IBM Integration Bus

Using the Loopback Connector to access MongoDB

Featuring:

MongoDB
Setting the Loopback Request "filterString"
The Loopback Request node

September 2016
Hands-on lab built at product Version 10.0.0.6

1. Introduction and Preparation

1.1 Introduction

IIB v10.0.0.6 has introduced new functionality from StrongLoop This function is exposed as a Loopback Connector. The first implementation of this is the Loopback Request node, and this can be used to access databases such as MongoDB.

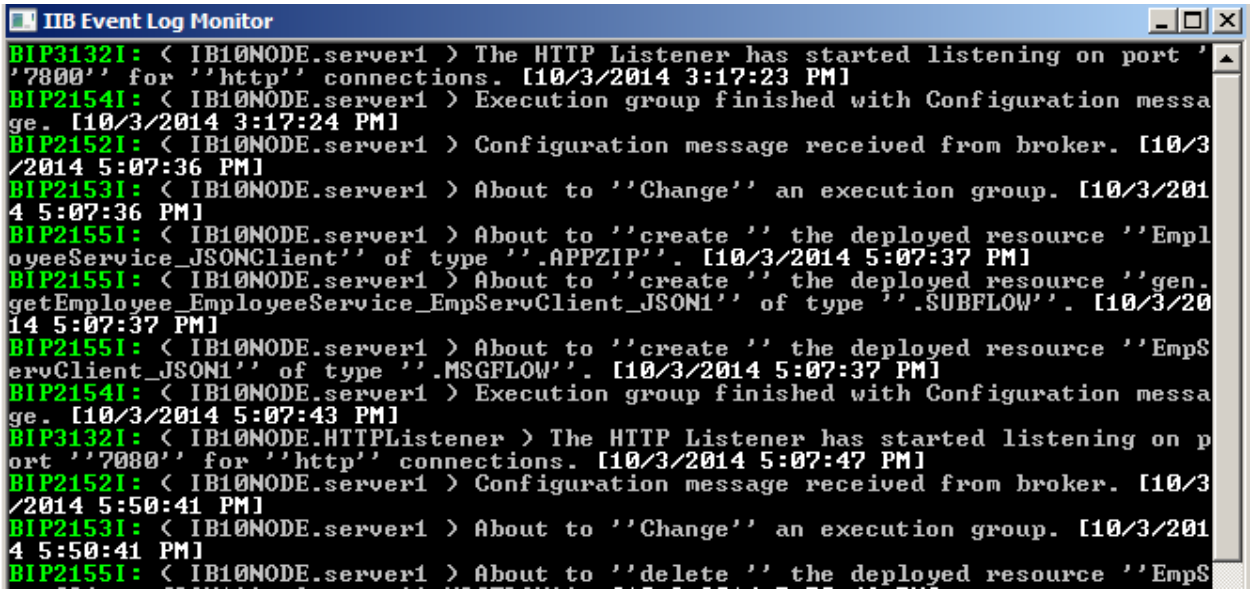
This lab provides a basic example of retrieving information from a MongoDB database. It is based on the previously built REST API, and will retrieve Employee documents from the HRDB database (EMPLOYEE container), located within a MongoDB instance.

IIB v10, fixpack 5 (10.0.0.5) has made significant changes in the Toolkit representation of REST APIs, the editor functions, and with the tools provided with the Mapping Node editor. This lab will make use of those functions to extract the required employee number from the input parameters. An approach is also provided to retrieve the same information using ESQL.

1.2 Open the Windows Log Monitor for IIB

A useful tool for IIB development on Windows is the IIB Log Viewer. This tool continuously monitors the Windows Event Log, and all messages from the log are displayed immediately.

From the Start menu, click IIB Event Log Monitor. The Monitor will open; it is useful to have this always open in the background.



This tool is not shipped as part of the IIB product; please contact us directly if you would like a copy.

1.3 Configure TESTNODE_iibuser for REST APIs

The instructions in this lab guide are based on a Windows implementation, with a user named "iibuser".
The Windows VMWare image on which this lab is based is not available outside IBM, so you will need to provide your own software product installations where necessary.

Login to Windows as the user "iibuser", password = "passw0rd". (You may already be logged in).

Start the IIB Toolkit from the Start menu.

The IIB support for the REST API requires some special configuration for the IIB node and server. Cross-Origin Resource Scripting (CORS) must be enabled for the IIB node to execute REST applications. This is also required when testing with the SwaggerUI test tool. See http://www.w3.org/TR/cors/?cm_mc_uid=09173639950214518562833&cm_mc_sid_50200000=1452177651 for further information.

1. Ensure that TESTNODE_iibuser is started.

2. Check that CORS has been enabled on the IIB node by running the following command in an Integration Console:

```
mqsireportproperties TESTNODE_iibuser
      -e default
      -o HTTPConnector
      -r
```

3. If CORS is enabled, you will see the following lines (amongst others):

```
corsEnabled='true'
 corsAllowOrigins='*'
 corsAllowCredentials='false'
 corsExposeHeaders='Content-Type'
 corsMaxAge='-1'
 corsAllowMethods='GET,HEAD,POST,PUT,PATCH,DELETE,OPTIONS'
 corsAllowHeaders='Accept,Accept-Language,Content-Language,Content-
   Type'
```

4. If CORS has not been enabled, run the following commands:

```
mqsichangeproperties TESTNODE_iibuser
      -e default
      -o HTTPConnector
      -n corsEnabled -v true

mqsistop TESTNODE_iibuser

mqsistart TESTNODE_iibuser
```

2. Create the HRDB database in MongoDB

This chapter will provide some very basic instructions to get you started with MongoDB, sufficient to perform this lab. There are many good instructional documents on the internet, starting with this site: https://www.mongodb.org/.

Note - on the IIB Workshop Windows system, MongoDB has been installed into the Program Files folder, and c:\Program Files\MongoDB\server\3.2\bin has been added to the PATH in the Windows System Environment Variables.

2.1 Start the MongoDB server and client shell

1. In a Windows Command Prompt, navigate to :

   c:\student10\Loopback\mongodb\commands

   Run the command:

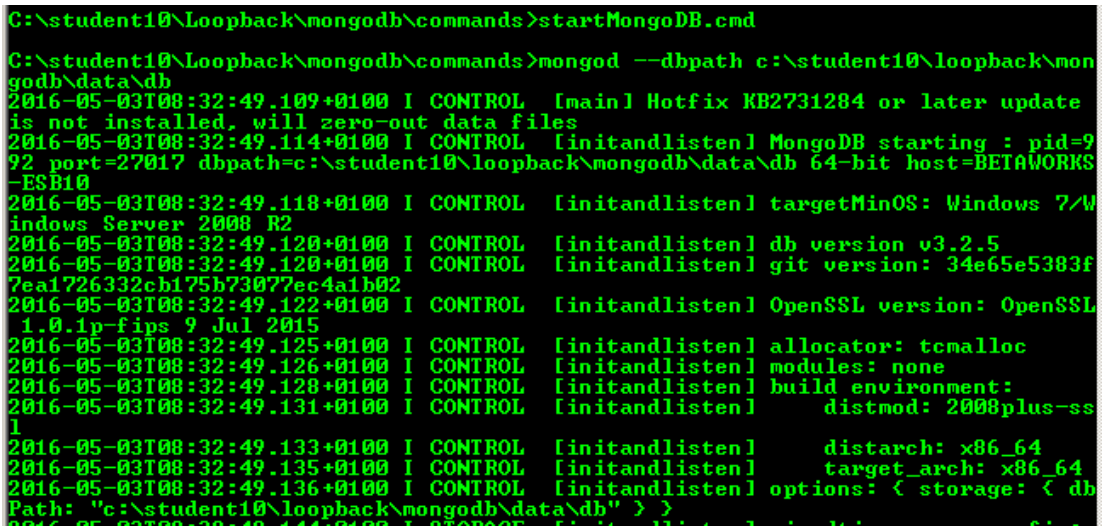
   startMongoDB

   For info, this will run the MongoDB command:

   mongod.exe --dbpath c:\student10\Loopback\mongodb\data\db

   This command will start the MongoDB server, and create any new databases in the specified folder. The folder specified in the dbpath parameter must exist, but does not need any specific preparation or configuration.

   No defaults have been changed, so the MongoDB server will start with the client listener 27017. The DOS window will be held open at this point. Do not close this window, or the MongoDB server will terminate.

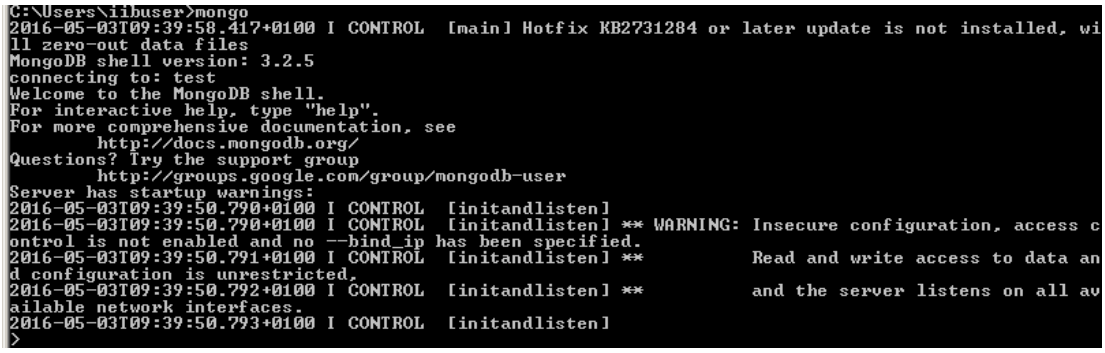


2. Start a Mongo client shell.

   Open a new Windows Command Prompt, and execute the command "**mongo**".

   This will use the default port of 27017, and connect to the started server.

   Note that the mongo client will initially connect to the server, and will connect to the **test** database.

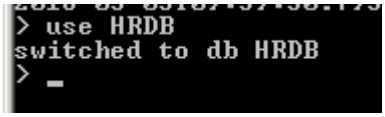


2.2 Create the HRDB database

With MongoDB, it is not necessary to explicitly define a database. A database is created on first reference, so you will do this now.

1. As mentioned above, the default database connection is "test", so switch to the required database name by issuing the mongo shell command :

   use HRDB

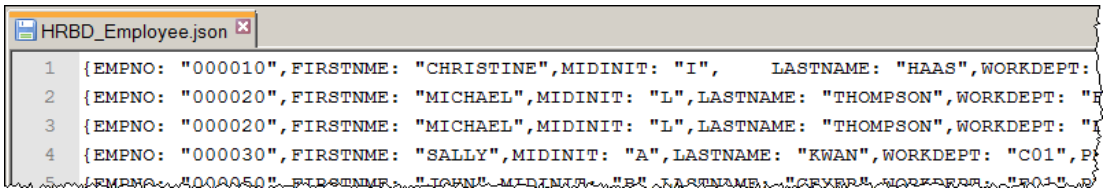
2. The lab has provided a set of data for the HRDB database. In Windows Explorer, locate the file

   c:\student10\Loopback\mongodb\createDB
   HRDB_Employee_batch_load.json

   Open this file with Notepad++.

   You will see the familiar contents of the HRDB EMPLOYEE data in JSON format.

   Each line has a "{" initiator and "}" terminator.

   Close the file without saving any changes.

3. You will now import this json data into a “Collection” called **EMPLOYEE** in the **HRDB** database.

   In a new Windows command prompt (not the window running the mongo shell), navigate to:

   c:\student10\Loopback\mongodb\createDB

   Enter the command:

   ```
   mongoimport --db HRDB
               --collection EMPLOYEE
               --drop
               --file HRDB_Employee_batch_load.json
   ```

   This command will create a collection called `EMPLOYEE` and import the json data in HRDB`_Employee_batch_load.json` (deleting any previous collection).

4. The mongo import command will respond similar to the following:

   ```
   2016-05-12T16:34:12.710+0100    connected to: localhost
   2016-05-12T16:34:12.714+0100    dropping: HRDB.EMPLOYEE
   2016-05-12T16:34:12.742+0100    imported 44 documents
   ```

5. Check that you can retrieve an entry from the Collection.

   In the window running the Mongo client shell, execute the command:

   db.EMPLOYEE.find ({ EMPNO: "000010" })

   This should return a single document containing the details of employee 000010;.

```
> db.EMPLOYEE.find({EMPNO: "000010"})

{ "_id" : ObjectId("57347fce015454d44dea9d45"), "EMPNO" : "000010", "FIRSTNME" :
"CHRISTINE", "MIDINIT" : "I", "LASTNAME" : "HAAS", "WORKDEPT" : "A00", "PHONENO" :
"3978", "HIREDATE" : "1995-01-01", "JOB" : "PRES    ", "EDLEVEL" : 18, "SEX" : "F",
"BIRTHDATE" : "1963-08-24", "SALARY" : 152750, "BONUS" : 1000, "COMM" : 4220 }
```

6. Finally, you can select all documents, by using the command

   db.EMPLOYEE.find ()

```
> db.EMPLOYEE.find()

{ "_id" : ObjectId("5734a274015454d44dea9d70"), "EMPNO" : "000020", "FIRSTNME" :
"MICHAEL", "MIDINIT" : "L", "LASTNAME" : "THOMPSON", "WORKDEPT" : "B01", "PHONENO" :
"3476", "HIREDATE" : "2003-10-10", "JOB" : "MANAGER ", "EDLEVEL" : 18, "SEX" : "M",
"BIRTHDATE" : "1978-02-02", "SALARY" : 94250, "BONUS" : 800, "COMM" : 3300 }
{ "_id" : ObjectId("5734a274015454d44dea9d71"), "EMPNO" : "000010", "FIRSTNME" :
"CHRISTINE", "MIDINIT" : "I", "LASTNAME" : "HAAS", "WORKDEPT" : "A00", "PHONENO" :
"3978", "HIREDATE" : "1995-01-01", "JOB" : "PRES    ", "EDLEVEL" : 18, "SEX" : "F",
"BIRTHDATE" : "1963-08-24", "SALARY" : 152750, "BONUS" : 1000, "COMM" : 4220 }
{ "_id" : ObjectId("5734a274015454d44dea9d72"), "EMPNO" : "000020", "FIRSTNME" :
"MICHAEL", "MIDINIT" : "L", "LASTNAME" : "THOMPSON", "WORKDEPT" : "B01", "PHONENO" :
"3476", "HIREDATE" : "2003-10-10"…….. etc
```

7. Now that you have loaded some test data into the MongoDB database HRDB, the next chapter will show you how to access this from IIB.

3. Configure the IIB installation

You can use a LoopBackRequest node in a message flow to access or create records through a LoopBack connector. First, you must install your chosen connector to work with IBM Integration Bus, and then configure the data source for the connector. You can then specify the security credentials that are required to access it. The following topics describe the steps involved in completing those tasks:

1. Installing the LoopBack connector
2. Configuring the data source and models for your LoopBack connector
3. Optionally - specifying security credentials for connecting to a secured data source

3.1 Install the LoopBack Connector

1. In an Integration Bus Command Console, change directory to the node_modules folder of the work path directory (defined by the MQSI_WORKPATH environment variable):

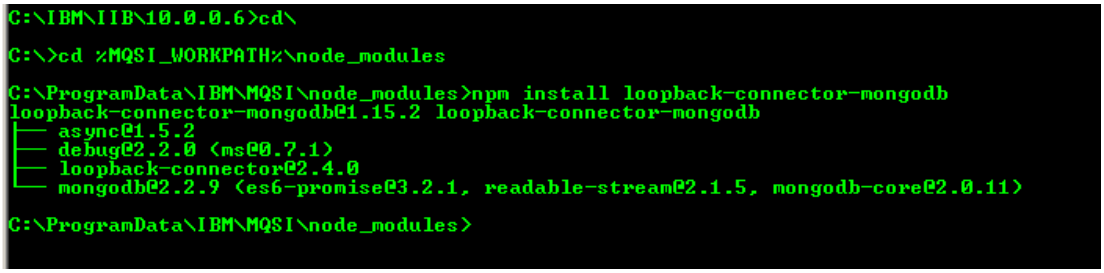
   ```
   cd \
   cd %MQSI_WORKPATH%\node_modules
   ```

   Install the required loopback connector for MongoDB by running the command

   ```
   npm install loopback-connector-mongodb
   ```

   This will create the folder **node-modules**, which contains the loopback connector for mongodb. ("npm" is a nodejs command, which is installed on the workshop Windows system.)

   The output of the command should look like this. You can use Windows Explorer to check the contents of the connectors\node_modules folder.



3.2 Configure data source for Loopback connector

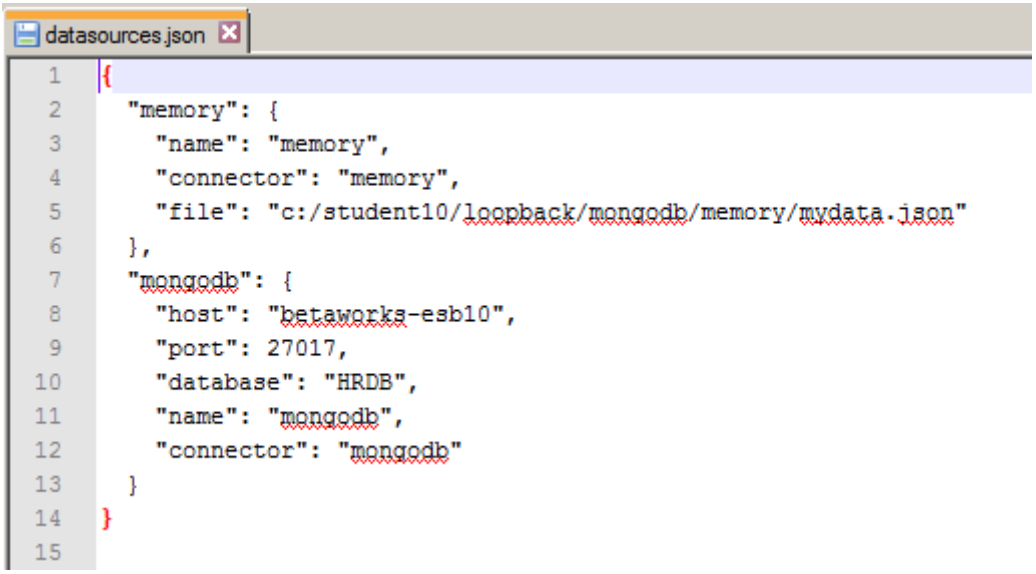
When you have installed a LoopBack connector to be used with IBM Integration Bus, you must configure the data source for the connector, by adding a connector-specific data-source stanza to the datasources.json file.

1. The creation process for the loopback connector does not automatically create the datasources.json connections details, so this must be created manually.

   In this example, we have provided the required datasources file, so using Windows Explorer, copy the file c:\student10\loopback\mongodb\config\datasources.json.

   Copy this file into the folder into the MQSI_WORKPATH\connectors/loopback folder. On the provided Windows workshop system, this folder will be **c:\ProgramData\IBM\MQSI\connectors\loopback.**

   Using Notepad++, open this file and take a look at the contents. The required stanza is the “mongodb” stanza, which corresponds to the data source name in the Loopback node properties in the IIB Toolkit. If you are using your own installation, you will need to change the hostname and port values accordingly.



4. Create an IIB REST API to access MongoDB

4.1 Create the new REST API

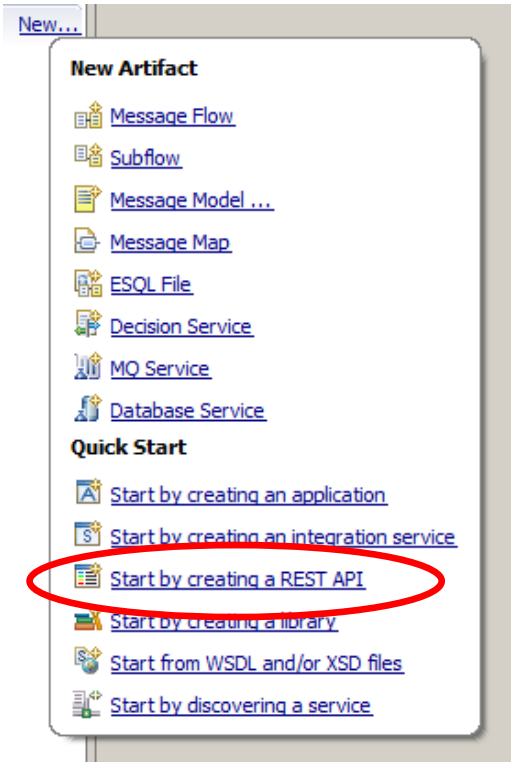
1. In the IIB Toolkit, create a new workspace called

   `c:\user\iibuser\IBM\IIBT10\workspace_loopback`

   Use File, Switch workspace, Other .... to do this.

   Note that it is important to restart the IIB Toolkit at this point, and to create a new workspace. The changes that you made to the MQSI_WORKPATH in section 3 can only be picked up by the IIB Toolkit after a restart.

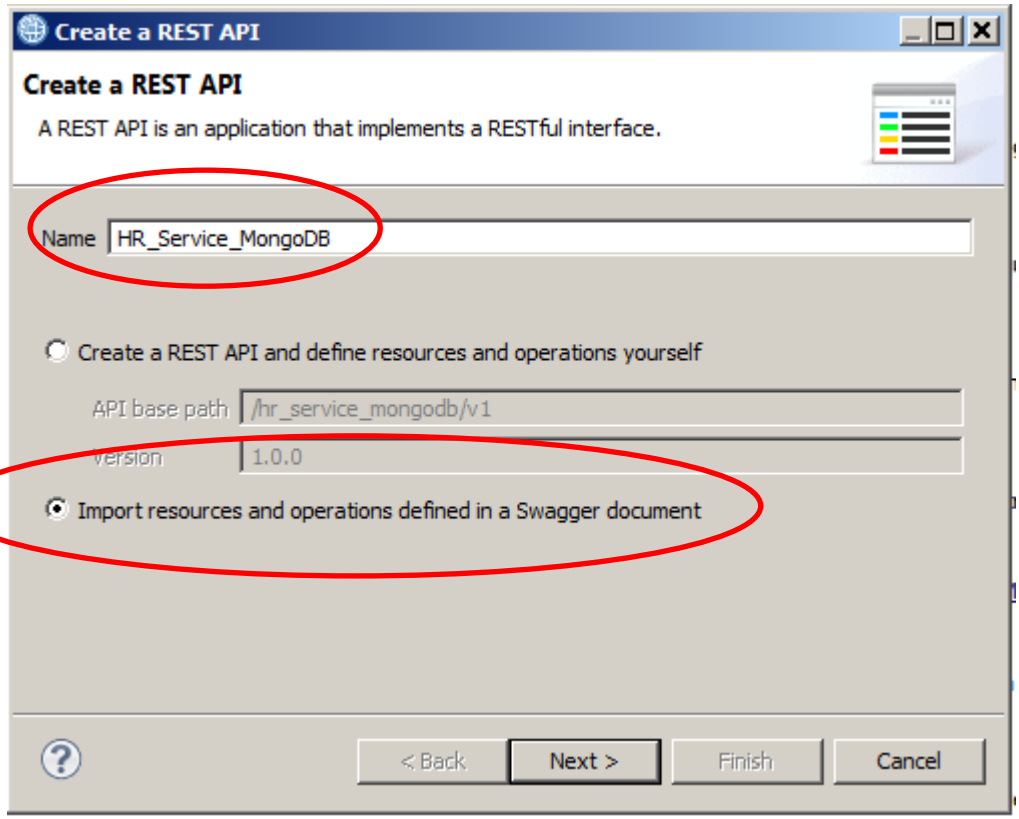
2. In the workspace, create a new REST API..



3. Name the new service HR_Service_MongoDB

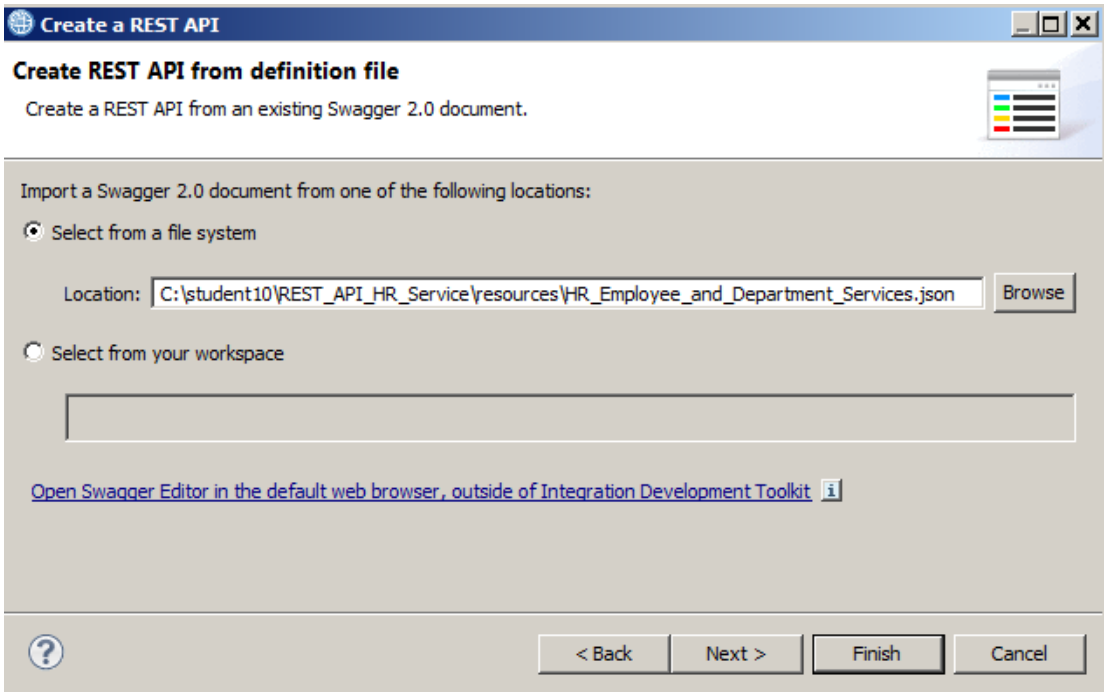
   Select "Import resources and operations defined in a Swagger document".

   Click Next.



4. Using the Browse button, import the JSON document

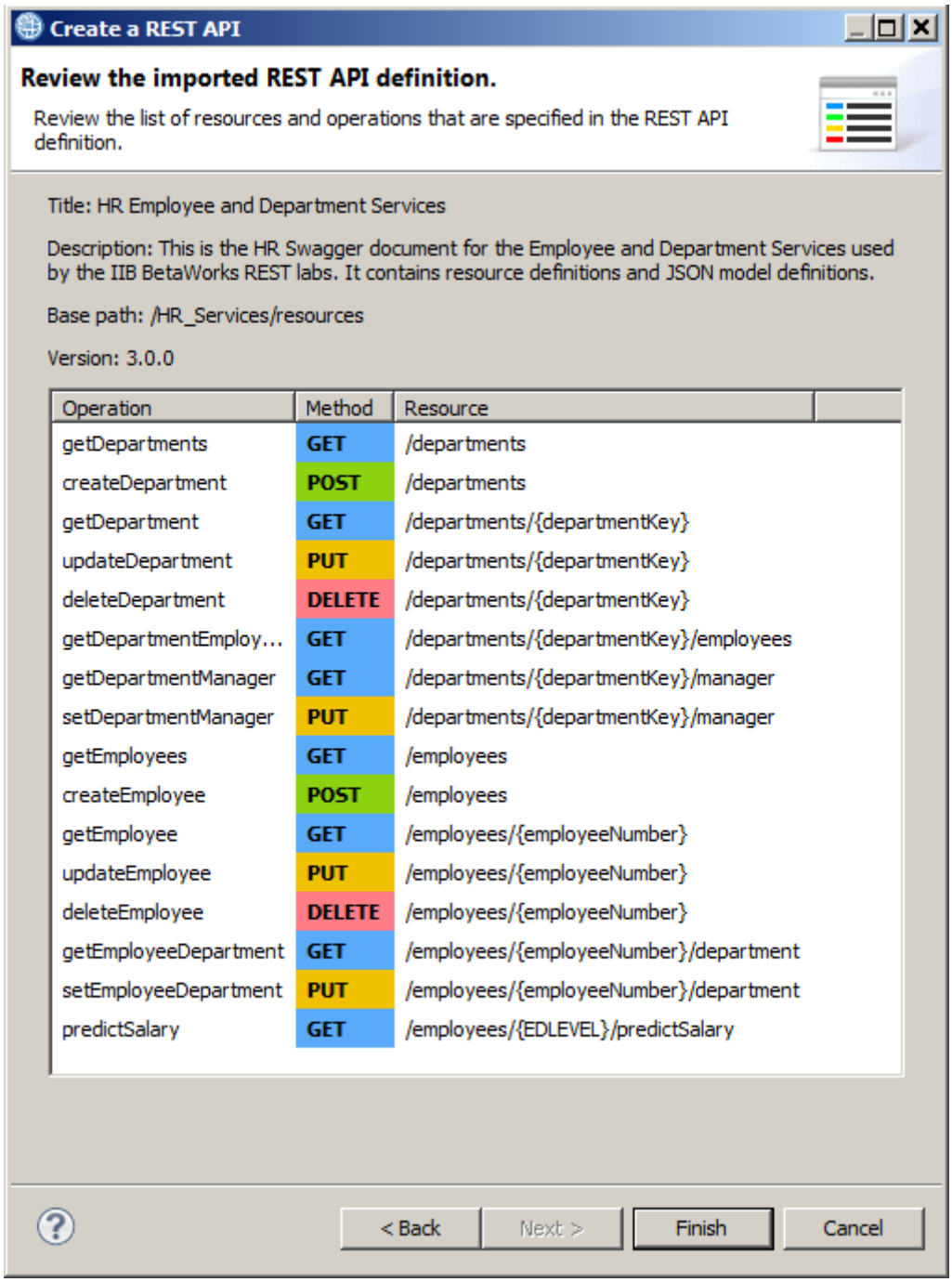
   `c:\student10\REST_API_HR_Service\resources\HR_Employee_and_Department_Services.json`



5. The summary window will show you all of the REST operations that were defined in the JSON document. These operations were constructed to match the EMPLOYEE and DEPARTMENT tables in the HRDB database.

   Note there is an operation named getEmployees (ie. retrieve a list of all employees), and an operation named getEmployee. This lab will implement the **getEmployee** operation.

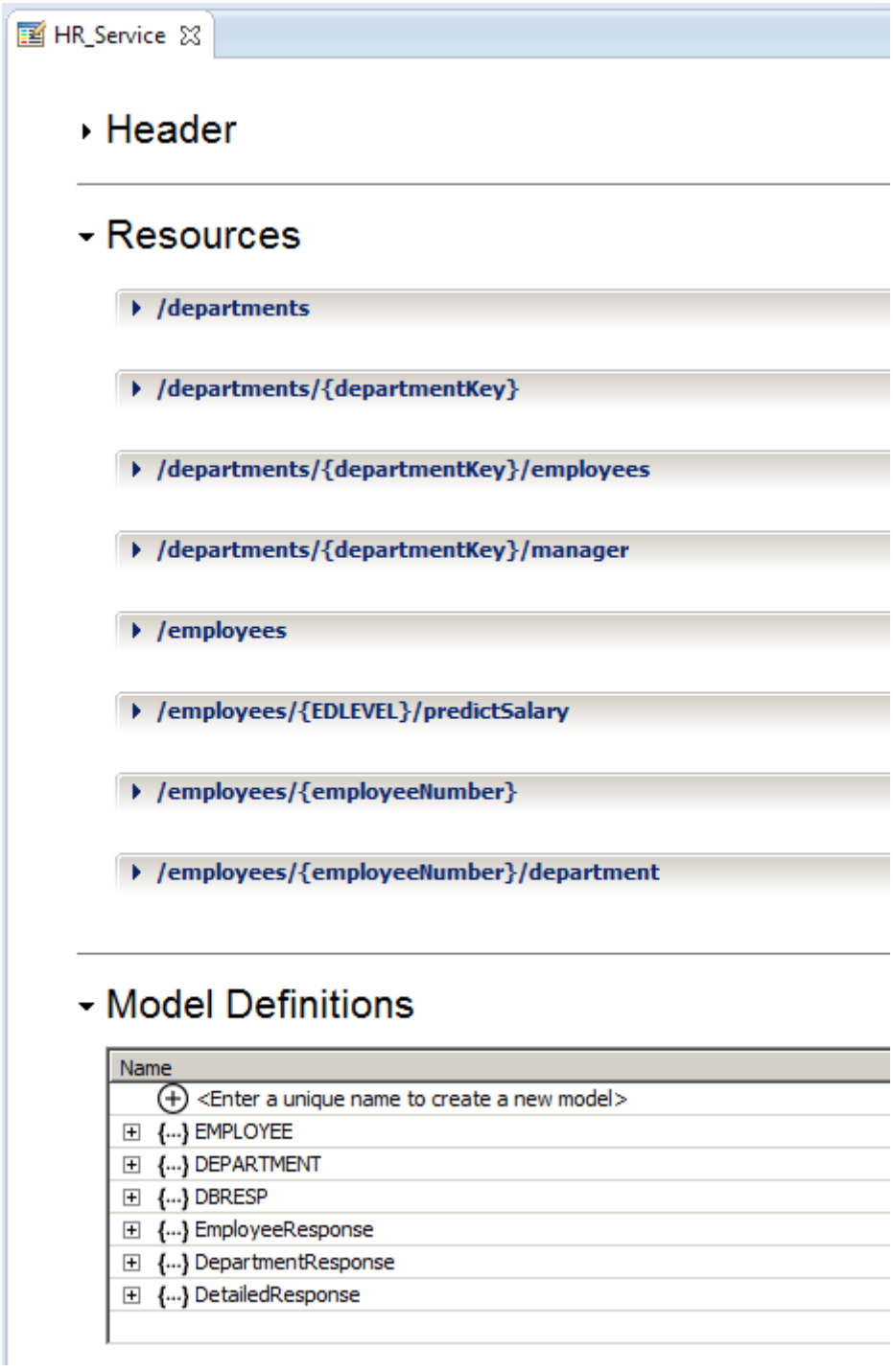
   Click Finish.



6. The swagger document has now been imported into the Integration Toolkit. The import process has also created a base REST application and a message flow that implements the REST API.

   The imported and generated items are split into five main sections in the REST API editor:

   - Header - containing the base URL for the REST API, title and description
   - Resources - containing all the resources from the swagger document, and all of the operations that are contained within each resource
   - Model Definitions - schema definitions for the input and output JSON objects
   - Error Handling - options to add some elements of runtime security
   - Security - basic security parameters



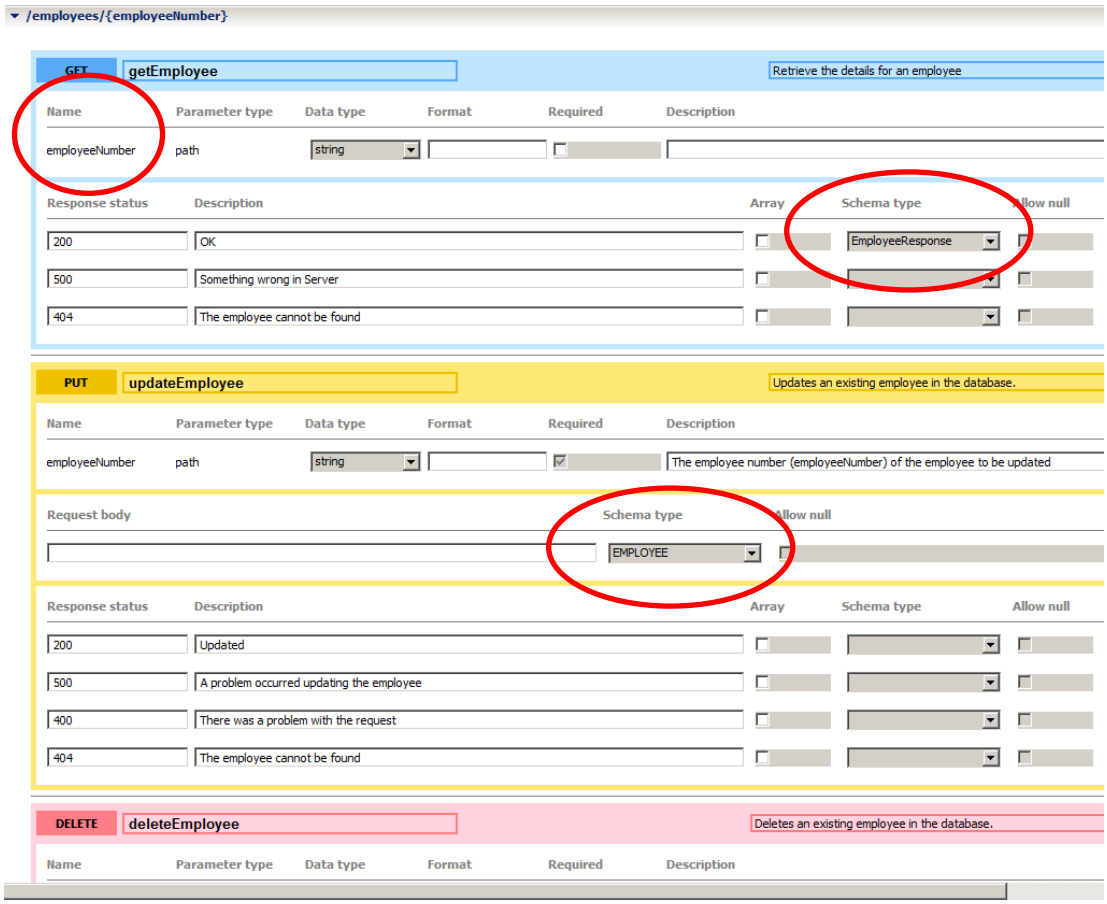
7. As an example of Resources, expand **/employees/{employeeNumber}**. (You may wish to collapse the **/department** resource, for readability).

   You will see three operations, GET, PUT and DELETE.

   For some of the operations (for example, the updateEmployee PUT operation in this resource), the Schema type has been set (in this case to EMPLOYEE).

   For some other operations (for example the getEmployee GET operation), the input parameter is specified (EMPNO). The Schema Type of the successful (200) operation has been set to EmployeeResponse (originally specified in the swagger doc).

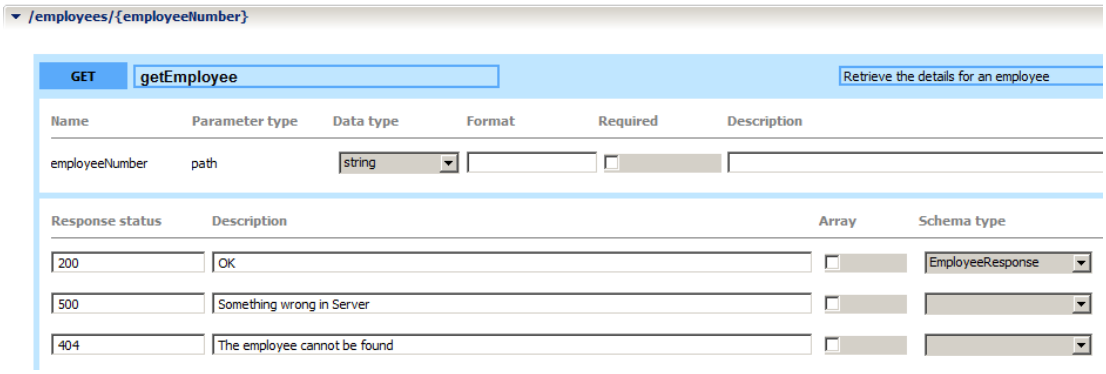
   You can use the Schema Type dropdowns to change the required schema for the operation. The available values are derived from the Model Definitions section. If no schema type is specified, the REST operation can dynamically specify the format of the output message.



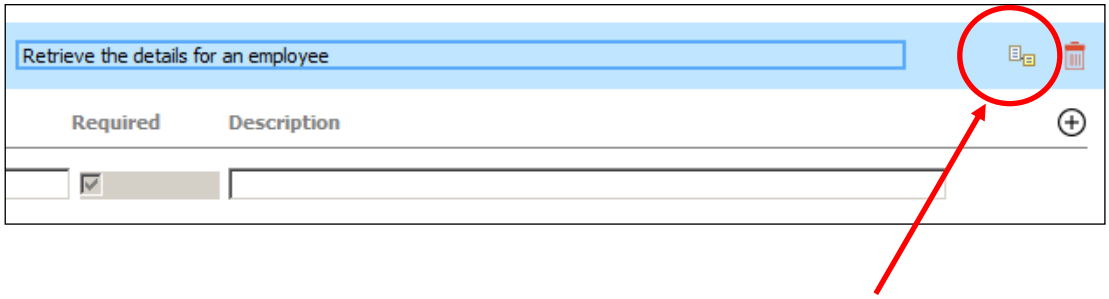
   Save the updated REST API (ctrl-S).

8. Expand the REST API Resources, and position the editor at the **/employees/{employeeNumber}** resource.

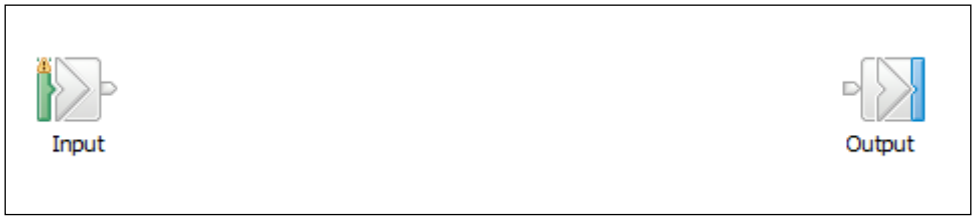
   The getEmployee operation is the first operation in this resource.



9. In the top right part of the description, click on the icon to "Create a subflow for the operation".



   This will create a skeleton subflow where you will provide the logic to implement the operation:



Two alternatives are provided in this lab:

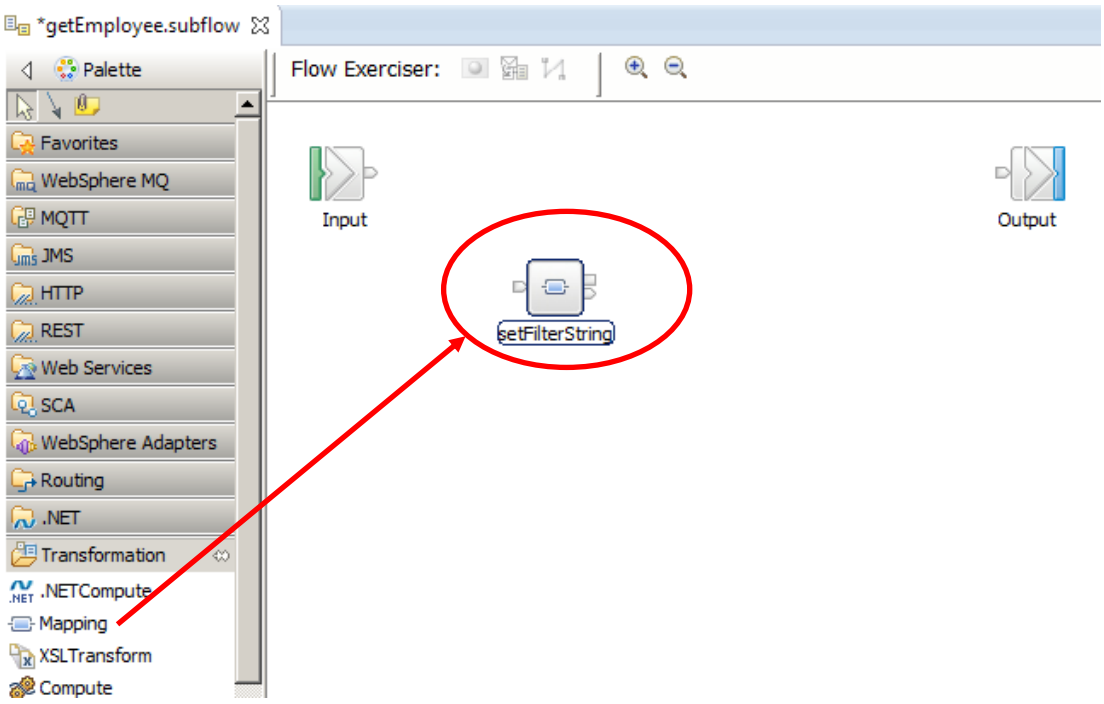
1. In the first alternative, you will use a new Mapping node to set the value of the LocalEnvironment filterString element that is used by the Loopback Request node.

2. In the second alternative, you will use an ESQL Compute node to set the value of the filterString element.

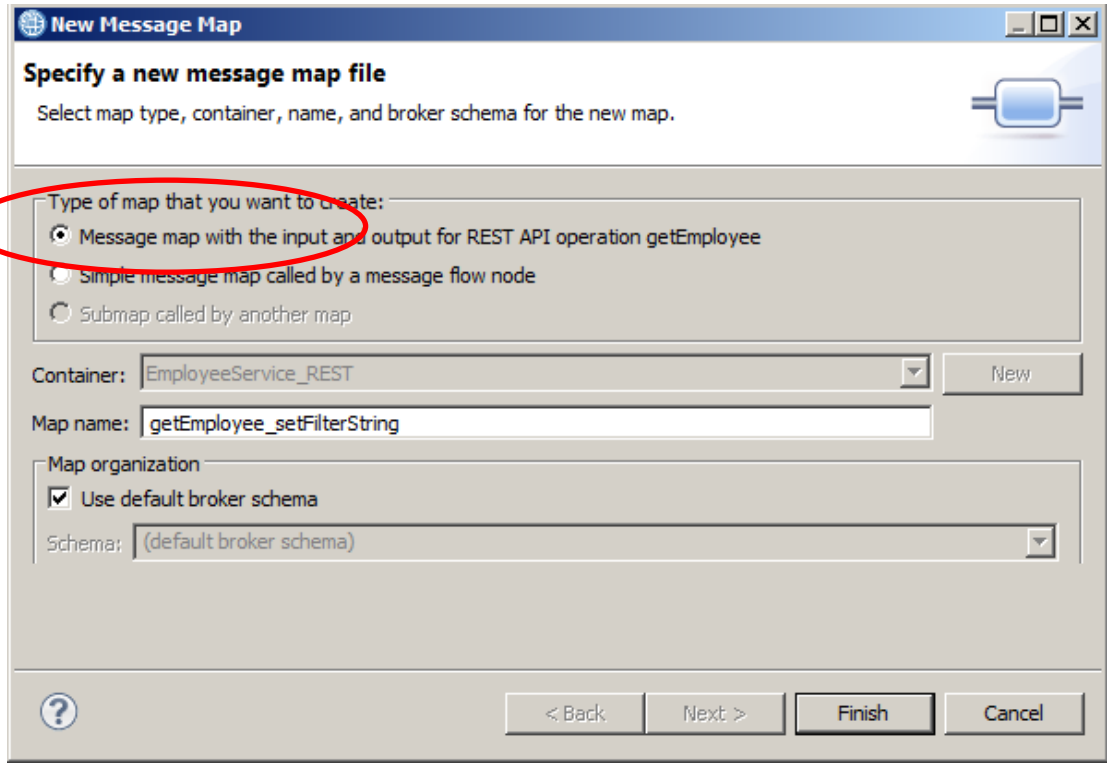
If you wish to use ESQL, skip to "4.3 Alternative 2 - using ESQL".

4.2 Alternative 1: Set LocalEnvironment "filterString" using Mapping Node

1. Add a new Mapping node to the flow editor; call it setFilterString.

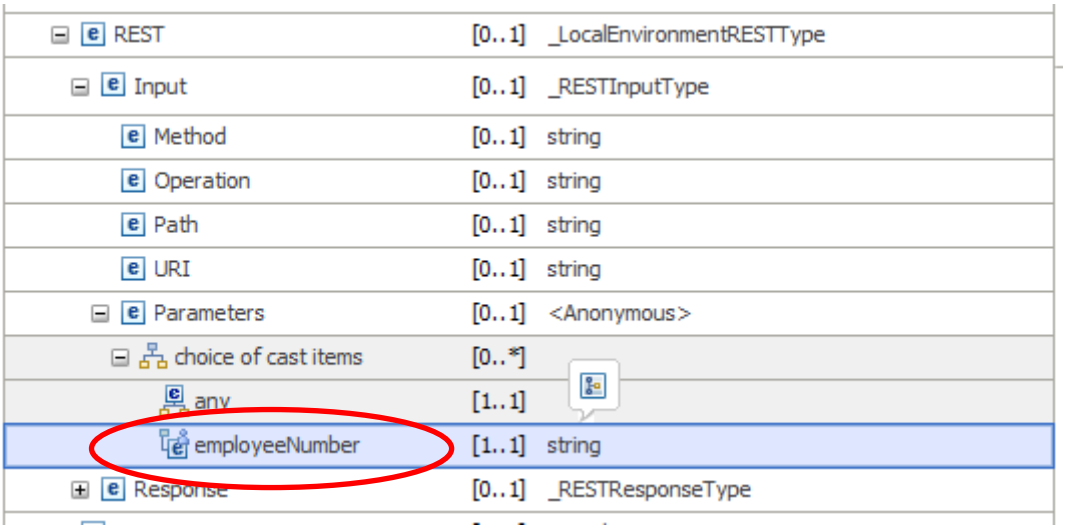


2. Open the new map. At the New Message Map window, accept the default (Message Map for REST API operation getEmployee), and click Finish.



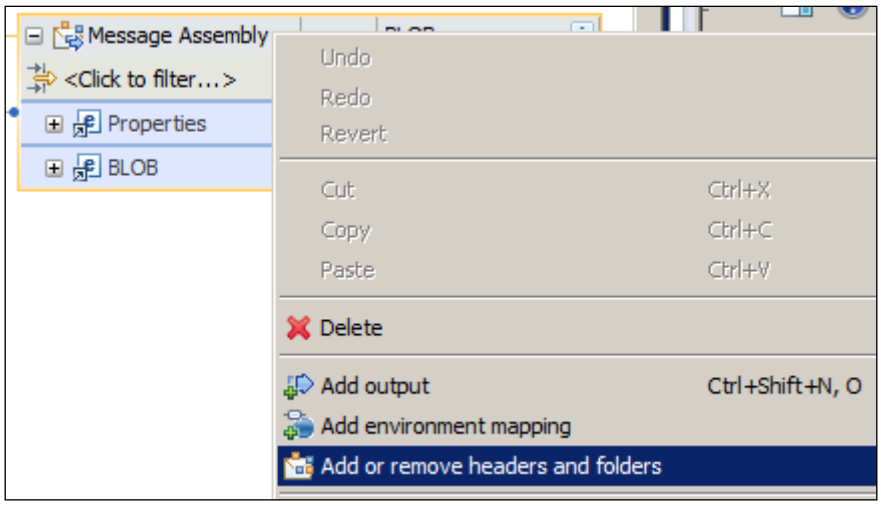
3. Note that LocalEnvironment has already been added to the input message assembly.

   Expanding this, and the REST folder, will show the input parameter employeeNumber. You will use this when setting the value of the output **filterString** parameter for the MongoDB access.

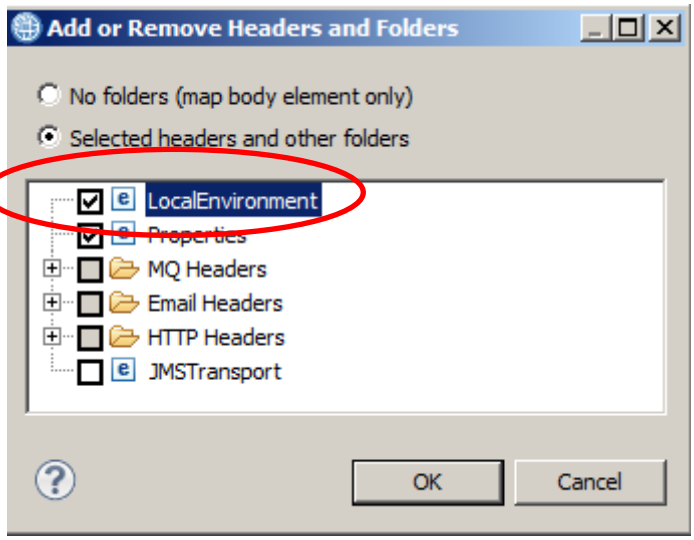


4. On the output message assembly, the LocalEnvironment has not been added, so add it now.

   Right-click the Message Assembly title, and select "Add or remove headers and folders".

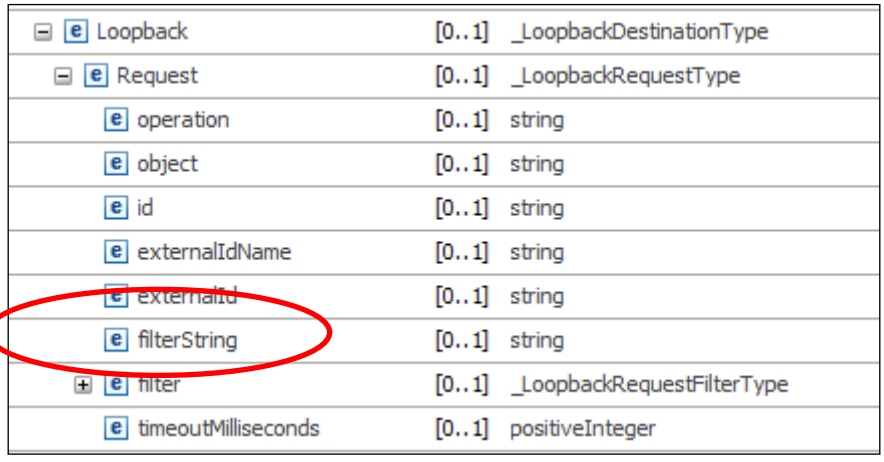


5. Select LocalEnvironment, then click OK.

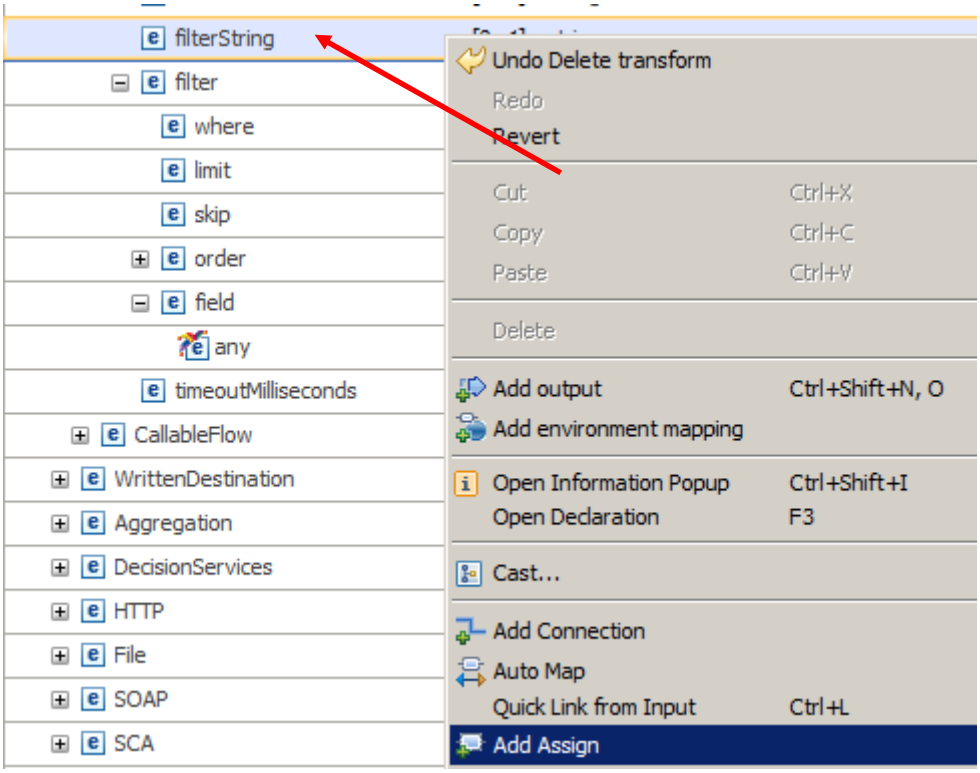


6. In the output LocalEnvironment, fully expand the **Destination/Loopback/Request** folder.

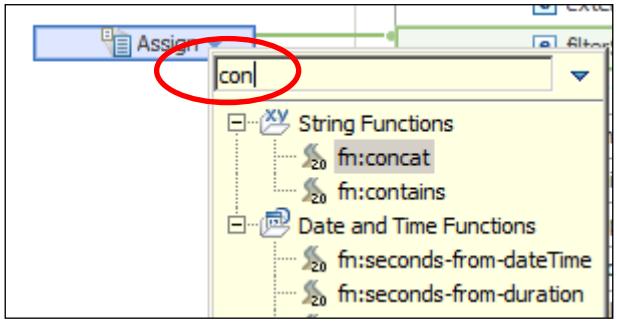
   You will see several elements. For this scenario, you will use the filterString element.



7. Right-click filterString, and select "Add Assign" from the context menu.

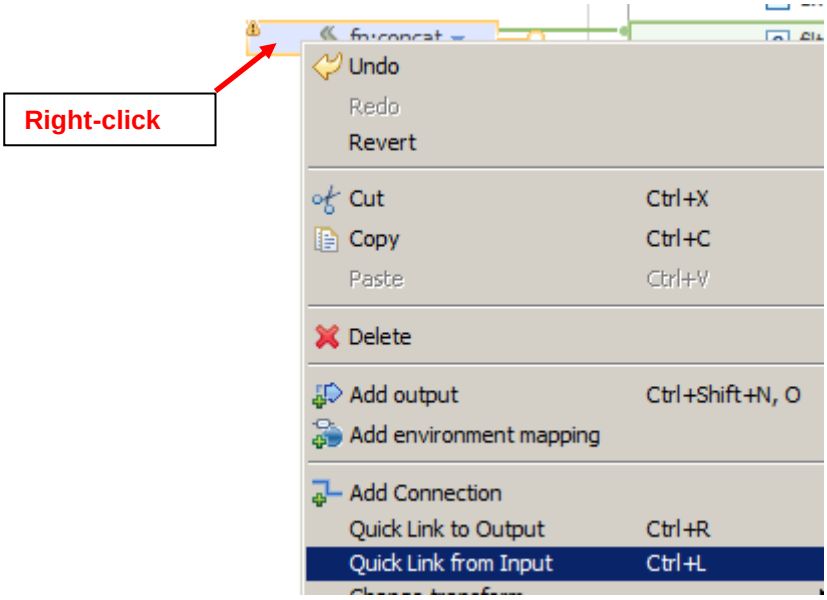


8. Click the blue drop-down arrow on the Assign transform, and using the search field, change the transform to a "fn:concat".



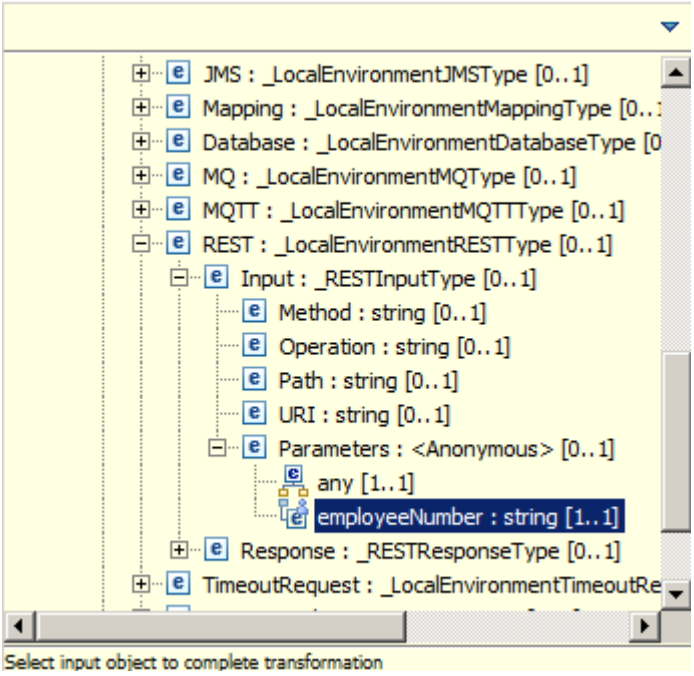
9. The Concat transform needs to take input from the EMPNO input element, so a connection to this has to be provided.

   Right-click the "fn:concat" transform and select "Quick link from Input".

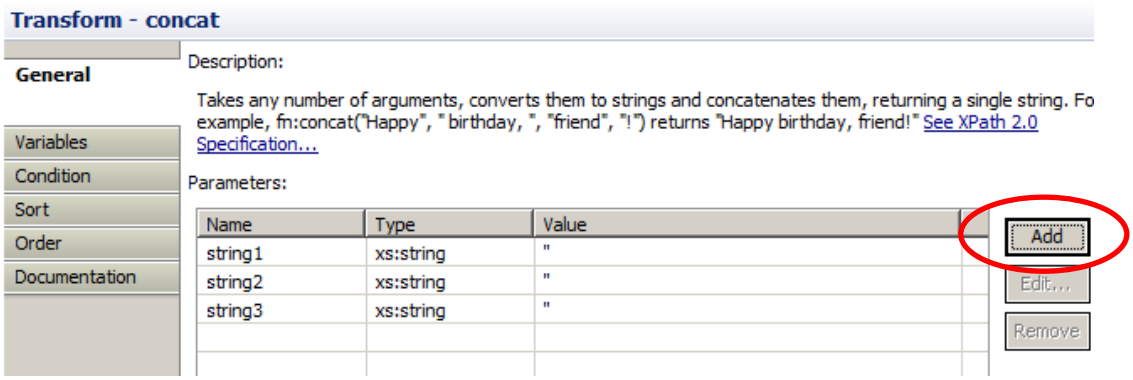


10. In the yellow pop-up window, collapse the Properties folder, expand the LocalEnvironment folder, and locate the REST/Input/Parameters folder.

    Select (click) the employeeNumber element.



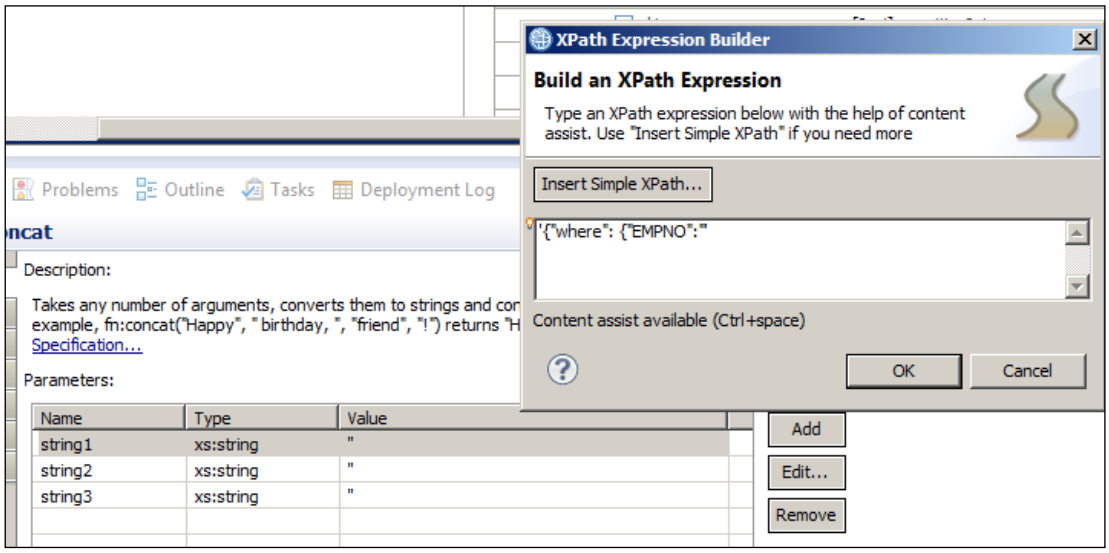
11. The properties of the fn:concat transform will initially show two parameters (on the General tab). Using the Add button, add a third one, as shown:



12. Highlight the first parameter, string1, and using the Edit button, set the value of this parameter to

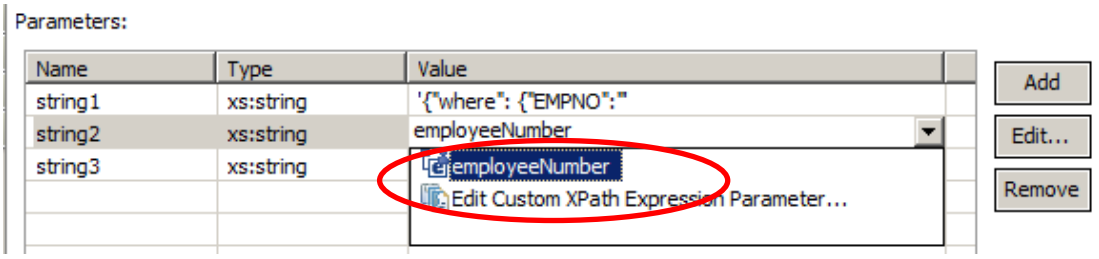
```
'{"where": {"EMPNO":"'
```

Click OK.

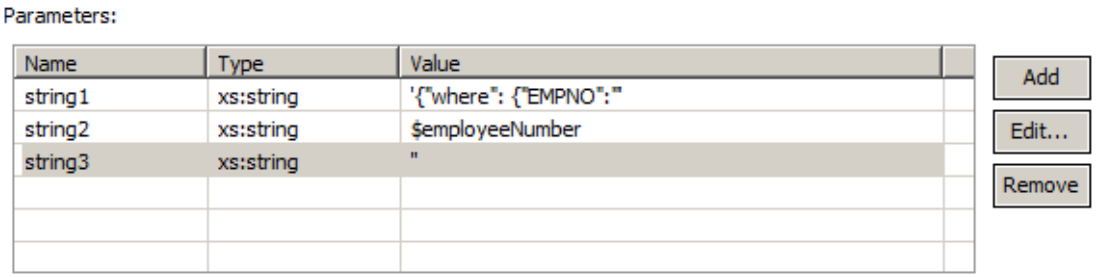


13. Set the value of string2 to $employeeNumber, by using the drop-down arrow that will be shown when you select this element.

    Click here:

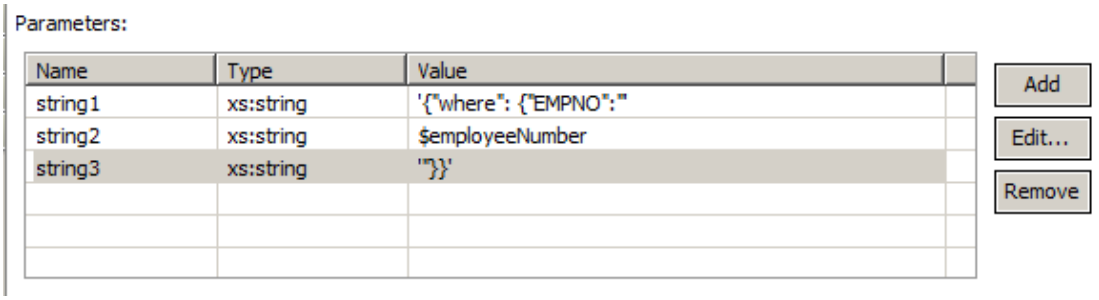


    Result:



14. Finally, set the value of string3 to

    ' " } } '

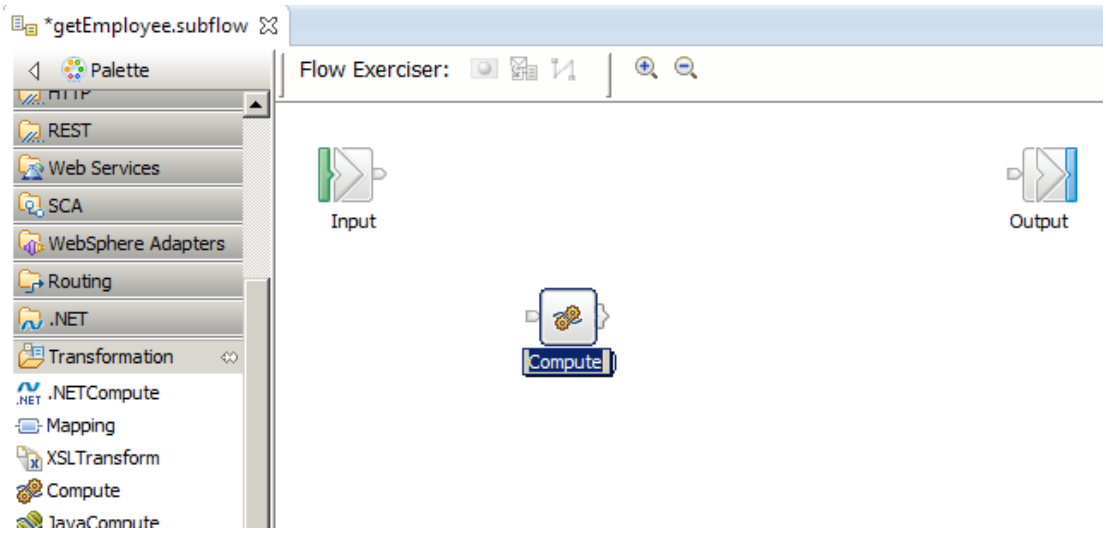


    Save and close the map.

15. Skip to 4.4 Complete the Flow Development.

4.3 Alternative 2: Set LocalEnvironment "filterString" using ESQL Compute Node

1. Add a new Compute (ESQL) node to the flow editor.

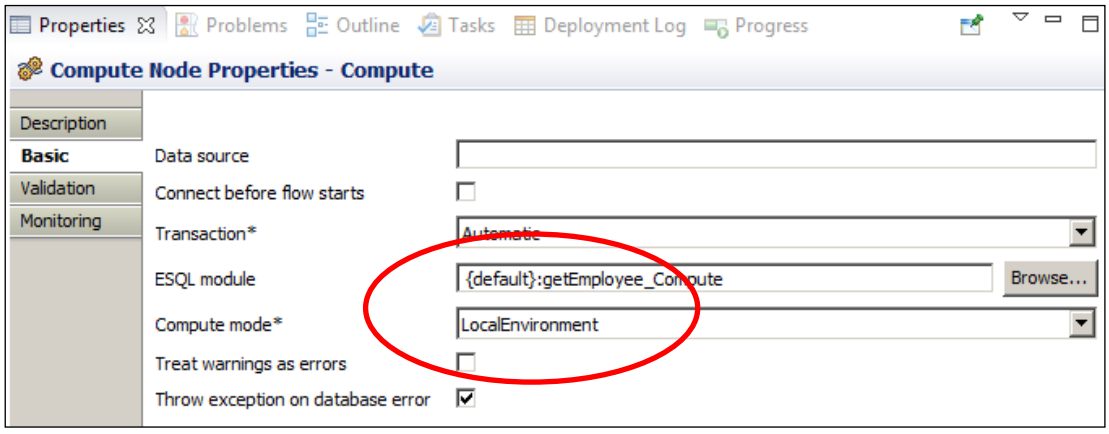


2. Select the Compute node, and in the node properties, set Compute mode to

"LocalEnvironment".

This is required because the ESQL in the Compute node will set the value of an element in the Loopback folder of the LocalEnvironment. This needs to be propagated to the Loopback Request node, so that it can be used to pass the query to the MongoDB database.

You can, of course, set the Compute Mode to other values, providing that the LocalEnvironment is included.



3. Open the Compute node, and add a new line of ESQL after the comment line, as shown:

```
-- CALL CopyEntireMessage();

set OutputLocalEnvironment.Destination.Loopback.Request.filterString =
       '{"where": {"EMPNO":"'
       || InputLocalEnvironment.REST.Input.Parameters.employeeNumber
       || '"}}';
```

Note, you can copy/paste this line from the file:

c:\student10\loopback\mongodb\esql\setFilterString.esql.txt

For reference, the ESQL will create a Loopback query element, contained in the **LocalEnvironment/Destination/Loopback/Request/** folder.

As an example, the query will have the following form:

```
filterString = '{"where": {"EMPNO":"000010"}}'
```

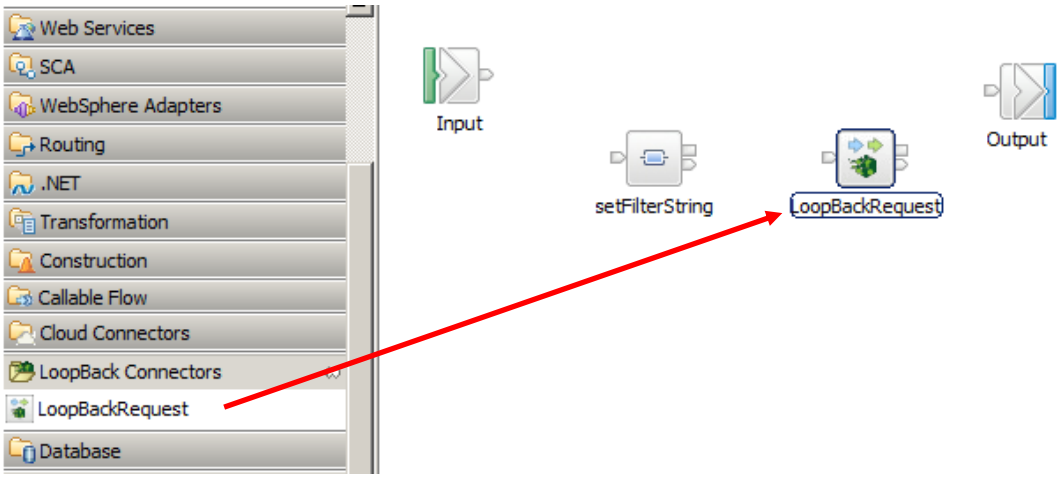
Save and close the ESQL editor.

4.4 Complete the flow development

You will now complete the development of the subflow by using the LoopBack Request node.

The screen captures in this section assume that the Mapping Node has been used to set the filterString, but apply equally if you have used an ESQL Compute node.

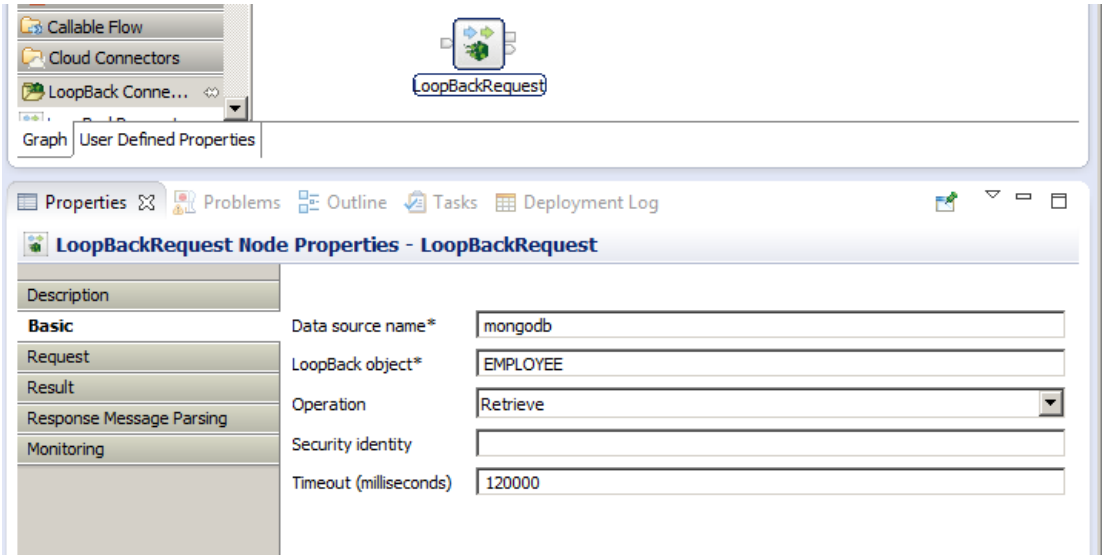
1. From the Loopback Connectors drawer, drop a Loopback Request node onto the flow editor.



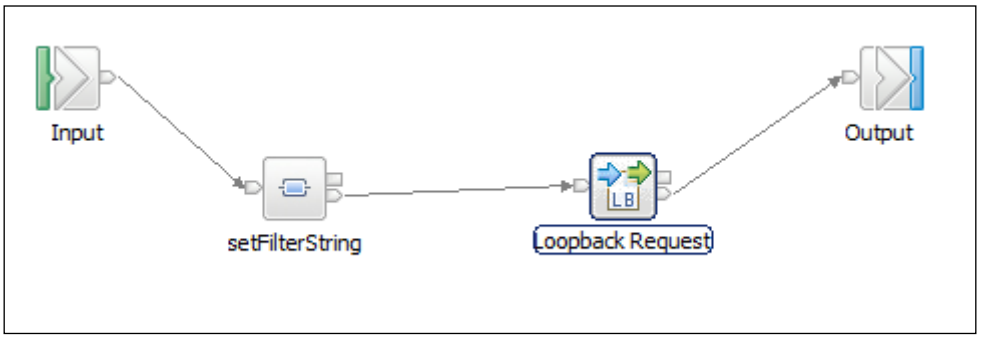
2. Select the Loopback Request node, and select the node Properties.

   On the Basic tab, set the following values:

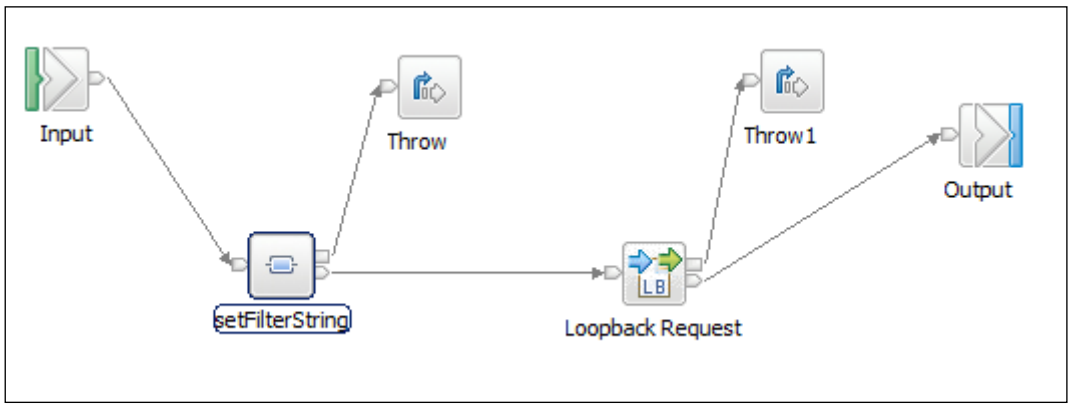
   - Name of the data source in the datasources.json file to connect to:
     - **mongodb**
   - Loopback object
     - **EMPLOYEE** (corresponding to the HRDB EMPLOYEE container)
   - Operation
     - **Retrieve**
   - Timeout
     - **1200** (to avoid long timeouts during development)



3. Connect the nodes as shown.



4. Connect Throw nodes (Construction folder) to the failure terminals of each of the nodes. Add suitable message text using the properties tab. This will help with any problem determination you may need when you come to test the REST API:



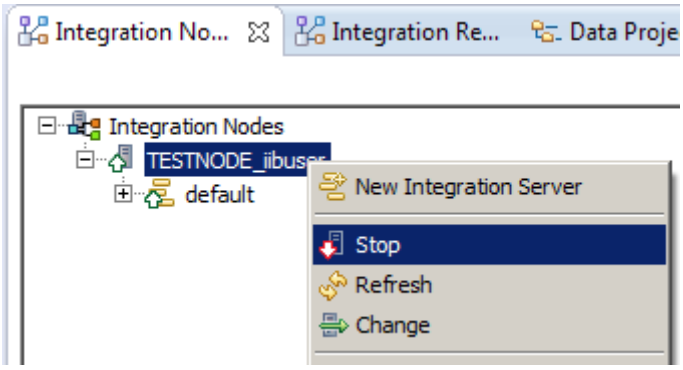
Save the subflow.

4.6 Deploy and test the REST API

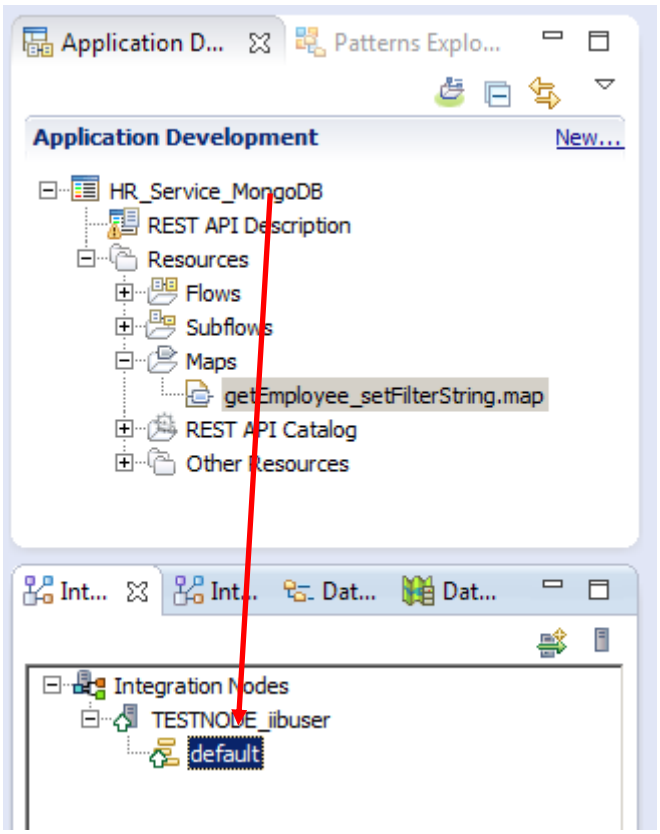
You will now deploy and test the updated REST API. This should retrieve information from the MongoDB HRDB database.

1. First, to activate the changes you made earlier (so that the IIB node can pick up the loopback connector from the MQSI_WORKPATH), stop and restart TESTNODE_iibuser.

   You can do this using the Integration Toolkit (right-click node, Stop, then Start), or a variety of other ways.

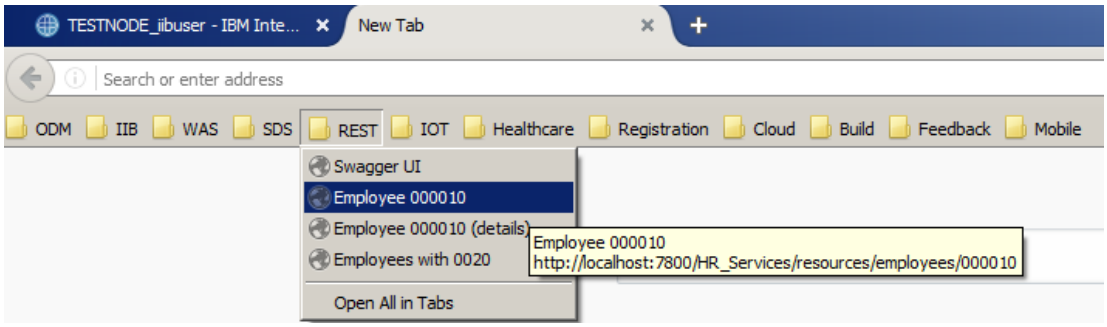


2. In the Integration Toolkit, deploy the HR_Service_MongoDB REST API by dragging and dropping onto the default server.

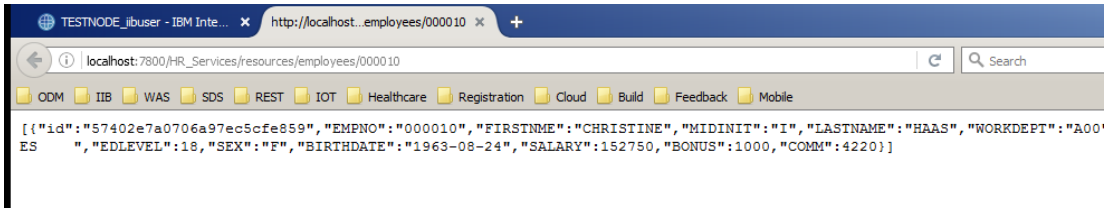


3. In the supplied Firefox browser, use the shortcut in the REST folder to use the URL:

   http://localhost:7800/HR_Services/resources/employees/000010



4. This should retrieve the document corresponding the EMPNO = "000010".



5. Terminate the mongo shell window, and the mongodb server window, using Ctrl-C in both cases.

END OF LAB GUIDE