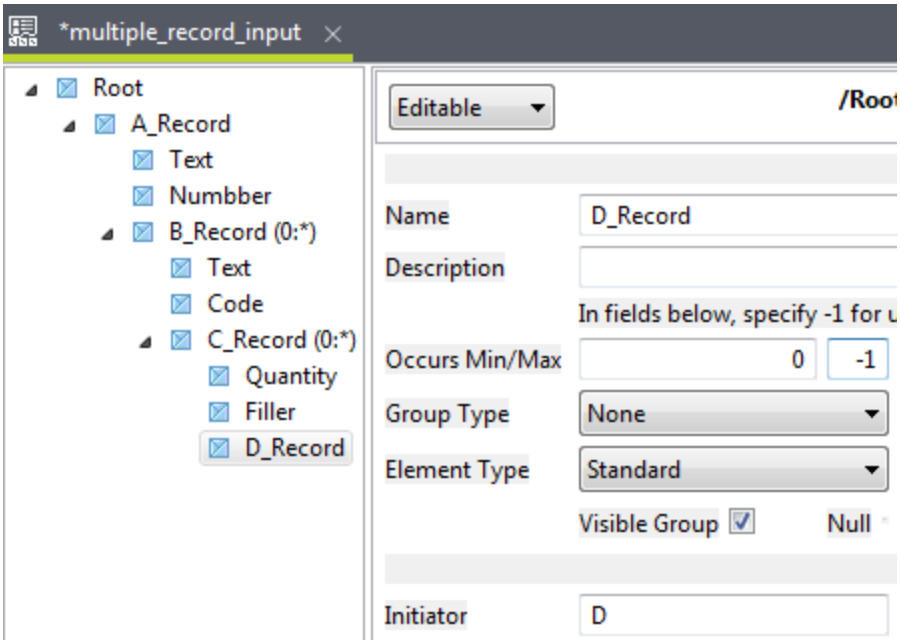


Creating the D_Record Element

1. Right-click **C_Record** and select **New Element**.

   Name it *D_Record*and set the **Initiator** field to *D*.

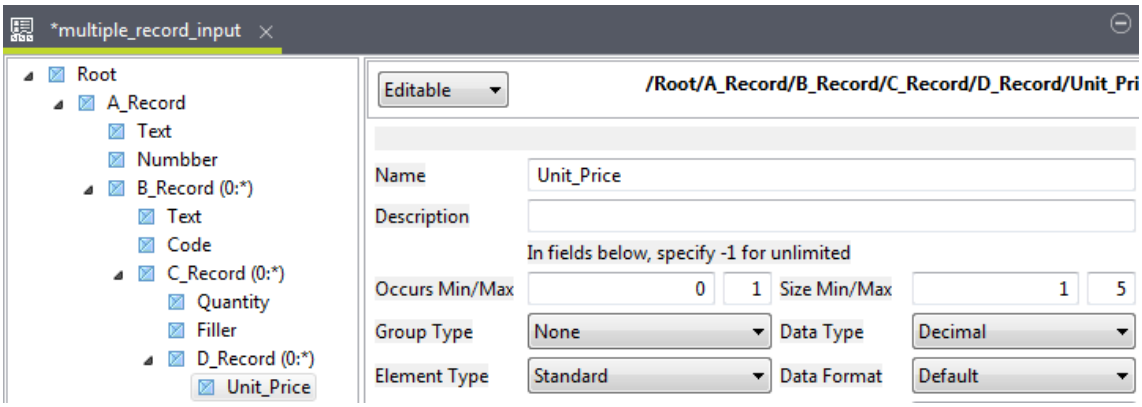
   Finally, set the **Occurs Min/Max** fields to *0* (Min) and *-1* (Max) to make it a looping element.



2. Right-click **D_Record** and select **New Element**.

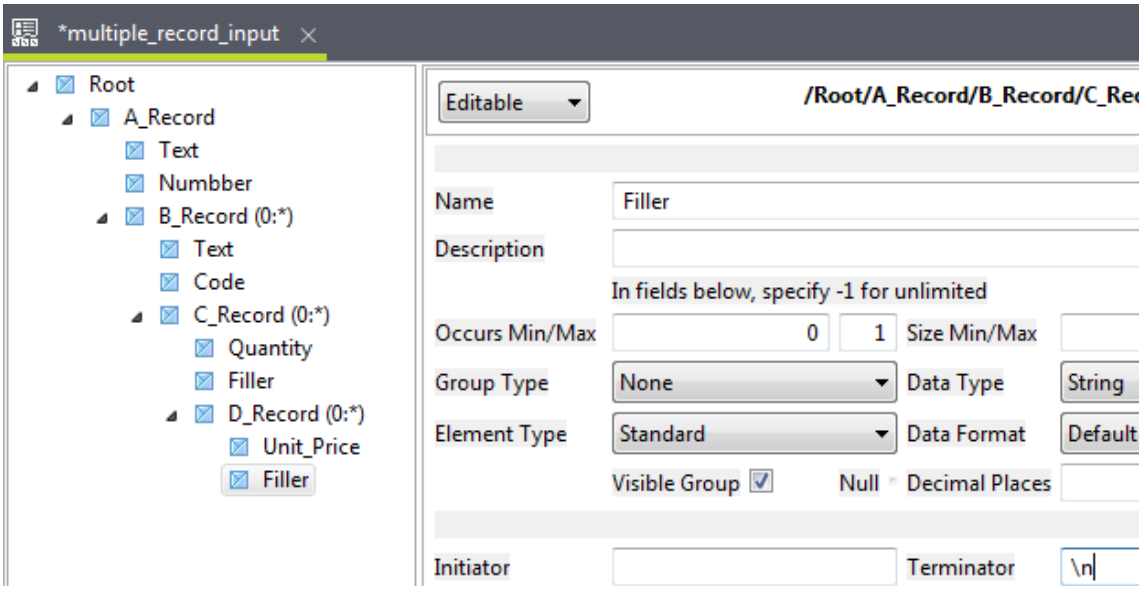
   Name it *Unit_Price* and set the **Size Min/Max** fields to **1** (Min) and **5** (Max).

   Finally, set the **Data Type** field to *Decimal*.



3. Right-click **D_Record** and select **New Element**.

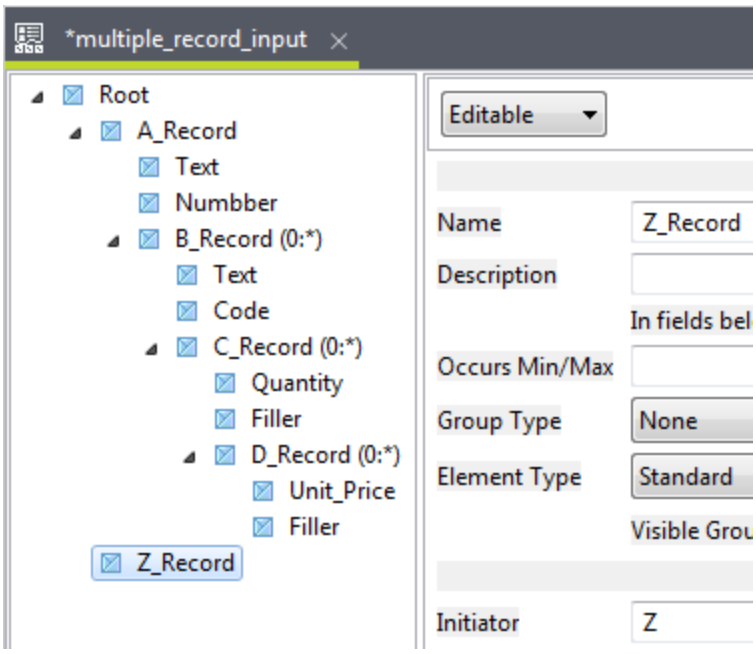
   Name it *Filler* and set the **Terminator** field to *\n*.



Creating the Z_Record Record

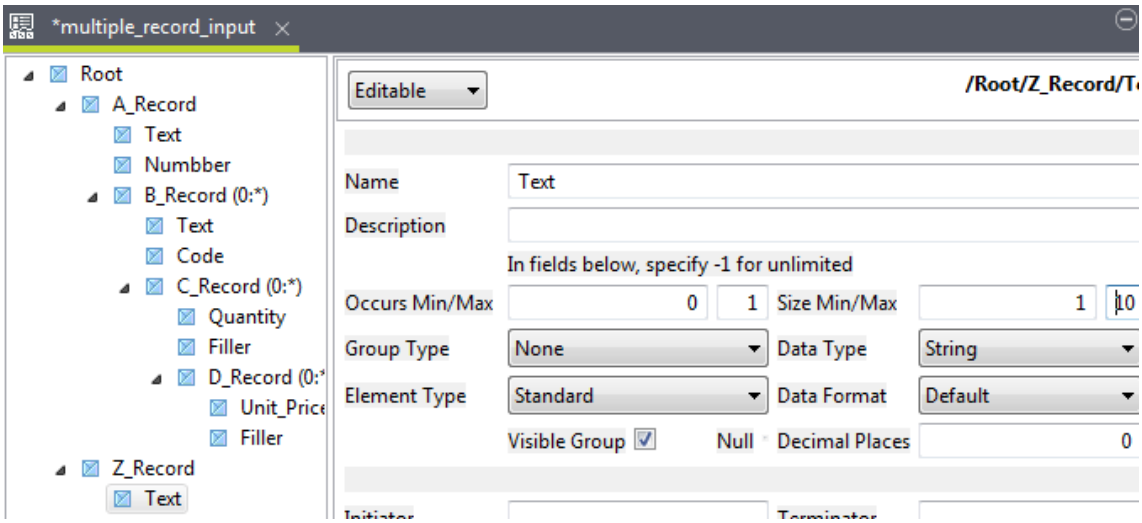
1. Right-click **Root** and select **New Element**.

   Name it *Z_Record* and set the **Initiator** field to *Z*.



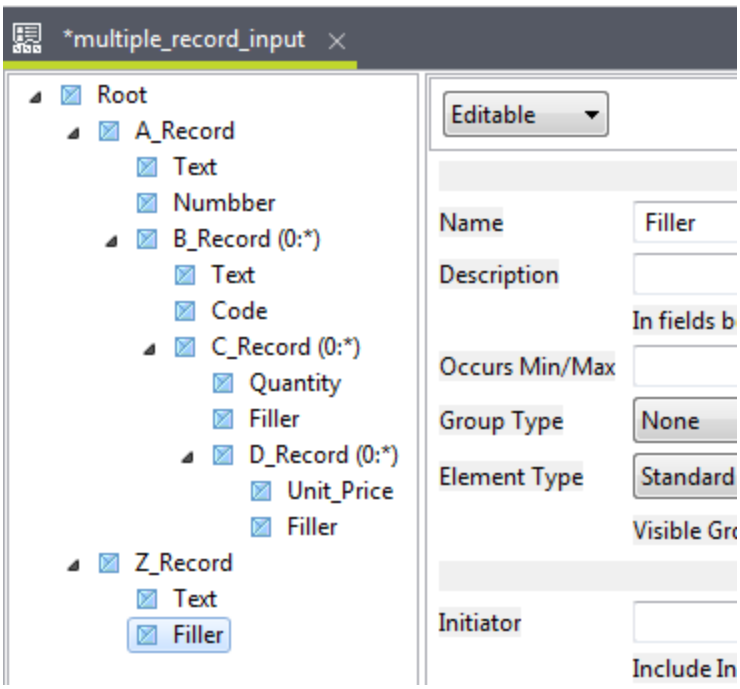
2. Right-click **Z_Record** and select **New Element**.

   Name it *Text* and set the **Size Min/Max** fields to *1* (Min) and *10* (Max).



3. Right-click **Z_Record** and select **New Element**.

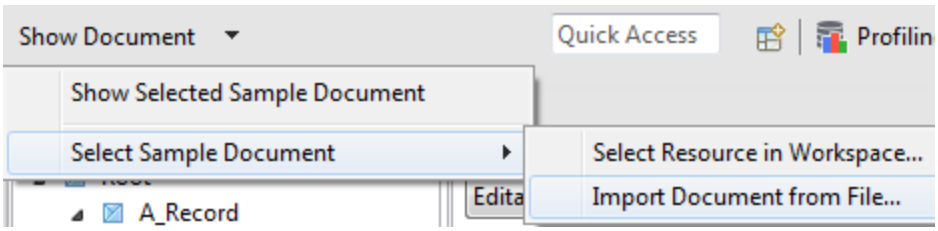
   Name it *Filler*.



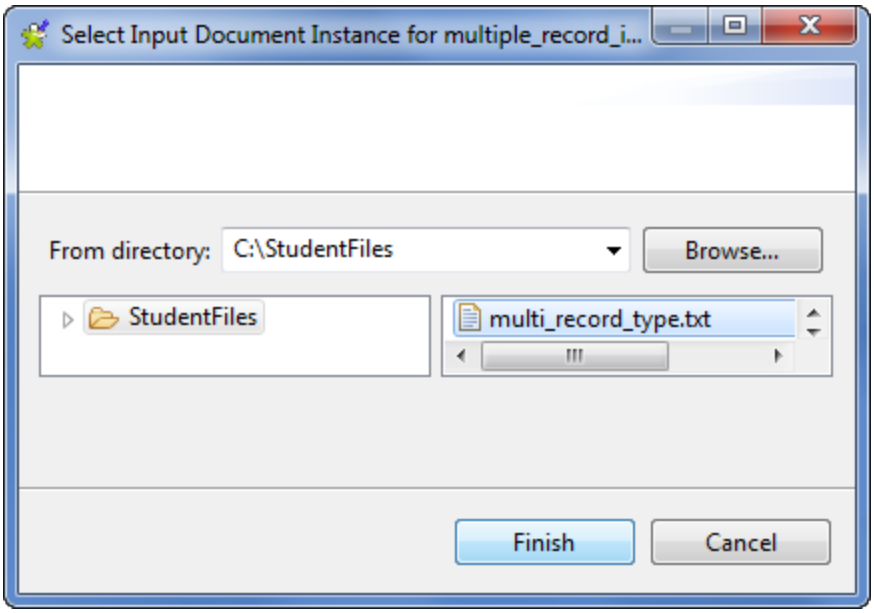
4. Save the changes to the input Structure.

Displaying a Sample Document

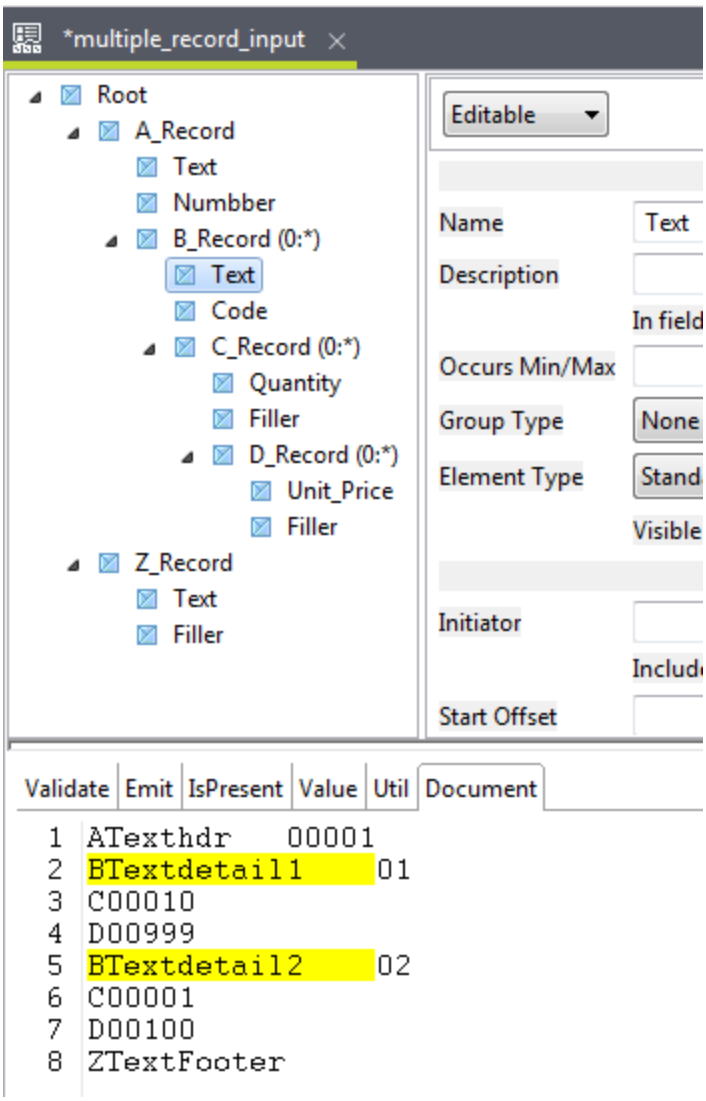
1. Expand the **Show Document** menu and go to **Select Sample Document > Import Document from File...**.



2. Click **Browse...** to select the *C:\StudentFiles* folder, then select *multiple_record_type.txt* and click **Finish**.



3. Select several elements from the input Structure and check that the right data is highlighted in the Document tab.

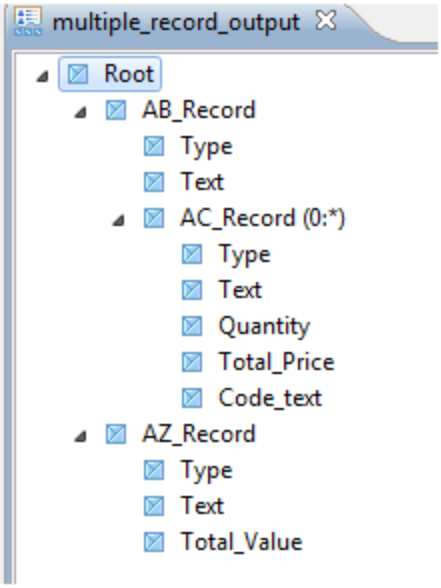


Next Step

With the input Structure created, let's create the output Structure.

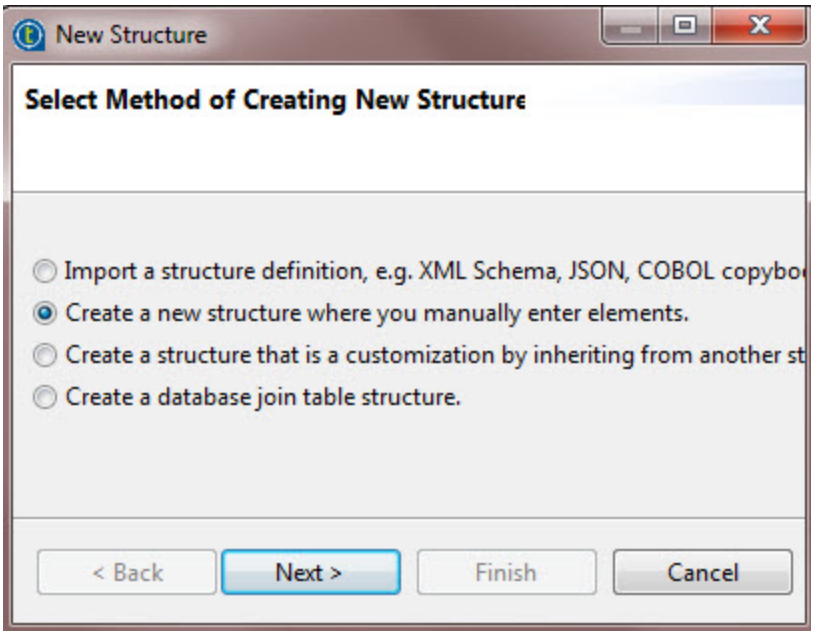
Creating the Output Structure

The objective of this section is to create the following output Structure.

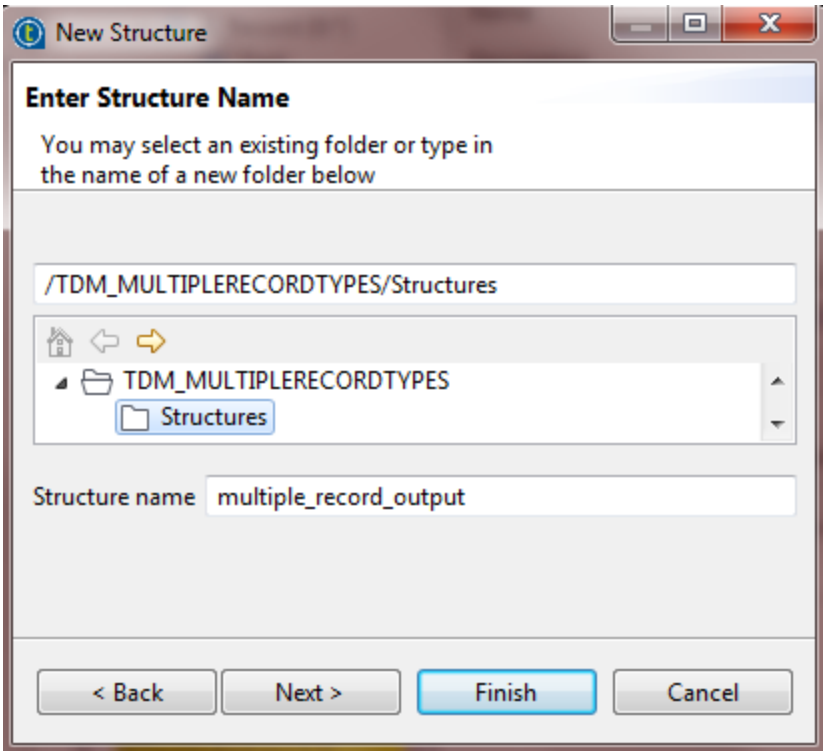


1. Right-click **Hierarchical Mapper > Structures** and select **New > Structure**.

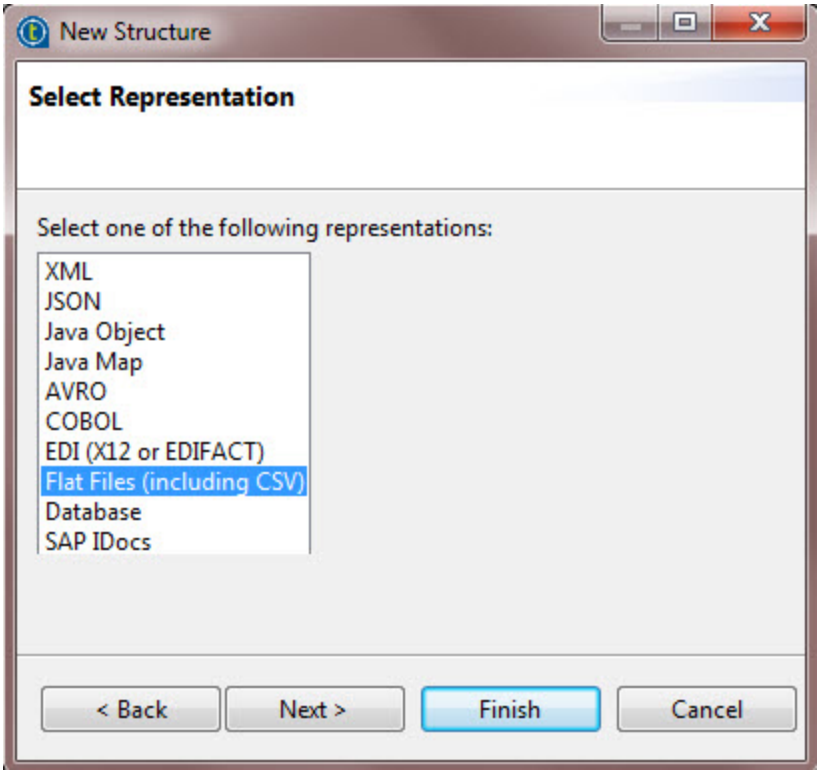
   Pick the **Create a new structure where you manually enter elements.** option and click **Next >**:



2. Name the new Structure *multiple_record_output* and click **Next >**.



3. Finally, select **Flat Files (including CSV)** for the representation and click **Finish**:

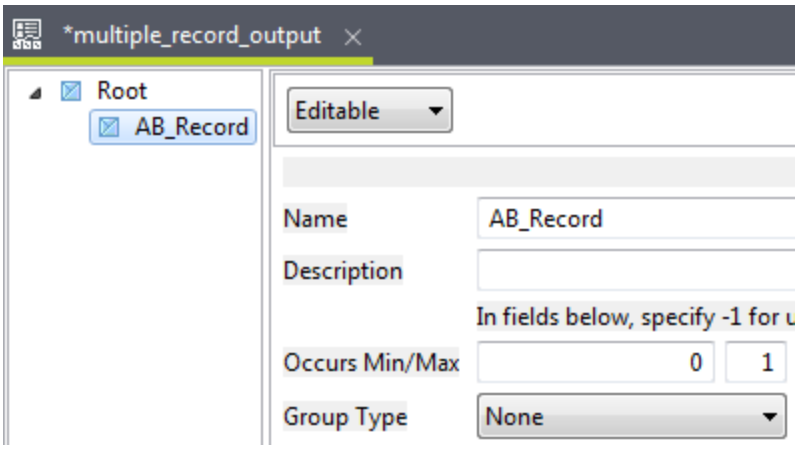


Creating the AB_Record Element

1. Right-click the empty area and select **New Element**.

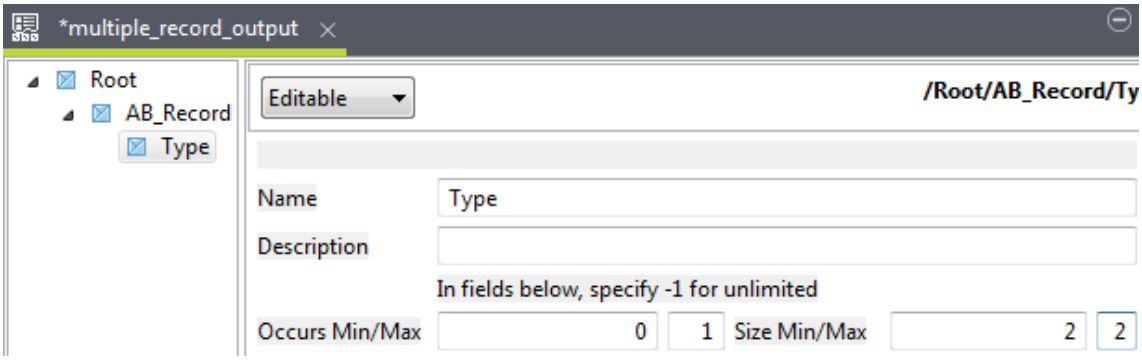
   Name it *Root*, then right-click it and select **New Element** again.

   Name the child element *AB_Record*.



2. Right-click **AB_Record** and select **New Element**.

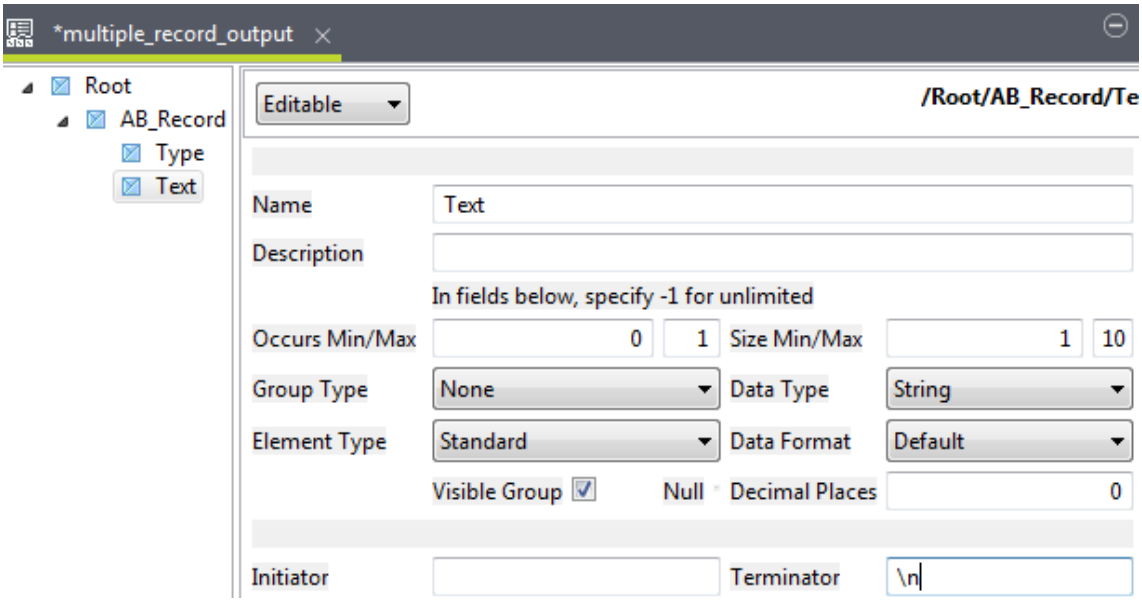
   Name it *Type* and set the **Size Min/Max** fields to *2* (Min) and *2* (Max).



3. Right-click **AB_Record** and select New Element.

   Name it *Text* and set the **Size Min/Max** fields to *1* (Min) and *10* (Max).

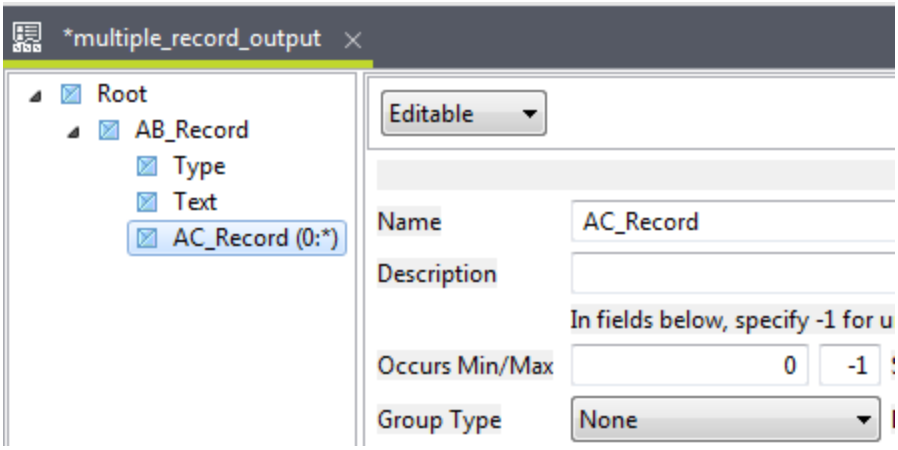
Finally, set the **Terminator** field to *\n*.



Creating the AC_Record Element

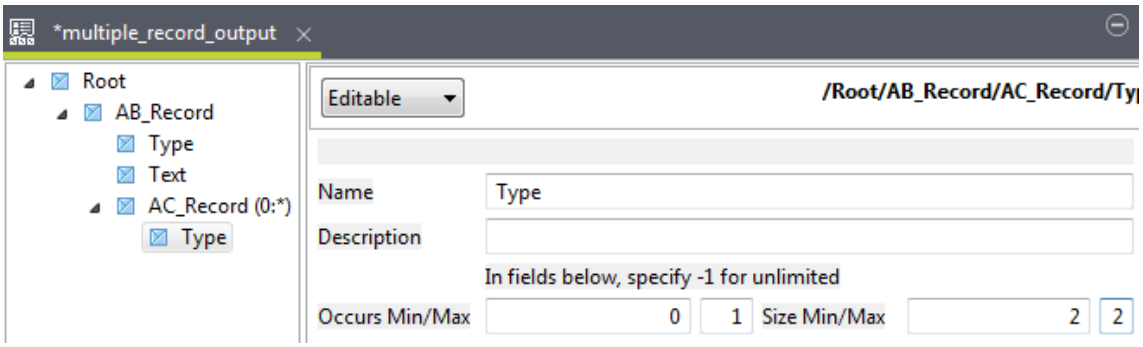
1. Right-click **AB_Record** and select **New Element**.

   Name it *AC_Record* and set the **Occurs Min/Max** fields to *0* (Min) and *-1* (Max) to make it a looping element.



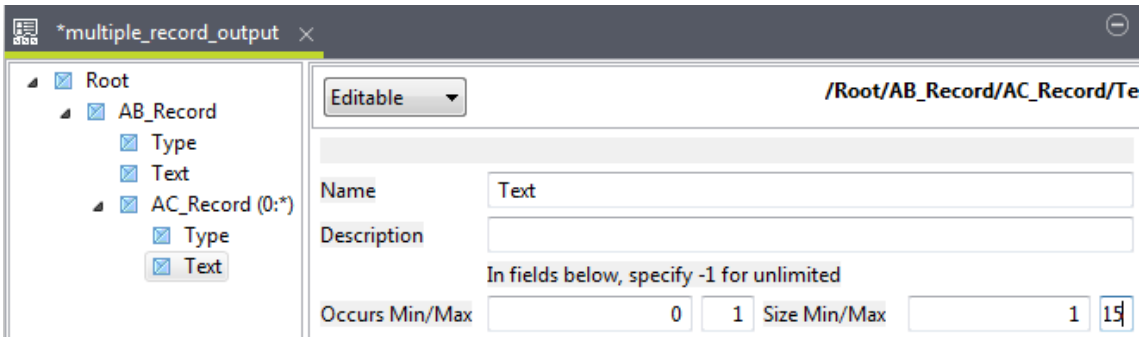
2. Right-click **AC_Record** and select **New Element**.

   Name it *Type* and set the **Size Min/Max** fields to *2* (Min) and *2* (Max).



3. Right-click **AC_Record** and select **New Element**.

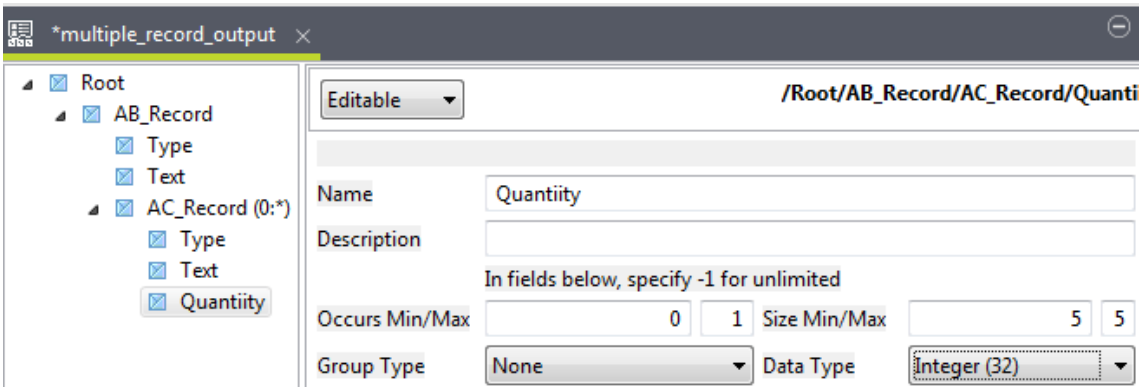
   Name it *Text* and set the **Size Min/Max** fields to *1* (Min) and *15* (Max).



4. Right-click **AC_Record** and select **New Element**.

   Name it *Quantity* and set the **Size Min/Max** fields to *5* (Min) and *5* (Max).

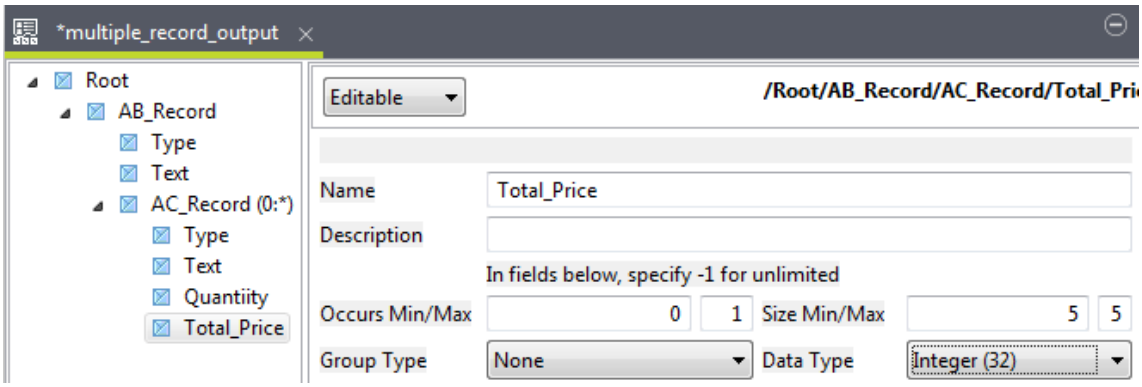
   Finally, set **Data Type** to *Integer (32)*.



5. Right-click **AC_Record** and select **New Element**.

   Name it *Total_Price* and set the **Size Min/Max** fields to *5* (Min) and *5* (Max).

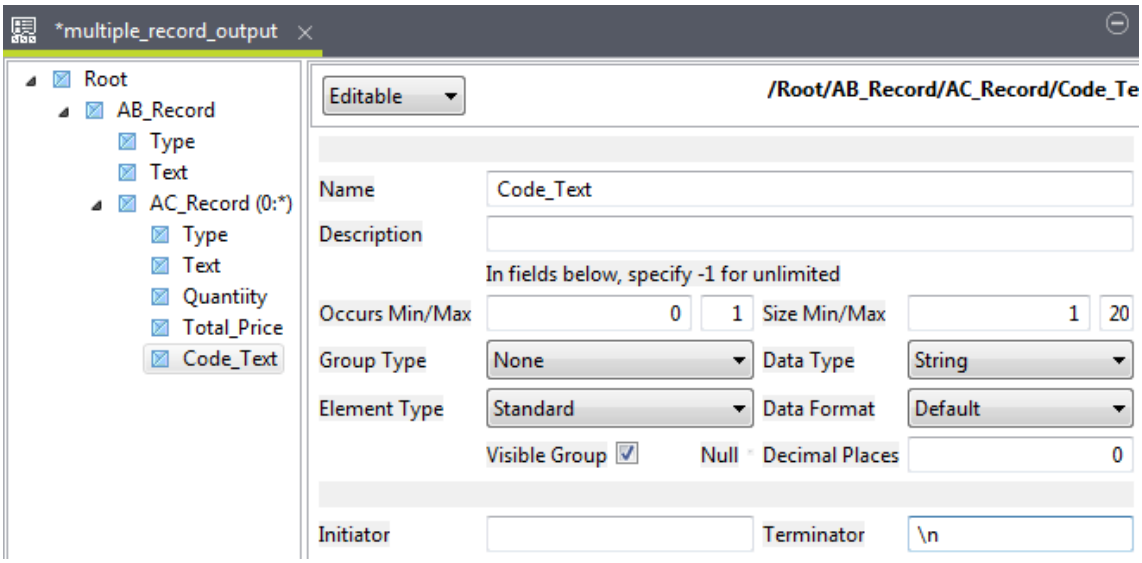
   Finally, set **Data Type** to *Integer (32)*.



6. Right-click **AC_Record** and select **New Element**.

   Name it *Code_Text* and set the **Size Min/Max** fields to *1* (Min) and *20* (Max).

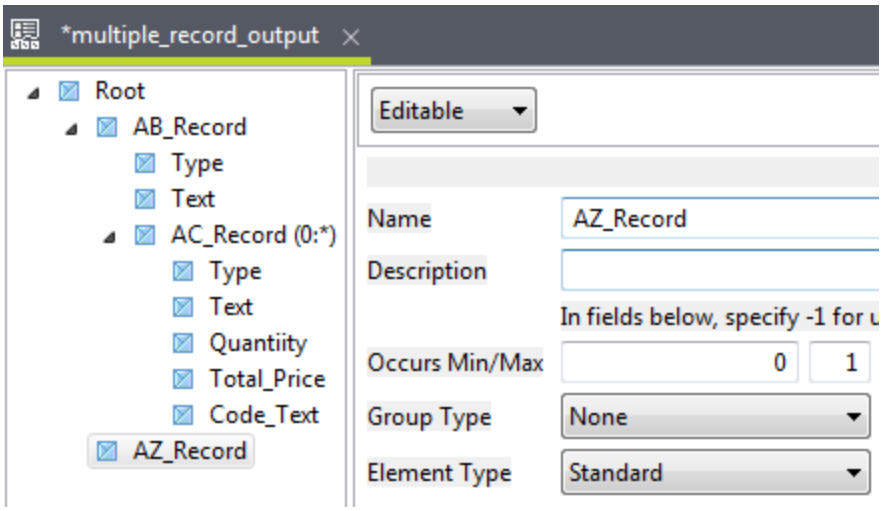
   Finally , set the **Terminator** field to *\n*.



Creating the AZ_Record Element

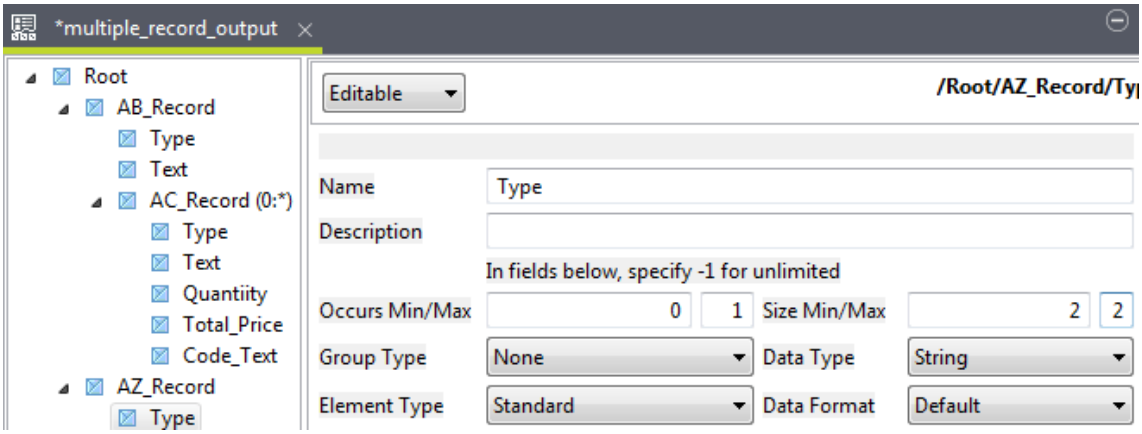
1. Right-click **Root** and select **New Element**.

   Name it *AZ_Record*.



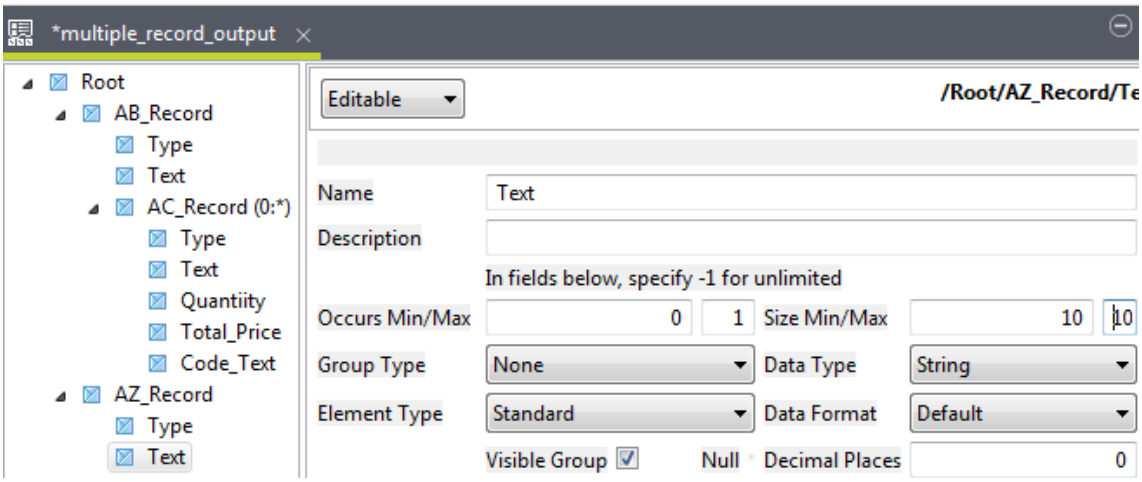
2. Right-click **AZ_Record** and select **New Element**.

   Name it *Type* and set the **Size Min/Max** fields to *2* (Min) and *2* (Max):



3. Right-click **AZ_Record** and select **New Element**.

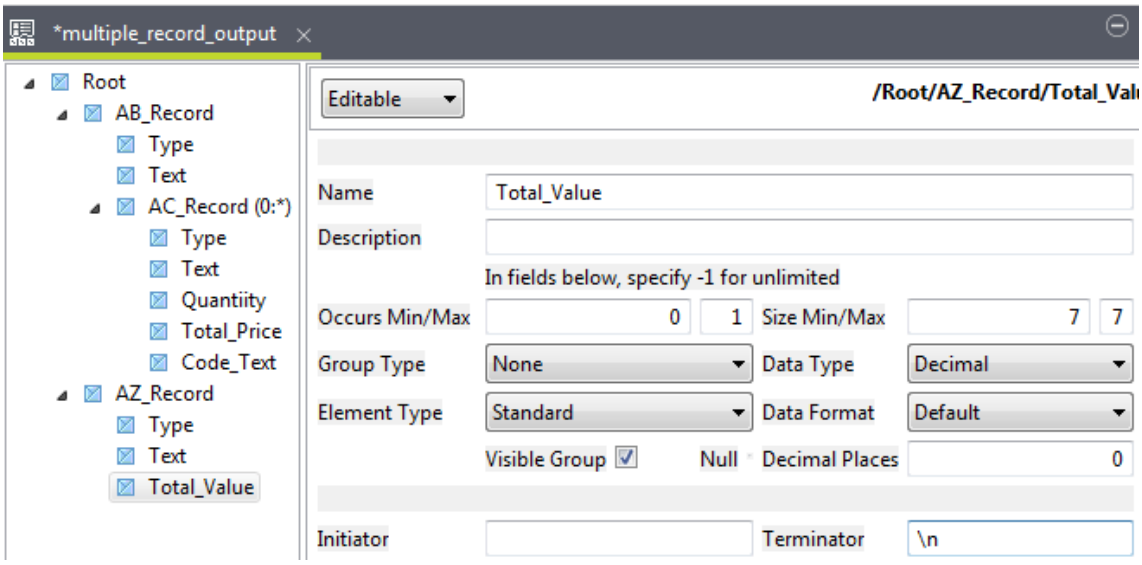
   Name it *Text* and set the **Size Min/Max** fields to *10* (Min) and *10* (Max).



4. Right-click **AZ_Record** and select **New Element**.

   Name it *Total_Value* and set the **Size Min/Max** fields to *7* for both Min and Max.

   Finally, set **Data Type** to *Decimal* and **Terminator** to *\n*.



5. Save the changes to the new output Structure.

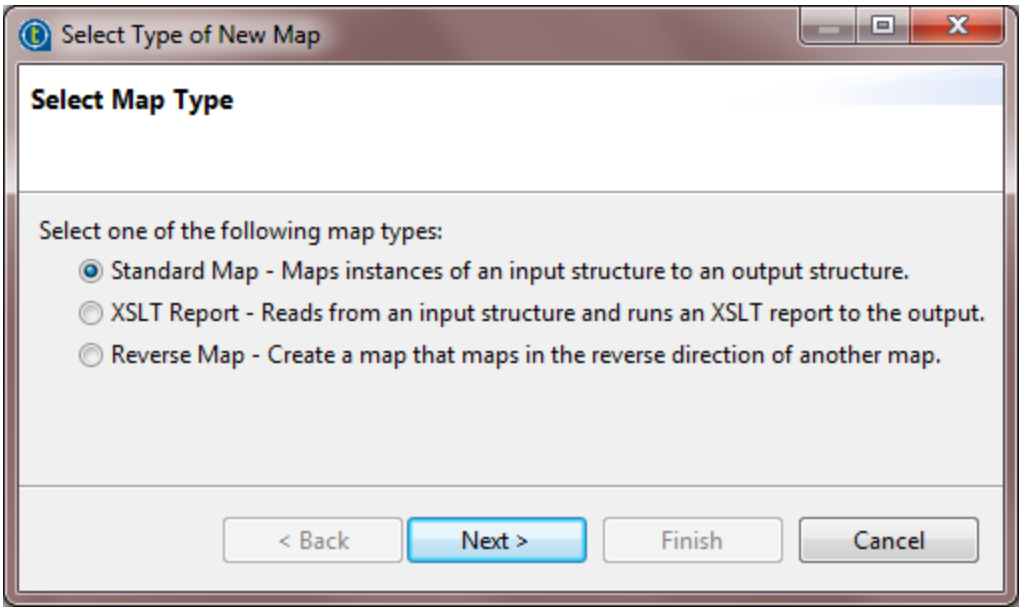
Next

With both the input and output Structures created, let's map the elements.

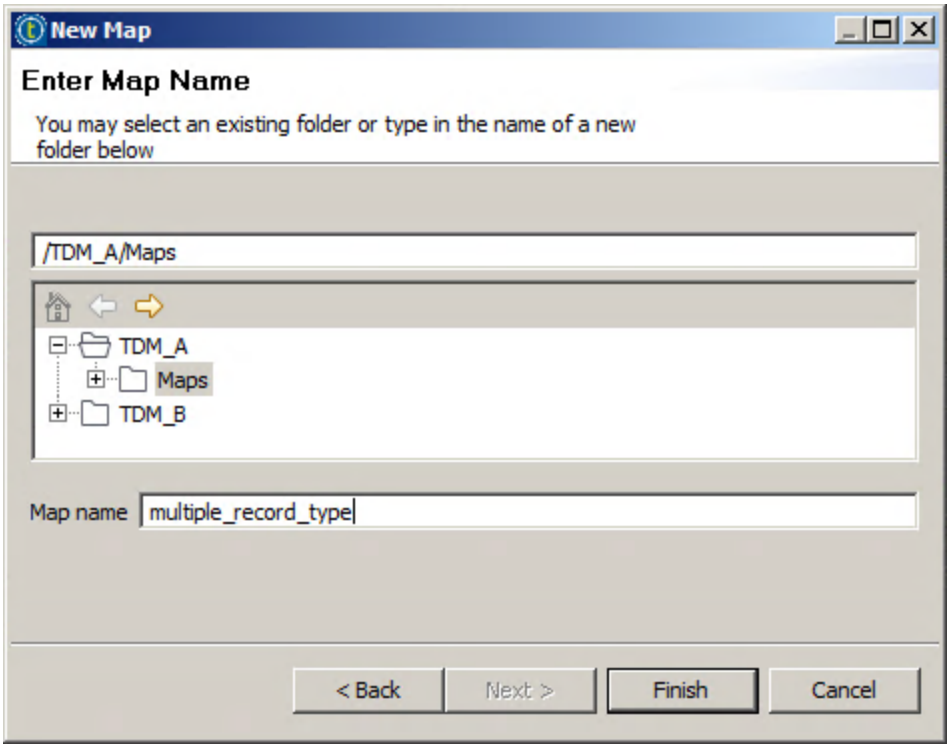
Mapping the Elements

1. Right-click **Hierarchical Mapper > Maps** and select **New > Map**.

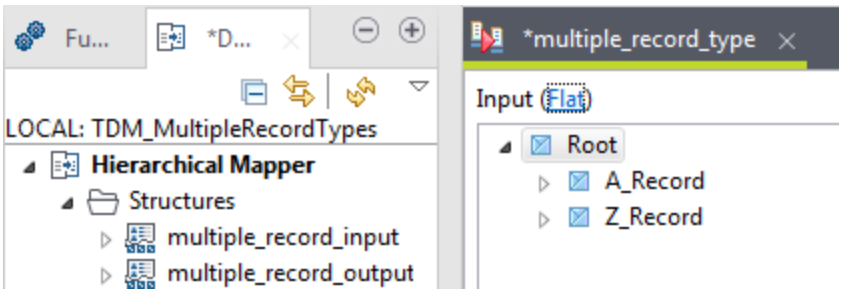
   Pick the **Standard Map** option and click **Next >**.



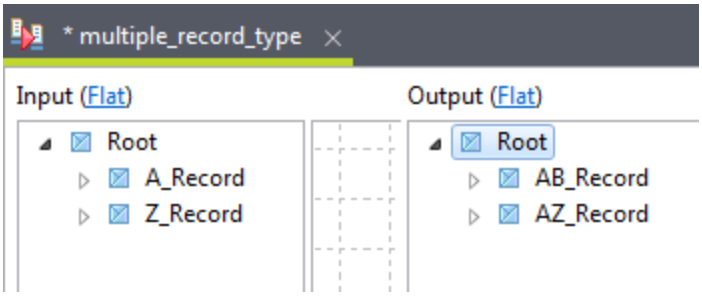
2. Name the new Map **multiple_record_type** and click **Finish**.



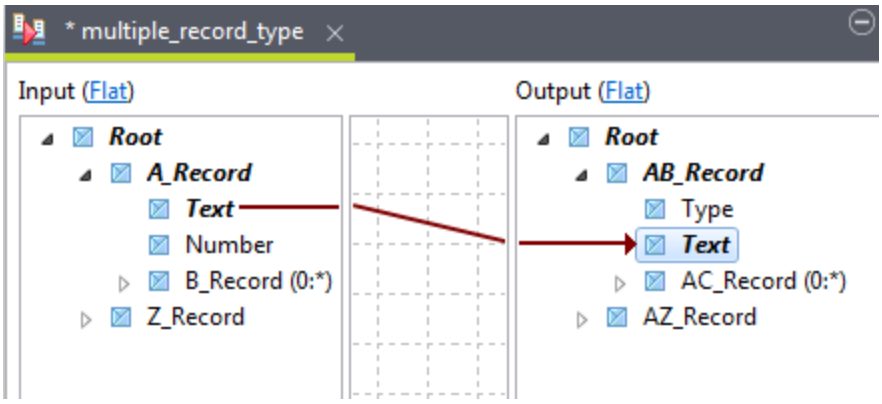
3. Drag & drop the **multiple_record_input** Structure to the **Input** area of the map.



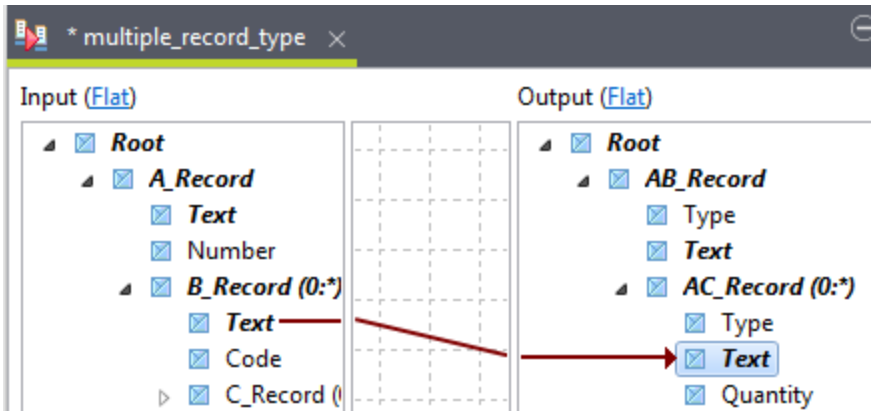
4. Drag & drop the **multiple_record_output** Structure to the **Output** area of the map.



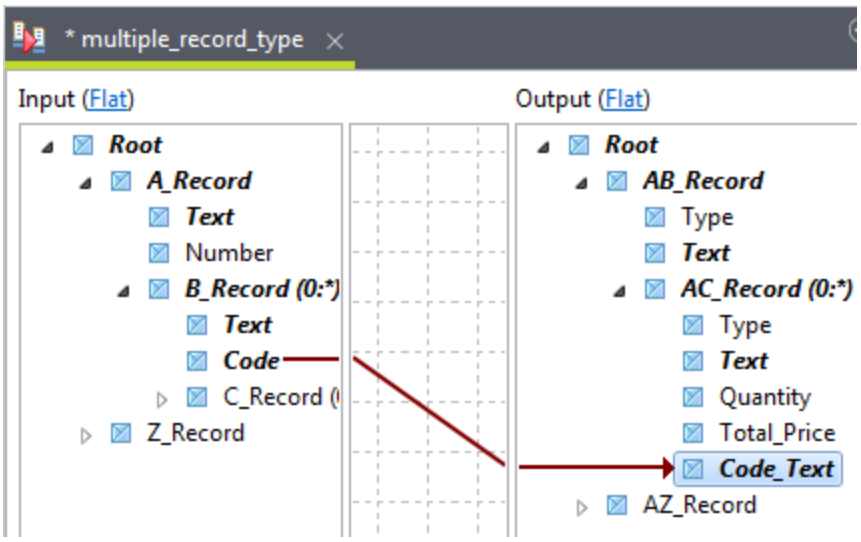
5. Map **Root > A_Record > Text** to **Root > AB_Record > Text**.



6. Map **Root > A_Record > B_Record > Text** to **Root > AB_Record > AC_Record > Text**.

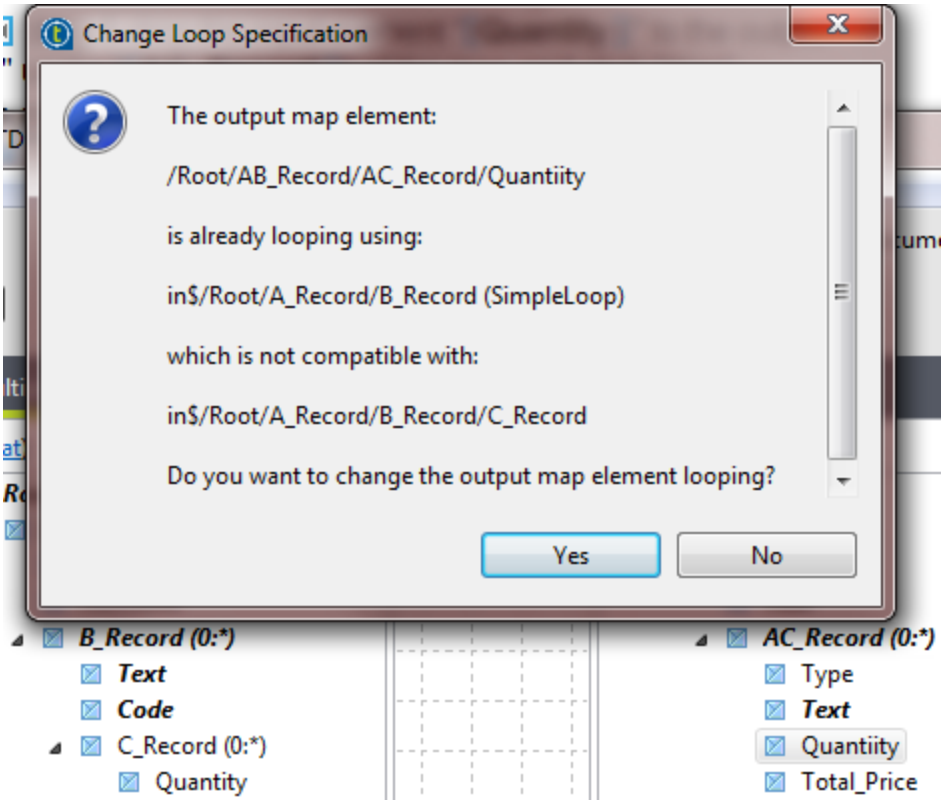


7. Map **Root > A_Record > B_Record > Code** to **Root > AB_Record > AC_Record > Code_Text**.

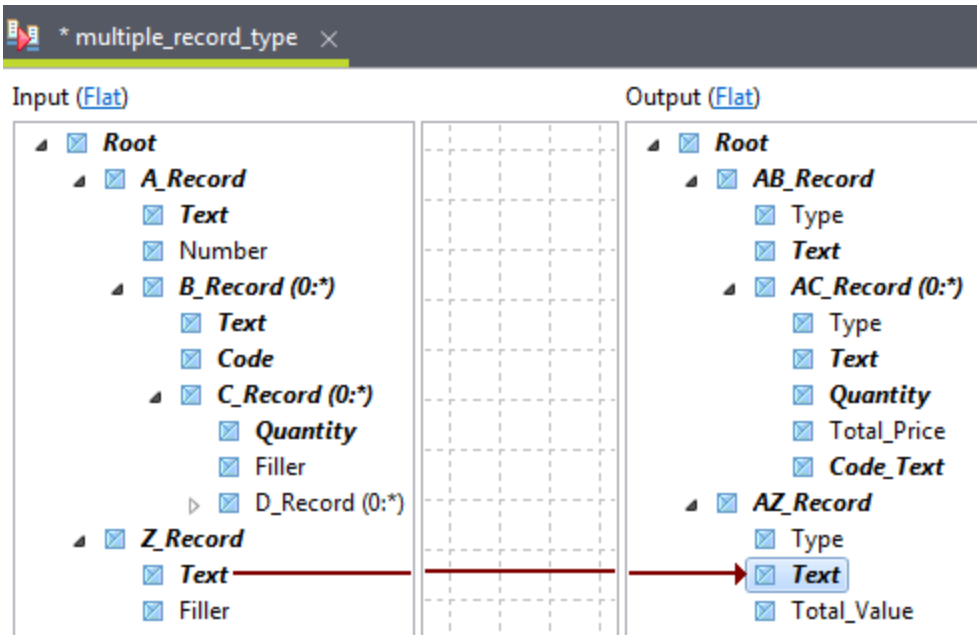


8. Map **Root > A_Record > B_Record > C_Record > Quantity** to **Root > AB_Record > AC_Record > Quantity**.

   Click **Yes** when offered to change the output map element looping. *Talend Data Mapper* detects that a nested looping is necessary to reach the *Quantity* element in the **Input** area, and offers to add this nested looping automatically.



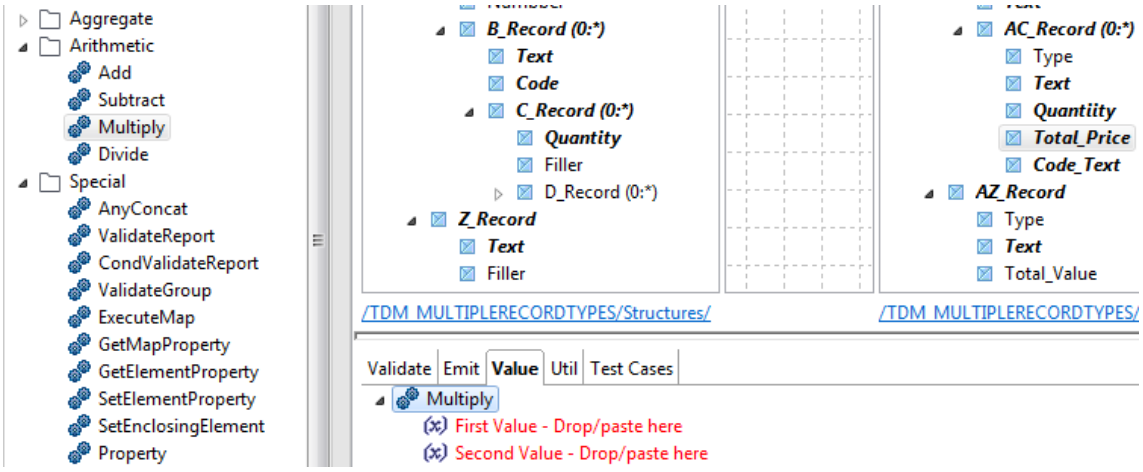
9. Map **Root > Z_Record > Text** to **Root > AZ_Record > Text**.



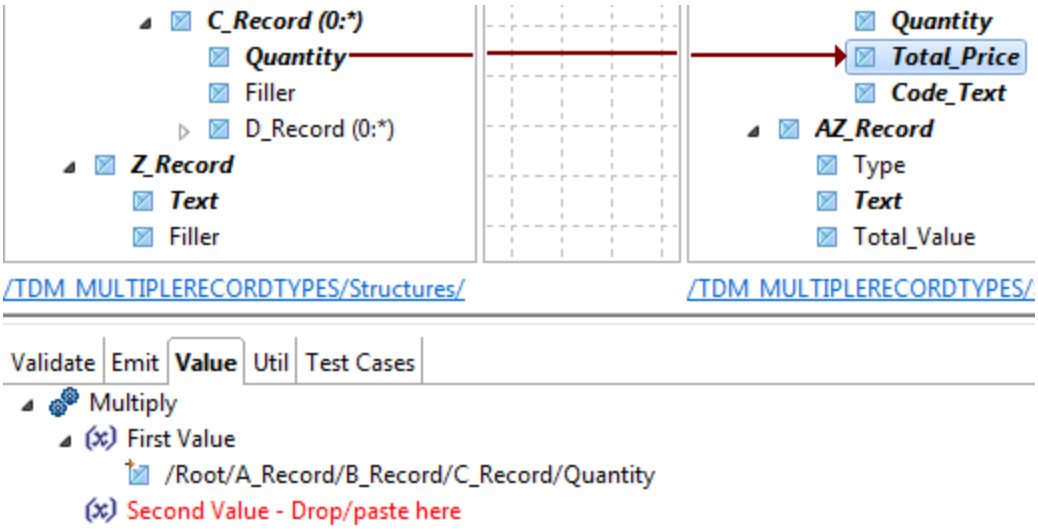
Adding Functions to Perform Computations

The objective of this section is to use Functions to perform simple computations, like the total price or the total value of the items.

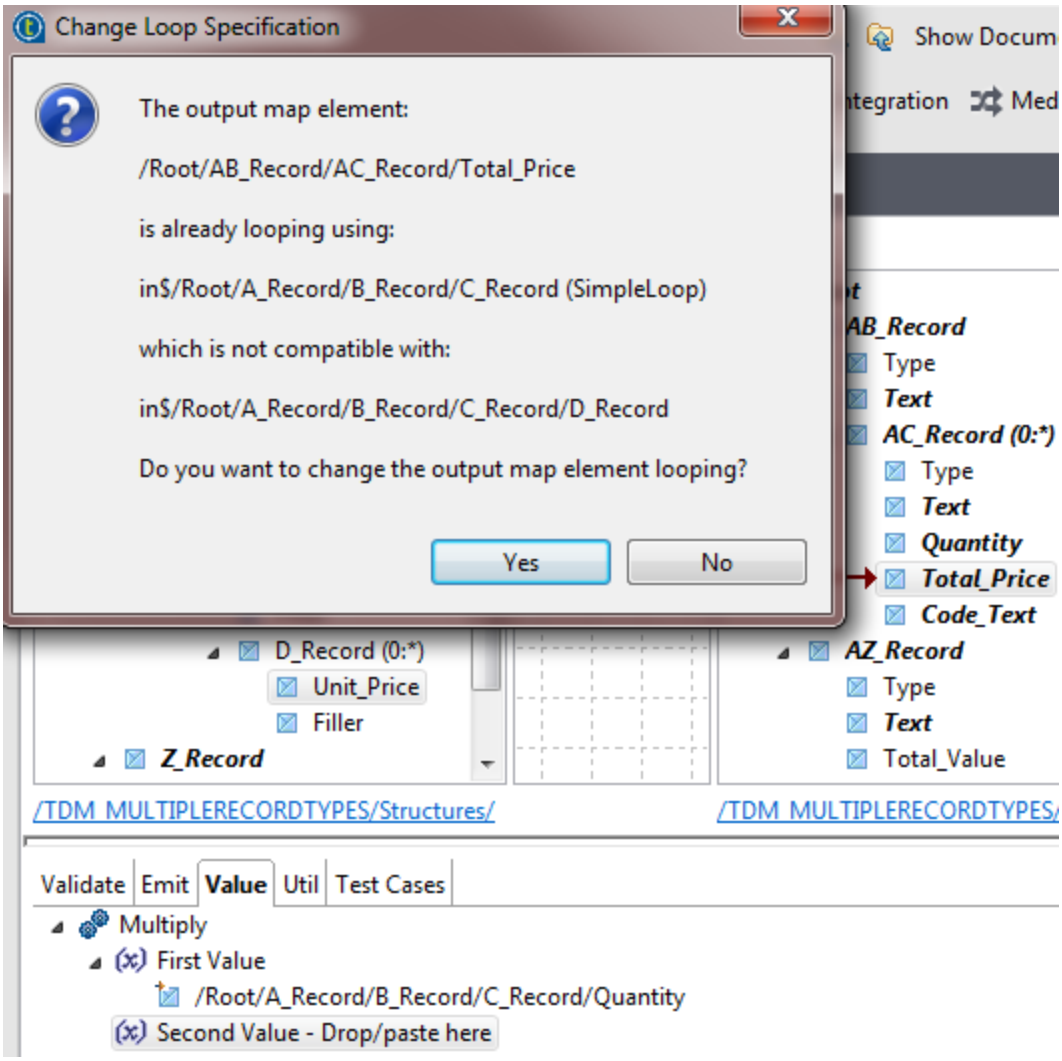
1. Select **Total_Price** in the **Output** area, then drag and drop a **Functions > Arithmetic > Multiply** Function to its **Value** tab.



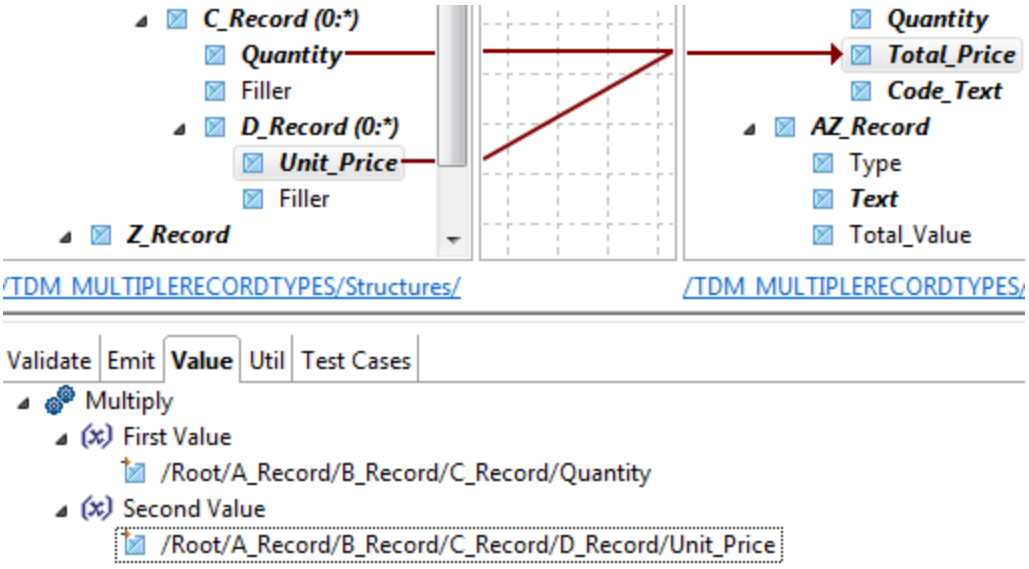
2. Drag and drop **C_Record > Quantity** from the **Input** area to the **First Value** field. Make sure not to select the element prior to dragging it, or the **Value** tab and the **First Value** field will disappear from view. You have to drag the *Quantity* element without selecting it first with a left click.



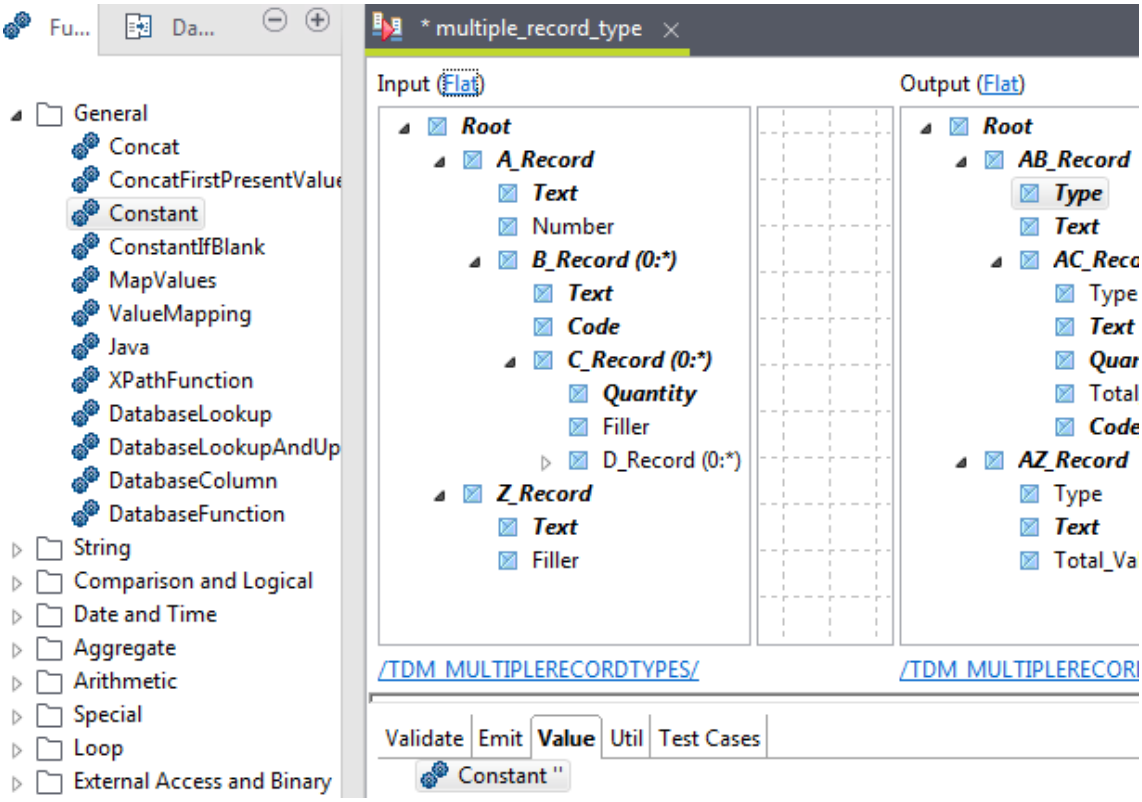
3. Drag and drop **D_Record > Unit_Price** from the **Input** area to the **Second Value** field and click **Yes** when offered to change the output map element looping.



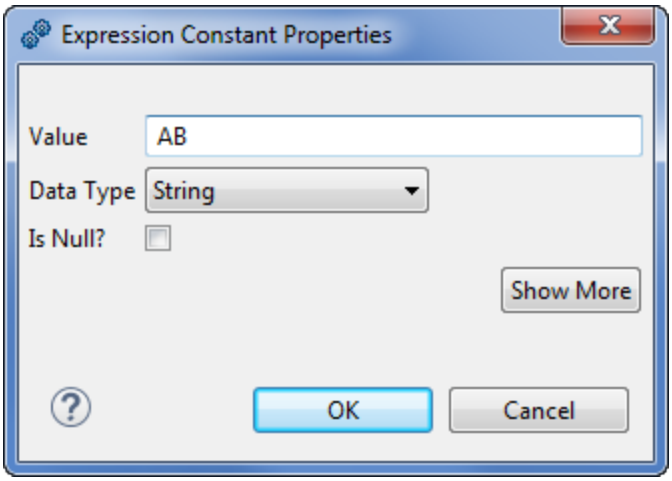
4. The final **Multiply** Function should look like the following.



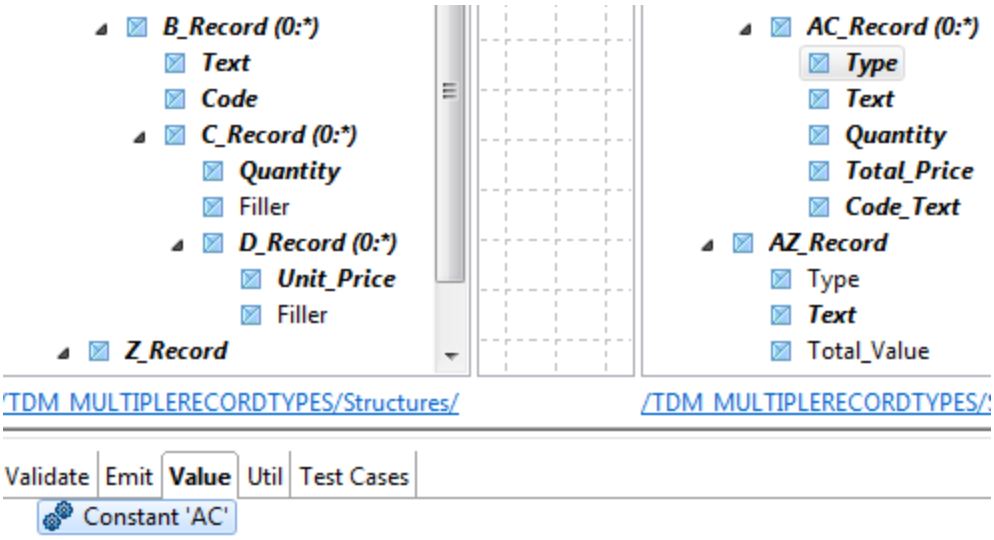
5. Now select **Root > AB_Record > Type** in the **Output** area, then drag and drop a **Functions > General > Constant** Function to its **Value** tab.



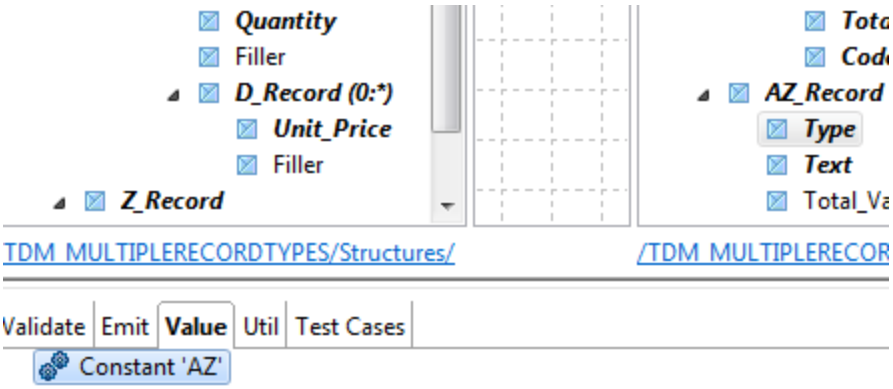
6. Double-click the **Constant** element, set the **Value** field to *AB* and click **OK**.



7. Select **Root > AB_Record > AC_Record > Type** in the **Output** area, then drag and drop a **Functions > General > Constant** Function to its **Value** tab. Double-click the **Constant** element, set the **Value** field to *AC* and click **OK**.

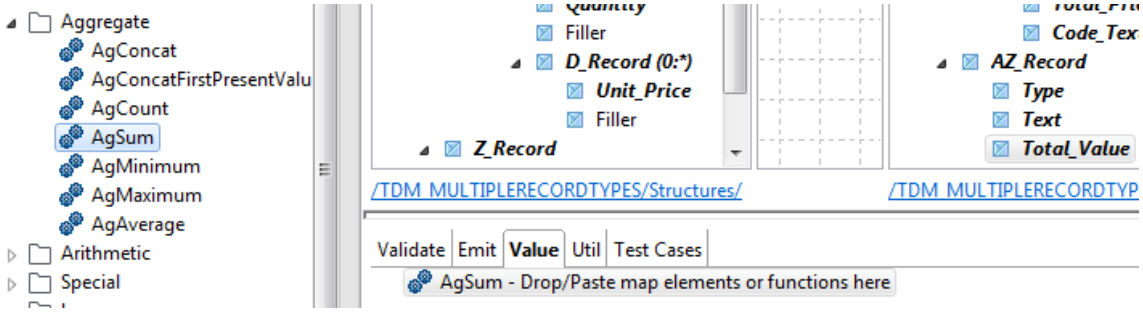


8. Select **Root > AZ_Record > Type** in the **Output** area, then drag and drop a **Functions > General > Constant** Function to its **Value** tab. Double-click the **Constant** element, set the **Value** field to *AZ* and click **OK**

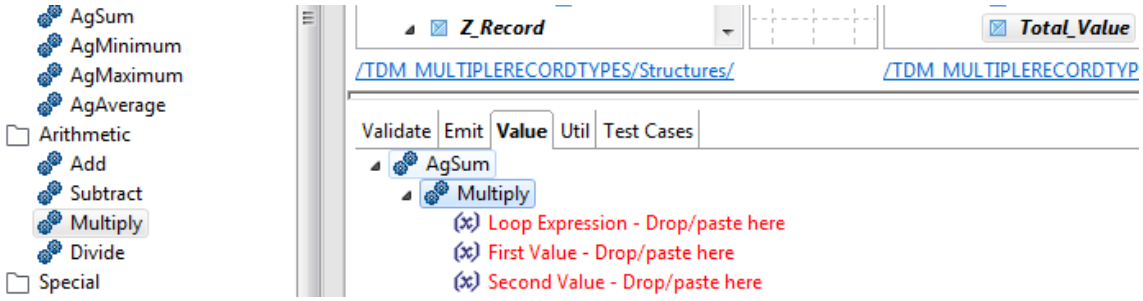


9. Select **Root > AZ_Record > Total_Value** in the **Output** area, then drag and drop a **Functions > Aggregate > AgSum**

Function to its **Value** tab.

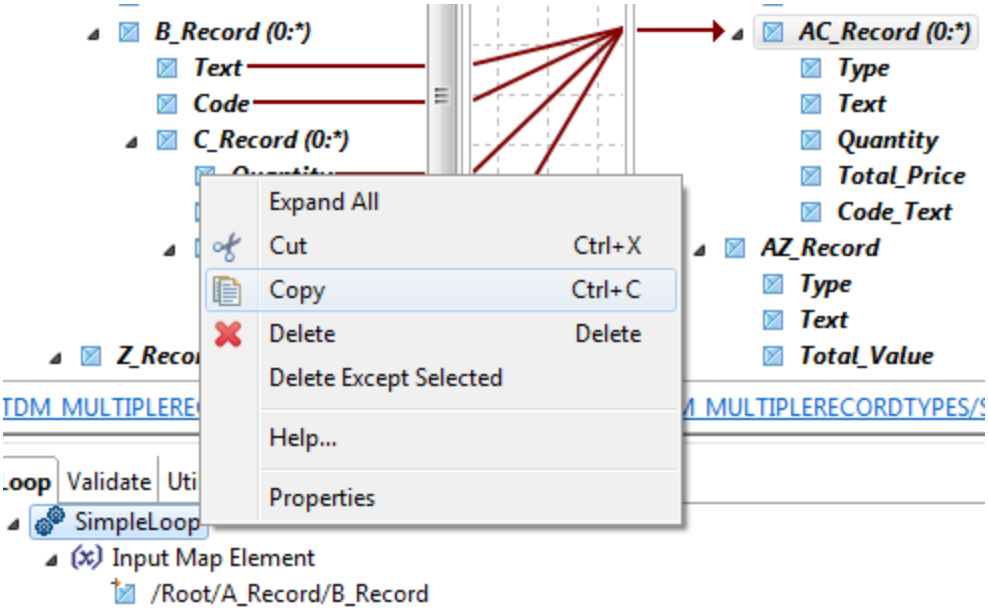


10. Drag and drop a **Functions > Arithmetic > Multiply** Function on top of the **AgSum** field.

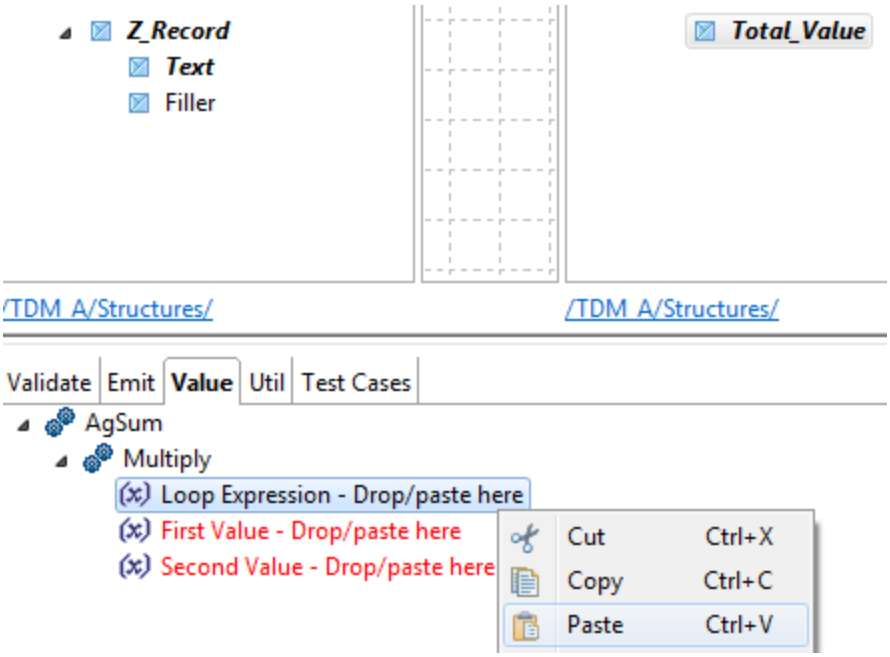


11. Select **Root > AB_Record > AC_Record** in the **Output** area, then switch to the **Loop** tab.

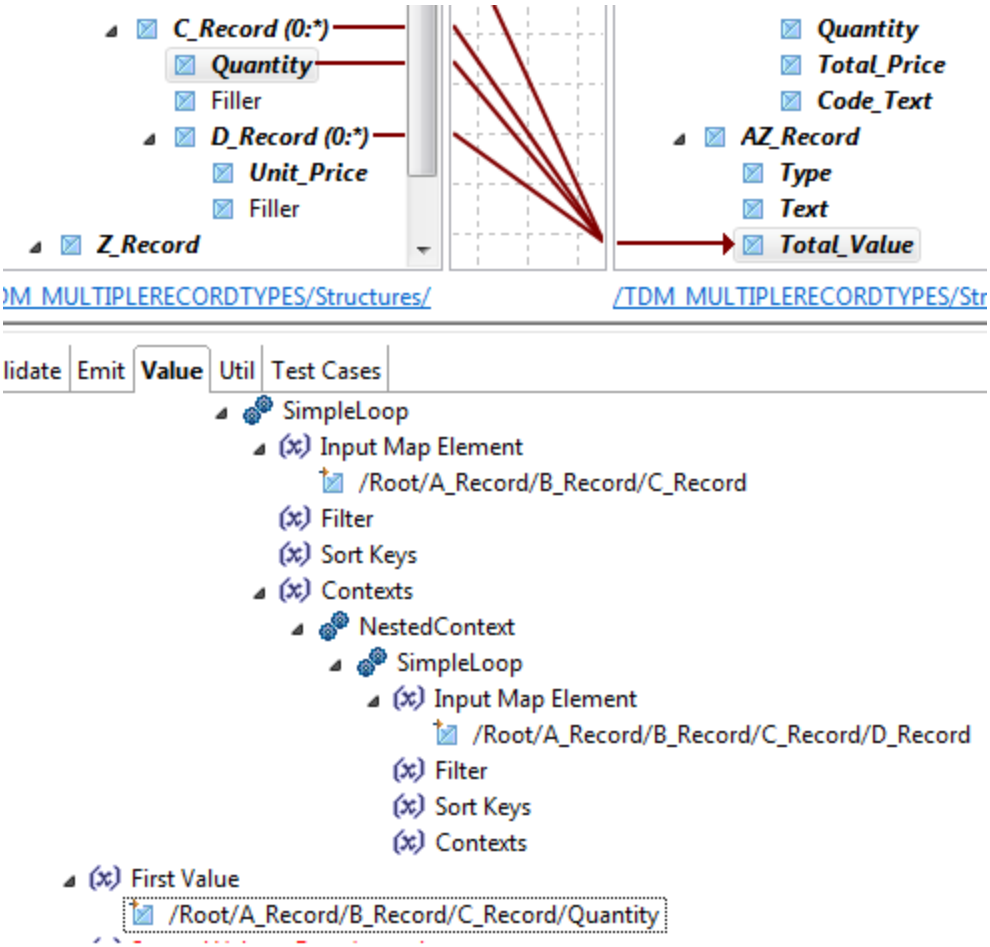
    Right-click the **SimpleLoop** field and select **Copy** to reuse this formula.



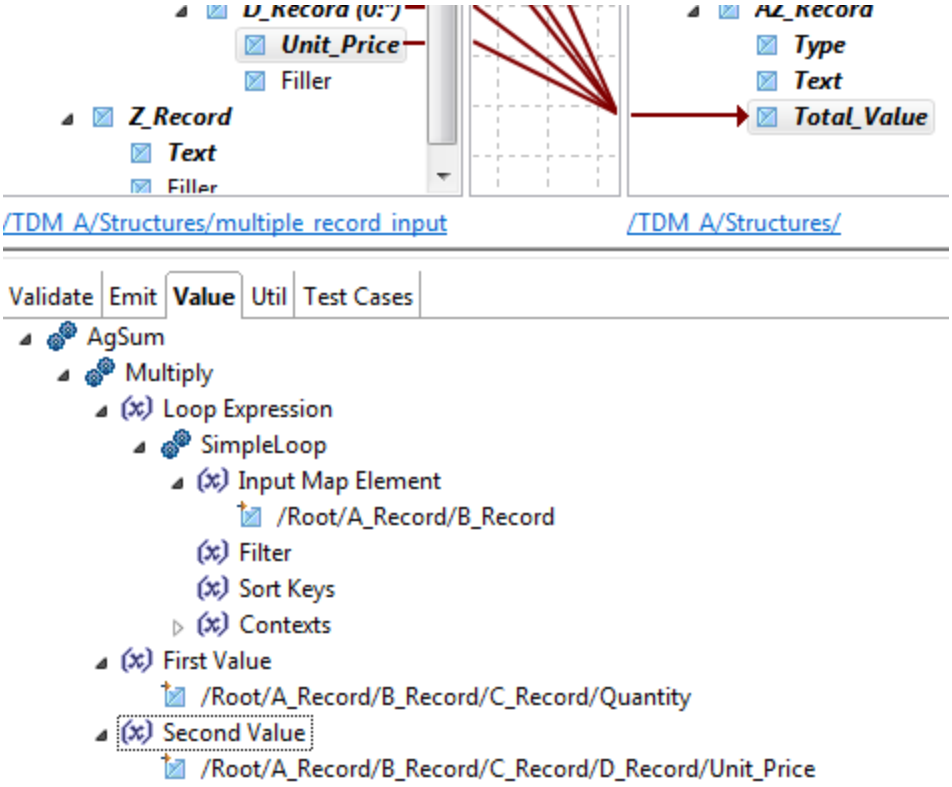
12. Select **Root > AZ_Record > Total_Value** again in the **Output** area, right-click **Loop Expression** and select **Paste**.



13. Drag and drop **C_Record > Quantity** from the **Input** area to the **First Value** field of the **AgSum** Function.

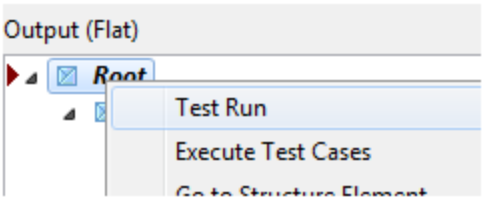


14. Drag and drop **D_Record > Unit_Price** from the **Input** area to the **Second Value** field of the **AgSum** Function. The final **AgSum** Function should look like the following.

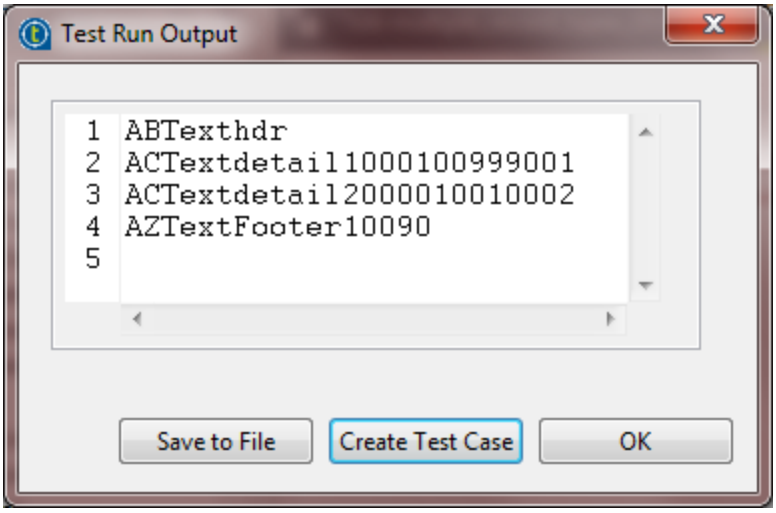


Test Run

1. Right-click *Root* in the **Output** area and select **Test Run**.



2. Check that the result looks like the following.

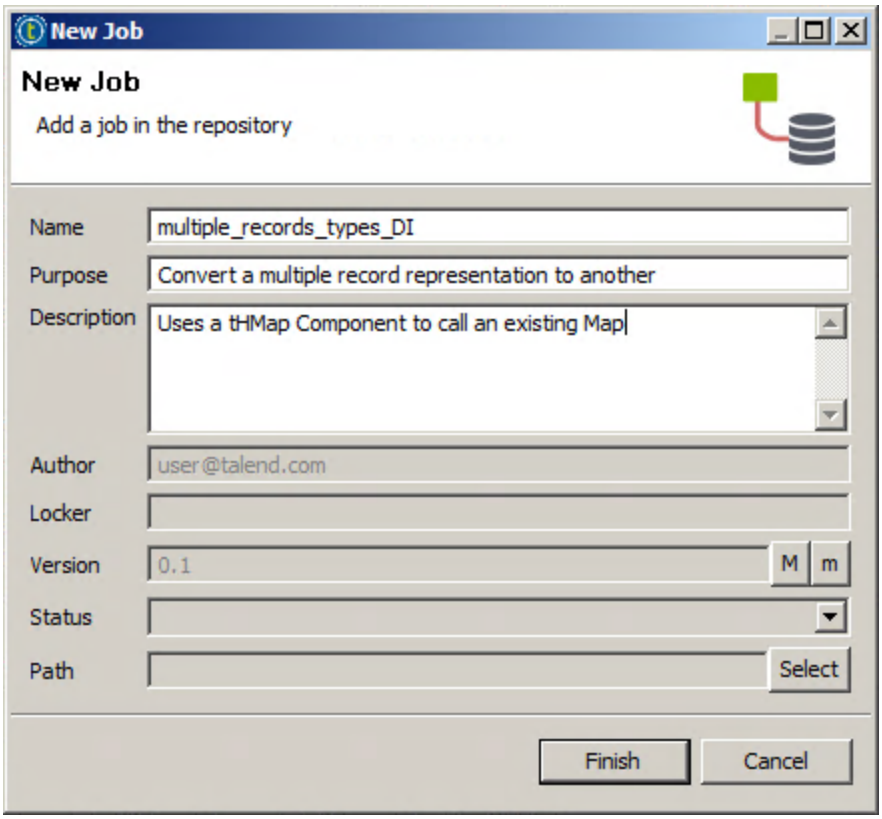


Next Step

Now let's create a DI Job to call the mapping that was just completed.

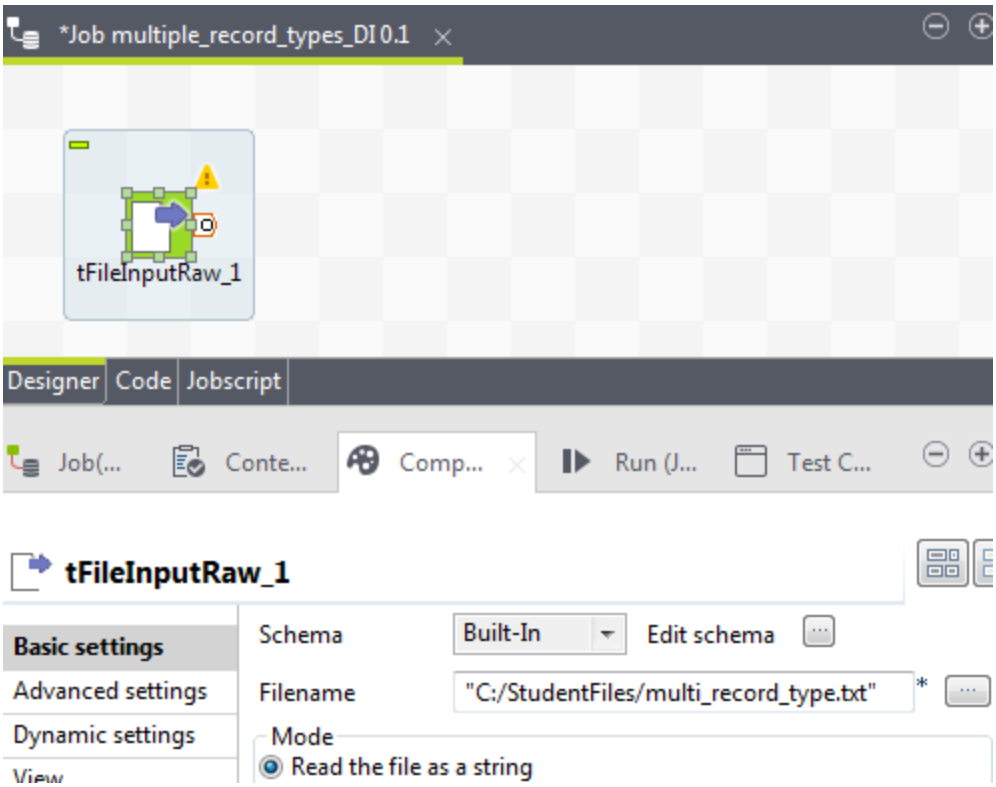
Creating the DI Job

1. Switch to the **Integration** perspective and create a Job called *multiple_record_types_DI*.



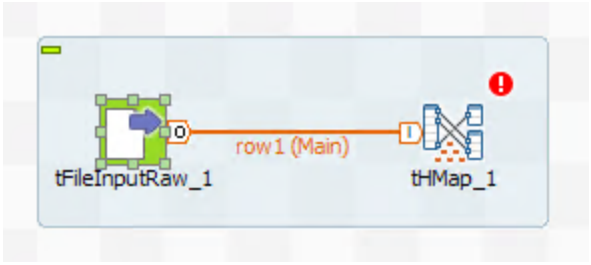
2. Place a **tFileInputRaw** Component in the canvas and double-click it to open its **Component** view.

   Click the **...** button next to the **Filename** field and select the *C:/StudenFiles/multiple_record_type.txt* file.



3. Place a **tHMap** Component on the canvas, acknowledging the red error sign that indicates the Map could not be found because it has not been configured yet.

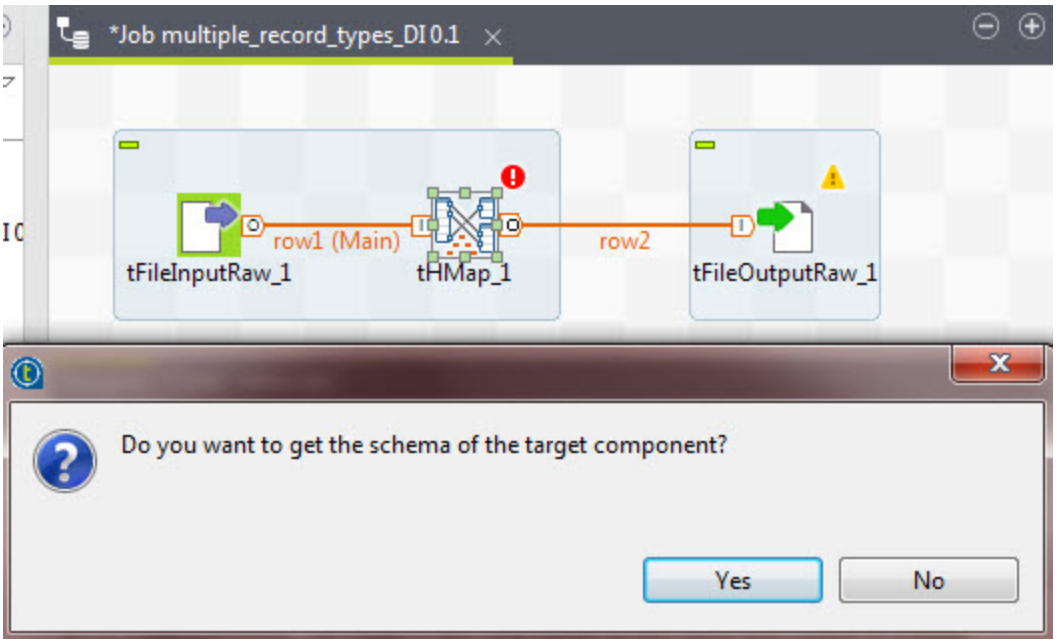
   Right-click **tFileInputRaw**, select **Row > Main** and connect the Component to **tHMap**.



4. Place a **tFileOutputRaw** Component on the canvas.

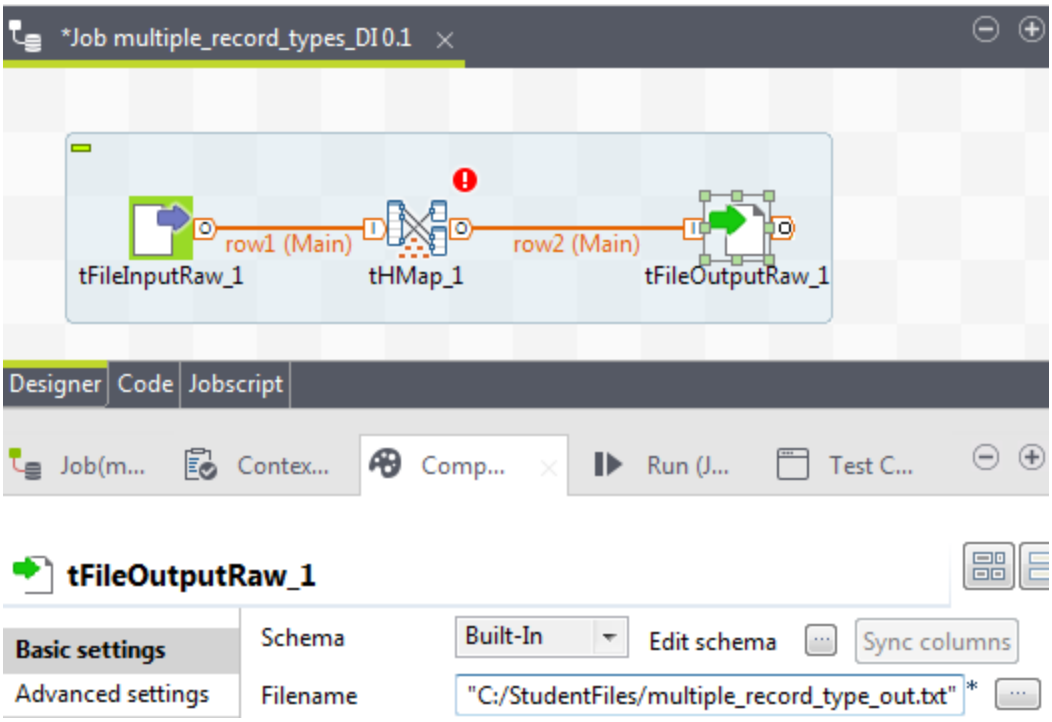
   Right-click **tHMap**, select **Row > Main** and connect the Component to **tFileOutputRaw**.

   Click **Yes** when asked to get the schema from the target Component.

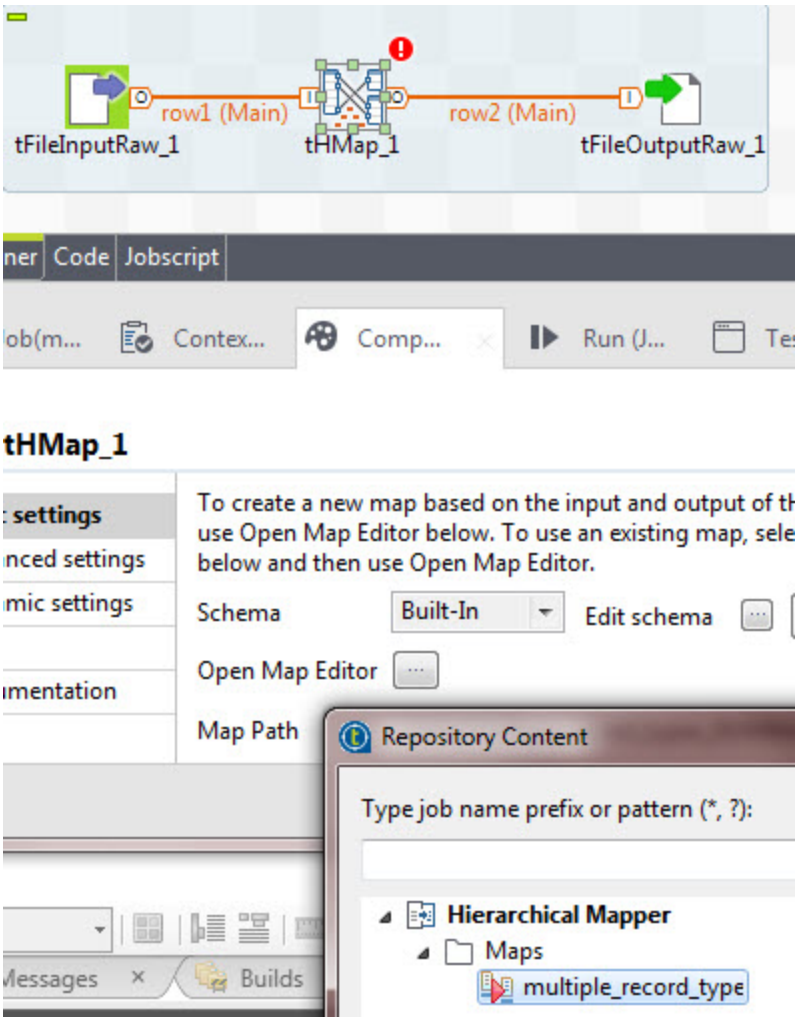


5. Double-click **tFileOutputRaw** to open its Component view.

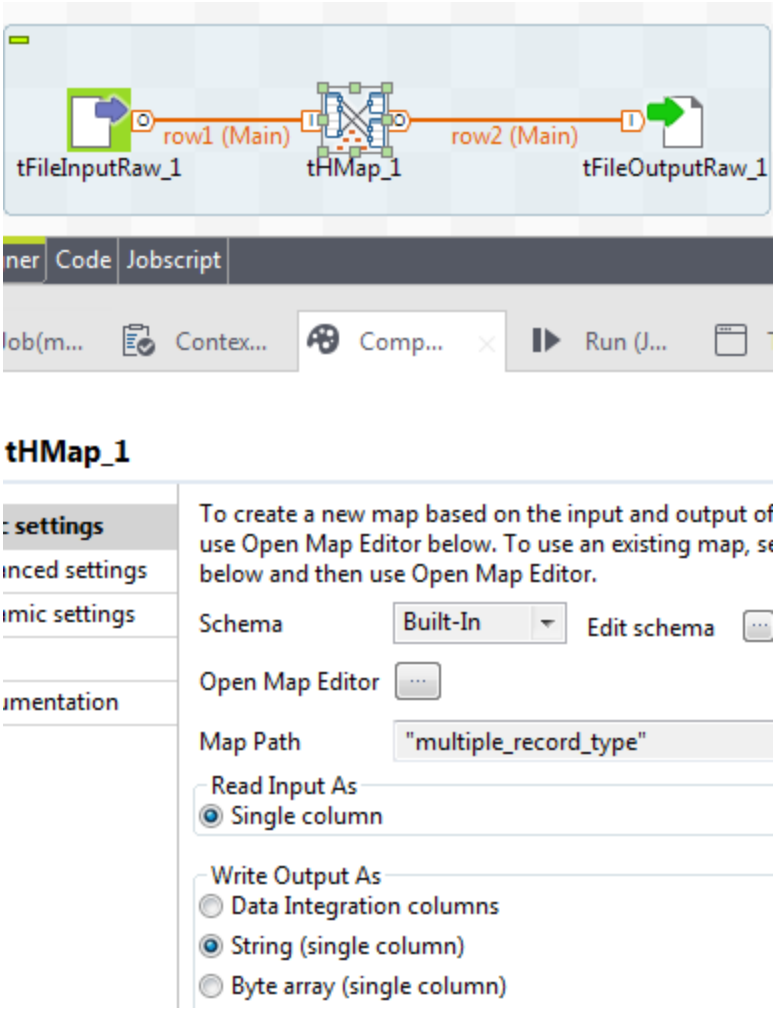
   Click the **...** button next to the **Filename** field, select *C:/StudentFiles/multiple_record_type.txt* and manually change the file name to *C:/StudentFiles/multiple_record_type_out.txt*.



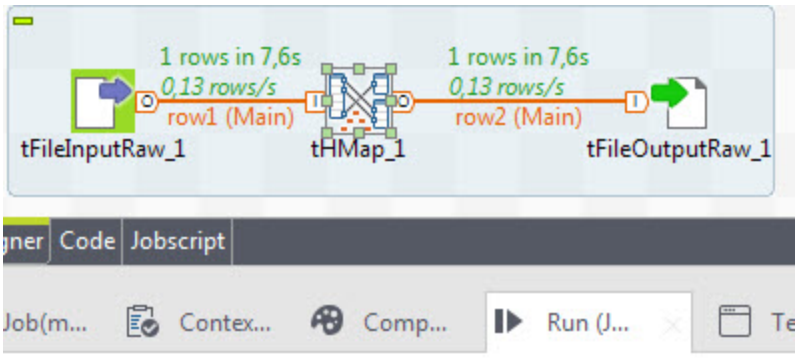
6. Select **tHMap** to display its **Component** view.
7. Click the **...** button to the right of the **Map Path** field.
8. Select the **multiple_record_type** Map created in the previous section and click **OK**.

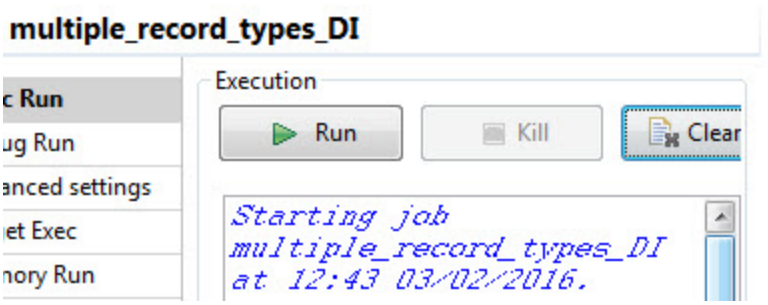


9. Note that **Read Input As** is automatically set to *Single column* and **Write Output As** is set to *String (single column)*.

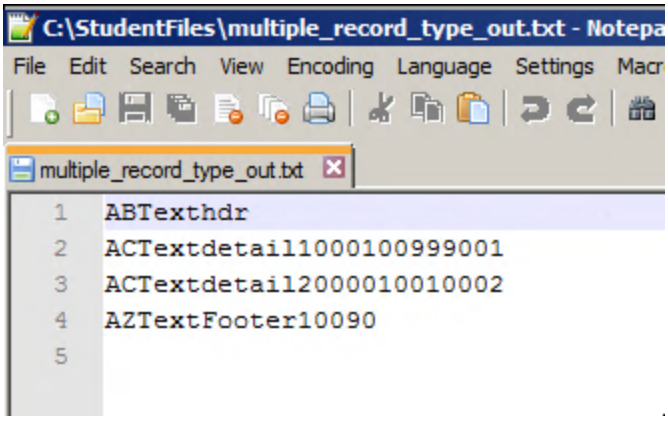


10. Finally, save all the changes (Structures, Map and DI Job) and run the Job.





11. Open the output file *C:\StudentFiles\multiple_record_type_out.txt* and check it has the following content.



Next Step

This lesson is almost over. Head to the Wrap-Up section for a summary of the concepts reviewed in this lesson.

Wrap-Up

In this lesson, you learned how to:

- Convert a multiple record type Structure to another multiple record type Structure
- Apply this transformation to flat files using a DI Job and a tHMap Component

Next Step

Congratulations, you successfully completed this lesson. Click the **Check your status with this unit** button below in order to save your progress. Then click **Completed. Let's continue >** on the next screen to jump to the next lesson.

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LESSON 4

Performing a Database Lookup

This chapter discusses the following.

Overview 124
Creating the Database Structure 125
Creating the Map 129
Wrap-Up 137

Overview

Lesson Overview

The objective of this exercise is perform a database lookup directly from a Map, in order to retrieve the value of an Element from a database based on some condition.

The example will reuse the *multiple_record_type* Map from the previous exercise, and retrieve the value of *Total_Price* from a database.

Objectives

After completing this lesson, you will be able to:

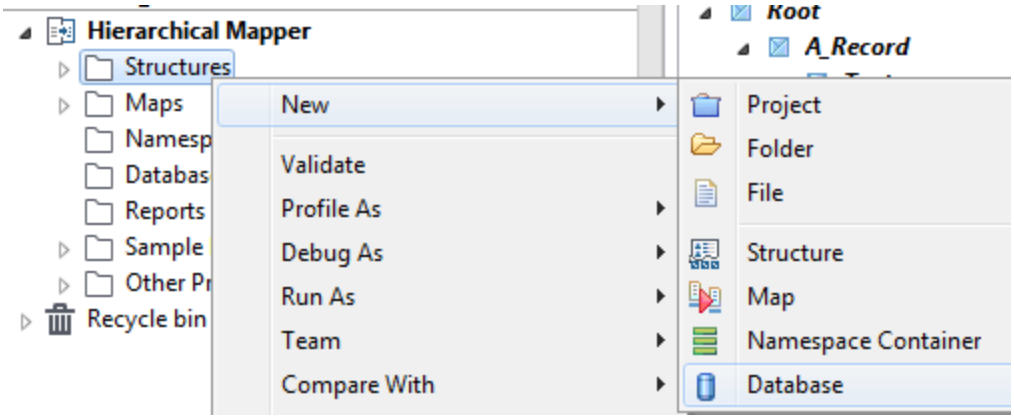
- Create a database connection and the associated Structures that can be reused from within a Map
- Compute the value of an Element at runtime, extracting it from a database based on a condition on other Elements

Next Step

First, let's create the database connection and the associated Structures that will be used to perform the lookup later on.

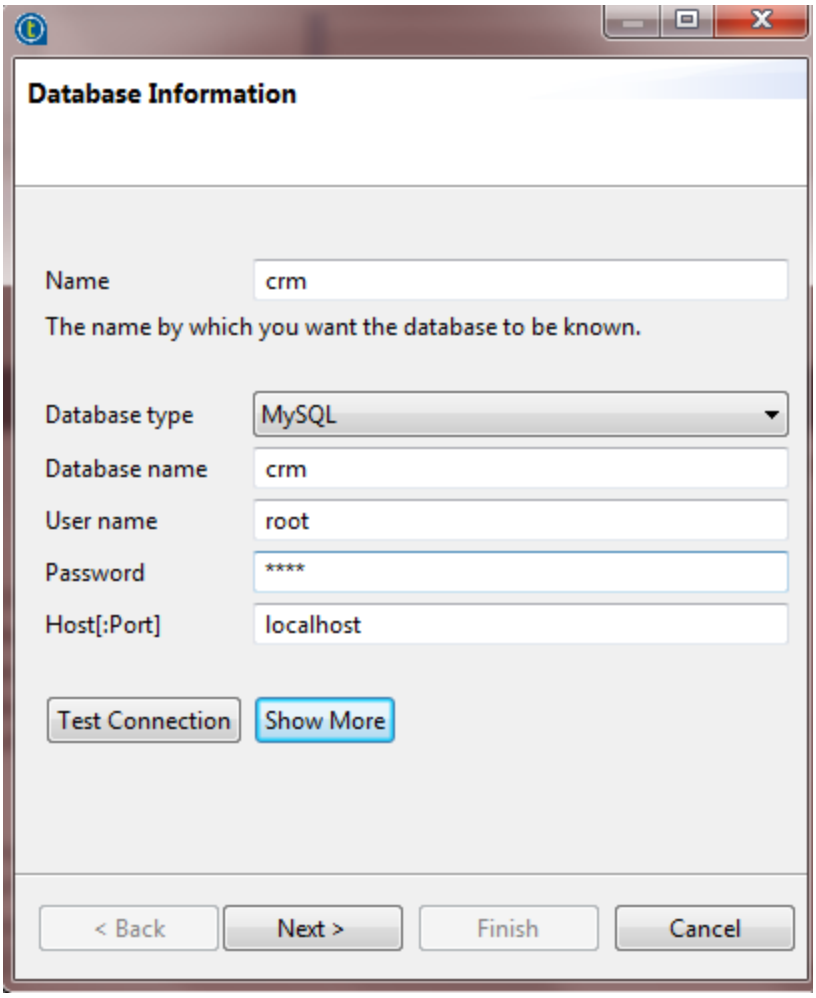
Creating the Database Structure

1. In the **Mapping** Perspective, right-click **Hierarchical Mapper > Structures** and select **New > Database**.

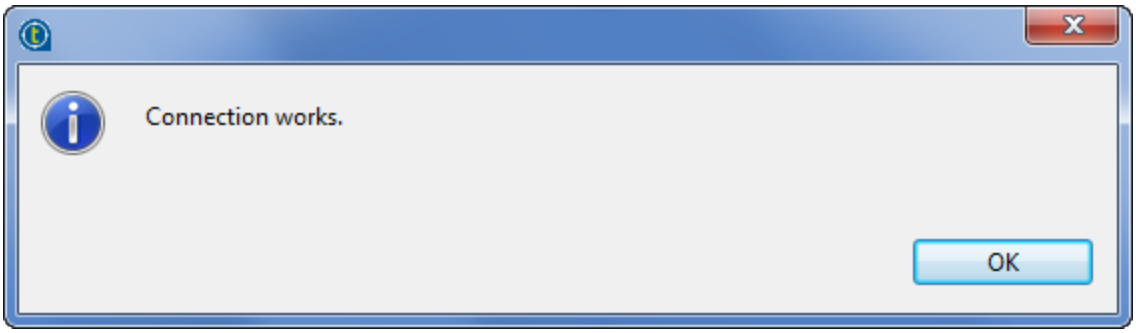


2. Enter the following details for the database connection and click **Test Connection**.

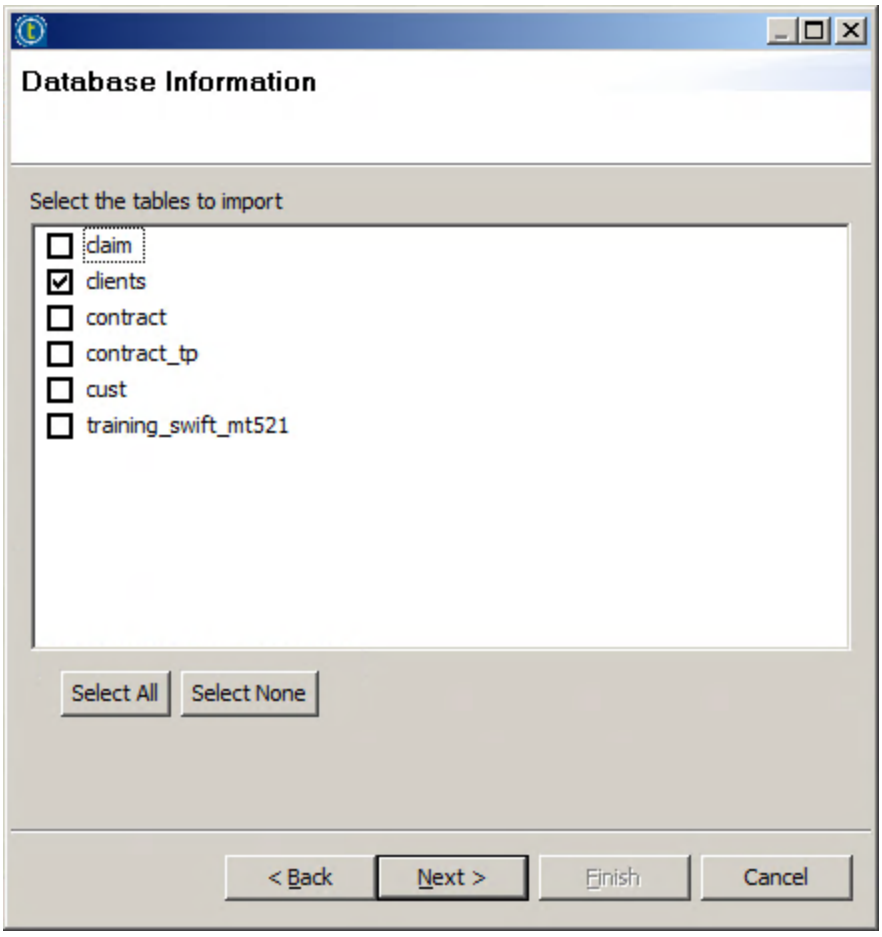
Field	Value
Name	crm
Database type	MySQL
Database name	crm
User name	root
Password	root
Host [:Port]	localhost



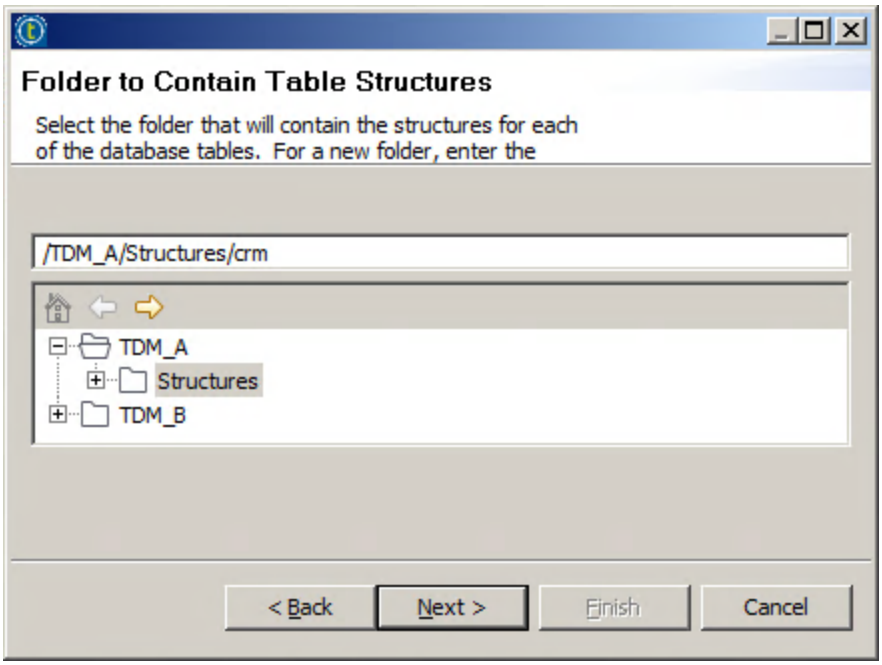
3. Click **OK** and then **Next >**.



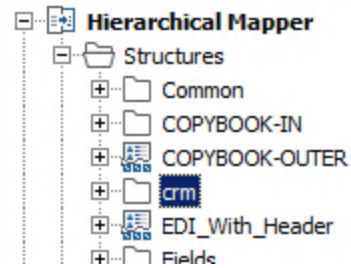
4. Select the **clients** table from the list and click **Next >**.



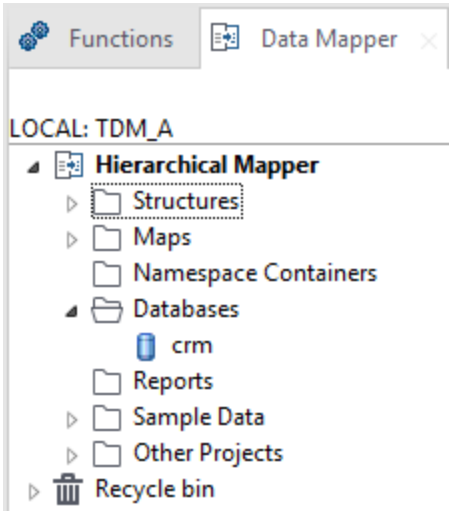
5. Keep the default saving location for the new Structure and click **Next >**.



6. Click **Finish** and check that the *crm* Structure was created under **Hierarchical Mapper > Structures**.



7. Also check that a *crm* connection was created under **Hierarchical Mapper > Databases**.

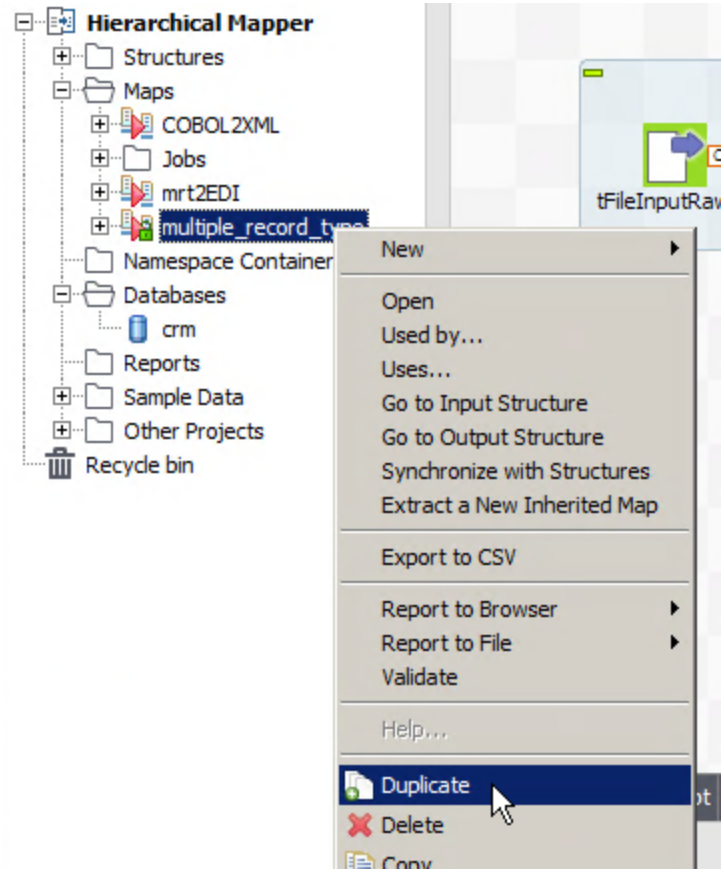


Next Step

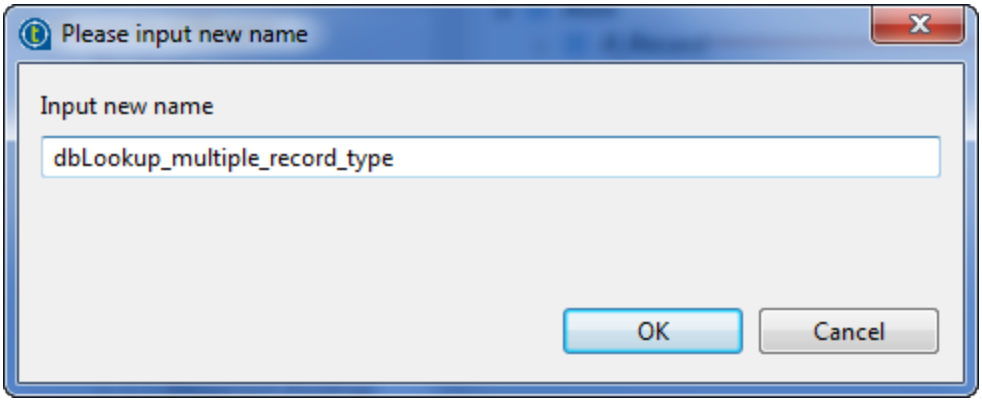
Now let's create the Map that will perform the actual lookup in the database.

Creating the Map

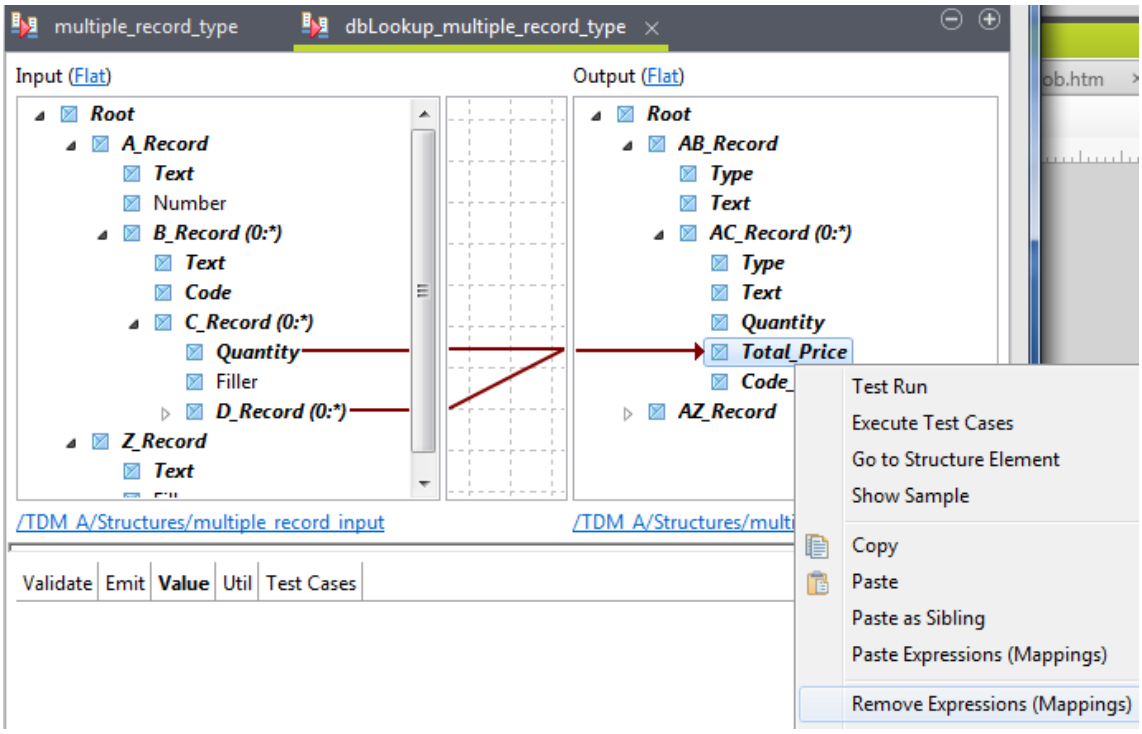
1. Right-click **Hierarchical Mapper > Maps > multiple_record_type** and select **Duplicate**.



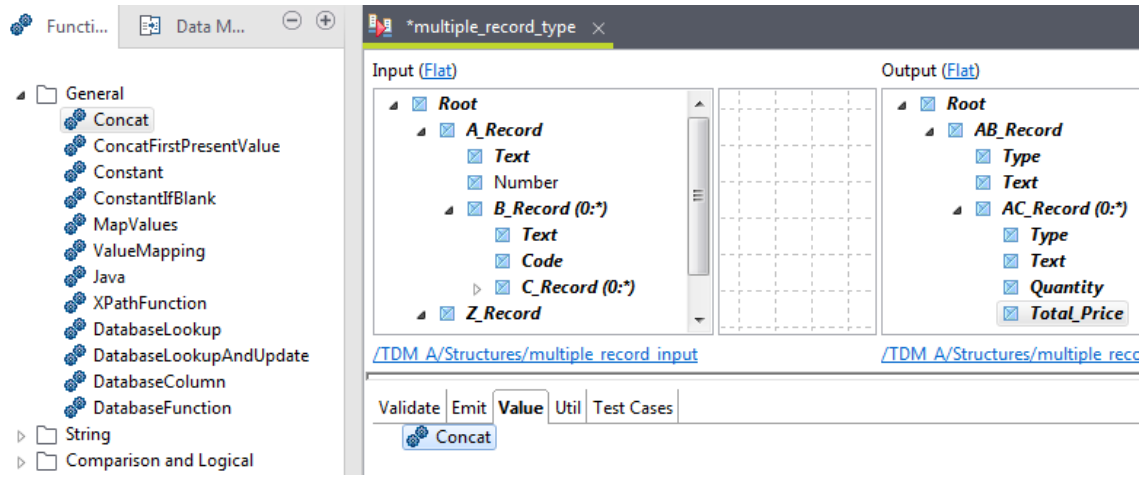
2. Change the name to **dbLookup_multiple_record_type** and click **OK**.



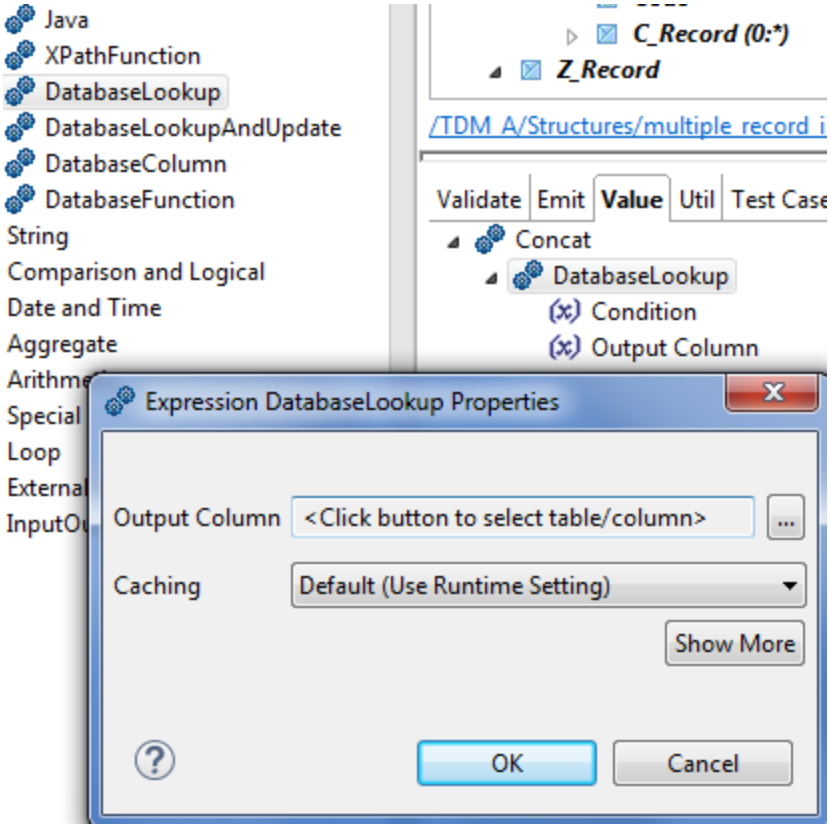
3. Open *dbLookup_multiple_record_type*, right-click **Root > AB_Record > AC_Record > Total_Price** in the **Output** area and select **Remove Expressions (Mappings)**.



4. To set the value of **Total_Price** to the result of the database lookup, drag a **Functions > General > Concat** Function to the **Value** tab.

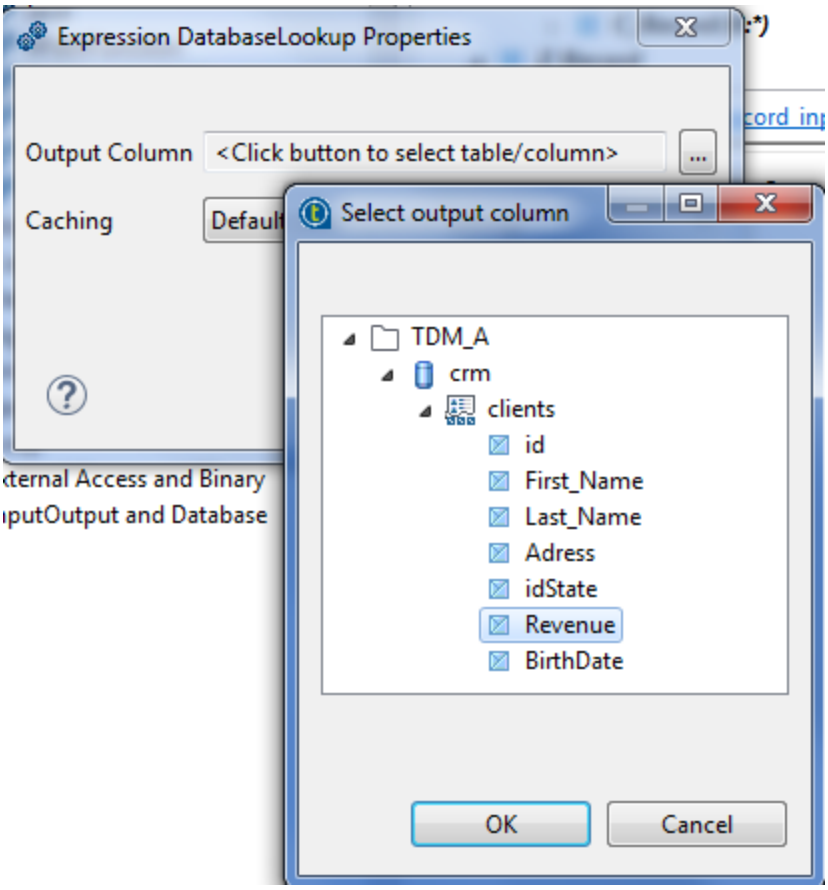


5. Drag and drop a **Functions > General > DatabaseLookup** Function on top of the **Concat** Function.

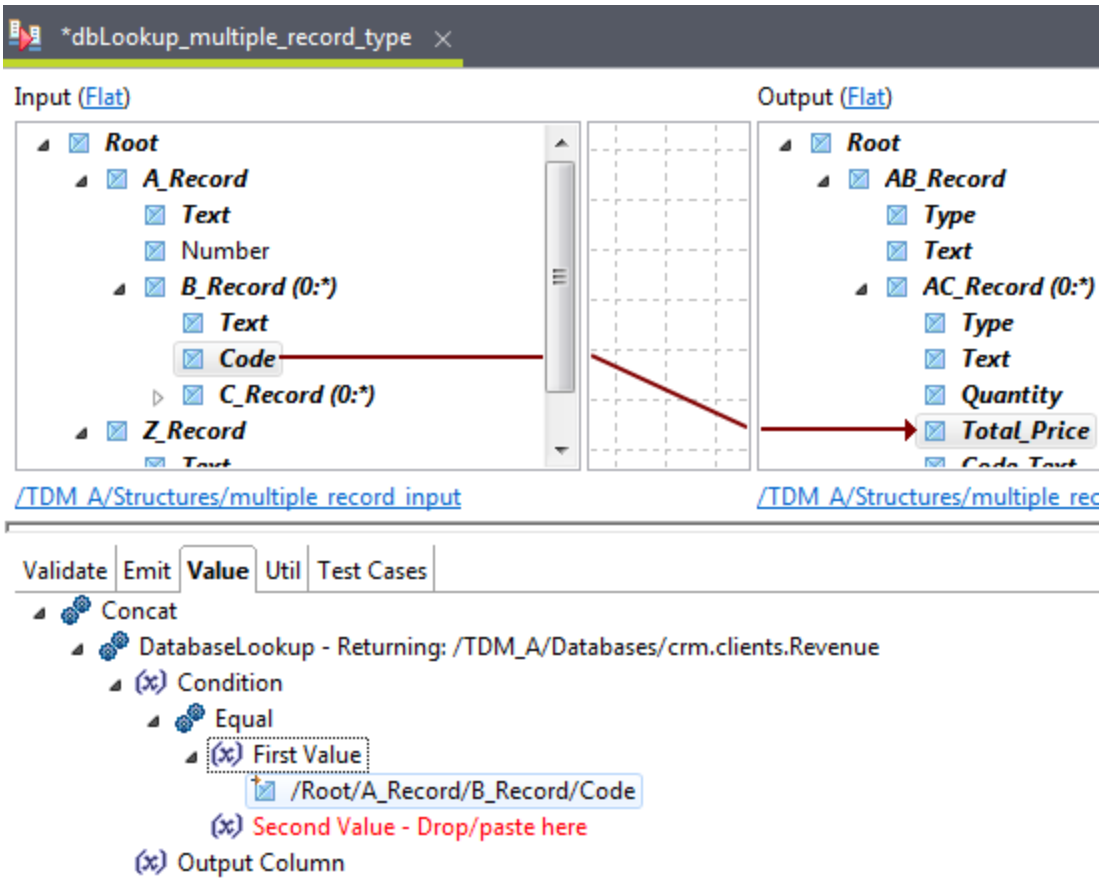


6. Click the **...** button next to the **Output Column** field.

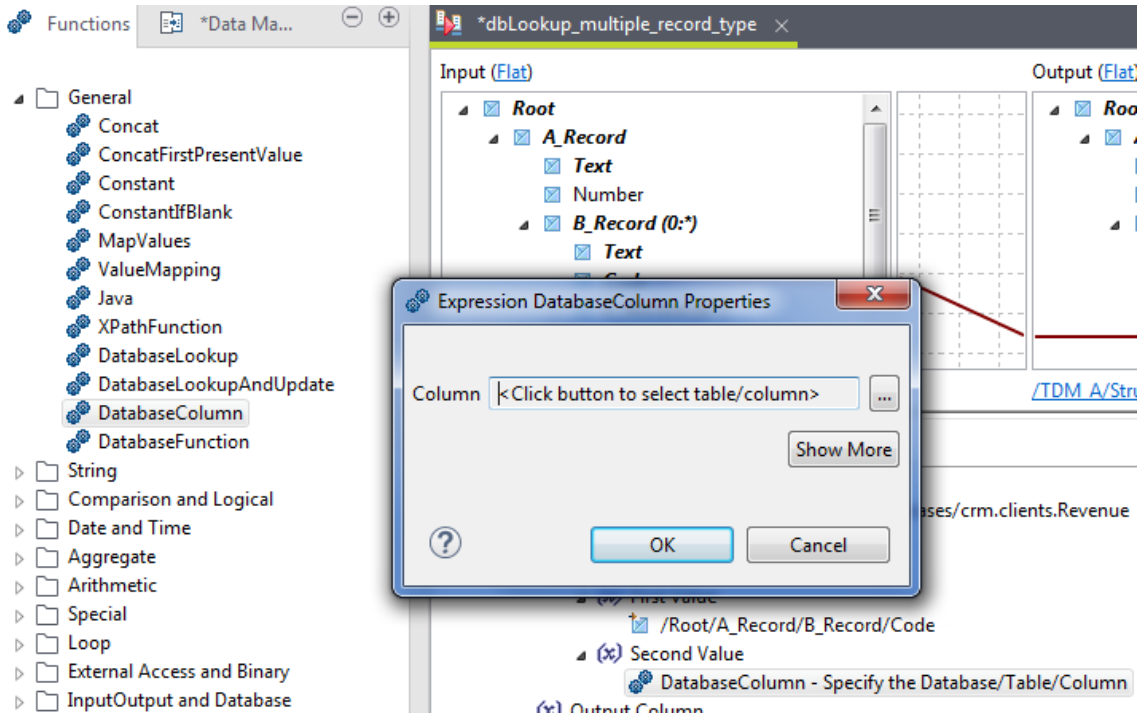
   Select the *Revenue* column from the *clients* table in the *crm*, then click **OK** twice to save the configuration.



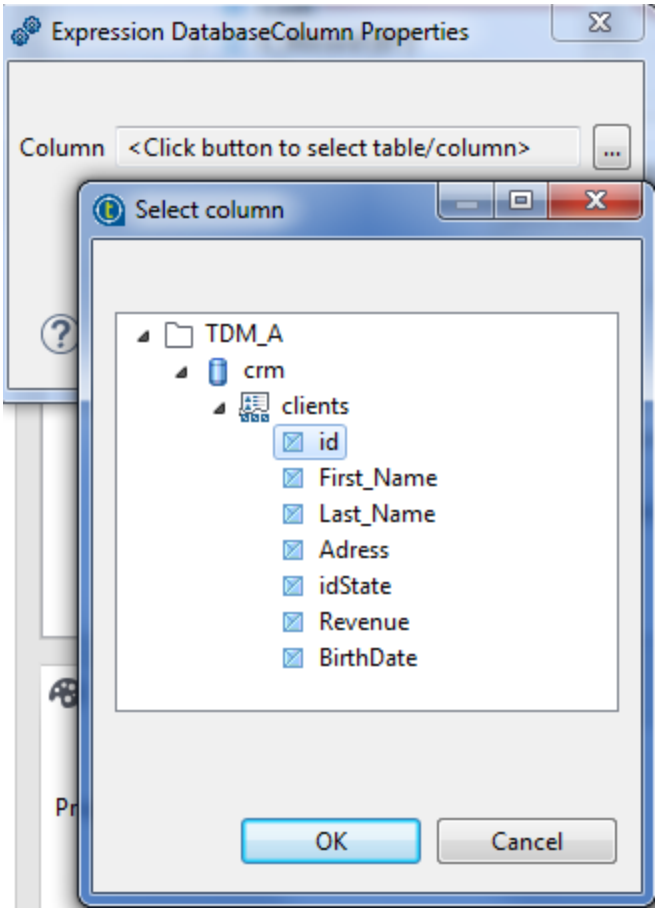
7. Drag and drop a **Functions > Comparison and Logical > Equal** Function to the **Condition** field in the **Value** tab, then drag and drop **Root > A_Record > B_Record > Code** to the **First Value** field of the condition.



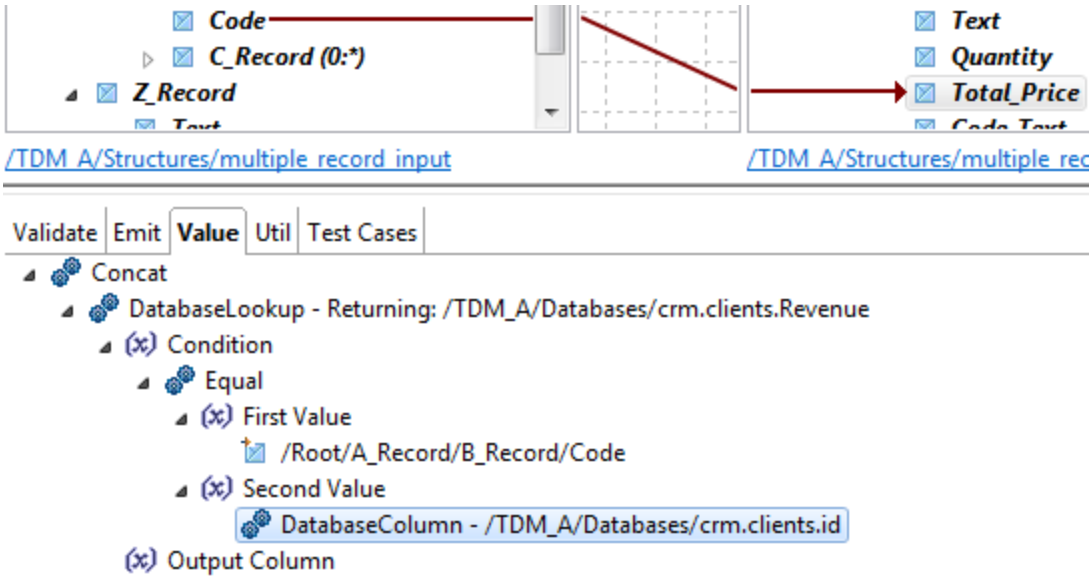
8. Drag and drop a **Functions > General > DatabaseColumn** Function on top of the **Second Value** field, then click the **...** button next to **Column** to select the actual lookup column.


Functions
*Data Ma...
General
Concat
ConcatFirstPresentValue
Constant
ConstantIfBlank
MapValues
ValueMapping
Java
XPathFunction
DatabaseLookup
DatabaseLookupAndUpdate
DatabaseColumn
DatabaseFunction
String
Comparison and Logical
Date and Time
Aggregate
Arithmetic
Special
Loop
External Access and Binary
InputOutput and Database
*dbLookup_multiple_record_type
Input (Flat)
Output (Flat)
Root
A_Record
Text
Number
B_Record (0:*)
Text
Expression DatabaseColumn Properties
Column
<Click button to select table/column>
...
Show More
OK
Cancel
/Root/A_Record/B_Record/Code
Second Value
DatabaseColumn - Specify the Database/Table/Column

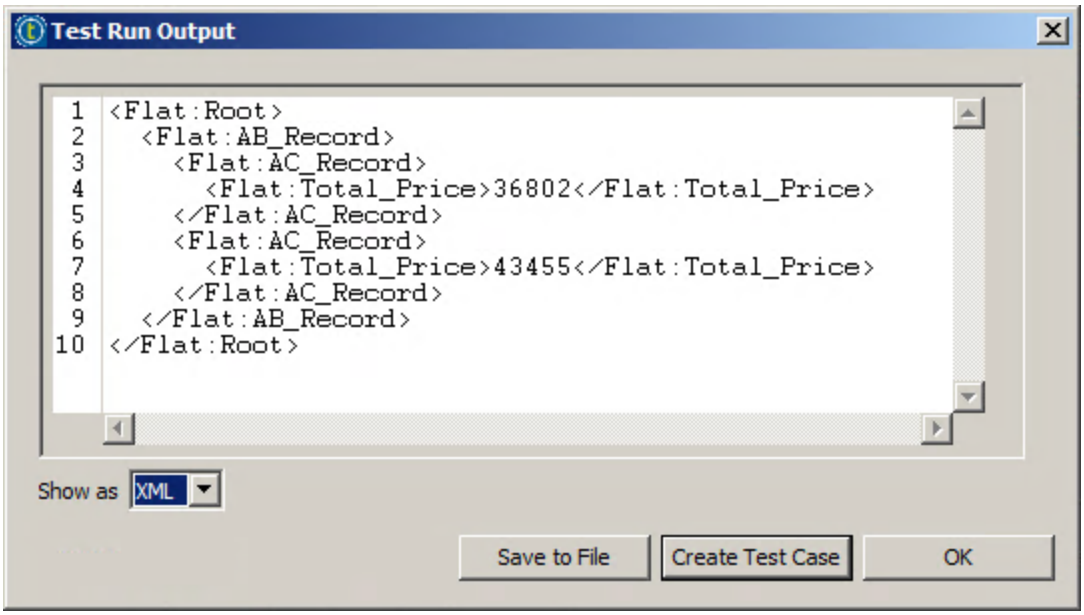
9. Select the *id* column for the lookup and click **OK** twice to save the configuration.



10. The final **Concat** Function should look like the following. This configuration will extract the value of the *Revenue* field where the value of the *id* field is equal to *Code*.



11. Right-click **Total_Price**, select **Test Run** and check that you get the following results. Note that you might have to select the XML representation at the bottom left of the dialog to get the same output.



Next Step

This lesson is almost over. Head to the Wrap-Up section for a summary of the concepts reviewed in this lesson.

Wrap-Up

In this lesson, you learned how to:

- Create a database connection and the associated Structures that can be reused from within a Map
- Compute the value of an Element at runtime, extracting it from a database based on a condition on other Elements

Next Step

Congratulations, you successfully completed this lesson. Click the **Check your status with this unit** button below in order to save your progress. Then click **Completed. Let's continue >** on the next screen to jump to the next lesson.

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